Czech University of Life Sciences Prague

Faculty of Economics and Management

Department of Economics

Master's Thesis

Impact of organic coffee cultivation in the Arhuaca community of the Sierra Nevada de Santa Marta, Colombia

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CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

Faculty of Economics and Management

DIPLOMA THESIS ASSIGNMENT

BSc. Diana Carolina Sarmiento Mantilla

Economics and Management

Thesis title

The impacts of the coffee industry on the selected Colombian community

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Objectives of thesis

Main aim: Recognize the impact that coffee has on the selected Colombian community.

Partial aims:
- Evaluate the farming activity of the indigenous communities of the Sierra Nevada de Santa Martha, Colombia.
- Identify the circular economy projects that are being implemented in these communities and access their impacts.
- Assess how the development of coffee sector in the indigenous community of the Sierra Nevada de Santa Marta contributes to the fulfillment of the Sustainable Development Goals (SDG).

Methodology

In this project both quantitative and qualitative methods will be used. The first part will be based on a deep investigation of different national, international, academic sources, such as: the national federation of coffee, the National Coffee Research Center and different articles that have been written mainly in the education's field, additionally we will review the historical data of coffee production in Colombia and the percentage of incidence of indigenous communities in La Sierra Nevada de Santa Martha in these statistics throughout history.

After having this information processed, on-site data collection will be processed in the Sierra Nevada de Santa Martha indigenous communities. Questionaire with opened and closed questions and structured interview will be used to collect data. Data will be analysed by standard statistical methods.

The proposed extent of the thesis

70 – 90 pages

Keywords

Coffee, sustainability, Fair trade, indigenous, Arhuaco, Arabica, consumption, agriculture

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Recommended information sources

Federacion Nacional de Cafeteros. (2022). FEDERACION DE CAFETEROS, Quiénes Somos. Federación Nacional de Cafeteros. https://federaciondecafeteros.org/wp/federacion/quienes-somos/

MacDonnell, K. (2022, April 6). 5 Coffee Certifications. Coffee Affection. https://coffeeaffection.com/what-do-coffee-certifications-mean/

McArthur, E. (2021). 10. Coffee Production and Consumption Systems | Shared by Learning. https://emf.thirdlight.com/link/iu2l5f6idmg-isqi9q/@/preview/1?o

Rain Forest Alliance ORG. (2021). 2020 Sustainable Agriculture Standard: Supply Chain Requirements. Rainforest Alliance. https://www.rainforest-alliance.org/resource-item/2020-sustainable-agriculture-standard-supply-chain-requirements/

Thurston, R. W., Morris, J., & Steiman, S. (2013). Coffee: A Comprehensive Guide to the Bean, the Beverage, and the Industry. Rowman & Littlefield Publishers. http://ebookcentral.proquest.com/lib/czup/detail.action?docID=1481220

Expected date of thesis defence

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Prague on 31. 03. 2023

Declaration

I declare that I have worked on my master's thesis titled " Impact of organic coffee cultivation in the Arhuaca community of the Sierra Nevada de Santa Marta, Colombia" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the master's thesis, I declare that the thesis does not break any copyrights.

In Prague on 31.03.2023 _____

Acknowledgement

I would like to thank to Ing. Pavel Kotyza, Ph.D., my supervisor and also to Felipe Ordoñez who was an important support in the construction of the surveys, my family and friends for their advice and support during my work on this thesis.

Impact of organic coffee cultivation in the Arhuaca community of the Sierra Nevada de Santa Marta, Colombia

Abstract

The main objective of this thesis is to analyze the economic, environmental and social impact of cultivation and subsequent sale of organic coffee in the indigenous community of the Arhuacos.

This research used quantitative and qualitative methods, analyzing primary information and then applying a survey to the coffee growers of the study population and subsequent interview with a manager of a cooperative that works with them; resulting in that, both economically, socially and financially, these coffee growers have a positive impact, thanks to the fact that on the one hand they are aligned with ancestral practices and care of nature, and on the other hand they have certifications such as FAIR TRADE and USDA that allow them to have access to international markets and guarantee not only a fair price for their product but also transfer some benefits to the community and their workers, having an impact on three fronts (economic, social and environmental).

Keywords: Coffee, sustainability, Fair trade, indigenous, Arhuaco, Arabica, consumption, agriculture.

Dopad organického pěstování kávy v komunitě Arhuaca v Sierra Nevada de Santa Marta, Kolumbie

Abstrakt

Hlavním cílem této práce je analyzovat ekonomický, environmentální a sociální dopad pěstování a následného prodeje organické kávy v domorodé komunitě Arhuacos.

Tento výzkum využíval kvantitativní a kvalitativní metody, analyzoval primární informace a následně aplikoval průzkum u pěstitelů kávy ze studované populace a následný rozhovor s manažerem družstva, které s nimi spolupracuje; Výsledkem je, že jak ekonomicky, sociálně a finančně, tak tito pěstitelé kávy mají pozitivní dopad, a to díky tomu, že jsou na jedné straně sladěni s praktikami předků a péčí o přírodu a na druhé straně mají certifikace jako FAIR TRADE a USDA, které jim umožňují přístup na mezinárodní trhy a zaručují nejen spravedlivou cenu za jejich produkt, ale také přenášejí určité výhody na komunitu a jejich pracovníky, což má dopad na třech frontách (ekonomické, sociální a environmentální).

Klíčová slova: Káva, udržitelnost, Fair trade, domorodé obyvatelstvo, Arhuaco, Arabica, spotřeba, zemědělství.

Table of content

1. Introduction

Coffee is an important product worldwide not only from the consumption point of view but also because it is relevant in some countries for its production, the author of this thesis will review the background that exists both worldwide and in Colombia, a country for which this product has a great importance in its tradition and economy, Colombia has the third position in the ranking of exporting countries and has more than 300 years of tradition growing this type of crops.

For this case study, the author will analyze the impacts to grown organic coffee in a specific indigenous community called the Arhuacos, who are mainly found in the Sierra Nevada de Santa Marta, in the north of the country, and has a specific group who grow organic coffee. At the same time, will explain the financial, social and environmental impact of this type of crops for this community and also will evaluated and explain the relationship between some variables that influence those three main aspects.

2. Objectives and Methodology

2.1 Objectives

The main objective of the thesis is to analyze whether the cultivation and subsequent sale of organic coffee in the indigenous community of the Arhuacos (who are located in the Sierra Nevada de Santa Marta), has a positive or negative impact at a financial, environmental and social level of the employees and the community.

For that reason, this thesis aims will respond the following questions:

1. Does the sale of organic coffee have a positive or negative impact on the profits of coffee growers in this community?
2. What type of certifications labels benefit the sale of organic coffee produced by this community?
3. How this community use circular economy method in the harvest and value chain of organic coffee?
4. To the fulfilment of which Sustainable Development Goals (SDG), does the production of organic coffee in this community contribute?

2.2 Methodology

This diploma thesis will use both quantitative and qualitative methods to explain the main objective of this document.

The first step was to collect secondary data from DANE (National Administrative Department of Statistics) and Colombian National Federation of Coffee Growers (Federacion Nacional de Cafeteros) about Coffee in Colombia: production (planting, harvesting and marketing), export price and cultivated area, during the period of 2011 and 2020. The author will use this period of time because although the history of Colombian coffee is more than 300 years old, Colombia had a coffee production crisis in the latest 90s(Vargas, 2017) and some political issues that could distort the results of this study if there are used previous years data.

Review of the recent academic and other literature related to Coffee production and sustainable crops. Like: Coffee Organization (ICO) who is a specialized agency of the United Nations that provides data and analysis on the global coffee market. The ICO publishes monthly coffee market reports that provide information on production, consumption, and trade trends. The ICO also provides historical data and forecasts for the coffee market. (International Coffee Organization, 2021) and Euromonitor International is a market research company that provides insights on the coffee market. Euromonitor provides data on coffee sales, market share, and consumer trends across different countries and regions. Euromonitor also provides reports on specific segments of the coffee market, such as ready-to-drink coffee and specialty coffee.

The second step was to apply a questionnaire, in this stage, a cooperative was chosen that works with the Arhuaco community in the Sierra Nevada de Santa Marta, since this organization brings together 700 coffee growers from the area, of which 150 currently grow organic coffee and they belong, as mentioned above, to the Arhuaco community that specific geographical location (Sierra Nevada de Santa Marta). This community was chosen precisely because they are not only growing the coffee of interest for this project, but also because they are one of the most important indigenous communities in the country and they care about preserving nature, including technological advances in their crops. Currently their main crops are coffee and sugar cane and some are also dedicated to raising cattle, sheep, goats, pigs and chickens. The questionnaire had 40 multiple choice and open questions. As was mentioned before, the total population was 150 coffee growers and the author wanted to apply it to a sample of 110 with a confidence of 95% and margin of error of 5%, however, after field work, where a face-to-face survey was carried out, the interviewer not only filled out the survey but also some of their responses were investigated, not only in order to enrich the information obtained but also to increase the qualitative data of the test, information that allows the author to answer the research questions and draw conclusions about the financial, social and environmental impact of organic coffee crops in that specific region of the country. Once the questionnaire was applied, the author got only 50 answers, which means that the sample has a confidence of 90% and a margin of error of 10% which continues to be representative for the total of the target population.

To calculate the sample, the author used the following formula:

$$n = \frac{(Z^2 * p * q * N)}{[(Z^2 * p * q) + ((N - 1) * E^2)]} \quad (1)$$

Where:
n= is the sample size
Z= value in the standard normal distribution corresponding to the desired confidence level (for 90% confidence, Z = 1.645).
p = estimated proportion of the population that has the characteristic of interest
q = 1 – p
N= Population
E = desired margin of error (in terms of proportion)

$$n = \frac{(1.645^2 * 0.5 * 0.5 * 150)}{[(1.645^2 * 0.5 * 0.5) + ((150 - 1) * 0.10^2)]} \qquad n = 46.84$$

The questionnaire is divided into 4 sections, the first part of the questionnaire is focused on culture and knowledge of sustainability, questions are related to their sustainability strategy, if they have one or not and if so, what type of certifications they have and how it contributes to the sustainability objectives and ask them also about their main motivation. The second part is about environmental management, questions about use of water, soil,

energy, use of waste and the use of packaging. In the third part of the questionnaire, social management issues are touched on, focused on hiring, gender inclusion, health conditions and quality of life of both, employees and the community and finally, financial management is asked, some questions are about the investments they have made in organic farming, the efficiencies and the added value they have perceived.

The questionnaire was carried out in February, directly with the target community and once the data was tabulated, on some occasions the respondents were contacted again to clarify or deepen some of their responses.

Additionally, an interview was held with an expert on coffee issues, who prefers to be anonymous for the study, however, he knows the structure of the Arhuacos, how they function as a community and how they grow coffee and its subsequent commercialization through the cooperative mentioned above.

After collect the data, the author used the SPSS program to analyze the correlation between variables through cross tables, to measure the relationship between some variables and to conclude the impact of sustainable crops on the tree aspect mentioned above (economic, social and environmental level), to measures this relationships, cross tables were used.

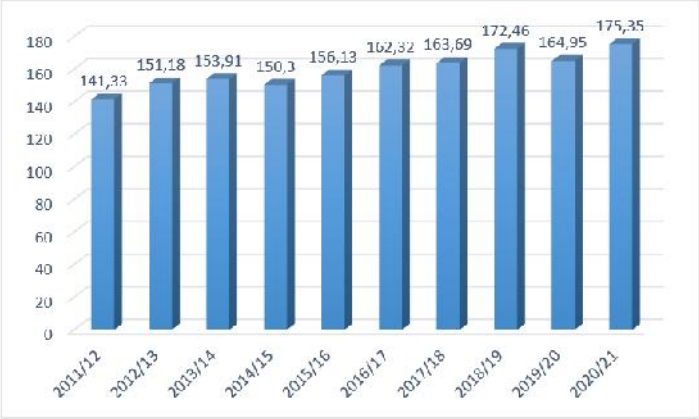
In some of this collected data the author adds the percentage change with the next formula:

$$\text{Percentage change} = \frac{[\text{Old number} - \text{Recent number}] \times 100}{\text{Old number}} \quad (2)$$

3. Literature Review

Coffee is one of the most important commodities in the world and is also one of the most traded commodities, with a global production and consumption that continues to rise every year. The coffee industry is a significant contributor to the global economy, employing millions of people worldwide and generating billions of dollars in revenue. Worldwide production in 2022 was 172.75 million of coffee 60 kg bags (Statista, 2023) and the most important countries who produce this commodity are Brazil who produced in 2022 around 23% of the total amount of coffee production, other important coffee producer country players are Vietnam and Colombia, and the highest coffee consumer countries are Brazil, United States of America and Japan who consumed around 56,651 (in thousand 60kg bags)(Yahoo Finance, 2019)

Graph 1: Coffee production worldwide from 2010/2011 to 2020/21
(in million 60 kilogram bags)



Source; Statista. (Statista, 2022)

This industry also generates millions of jobs worldwide, from its production stage to the end of the value chain, this is because it is very demanding of labor force, due coffee production in most of the producer's countries does not have a high technological level. According to the International Labor Organization, coffee employs more than 25 million people worldwide, including those involved in production, processing, trading, and retail. Coffee is an important source of livelihood for many people in developing countries, particularly in Africa, Asia, and Latin America. When talking about the coffee industry, it must be considered from the farmers and exporters to the roasters and retailers, with a global value chain spanning countries and regions.

Nowadays, people around the world are worried about climate change and to reduce the amount of contaminations that are produced. In the agricultural and food related emission, the main issues are the uses of the land and the reduction in the use of pesticides. Growers, organizations and people are worried on the reduction of green gas emissions, which according to a FAO's analysis (OECD, 2023) those numbers are 9% less than in the previous 20 years. Coffee production has a significant impact on the environment, society, and economy. Sustainable coffee production aims to minimize

negative impacts on these areas while promoting positive impacts. Here are some aspects related to the sustainable, social impact, financial impact, and environment impact of coffee production, as well as eco-friendly crops.

Sustainable coffee production includes practices such as agroforestry, conservation of soil and water, use of organic fertilizers, and integrated pest management. Certification programs such as Fairtrade, Rainforest Alliance, and UTZ Certified promote sustainable coffee production by providing economic incentives for farmers who adopt these practices.

Coffee production is a vital source of income for millions of smallholder farmers around the world (Global coffee Platform, 2021), as was mentioned before, this industry offer around 25 million of families income. However, many farmers face challenges such as low prices, climate change, and lack of access to credit and markets. Sustainable coffee production can help to address these challenges by promoting fair prices, improving working conditions, and empowering farmers.

Sustainable coffee production can also have a positive financial impact on farmers and communities. By adopting sustainable practices, farmers can increase their yields, reduce input costs, and access premium markets, which can lead to increased income and improved livelihoods.

Coffee production can have significant environmental impacts, including deforestation, water pollution, and greenhouse gas emissions. Sustainable coffee production practices can help to mitigate these impacts by promoting the conservation of natural resources, reducing greenhouse gas emissions, and promoting biodiversity. Some coffee farmers are experimenting with alternative, eco-friendly crops such as shade-grown coffee, which can help to promote biodiversity and provide habitat for wildlife. Other crops such as cacao, bananas, and avocados can also be grown alongside coffee, providing additional income streams and promoting soil health.

3.1 Positive and negative impacts to make the transition to a Green business

Coffee production has significant economic impacts, both positive and negative. While coffee production can provide income and employment opportunities for millions of people, it can also contribute to economic inequality and environmental degradation. Here are some references to support the economic impacts of coffee production and its effects on green transition business performance:

Positive Economic Impacts: Coffee is a vital source of income and employment for millions of people in developing countries. As was mentioned before, International Coffee Organization estimated that the coffee industry provided jobs for over 25 million people worldwide. Coffee production can also contribute to economic growth and foreign exchange earnings in producing countries.

Negative Economic Impacts: Coffee prices are subject to significant volatility, which can create challenges for coffee producers and their communities. Low coffee prices can lead to poverty and economic insecurity for coffee farmers and their families. In addition,

coffee production can contribute to economic inequality, as smallholder farmers often receive lower prices for their coffee compared to large-scale producers.

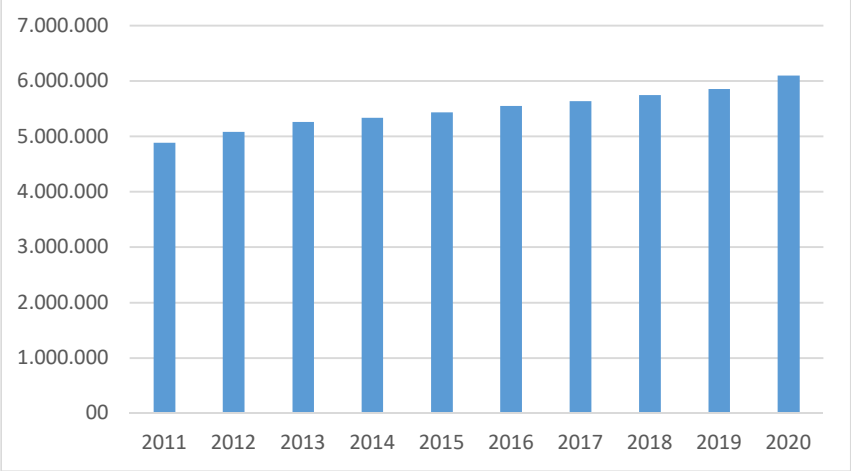
Green Transition Business Performance: The green transition can provide economic opportunities for coffee producers by promoting more sustainable practices and creating demand for environmentally and socially responsible products. Certification programs such as Fairtrade, Rainforest Alliance, and UTZ Certified can help to promote sustainable coffee production and provide economic incentives for farmers who adopt these practices. A study by the International Trade Centre found that Fairtrade certification led to increased sales and higher prices for certified coffee farmers (ITC, 2019).

3.2 Coffee global market

Coffee is a worldwide and well known beverage, witch's produced in 32 countries, and consumed between 10% and 20% of the households around the world(International Coffee Organization, 2004). The global coffee market is a complex and dynamic industry that is shaped by a range of factors, including production levels, consumer demand, trade policies, and climate change.

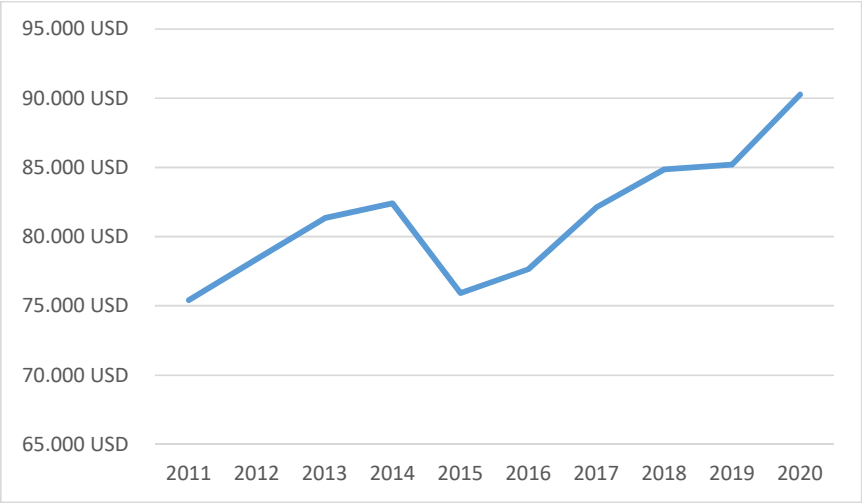
According to Euro monitor (Euromonitor, 2022a), from 2011 to 2020 the production of coffee in the global market has been increasing by more than 20% and its prices also has been increasing by 16% during the same period of time, as you can see it on the followings graphs

Graph 2: Retail Volume in tones.



Source; Author based on Euromonitor data (Euromonitor, 2022a)

Graph 3: Retail Value RSP in USD million current Prices



Source, Author based on Euromonitor data (Euromonitor, 2022a)

Coffee is typically traded as a commodity on international exchanges such as the New York Stock Exchange (NYSE) and the Intercontinental Exchange (ICE). The prices of coffee are determined by supply and demand, as well as other factors such as weather conditions, political instability, and currency exchange rates. In the following graph you can see the prices of green coffee beans traded on the stock market during the last 5 years, where it can be seen that the Covid-19 pandemic and the situation between Ukraine and Russia have increased the price of the product.

Graph 4: Coffee stock market prices last 5 years

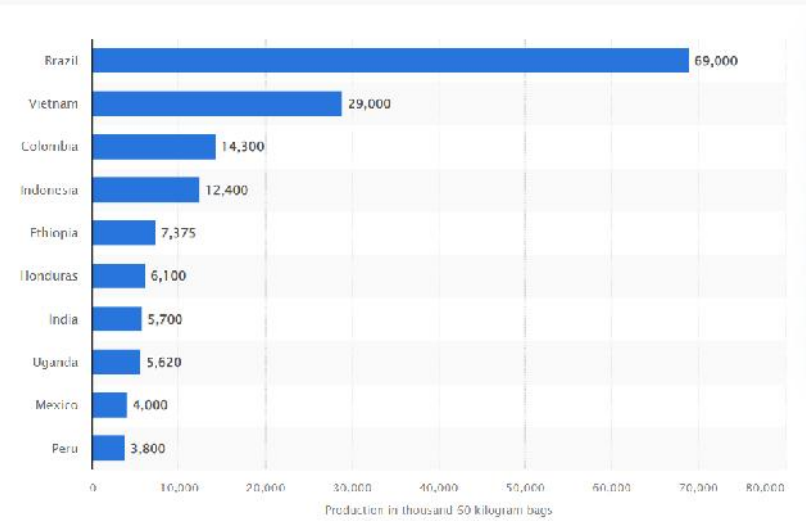
Source; NASDAQ (Nasdaq, 2023)

3.1.1 Production market

Around 10.3 million hectares are cultivated in the world, producing 10.47 tons of coffee beans per year. These crops are located mainly along the equator around the world (mainly South America, Africa and Asia), one of the biggest trends in the coffee production market is the increasing popularity of specialty coffee. Specialty coffee refers to coffee that is made from high-quality beans that are grown in specific regions, roasted in small batches, and brewed to highlight their unique flavors and aromas.

Latin America being the main source of grain production with 85% of the production and the rest coming from Asia and Africa. It is important to mention that the main coffee producers are Brazil, Vietnam and Colombia as is showing in the following graph.

Graph 5 Coffee production worldwide in 2020
(in thousands 60 kg bags)



Source; Statista. (Statista, 2023)

One of the most important organizations who works to increase the quality and amount of sustainable crops (in general) is Rainforest-alliance, who also works with more than 400,000 certificated coffee producers (Nerger, 2021) in in Latin America, East Africa, and Asia. Its mission is to connect those coffee farmers with responsible markets, and their help with the growers is not only alliance with those markets, it includes also provide training in climate-smart and regenerative growing practices, which in turn generates not only improve profits but also the quality of production.

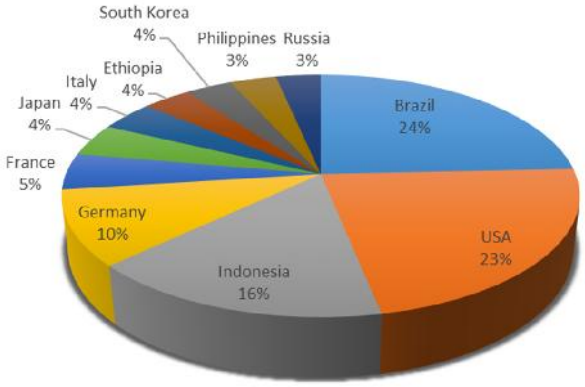
3.1.2 Consumption market

Restaurants and bar industries are one of the biggest consumers of coffee, due de Covid, the lockdowns and restriction during the pandemic in 2020, this industry were highly affect, however during 2021 this industry had a pick on the consumption that help to improve the industries indicators.

Nowadays, organic, eco-friendly and fair trade coffees are one of the coffee market niches (Global coffee Platform, 2021) which not only provides a premium coffee for consumers but also bring benefits to growers because they will produce a sustainable crop. However, this niche is only the 2% of consumption in developed markets, which is a small part of the total consumption pie. Nestlé SA is a leader in the coffee beverage industry and reported a 4.4% increase in its organic coffee sales in the first quarter of 2020 (Yahoo Finance, 2022), and also informed that consumption change due de Covid pandemic in 2020, for more convenient forms of coffee like coffee pod and capsules and instant coffee.

According to Euro monitor(Euromonitor, 2022b), the market size is about 7.232.242 tons in 2020, and the most representatives countries are Brazil (24%), United States of America (23%) and Indonesia (16%).

Graph 6 Market size in 2020



Source; Author based on Euromonitor (Euromonitor, 2022b)

This report also shows how each of the main consuming countries has been changing their consumption behavior from 2011 to 2020, countries like the Philippines grow 93% in this period of time, changing their consumption of 80,656 tons/year in 2011. to 155,687 tons/year in 2020, however, other countries such as Italy decrease their consumption by 15%, as can be seen in the following table:

Table 1. Market Size Variation

Geography	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Variation
Philippines	80.656	89.714	104.752	116.682	127.889	142.033	154.790	163.104	174.073	155.687	93%
Indonesia	384.191	455.943	541.926	600.697	636.842	683.433	711.815	731.280	744.426	725.625	89%
Ethiopia	117.654	120.255	121.660	122.840	124.684	128.585	134.480	142.028	150.568	158.075	34%
China	88.737	96.945	101.644	105.462	109.211	109.587	111.686	114.534	116.088	116.701	32%
Brazil	894.867	928.741	960.550	1.000.444	1.034.938	1.062.209	1.097.718	1.137.884	1.180.947	1.094.458	22%
Russia	124.746	130.360	132.108	133.748	133.526	135.036	139.756	147.426	153.818	149.819	20%
Canada	101.811	103.316	104.989	105.420	107.551	110.014	112.360	114.488	116.587	116.478	14%
South Korea	140.255	153.418	160.726	169.103	152.761	151.958	151.209	150.786	154.451	156.417	12%
USA	912.503	938.196	962.955	949.370	961.471	961.691	950.139	963.406	976.452	1.016.540	11%
Japan	183.176	186.510	192.536	196.593	202.626	207.006	207.638	207.155	210.040	195.638	7%
Spain	133.141	134.836	133.948	132.017	131.593	133.209	135.528	138.476	142.867	135.941	2%
Germany	447.308	445.536	446.209	438.494	430.973	435.797	438.394	439.028	434.995	450.233	1%
France	223.770	224.436	222.803	217.969	216.064	213.686	214.424	215.604	220.367	220.083	-2%
Italy	217.040	216.080	213.878	215.208	212.063	210.696	206.275	203.743	199.811	183.594	-15%

Source; Author based on Euromonitor data (Euromonitor, 2022b)

3.1.3 Types of coffee crops

The commercial main species of coffee are Arabica and Robusta. According with a paper of FAO (Food and Agriculture Organization of the United Nations, 2022), Arabica plants has a higher quality and grow up in elevated areas of the tropics and sub-tropics at altitudes between 600 and 2000 meters above sea level, and requires specific conditions such as a mild climate, moderate rainfall, and well-drained soil. Robusta coffee, on the other hand, is grown at lower altitudes, typically between sea level and 600 meters, and can tolerate a wider range of environmental conditions. Robusta coffee is generally considered to be of lower quality than Arabica coffee, but it is still an important source of caffeine and is used in many blends. The ideal conditions for growing coffee plants include:

- Temperatures between 15°C and 25°C (59°F to 77°F)
- Annual rainfall between 1500mm to 2000mm (60 inches to 80 inches)
- Well-drained soil with a pH between 6.0 and 6.5
- Plenty of sunlight and shade

Each variety of coffee bean has its own unique characteristics in terms of flavor, aroma, and acidity. The choice of coffee bean variety depends on factors such as climate, altitude, and soil type. Farmers may also choose to blend different varieties of coffee beans to achieve a desired flavor profile.

3.1.4 Types of Certifications and regulations

Coffee is one of the items in the family shopping basket for which consumers and the market expect higher levels of quality and eco-friendly behavior. For this reason, the certifications currently given to this product are:

- New Rainforest Alliance seal:

Graph 7: Rainforest Alliance Logo

Source; Rain Forest Alliance (Rain Forest Alliance ORG, 2020)

From March 2020 to December 2022, companies that had UTZ and Alliance Rainforest seals must change to this new certification. This seal represents that companies which uses it have rigorous criteria for the sustainable agriculture

standards(Rain Forest Alliance ORG, 2022). In 2021, Rainforest Alliance worked with 296.612 farmers around the world, in an area of 583.026 hectares and a production about 845.497 mt and each year this numbers increase(Rain Forest Alliance ORG, 2020). This certification includes farmers and suppliers. For farmers is a guideline for improve their crops with innovation, better practices to produce and also practices to improve their livelihoods (Rain Forest Alliance ORG, 2021a). For supply chain, this certification is aware about transparency and responsible business(Rain Forest Alliance ORG, 2021b)

- UTZ:

Graph 8 UTZ logo

Source; Rainforest alliance (Rain Forest Alliance ORG, 2018b)

According to Rainforest (Rain Forest Alliance ORG, 2018a), this certification stands for more sustainable farming and better opportunities for farmers, their families, and our planet. It helps the farmers to produce coffee (tea, cocoa and hazelnuts products are also included) with better quality, improve working conditions protect the environment and also to get more income, this certification were used in companies, however in 2022 this label will change to New Rainforest Alliance Seal.

- Bird-friendly (Smithsonian):

Graph 9 Bird-Friendly Smithsonian Logo

Source; Smithsonian Institute (Smithsonian's national zoo& conservation biology Institute, 2017)

This certification means that at least 40% of the coffee plants grows in the shadow, this index helps reduce the consumption of water, prevent the soil erosion and protect habitat for migrate birds and even improves the quality of the work of employees, because this crops offers shade when they are working (MacDonnell, 2022).

- USDA Organic:

Graph 10 USDA Organic Logo

Source; Agricultural Marketing Service (U.S. Depatment of agriculture, 2023)

This certification is important for products that will be sell in United States because it means that the crop has been grown and processed without chemicals form now and the three previous years, that those crops are not close to non-organic crops and also that they are not causing unnecessary erosion(MacDonnell, 2022).

- Fair trade Certified:

Graph 11: Fair trade Logo

Source; Fair Trade International (Fair Trade, 2023)

This label is focus on wages for employees, laws of labor and Advocacy for partnerships, and it is controlled by Fair Trade organization (USA-America and International) and is

designed to improve the lives of coffee communities living in below-poverty conditions (MacDonnell, 2022).

3.3 Circular economy

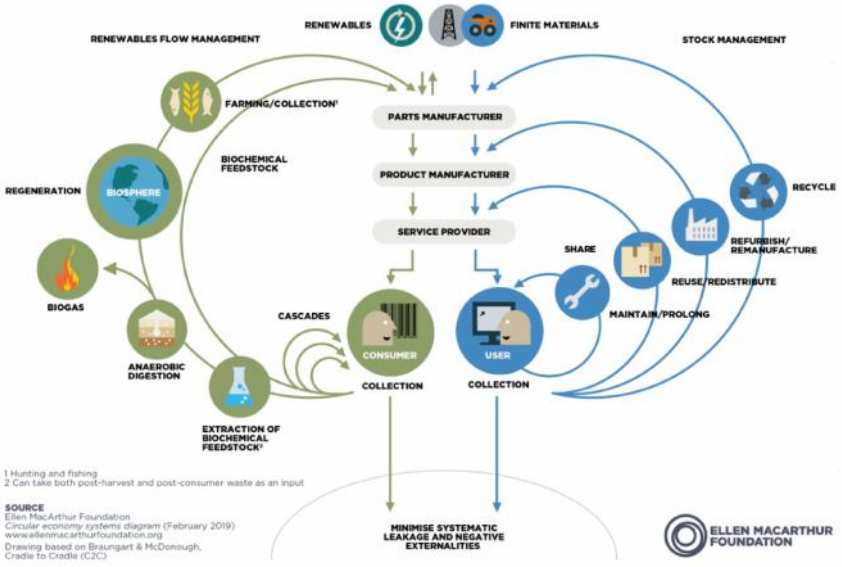
According to Ellen MacArthur Foundation: "The circular economy is a systems solution framework that tackles global challenges like climate change, biodiversity loss, waste, and pollution(Ellen Macarthur Foundation, 2019a). It is based in three principles:

1. Eliminate waste and pollution: Companies has to create
2. Circulate products and raw materials:
3. Regenerate nature

This approach is important not only because it will help reduce the amount of waste produced by coffee plantations, but also because it helps reduce the impact on the environment and, as a consequence, climate change, reduces the number of species that have been lost, and also influences in a positive way the social needs of the community.

The butterfly diagram from Ellen MacArthur Foundation, is a diagram which explains how circular economy system works, on the right part is the technical cycle, but for this thesis, the most important cycle is biological cycle (located on the left side), and it shows how biodegradable materials returned to the earth and regenerates it (Ellen Macarthur Foundation, 2019b).

Graph 12: The Butterfly Diagram



Source; Ellen MacArthur Foundation(Ellen Macarthur Foundation, 2019b)

3.3.1 How circular economy works in coffee crops

According to scientists from the University of Texas(Airhart, 2014), from 1996 to the present, the production of coffee grown under shade has been reduced by 20%, this fact is important because On the one hand, the consumption of organic coffee worldwide has

increased by around 75% and on the other hand, this type of crops are important in the circular economy cycle because they act as corridors for migratory birds, they provide good raw material pollinators like bees and bats. and it also helps filter water and air, prevent erosion, hold carbon, and bring more nutrients into the soil.

Graph 13: Circular Economy in the Agri-food

Source; Ellen MacArthur Foundation. Available at: (Ellen Macarthur Foundation, 2019b)

The concept of circular economy has gained significant attention in the agri-food industry in recent years. Circular economy is an economic model that aims to minimize waste and maximize resource efficiency by closing the loop of materials and resources. In the agri-food industry, this means reducing waste and creating value by using by products or waste streams as inputs for other products, such as animal feed or fertilizer. Some examples of circular economy in the agri-food industry are:

- Sustainable agriculture practices: Many farmers are adopting sustainable agriculture practices, such as crop rotation, cover cropping, and conservation tillage, to reduce soil erosion and maintain soil fertility. These practices reduce waste and create a circular system of nutrient cycling.

- Food waste reduction: The agri-food industry is responsible for a significant amount of food waste, from crop losses to unsold produce. Food waste reduction initiatives, such as food banks, composting, and anaerobic digestion, can divert waste from landfills and create value through energy generation or compost production.

- Byproduct utilization: Byproducts from the agri-food industry, such as spent grains from brewing or pulp from juicing, can be used as inputs for other products. For example, spent grains can be used as animal feed or fertilizer, while pulp can be used for animal feed or as a source of fiber for textiles.

- Closed-loop supply chains: Some companies are developing closed-loop supply chains, where waste from one process becomes the input for another.

For example, a company may use agricultural waste to produce biodegradable packaging, which can then be composted or recycled.

The coffee industry has also started to explore circular economy principles, with several examples of circular initiatives in coffee farming, processing, and consumption. According with coffee and climate organization (Coffe&Climate, 2023), here are some examples of circular economy in coffee crops:

- Coffee pulp utilization: Coffee pulp is a byproduct of coffee processing and is often discarded, which can lead to environmental problems such as water pollution. However, coffee pulp can be used as a source of organic matter for soil improvement or as animal feed. In some cases, coffee pulp can also be used to produce biofuels or bioplastics.

- Coffee husk utilization: Coffee husk is the outer layer of the coffee cherry and is also a byproduct of coffee processing. Coffee husk can be used as a source of energy; such as fuel for boilers or as a source of charcoal for cooking. Some companies are also exploring the use of coffee husk as a source of fiber for textiles or as a material for construction.

- Closed-loop supply chains: Some coffee companies are exploring closed-loop supply chains, where waste from one process becomes the input for another. For example, coffee grounds can be used as a source of nitrogen for growing mushrooms, which can then be sold as a food product. Some companies are also exploring the use of coffee waste as a source of biodegradable packaging materials.

- Sustainable coffee farming practices: Many coffee farmers are adopting sustainable farming practices, such as shade-grown coffee or agroforestry, which can improve soil health, reduce water use, and promote biodiversity. These practices can also reduce waste and create a circular system of nutrient cycling.

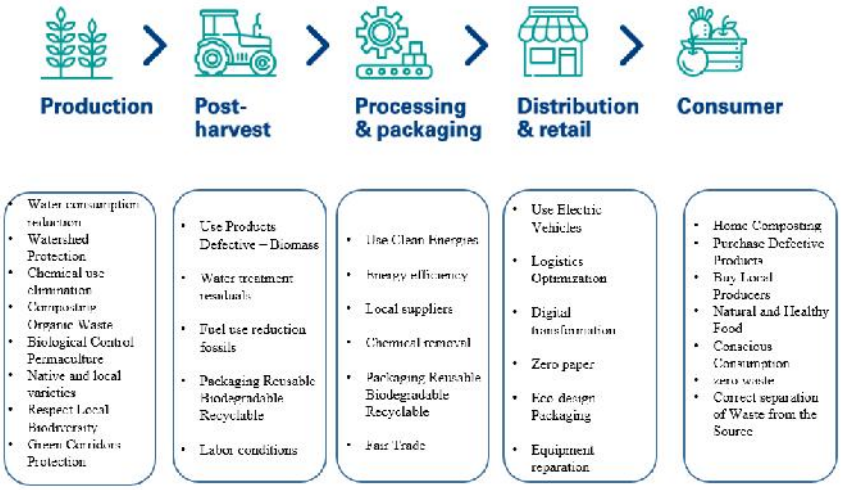
3.3.2 Sustainable approaches in coffee production

Sustainable coffee production has been define in different ways, as we can see (International Coffee Organization, 2004)we can be define it as the producers shall meet a long term environmental and social goals while being able to compete effectively with other market participants and achieve prices that cover his production costs and allow him to earn an acceptable business margin. Nowadays we find well-known organic, fair trade, and eco-friendly coffees with, can contribute to the mail goal of sustainability and this is important for global market because despite it is now a niche and it is small than 2% of the consumption, this market has many opportunities to grow up because the consumer profile is change on one hand because climatic change and in other hand because people are worried about social responsibility (fair trade with farm households mainly).

Nowadays, organic, eco-friendly and fair trade coffees are one of the coffee market niches, this kind of crops brings to the grower not only improvements in their rates of production but also According to International Coffee Organization (ICO) other advantages are (ICO, Executive Summary, n.d.):

1. Improved natural resource management and biodiversity conservation.
2. Crop resilience to weather & climactic risk
3. On-farm diversification and fewer external input costs reduce financial exposure
4. Community or organizational development and increased use of rural labor
5. Fewer health risks due to misuse of agrochemicals

Graph 14: Benefits of sustainable crops from production to sale of the product



Source; Circular Economy Center (CEC, 2023)

The previous graph shows the different stages that agriculture crops faces after the harvest is finished and which are the benefits to implement a sustainable strategy on their crops.

Coffee cultivation: this stage includes the production and germination of seeds, preparation of the land, handling of the same and harvesting of the coffee cherry. Also included are the raw materials and the energy used for the fruit to grow, as well as the processes and emissions generated by the farm.

Post-Harvest Processing: Coffee cherries are processed into green coffee beans ("parchment coffee") by removing the pulp (pulping) and mucilage before washing and drying the coffee beans. This process includes all the important raw materials and the energy used to produce green coffee, just as in the previous process, the processes and emissions in the crop during and after harvest are recorded. Another post-harvest process is threshing, which consists of mechanically removing the dry husk from the parchment coffee and obtaining green coffee beans selected by size, density or specific weight. In this process, any impurities that the coffee bean may bring are removed. Additionally, other post-harvest stages are contemplated, such as Manufacturing and Manufacturing, both for ground and roasted coffee, and for soluble coffee. Manufacturing also implies the raw materials and energy used.

In Packaging stage are three levels of packaging: primary, secondary and tertiary: Primary packaging represents packaging that usually cannot be separated from the coffee until consumption (e.g., packaging in contact directly with the product, the lid, the hermetic laminate used to protect the capsules and any labels attached). Secondary packaging is usually purchased by the consumer and can be separated from the primary package before consumption (such as covers and boxes) without affecting the conservation. Tertiary packaging is used to facilitate distribution and usually does not reach the consumer (e.g. pallets, plastic film, cardboard trays).

The distribution stage means that the distribution to the consumer can also be part of the main activities, since in some cases, companies are the ones who do this activity. Transportation and distribution to the consumer must take into account purchasing habits (transportation by car, on foot, by bicycle or public transport; home delivery, office delivery). Also transport to the port, storage, loading on the ship and transport to the consumer. These processes include vehicles used to deliver products to distribution centers (for example, forklifts).

Last but not least, the consumer could contribute to the process by using the waste generated by the coffee in composting, as well as helping responsible consumption, supporting small farmers and raising awareness on recycling issues as well.

4. Practical Part

4.1 Colombian coffee

As mentioned above, Colombia is the third largest coffee producer in the world, with a level of green bean exports of 835,000 tons per year and is 6.3% of the country's GDP and the global share output was 7.8% (Euromonitor, 2022a).

One important item that affect the coffee production in Colombia is the climate change, according to Euromonitor brief analysis (Euromonitor, 2022a), in 2021 the production were affected due La Niña weather pattern which devastate coffee crops in 2021 and also the anti-government protest during spring 2021 delayed shipments and exports, the production rate reduction were 16% during 2021 for those reasons. On the map below you can see the Colombian geography, the mountain chain that crosses the country and the altitude of the mountains, this last information is very valuable, since coffee crops are cultivated especially in mountains between 600 and 2000 meters above sea level and as can be seen on the map, the areas with these altitudes are areas that are used to grow coffee. mostly.

Graph 15 Colombian map

Source; (Worldmeters, 2023)

It is important to mention that Fedecafe expects a reduction in Fedecafe's production by 2022, from 13.8 million to 13.0 million 60kg bags, the main reason is the cost overrun and the reduction of fertilizers due to the invasion of Russia by Ukraine, situation that affects coffee production worldwide, added to the devaluation of the Colombian currency, reduces the gross margin of coffee growers and makes crops less profitable.

Agriculture is one of the most important economic sectors in Colombia, according to OECD`s investigation (OECD, 2023), it employs about 62% of the rural workforce, and brings to the country about 6.3% of the GDP, it is also important to mention that long-cycle crops (such as coffee, bananas, oil palm) are those that occupy the highest percentage of cultivated land in the country, being approximately 60% of this item; coffee crops are the most representative crops, not only because of their extension, but also because they are the ones that contribute the most in terms of value-added.

4.1.1 History

Colombian Coffee history dates back to the year 1787, when the cultivation of this grain began for the first time, allowing the coffee tradition to endure in the country for more than 235 years and today it is recognized not only for its volume of production but also for the quality of it.

Colombia is a country with a long history, where coffee has been present since 1787, when coffee was introduced to national agriculture thanks to a Jesuit who brought the first seeds(Colombian Coffee, 2023). The coffee industry grew rapidly until today becoming the third country in the world with the highest rates of grain exports and with more than 500,000 coffee growers.

Since 1927, Colombian coffee growers have grouped together to create the National Federation of Coffee Growers(Federación Nacional de Cafeteros, 2022), which is an NGO that is responsible for representing them at a national and international level and that watches over the well-being of coffee growers and to obtain fair negotiations for their products, additionally it has a national research Centre (CENICAFE) who was created in 1938, which is in charge of being at the forefront of technology to apply it to crops in a competitive and sustainable way and in this way improve the competitiveness of products, just to mention some of its functions.

In 1959 the character of Juan Velez was born, this being a representative of the country's coffee culture and an icon that to this day is associated with Colombian coffee. Additionally, a Colombian Coffee office is opened in Tokyo, which not only strengthened relations between the two countries, but also made Japan the second largest consumer of Colombian Coffee in the world to this day. As the last important fact about the history of Colombian coffee, in 1984 a distinctive seal of Cafe de Colombia was created, known worldwide.

Graph 16 Colombian Coffee Stamp

Source; Colombian national federation of coffee growers(Colombian Coffee, 2023)

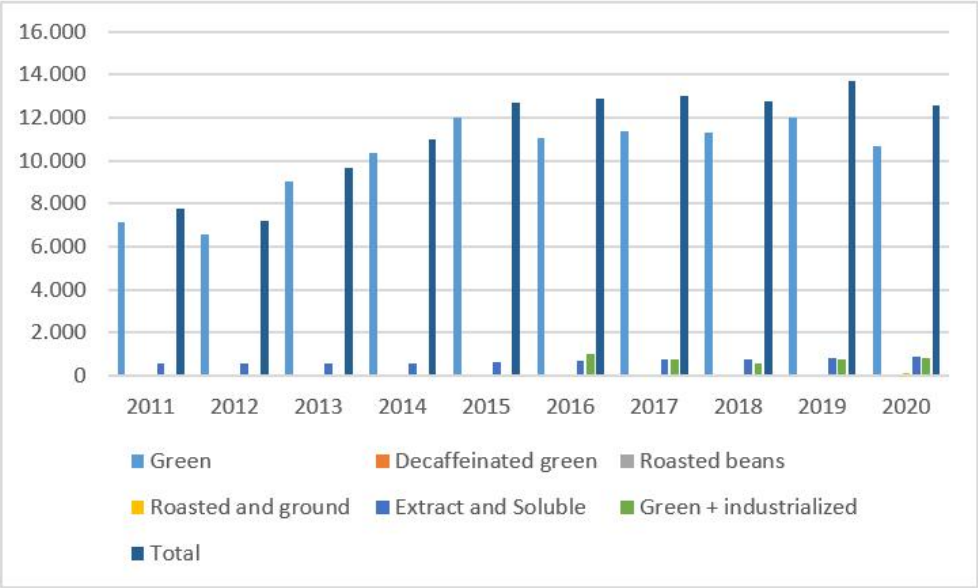
In recent years, Colombian coffee farmers have worked hard to improve the quality of their product and the sustainability of coffee crops, for this reason, Colombia is known for producing high-quality specialty coffees that are popular among coffee connoisseurs. The history of Colombian coffee is closely linked to the economic and social development of the country, and the coffee industry continues to be an important part of Colombia's economy and cultural heritage.

4.1.2 Colombian Coffee export data

According to Colombian National Federation of Coffee Growers (Federacion Nacional de Cafeteros, 2023b), persons or firms who want to export green or processed coffee needs to register as exporters in the National Registry of Coffee exporters since 2015, This registry is made in order to support coffee growers to have clear guidelines and quality regulations for export coffee and in the same way the information of the requirements to export to different parts of the world is updated, currently it is information Mandatory prevention measures for control and self-control applied to the export of green coffee in almonds destined for the Japanese market, Prevention and self-control measures to guarantee the quality of coffee for export to the European Union market, Measures for the entry of coffee to the People's Republic of China on the administration of the Registry of Foreign Manufacturers of Imported Food from the People's Republic of China, among other guidelines that must be taken into account and the Federation provides support in this process.

The growth of Colombian coffee exports in the period from 2011 to 2020 has been 62%, this increase can be explain due to the modernization of crops, making them more efficient because, as shown in table 2, contrary to production, the hectares cultivated nationwide have decreased by 8% in the same period of time, this decrease is due to various factors such as the diversification of agricultural products in areas where previously only coffee was grown, displacement by guerrilla groups and drug trafficking, mainly.

Graph 17 Volume of Colombian coffee exports by type - by year



Source; Colombian national federation of coffee growers. (Federacion Nacional de Cafeteros, 2023a)

Table 2 Volume of Colombian coffee exports by type - by year

Volume of Colombian coffee exports by type - by year							
Thousands of bags of 60 kg of green coffee equivalent							
Year	Green	Decaffeinated green	Roasted beans	Roasted and ground	Extract and Soluble	Green + industrialized	Total
2011	7,108	14	55	14	543		7,734
2012	6,535	22	53	31	528		7,169
2013	9,041	20	48	26	535		9,671
2014	10,326	14	37	48	531		10,957
2015	11,970	22	42	54	602	24	12,714
2016	11,034	9	40	52	708	1,001	12,845
2017	11,385	15	33	74	756	721	12,983
2018	11,316	17	38	59	779	542	12,751
2019	11,977	16	41	81	809	743	13,668
2020	10,684	13	44	90	880	817	12,527

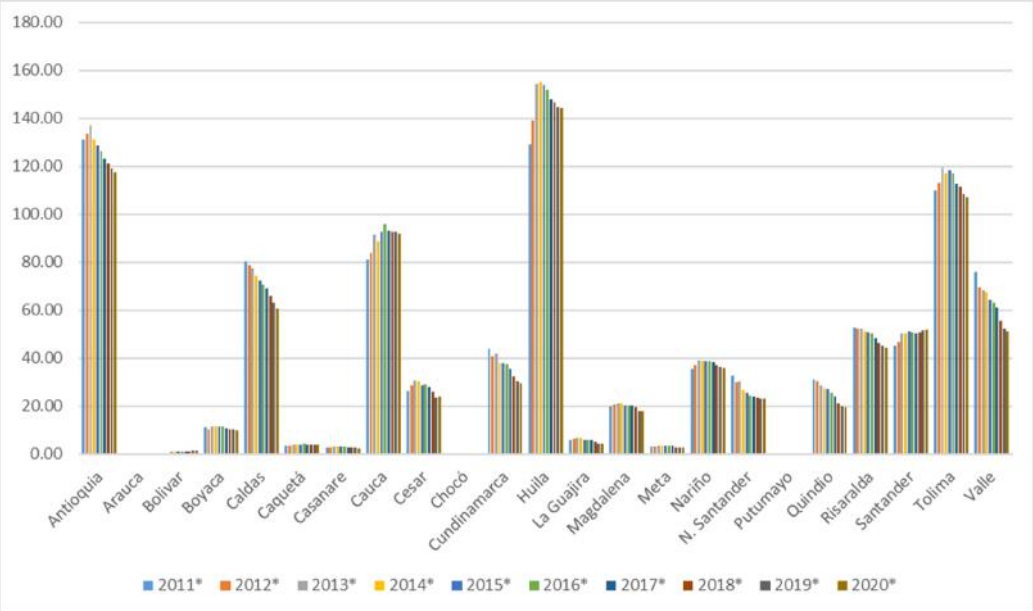
Source; Colombian national federation of coffee growers. (Federacion Nacional de Cafeteros, 2023a)

Table 3 Area cultivated per department in Colombia

Thousands of hectares per department										
Departamento	2011*	2012*	2013*	2014*	2015*	2016*	2017*	2018*	2019*	2020*
Antioquia	131.17	133.61	137.13	130.99	128.63	126.40	123.26	120.96	119.16	117.53
Arauca	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d	0.11
Bolivar	n/d	n/d	1.00	1.12	1.16	1.18	1.23	1.31	1.39	1.40
Boyaca	11.27	10.35	11.49	11.41	11.52	11.45	10.57	10.41	10.25	10.14
Caldas	80.52	78.58	77.56	74.53	72.37	70.79	68.97	66.02	63.05	60.82
Caquetá	3.43	3.68	4.08	3.99	4.09	4.16	4.05	4.02	3.99	3.80
Casanare	2.74	2.92	3.20	3.25	3.20	3.17	2.92	2.74	2.60	2.54
Cauca	81.17	84.06	91.61	88.83	92.62	95.75	93.30	92.56	92.67	91.94
Cesar	26.19	28.69	30.77	30.28	28.91	29.02	28.03	25.95	23.63	23.89
Chocó	0.21	0.17	0.17	0.16	0.16	0.16	0.17	0.17	0.18	0.18
Cundinamarca	43.85	40.79	41.99	38.00	37.92	37.68	35.43	32.32	30.31	29.71
Huila	129.15	139.14	154.49	154.98	154.09	151.87	147.80	146.76	144.90	144.31
La Guajira	5.79	6.21	6.77	6.79	6.12	6.13	5.86	5.14	4.25	4.22
Magdalena	19.76	20.56	21.26	21.27	20.39	20.52	20.17	19.39	17.96	17.97
Meta	3.01	3.23	3.60	3.44	3.53	3.61	3.40	2.90	2.89	2.80
Nariño	35.37	37.12	39.29	38.86	38.85	38.75	38.17	37.26	36.16	35.76
N. Santander	32.90	30.01	30.39	26.73	25.44	24.34	23.99	23.56	23.03	23.10
Putumayo	n/d	n/d	0.04	0.13	0.13	0.00	0.22	0.23	0.21	0.21
Quindio	31.07	30.18	28.88	27.67	27.02	25.68	23.76	21.25	20.02	19.65
Risaralda	52.56	52.32	52.27	51.03	50.80	50.26	48.52	46.39	45.13	44.47
Santander	45.23	46.83	50.27	50.32	51.14	50.61	50.16	50.66	51.35	52.01
Tolima	109.86	113.15	119.33	117.18	118.43	117.27	112.87	111.71	108.17	106.99
Valle	75.80	69.44	68.39	67.57	64.39	62.96	61.11	55.41	52.41	51.19
TOTAL	921.06	931.06	974.01	948.53	940.92	931.75	903.95	877.14	853.70	844.74

Source; Colombian national federation of coffee growers. (Federacion Nacional de Cafeteros, 2023a)

Graph 18 trend by department of cultivated area by department in Colombia



Source; Colombian national federation of coffee growers. (Federacion Nacional de Cafeteros, 2023a)

As can be seen in the previous graph, the departments with the greatest coffee tradition are Antioquia, Huila, Tolima, Cauca and Caldas, where the trend in recent years has been to slightly decrease the cultivated area, this is mainly due to crop substitution in many of the areas, the armed conflict and drug trafficking have forced many coffee growers to replace their coffee crops with illicit coca crops, crops that, according to the United Nations Office on Drugs and Crime (United Nations, 2022), reported a growth of 43% by 2021 these crops.

The trend for the department of Magdalena, which is where the Sierra Nevada de Santa Marta is located, is no different, this behavior has the same explanation, in recent years armed groups have once again gained participation in these areas, however, the variation is not as significant as in other departments.

4.1.3 Sierra Nevada de Santa Marta

The Sierra Nevada de Santa Marta, is a chain of coastal mountains, which is considered, in turn, the longest coastal mountain chain in the world, is located in the north of the country as you can see in the following map and belongs to three departments: Magdalena, Guajira and Cesar, has an approximate extension of 17,000 km² and UNESCO declared it a Biosphere Reserve and World Heritage Site in 1979 (Colombia travel, 2022) due to the amount of fauna and flora, and also include numerous endemic species. The region is also home to several indigenous communities, who have inhabited the area for thousands of years, nowadays there are 4 indigenous communities that are the Arhuacos, the Kowi, the Wiwa and the Kankuamos. The region has a diverse climate, ranging from tropical rainforest to snow-capped peaks, due to its unique topography and location. Due to its expansion, this territory has a variety of climates and ecosystems and is an important water source (more than 30 water basins are estimated in this area) and biologically for the country (Colombian National Parks Organization, 2022).

Graph 19 Colombian Map with the location of Sierra Nevada de Santa Marta

Source; French Institute of Andean Studies (De Andreis, 2022)

Picture 1: Photography of Sierra Nevada de Santa Marta

Source; Colparques Organization (Colombian National Parks Organization, 2022)

The climatic conditions in the Sierra Nevada de Santa Marta vary depending on the altitude. At lower altitudes, the climate is tropical, with temperatures ranging from 25-30°C and high humidity. In the higher areas, the climate is cooler and drier, with temperatures ranging from 0-20°C. The region receives an average annual rainfall of 2,000-3,000 mm, with the rainy season occurring between May and November.

On the other hand, The Sierra Nevada de Santa Marta is one of the poorest regions in Colombia, with high levels of poverty, unemployment, and inequality. The region's economy is based primarily on agriculture, with coffee, bananas, sugar cane and cocoa being the main crops grown. Tourism is also an important industry, with visitors attracted by the region's natural beauty and cultural heritage. However, the tourism industry is often criticized for its negative impact on the environment and indigenous communities.

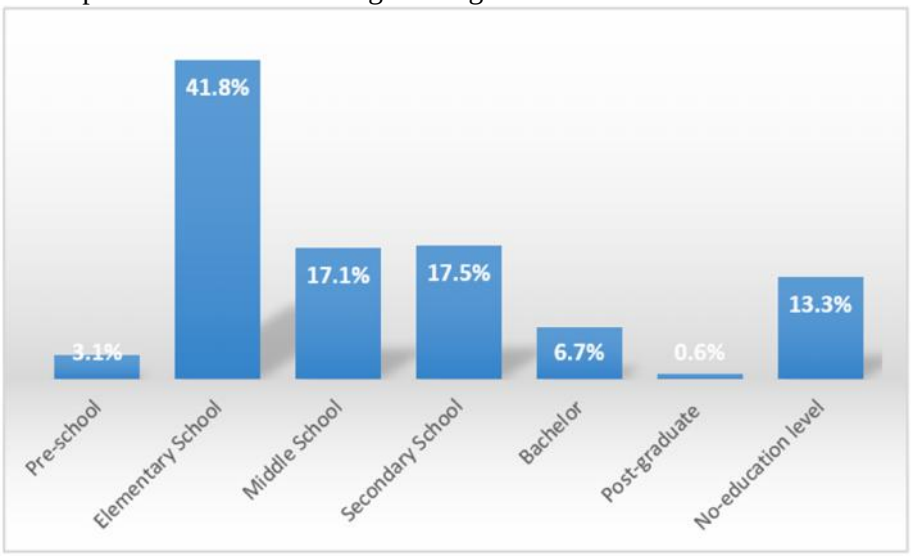
4.1.4 Arhuaco’s community

According to the Department National of Statistic(Dane, 2019b), in its last census who was made in 2018, Colombia has more than 115 indigenous communities throughout the national territory, these communities represent 13.6% of the Colombian population. This population grows according with the previous census in 36.8% and the explanation for the increase was not only due to the birth rate of the indigenous communities, but also because the 2018 census had greater coverage at the territory level and the number of people surveyed. The population is considered homogeneous, since it has a 50.1% female population and a 49.9% male population. For the department of Magdalena, which is where the Arhuaco community is mainly located, these measurements are slightly lower, with 48.8% of the population being women and the remaining 51.2% men. Of this population, 60.4% is in an age range between 15 and 64 years, age that for labor terms, are people capable to work.

The Arhuaco indigenous community in total has a population of 34,711 people, that is, it is 0.069% of the total Colombian population. Although it is true it is a small community, it plays an important role in the development of agricultural activities in the Sierra Nevada de Santa Marta.

In the following graph you can see the level of schooling in the indigenous communities, which shows that a large percentage of the community fails to advance in obtaining higher degrees and the level of student desertion is high, this will also help in part to explain the level of poverty and the low wages earned by members of the indigenous community.

Graph 20 Level of schooling in indigenous communities in Colombia



Source; DANE (Dane, 2019b)

According with DANE (National Administrative department of Statistics) (Dane, 2019a) informal work in rural areas for 2018 is 81%, and the average at the national level is 72.3%, this is mainly due to the fact that in Colombia the productive system due to the tax and labor expenses is incapable of creating enough jobs and people must resort to informal jobs to survive. On the other hand, the unemployment rate in vulnerable populations, such as indigenous, Afro-descendant and Raizal communities, stands at 8.9%, which is low when compared to national unemployment, since in Colombia this indicator is 11.8% for this same period. One of the reasons, as is shown in the previous graph, is the low level of education that exists in these communities and the little formality in their agricultural activities, since the majority of the indigenous communities of the country are dedicated to the commercialization of their agricultural products and / or handmade.

Regarding wages and salaries, it is not easy to find specific information about the Arhuaco people in particular; however, according to data from the Colombian government (Labor Ministery, 2022), the minimum wage in Colombia in 2023 is approximately $1,160,000 Colombian pesos per month (equivalent to about $242 USD), where it is observed in the same way that many workers in Colombia earn less than the minimum wage, especially in the informal sector.

In this thesis, the focus is on the Arhuaco community, taking into account that they are aware that they not only grow traditional coffee, but in recent years they have focused on growing organic coffee. The Arhuaco community is located in the north of the country, and its geographical location is important because the Sierra Nevada de Santa Martha is located in this territory, a space that meets all the requirements for height, humidity, and temperature, to be conducive to the growth of coffee plants.

In that specific area, there is an indigenous community, who are located in the region of the Sierra Nevada de Santa Marta and there are 152 coffee growers who joined a cooperative and produce organic coffee with all fare trade certifications and quality to export their coffee. For this community, the environmental issue is very important and they have a high degree of commitment to caring for it, since from their ancestral descendants they know the importance of the land and the care they must have to obtain a good harvest. It also important to mention, that Arhuacos made part of one of the Intangible Cultural Heritage of Humanity (Unesco, 2021), they belong to this list especially because of their ancestral importance, they have a philosophy of life that seeks balance with nature and its protection. This wisdom transmitted from generation to generation through community activities, the use of their indigenous language and respect for sacred mandates, therefore plays a fundamental role in protecting the Sierra Nevada de Santa Marta.

Picture 2 Arhuacos

Source; (Unesco, 2021)

There are several organizations in the area where this indigenous community lives, which have been concerned that crops become more technical, not only to have greater crop productivity but also to improve their quality. As the author previously mentioned, for

this thesis has been working with a special cooperative that brings together these 152 coffee growers and is concerned that the negotiation mainly favors the indigenous people.

4.1.5 Variety of crops

Coffee is a crop known worldwide, there are varieties of its seed, which give a particular flavor and texture. The most common varieties are Arabica and Robusta.

Arabica coffee is the most cultivated bean in the world, the main growers of this species are Colombia, Ethiopia and Brazil, this variety is known for its mild flavor and low levels of acidity. According with CENECAFE (Cenicafe, 2022) Within this category in Colombia six different types of seed are planted: Typical, Bourbon, Maragogipe, Taby, Caturra and Variety Colombia. The following table lists the characteristics of each of them:

Table 4: Characteristics Types of Arabica Coffee in Colombia

Characteristics	TIPICA	BORBÓN	MARAGOGYPE	TABI	CATURRA	COLOMBIA
Rust susceptibility	Yes	Yes	Yes	No	Yes	No
Grain size (% of supreme)	70%	46%	90%-100%	80%	66%	80%
Planting density (trees per hectare)	2,500	2,500	2,500	Hasta 3,000	Hasta 10,000	Hasta 10,000
Production per tree (in the sun) *kilos of c.p	0.9	1.2	0.7	0.7	0.5	0.5
Producción por hectárea* @ c.p.s.	180	240	140	140	169-272	400
*Calculation based on averages of many CENICAFE trials, at the planting densities described in this table						

Source; CENICAFE (Cenicafe, 2022)

The most cultivated variety is Colombian, coffee who is recognized worldwide for the quality of its grain, which is a type of coffee that grows between 500 and 2,400 meters above sea level, in humid areas and warm and This climate is very favorable in Colombia, currently it is cultivated in 22 of the 32 departments of the country, thus achieving important grain export quotas mainly and its harvest is mainly collected from October to February, thus guaranteeing annual production. It is important to highlight that the seed that is grown is the result of years of research, since it is a seed that genetically managed to become more resistant to rust, which is a fungus that affects coffee crops in the world, and the research Centre (CENICAFE) managed to obtain this plant which, under normal growing conditions, is 90% more resistant to the plague than other coffee seeds.

Robusta coffee is the second most widely grown coffee variety in the world. The main producing countries of this seed are Vietnam, Brazil and Indonesia, its main characteristic is the strong flavor and higher concentration of caffeine. This variety is cultivated between 0 and 800 meters above sea level. Robusta coffee beans are smaller than Arabica beans, and have a higher yield per tree. Its concentration level is approximately twice that of Arabica coffee beans, it is more resistant to diseases, this facilitates its cultivation in areas where there are not optimal conditions, its price and quality are lower than that of Arabica beans and it is mainly used in instant coffee.

4.1.6 Traditional crops vs sustainable crops

Traditional coffee farming refers to the conventional way of producing coffee, which involves using synthetic fertilizers, pesticides, and herbicides. On the other hand, sustainable coffee farming refers to an eco-friendlier approach to coffee production that focuses on using

organic and natural methods to produce coffee while minimizing the impact on the environment and promoting social responsibility. The following table shows the advantages and disadvantages of each kind of crops:

Table 5: Traditional crops vs Sustainable crops advantages and disadvantages

Advantages/disadvantages	Traditional Crops	Sustainable Crops
Advantages	**Higher yield:** Traditional coffee farming methods generally lead to higher yields of coffee beans compared to sustainable coffee farming practices. This is because synthetic fertilizers and pesticides can help control pests and increase crop growth. **Lower costs:** Traditional coffee farming methods are often less expensive compared to sustainable coffee farming practices. This is because synthetic fertilizers and pesticides are usually less expensive than organic alternatives. However, in 2022 due the war in europe, those prices increased around 300%, which means that in this specific period of time, it`s difficult to keek this statement.	**Environmentally friendly**: Sustainable coffee farming practices promote soil health, water conservation, and biodiversity by using organic and natural methods to produce coffee. renewable energy such as solar energy, use of waste for other products such as furniture and also te with the coffee husk, composting. **Social responsibility**: Many sustainable coffee farming practices promote fair trade and ethical labor practices, which can help support local communities and provide a living wage for workers.
Disadvantages	**Environmental impact:** Traditional coffee farming practices often rely on synthetic fertilizers and pesticides, which can lead to soil degradation, water pollution, and harm to wildlife and biodiversity. **Health concerns:** Exposure to synthetic pesticides and herbicides can pose health risks to farmers and workers who come into contact with them.	**Lower yields**: Sustainable coffee farming practices can lead to lower yields compared to traditional coffee farming methods, which can make it difficult for farmers to make a living wage. **Higher costs:** Sustainable coffee farming practices can be more expensive compared to traditional coffee farming methods due to the higher cost of organic fertilizers and pesticides.

Source; Own research based on (International Coffee Organization, 2004), (Global coffee Platform, 2021)

4.1.7 Production process

In the first place, the Arhuacos are in charge of carefully selecting the coffee seeds to ensure that they are of high quality and are not contaminated. Once they make this selection, they plant them in small portions of land throughout the Sierra Nevada. Where they know and know that the climate and soil conditions are optimal for coffee growth.

During the cultivation process, the Arhuacos use organic and natural methods to keep the soil and plants healthy, they care about producing and using organic fertilizer to enrich the soil, which is why it is not necessary for them to use pesticides and herbicides. synthetics that can harm the health of plants and the environment.

Other land conservation practices used by the Arhuacos are planting interspersed with other plants, to protect the soil from erosion and maintain biodiversity in the area and in this way also generate the shade that coffee trees need to grow. They also use traditional methods to control pests and diseases, such as pruning and manual removal of harmful insects.

Once the coffee plants have reached maturity, careful harvesting is done to collect the coffee beans.

The conservation in Colombia of the traditional method of harvesting (highly artisanal) has an explanation or support in the particular characteristics of the land in which the coffee is planted, which -usually- correspond to mountainous and rugged terrain, which considerably hinders the use of grain harvesting machines; secondly, the mechanization of any of the stages of the productive chain (particularly harvesting) would lead to the loss of the quality of the Colombian bean, the main letter of introduction of national coffee in foreign markets (Restrepo, 2013)

4.2 Colombian sustainable crops

4.2.1 Why Arhuacos have sustainable crops

The history of the Arhuacos in agriculture goes back centuries, their worldview and care for the land make them work hard for the care of nature, their worldview is deeply related to their relationship with nature and the territory in which they inhabit. The Arhuacos believe that everything in life is interconnected and that each element of the universe has its own spirit and energy.

The Arhuacos believe that every human being has a spiritual connection with their territory and that they must protect and preserve nature. For them, nature is not just a resource to be exploited, but it is a living being that must be respected and cared for. For this reason, the Arhuacos have maintained traditional practices of sustainable agriculture, fishing and hunting, which allow them to maintain a balance with nature and live in harmony with it.

In addition, the worldview of the Arhuacos also includes a system of religious beliefs and practices that focuses on communication with the spirits of nature and the ancestors. The Arhuacos believe that through meditation and performing rituals, they can connect with the spirits and receive guidance and protection(Arteta, 2013).

In summary, the worldview of the Arhuacos is a fundamental part of their culture and is based on their relationship with nature and their territory. This worldview has allowed the Arhuacos to maintain a spiritual connection with their land and live in harmony with nature for centuries and it could be said that this community has not made a transition from traditional to organic and sustainable crops, since it has been living under these philosophies for centuries and they transfer their knowledge generation after generation.

4.2.2 Crop residues and how they handle it

Crop residues are the waste generated in coffee plantations and the parts of the plants that remain after the harvest ends or during its process, such as leaves, stems and other materials from the bushes. The Arhuacos, being a community so committed to caring for the environment, have developed a system of crop rotation and organic agriculture that allows them to manage crop residues in an environmentally sustainable manner. After the harvest, plant residues are left in the fields to decompose naturally, providing nutrients to the soil and supporting the growth of new crops. In some cases, even these fertilizers generated from the crops are marketed as products. of added value for other agricultural activities since they create their own compost, which they use as a natural fertilizer for their crops and allow this fertilizer to generate a nutrient-rich soil.

By using crop residues in this way, the Arhuacos are able to maintain the health and fertility of their soil without resorting to synthetic fertilizers or other chemicals(*Anei Coffee | Organic Coffee - Home*, n.d.). This not only supports the long-term sustainability of their farming practices, but also helps preserve the natural environment in which they live.

It can be said that the Arhuaco community manages crop residues in a manner consistent with their traditional agricultural practices and their respect for the environment. They use crop residues to support the health and fertility of their soil, allowing them to maintain a sustainable and harmonious relationship with their land.

4.3 Survey to Arhuacos coffee growers

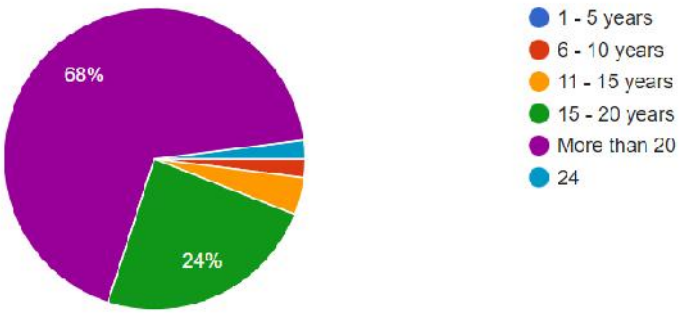
As mentioned before, the survey was applied to a specific population where the sample that has been taken from the Arhuaca community located in the Sierra Nevada de Santa Marta, in the department of Magdalena and consists of 50 respondents, the population surveyed was 68% women and 32% men, owners of coffee crops, the fact that the sample is mostly composed of women (68%) is an important aspect to consider, as it may indicate that women are playing a significant role in coffee production in the community. Those farmers are in an age range between 30 and 65 years. The sample represents approximately one third of the total population of the coffee community that is associated in a cooperative founded more than 25 years ago, whose main objective is to strengthen the economy of the community through coffee crops, especially high quality organic coffee.

This survey yielded the following results:

4.4 Analysis of the results

The results obtained will be analyzed, ranging from general aspects of crops such as the trajectory that coffee growers have in the activity, as well as the knowledge they have about the environmental, social and economic impact of the actions taken on their crops. In the appendix you can see the details of the questions and in the case study the most relevant questions will be taken that will help us obtain results for this investigation.

Graph 21: How long have you had organic coffee crops?



Source; own processing

As can be seen in the graph 22, 68% of coffee growers have been in the business for more than 20 years, as mentioned above, this is a tradition that is passed from generation to generation and that, beyond a commercial purpose, also has an environmental component and philosophy for the community. In the interview, it was also possible to inquire about coffee growers who have been in the activity for less than 5 years and who, despite being a relatively small number, stated that they had previously grown other types of products.

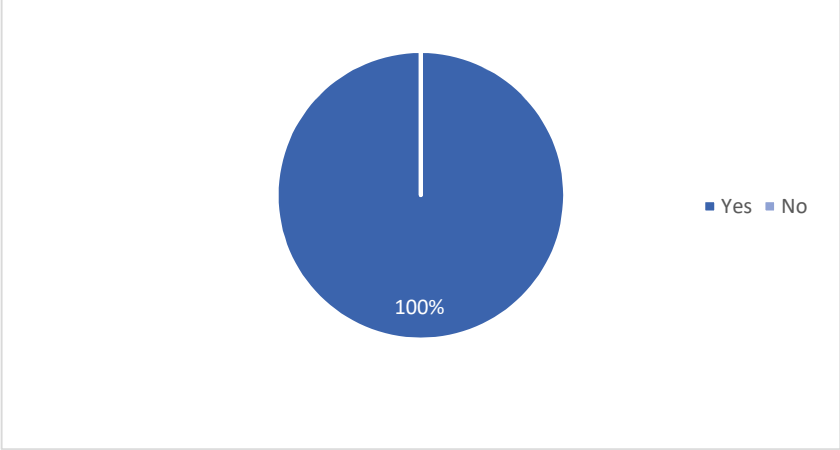
Another question was related to What is the level of knowledge and appropriation of Sustainability by the company? 64% answered that the knowledge is average, it is important for this point to clarify that due to its background linked to caring for the environment, producing this type of of crops does not generate a greater effort for them, nor does it mean a big change in the way they are cultivated, which is why the level of knowledge of sustainability is considered to be medium, but in accordance with what was observed in the field of study, there are very good practices both in the plantation and in the care that is taken for the collection of the fruits.

Graph 22: What is the level of knowledge and appropriation of Sustainability by the company?

Source; own processing

The next highest percentage in this question was that they have in-depth knowledge of the sector, here it is important to mention that the cooperative that works hand in hand with these coffee growers does an important job in bringing new practices and knowledge to growers in the area, reason which is why they are considered to be at the forefront with some aspects related to good sustainability practices.

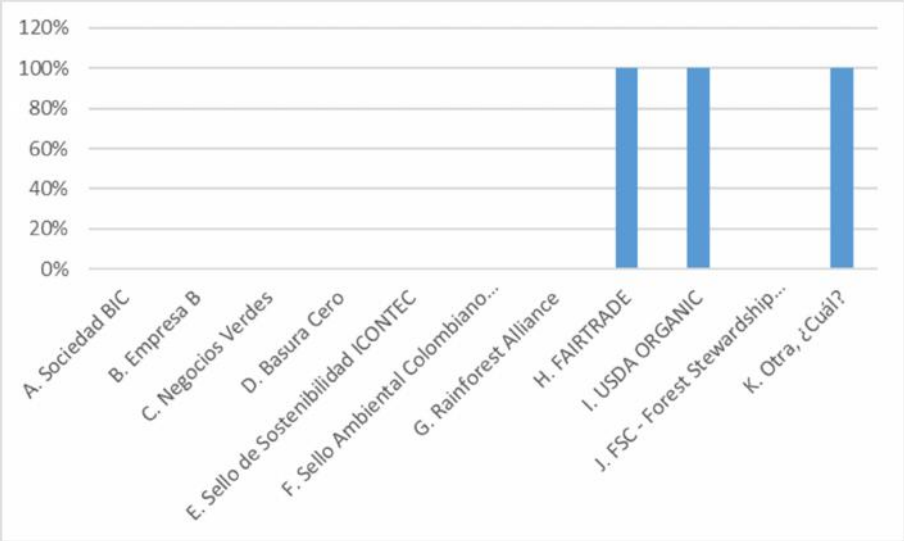
Graph 23: Does the company currently have any Certification related to Sustainability?



Source; own processing

Related to the question if they have any certification related to sustainability, 100% of those surveyed stated that they have these certifications. The following question inquires further into what type of certifications they have, however, these coffee growers work with a cooperative that exports the products and to guarantee the quality of their products and obtain important and fair negotiations for the entire value chain, they must have these certifications

Graph 24: What Certifications does your Company have?



Source; own processing

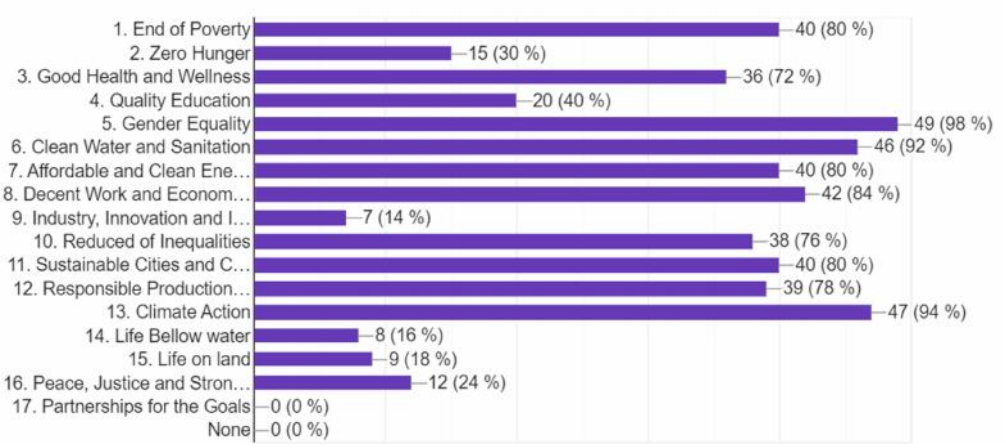
In this question, the influence of the association is highly relevant, since in order to belong to the cooperative they must have the required certification requirements, where the most important are FAIR TRADE and USDA ORGANIC, certifications that allow them to enter the American markets and Europeans more easily, demonstrating the quality of their products. For this question, the directors of the cooperative were also inquired and they mention that the seals are important not only to guarantee the quality of the products, but also to achieve better negotiations in terms of price, since, for example, the FAIR TRADE seal, guarantees a minimum market price even if the price on the New York Stock Exchange

is below 1.4 cents of usd/pound, the minimum price that will be paid to coffee growers is this, which is why certifications are not important only at the level reputational but also economically.

Fair trade certification, as mentioned in the literature, seeks that commercial relations between producers and consumers are fair and equitable and that all stages of the chain are treated under these parameters. Some of the benefits of having these certifications are improving the living conditions of producers and communities, promoting sustainable development and environmental protection, helping to reduce poverty and inequality, promoting gender equality and non-discrimination, and It promotes transparency and responsibility in the supply chain, which are also objectives that the cooperative promotes and are not only aligned with the cosmivision of the Arhuaco community, but also contribute to the fulfillment of the sustainable development objectives, which, as mentioned in Answers above are of vital importance to the community.

The use of the Fairtrade seal has a cost, which is negotiated and transferred to the coffee growers, however, according to the interview with the specialist, he reports that this cost is relatively low compared to the benefits it has brought to the community, since they receive In contribution, not only the opportunity to market their product and have greater market penetration, and have a guaranteed minimum price for their coffee, which covers production costs and guarantees them a stable income, but also to obtain a development premium , money that the cooperative invests in activities for the community such as workshops on recycling, finances, investments in schools, health centers or infrastructure and even leisure activities with families.

Graph 25: Does the company contribute more directly to which of the 17 Sustainable Development Goals?



Source; own processing

The answers to these questions should be analyzed one by one, since although it is true that they have significant variations in each one, the criteria of the interviewees also played an important role in the interpretation of their answers.

When asked about the impact on the objective of eliminating poverty, 80% of the interviewees affirmed that their crops contributed to this objective since they generated fair jobs and good conditions not only for their employees but also for their families, allowing

them to The income could not only pay the basic expenses of the family basket, but also improve the living conditions of their closed family.

The goal of zero hunger had a lower proportion, since some of the respondents related it to the fact that by generating employment and generating an agricultural product, they were contributing to the reduction of this indicator.

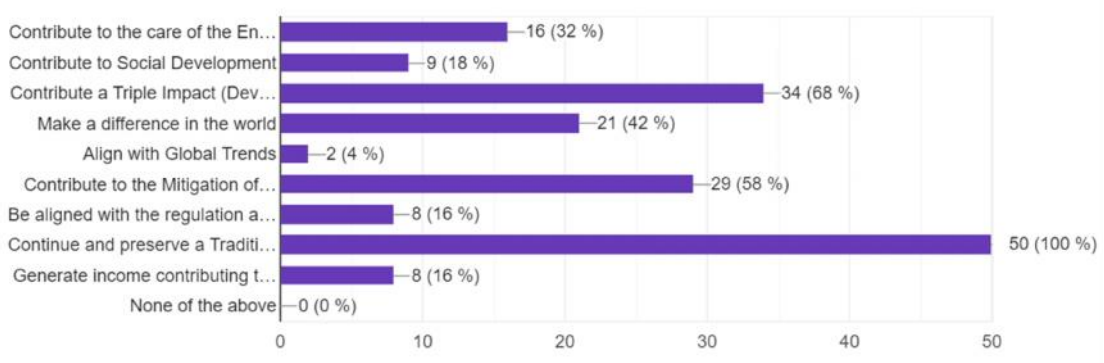
The objectives related to the environment such as Clean Water and sanitation, affordable and clean energy, climate action were objectives with a large number of responses, since they are aware of the impact that organic crops have within their compliance, the use aware of water, soil, energy, are concepts and philosophies of life that the Arhuacos know and develop within the community and within their agricultural activity, and that today are more valid, this in order to mitigate the environmental impact .

Regarding the indicators related to the quality of life, the people surveyed answered that their crops have an impact mainly on the health and well-being of their employees and their families, since on the one hand they have favorable working conditions for their employees, such as food, personal protection elements, social security, training and on the other hand fair wages, which allows not only employees to feel comfortable in their workplace and have a better quality of life but also that this translates to the well-being of your family. Additionally, by being associated, the cooperative ensures that the minimum requirements for workers are met, such as access to the health system, not only that they include preventive and curative medical care, as well as mental health services, balance between work and free time is another important reason why coffee growers have selected this answer.

The Arhuaca community has great challenges in terms of gender inequality and the inclusion of women, especially in decision-making and in social and economic life, like other indigenous communities in Colombia, since for these communities, the role of the women within its structure is mainly as caretakers and transmitters of culture and tradition, despite the above, the surveyed population, as mentioned above, belongs to a cooperative that was also created with the aim of giving greater importance to the role of women, giving priority to women heads of household, for this reason indicators such as Gender Equality had a significant response within the results of the survey, since this cooperative seeks to improve not only the role of women within society but also that they receive wages fair.

Another important axis that can be observed in the answers to this question has to do with the contribution to peace, that although it is true that they are not involved in political issues, the coffee growers surveyed are aware of the great social problems that Colombia has, which the guerrillas have been present in their territories for decades and that additionally these lands are also suitable for illicit crops, however, they are aware that with their agricultural activity they contribute in some way to mitigate this problem, of employing young people who for one reason or another another, they could be thinking of being part of armed groups or of having illegal crops and that in this way violence would increase in the Sierra Nevada de Santa Marta, for this reason this indicator, despite not having a significant vote, is also relevant to the results of the investigation.

Graph 26: What is the main motivation of the company to implement Sustainability?



Source; own processing

In this question, the commitment that coffee growers have with their indigenous legacy is forceful, as can be seen in the graph above, this answer with the highest score was: Continue and preserve a Tradition and Ancestral Knowledge, this means that they are committed not only to the development of their activity but also to leave a legacy to their children and that their traditions, ancient practices and care for the environment continue to be transmitted from generation to generation.

The Arhuacos interviewed also consider that another important driver for having sustainable crops is having an environmental impact on their crops, since for them nature is synonymous with wisdom and knowledge, in this way they seek to preserve and protect it, which is why they promote sustainable and environmentally friendly practices such as the conservation of water sources and the protection of biodiversity.

The category with the lowest votes was to align with global trends, they are aware that today climate change and the perception that consumers have about a more responsible and healthy consumption is greater than a few years ago, for them, on the other hand to cultivate responsibly and careful with the environment is not a matter of trends, it is part of their way of relating to nature and their ideology.

Graph 27: How are the purchases of inputs for the company currently managed?

Source; own processing

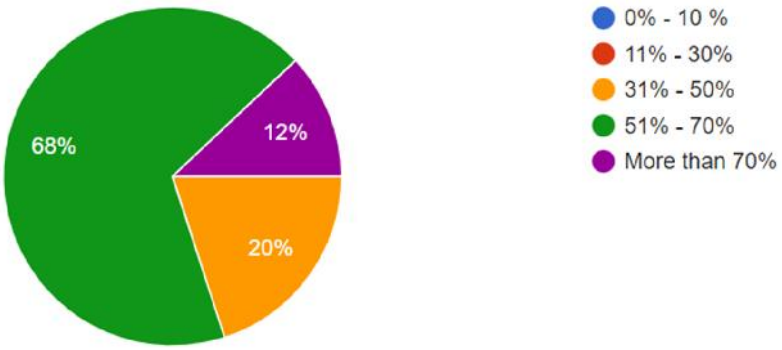
As previously mentioned, this community was grouped into a cooperative that is concerned with having high standards and meeting the requirements of their certifications. For this reason, for the coffee growers interviewed, their main criteria when buying inputs for their crops is That their suppliers are aligned with this type of practice, since it not only

allows them to comply with the basic requirements demanded by these certifications, but also because they recognize that suppliers are vital in their value chain and must be aligned with deep respect for nature.

The second criterion with the highest vote is the purchase from local suppliers. They are aware that as a community they also have a responsibility with their environment, not only socially but also economically and that is why, although the first criterion is true, it is aligned regarding sustainability issues. Another priority is to make alliances with local suppliers, support the local industry and in this way not only meet its objectives but in some way expand the wave of benefits that the commercialization of its products brings, also adding value to its supply chain.

On the other hand, it is clearly observed that none of the individuals surveyed is concerned about the price of their inputs, because although it is true that the use of environmentally friendly products has an economic impact, their supply must be done in a manner Conscious and aligned with the way of cultivating.

Graph 28: Sustainable Procurement: % Local Suppliers



Source; own processing

As can be seen in the previous graph, 68% of the suppliers of the surveyed community purchase raw materials from local suppliers, since the relationship between the Arhuacos and the suppliers is based on reciprocity and mutual respect. Seeking to establish long-term relationships, they are aware that these relationships are built based on trust and the quality of their products and that is why they care about establishing lasting relationships that are somehow aligned with their philosophy of life and their respect for the environment. environment.

On the other hand, purchases that are not made locally are due, according to the investigation carried out, to products that are not available locally or that, due to technical needs, require specialized suppliers. However, for the purchase, it is also a priority that They are certified suppliers and that their products are not only of high quality but also respectful of the environment.

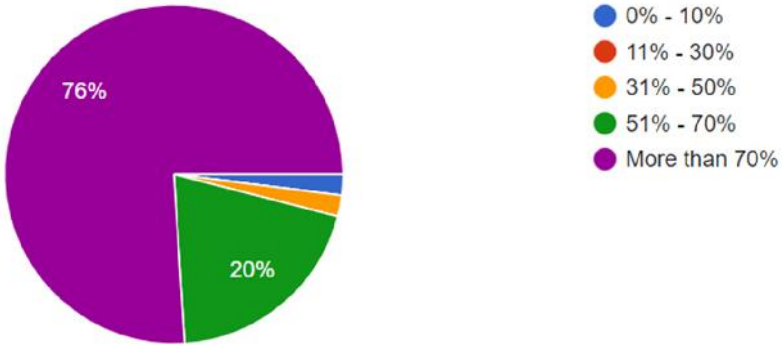
Graph 29: How is the soil currently managed in the Sowing processes?

Source; own processing

The crops of the interviewed Arhuacos, being in an important geographical area not only for the community but also for the country, and aligned with their ancestral cultivation practices, are very careful in the way they plant, which is why the answer with The highest score was: There are clearly defined planting spaces, with green corridors, protected areas, areas for rivers and streams, reserves with native and local vegetation, since they practice organic agriculture, where they care that their crops and the always go in harmony with natural cycles. In the same way, they care about protecting the flora and fauna of their environment and that the natural balance is maintained.

Additionally, in the following two graphs it will also be observed how the crops are related to the extension of land and its preservation.

Graph 30: Indicators - Soil Management and Biodiversity: % Cultivated Area

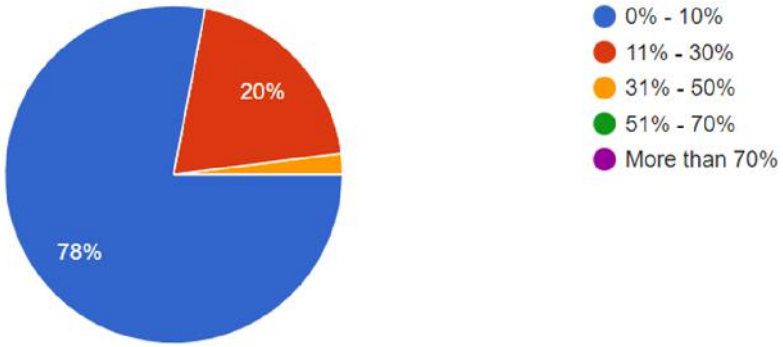


Source; own processing

When inquiring with the interviewees, the extensions of land vary and their topography also, which is why in some cases the percentage of reserved areas is higher or lower in the farms of the respondents. The Ministry of the Environment reports 573,312 protected hectares in the Sierra Nevada de Santa Marta(Ministery of Environment, 2023) and for this reason it is the largest continental protected area in the Colombian Caribbean, The Sierra Nevada de Santa Marta Natural Reserve is home to numerous species of fauna and flora, including 628 species of birds, more than 200 species of mammals, and more than 3,500 species of plants. To protect the biodiversity and natural resources of the Sierra Nevada de Santa Marta, several protected areas have been established in the region, including

national parks, forest reserves, and wildlife sanctuaries. These protected areas are managed by the government and work together with local communities to conserve and protect the region's ecosystems and species. This is important because in the Sierra Nevada there are several sources of water and it contains an important diversity of flora and fauna, which make Colombia one of the most biodiverse countries in the world. So this question and the following one are of great importance within the investigation because it shows that although it is true that more than 70% of the land extensions of the farms are cultivated, they care about maintaining respect and balance in the area.

Graph 31: Indicators - Soil Management and Biodiversity: % Reserve Area



Source; own processing

This question is related to the previous one and as previously mentioned, this value depends on the location of the farms, since it is a large extension of land and in some cases protected as a nature reserve, each farm has its particularities, however the majority of the farms of the coffee growers interviewed have a low or in some cases almost zero percentage of protected area, which means that the productivity of the land can be better used. As has been mentioned on several occasions, the Arhuacos are respectful with the environment and with a conscious crop that does not harm nature.

Graph 32: How is water consumption currently managed in the company's processes (Sowing-Postharvest-Processing)?

Source; own processing

The interviewed community seeks to protect water, since they see it as a living being and provider of life and water sources are considered sacred and are protected by the spiritual leaders of the community, for this reason they care about conserving it and make a conscious collection for their crops, they have a biological filtration system that allows them to take

advantage of and reuse water so that the impact on the environment is positive. The Arhuaca community maintains a traditional irrigation system that allows the equitable distribution of water between the communities and the crops. This system is based on stone canals and ditches that conduct water from the sources to the crops, without wasting water. The collection and storage of rainwater during the rainy season for later use is also promoted. Additionally, it is important to highlight that as a community the conscious use of water is promoted, both for crops and daily activities. Despite having a great commitment to caring for water and the environment in general, most of the coffee growers surveyed monitor consumption and empower their employees to make conscious use of this resource.

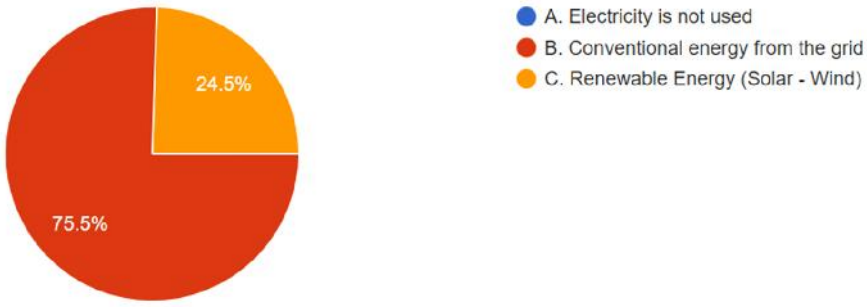
Graph 33: How is energy consumption currently managed in the company's processes (Postharvest-Processing-Marketing)?

Source; own processing

The Arhuaca community, being a community that lives in harmony with nature, has a very different approach to energy consumption than most urban communities. Instead of relying on external energy sources, the Arhuaca community uses natural and sustainable energy sources to meet their energy needs.

One of the most important sources of energy for the Arhuaco community is solar energy. Some of the people surveyed reported that they have solar panels to generate energy for lighting and charging electronic devices, such as radios and mobile phones, and that it is used in some crops. Also for the machines used in the process of pulping the grains. However, due to the high cost of the initial investment that the change to solar panels requires, not all growers have implemented this practice, but they do plan to make the change in the future. As a community, another important source of energy is biomass, mainly wood, which is used mainly for cooking and heating homes, being promoters of the responsible use of wood and the restoration of trees. Being a community committed to the environment and its care, it also promotes the conscious and sustainable use of energy, encourages the reduction of energy consumption in daily activities, such as the use of lights and appliances only when necessary.

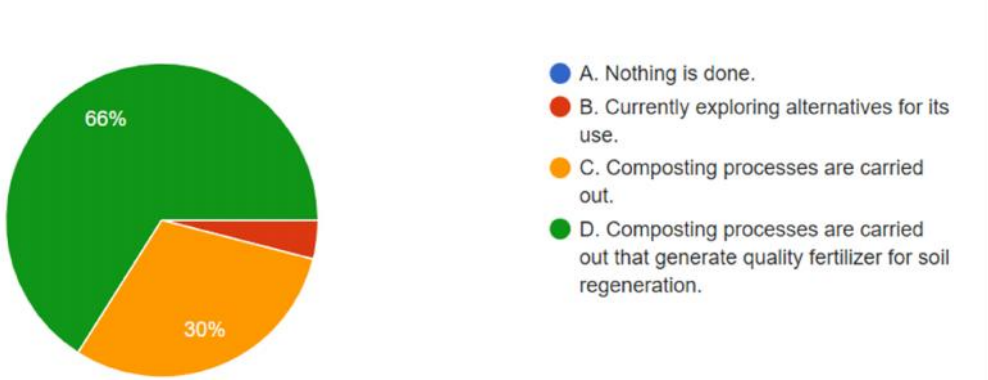
Graph 34: What type of energy is used in the production process (Postharvest-Processing-Marketing)?



Source; own processing

75% of those surveyed report using conventional energy from the grid, although it is true some are switching to solar panels, investment is being made gradually and they still have a high dependence on conventional energy, however they make conscious use of energy and are concerned with optimizing its use, investigating a little more in their answers, the surveyed coffee growers report that, for example, the use of pulping machines is programmed so that the use of energy does not increase unnecessarily.

Graph 35: How is the Organic Waste generated during the planting, harvesting and processing of Coffee currently managed?



Source; own processing

Throughout the coffee growing process, residues such as leaves, pieces of wood from the bushes and coffee beans are generated, which fall to the ground naturally and are an excellent source to use in composting due to their high nitrogen and carbon content, which makes the organic fertilizer generated by this practice rich in nutrients and improves the quality of the soil, even this helps to improve crop productivity. The coffee growers inform us that they collect this material consciously to create organic fertilizer for use in their crops and if there is a surplus they sell it to other coffee growers or outside the community to also obtain additional income.

Graph 36: How is Solid Waste (packaging) generated during the planting, harvesting, processing and marketing of Coffee currently managed?

Source; own processing

The community is located in a mountainous territory, where access to various public services such as garbage collection is limited, however, according to 90% of the respondents, garbage collection is a process that they do consciously from the beginning. Well, they classify the waste, in such a way that at the end of the day, they are separated between usable and non-usable, the products that can be used again enter a cleaning or separation process to be able to reuse them and those that cannot, they are stored to be later collected by garbage collection companies, who are in charge of the final disposal of these resources.

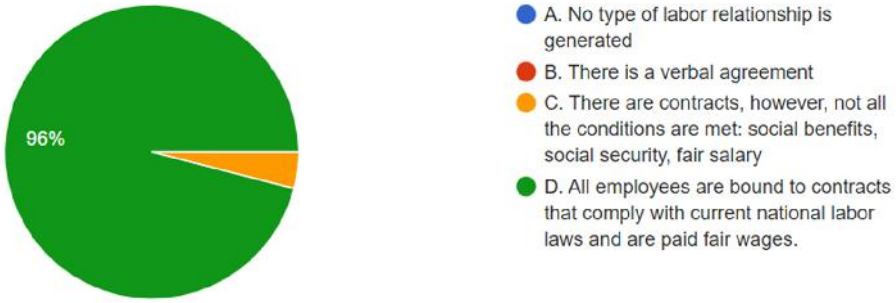
Graph 37: How is the marketing of the products currently carried out?

Source; own processing

In general, coffee crops use packaging made of natural fibers and that can be reused in the process, since harvesting is done in natural fiber pallets, which in addition to being traditional, inconsistently encourage the use of products found in the nature, it is important to highlight in this question, that only the harvest process is mentioned, subsequent processes such as threshing, grinding and subsequent packaging for the consumer were not taken into account.

One of the most common packaging used by the Arhuaca community is the jute bag, these bags are generally a bag to store 60kg of coffee and are made of natural jute fiber, which is a biodegradable and renewable material, this product is used because it also Being strong and durable, it is easy to handle and this makes it ideal for storing and transporting coffee beans. To a lesser extent, paper bags are used, mainly to collect samples, and they try to buy recycled paper bags to mitigate the impact.

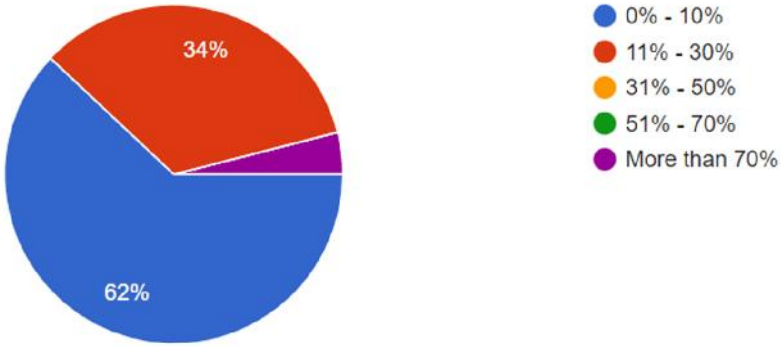
Graph 38: How does the company engage its employees?



Source; own processing

In general terms, the unemployment indicator in Colombia is biased because 43% of Colombians have informal jobs (Portafolio, 2023) and they are not included in the statistics, which makes the unemployment rate even higher than it really is, additionally , in the agricultural sector it is not very common to find the hiring of personnel formalized, additionally because it is seasonal and these temporary employees sometimes do not have an established work contract, this being a risk for the owners of the plantations at a labor and legal level, However, for this community surveyed, the outlook is different because on the one hand they have certifications such as Fair Trade, which has clear policies and also commits those who are certified to have social responsibility, employees being an important factor in this item, it is because of This means that the coffee growers surveyed are aligned with the formal hiring of their employees.

Graph 39: Indicators - Safety and Labor Relations : % of Employees with Salaries higher than the national average according to their functions

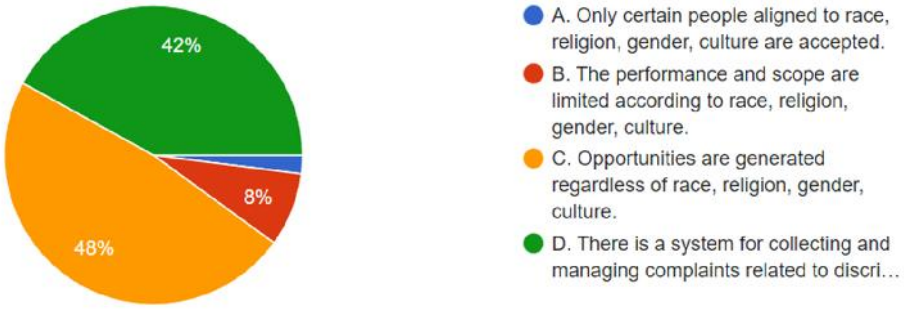


Source; own processing

This question is strongly related to the previous one, because although it is true that 96% of the employees are hired with all the benefits and all the labor regulations that apply to their activity, it is important that they are well paid. The minimum salary in Colombia in 2023 is $1,160,000 COP, which is around 240 USD, a value that is acceptable for a community like the Arhuaca to have a standard of living that satisfies basic needs. However, when answering this question, the coffee growers expanded the information indicating that there are different salary scales, such as administrative employees who could, depending on the hierarchy and functions, earn more than the current legal minimum wage, however with

coffee pickers, the compensation is different, although it is true, the salary is directly related to the amount of coffee they collect, they guarantee a fair minimum payment that guarantees that the collector receives at least a minimum salary per month, it is important to note that the crops require a minimum staff to operate throughout the year , but in harvest seasons they have a high recruitment rate.

Graph 40: What practices does the company employ regarding the principles of non-discrimination?

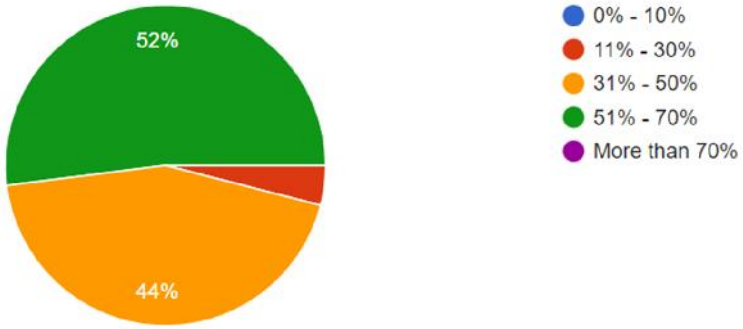


Source; own processing

Colombia is a country that in recent years has worked hard to reduce discrimination especially in the workplace, the national government has established laws and policies to promote equality and non-discrimination such as Law 1496 of 2011 (FUNDACION PUBLICA, 2011) that seeks equal treatment and opportunities for all employees, regardless of race, sexual orientation, religion, ethnicity or disability. On the other hand, the certifications that these coffee growers have, such as Fairtrade, require companies to respect the human and labor rights of their workers.

The variation in this response from coffee growers is due to the fact that although it is true that there are no clear hiring policies, the cooperative to which these coffee growers belong focuses on supporting women and for this reason those surveyed give priority to women. women heads of household of the Arhuaca community, and for the remaining vacancies there is no bias of any kind.

Graph 41: Indicators - Gender Inclusion

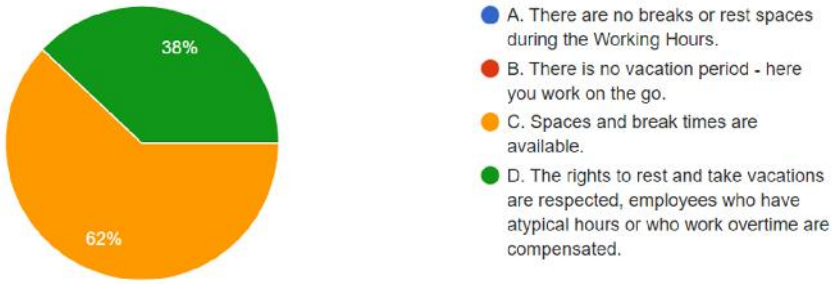


Source; own processing

Gender inclusion refers to equal opportunities for both men and women. The Colombian government and the National Federation of coffee growers have created programs to promote opportunities and treatment for men and women (Federacion Nacional de Cafeteros, 2022a), it is important to mention that women have an active role in many fields and the coffee sector is not indifferent to this behavior, historically, women Agricultural activities have mainly employed men, however in recent years this trend has changed since many women are involved from the production process, either as workers, producers or leaders of coffee organizations, to marketing. In addition, sustainability certifications, such as Fairtrade, require coffee companies to guarantee gender equality at all stages of the production process, from planting to marketing.

As mentioned in the previous answer, women are the priority for the evaluated community, it is important to highlight that the cooperative to which they belong was founded more than 25 years ago by an indigenous woman and whose objective is to improve the quality of life of these women, giving them the opportunity to generate income and an activity that in turn manages to expand this well-being to the families.

Graph 42: What working conditions are used to maintain a correct Mental Health of workers?



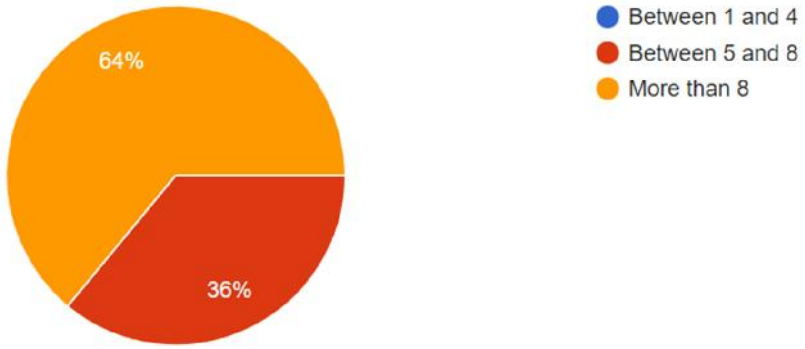
Source; own processing

In coffee crops, workers are exposed to factors that can expose the mental health of workers, such as strenuous work, since at harvest time more than 8 hours are worked and the workday begins very early in the morning. Additionally, it is common that in rural areas there is no access to adequate mental health services.

The coffee farmers interviewed are aware that their job is not only to provide employment with a fair salary but also to ensure the well-being of their employees in different aspects, which is why they work hard to include, for example, the proper use of protective equipment. staff and regular training on mental health issues.

The coffee growers surveyed consider that the working conditions for their employees are good, since they respect rest hours, in some cases provide spaces for recreation and food, and additionally at harvest times, which is when there is more demand for work, overtime surcharges are paid to employees.

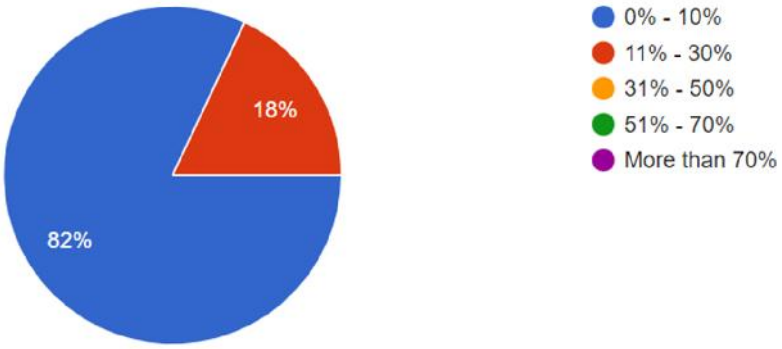
Graph 43: Number of Daily Hours of the Working Day



Source; own processing

Agricultural products have different seasons and the cultivation of coffee is not different from this behavior, at harvest time the workers may have working hours longer than 8 hours, for this reason many of the respondents indicated this value (36%), however the 64% of the coffee growers answered that they are between 5 and 8 hours, since this is the regular schedule of the plantations, beginning as indicated in the previous answer, that the working day begins very early, and consequently ends in the afternoon. , when answering they were very clear that in the event that a worker exceeds the 8-hour day, they financially compensate this item and adequate breaks during long working hours.

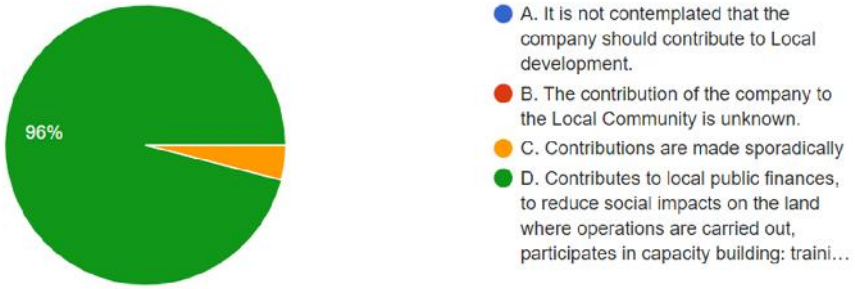
Graph 44: Indicators - Employee Health and Safety Conditions: % Annual Number of Work Accidents



Source; own processing

The coffee growers surveyed stated that less than 10% of the employees suffered some type of accident at work, they provide personal protection elements and regular training on accident prevention, however they are not oblivious to this. The main risk that employees face is strenuous manual work, which can trigger muscle pain, back pain, and extreme fatigue; however, coffee farmers are concerned with providing optimal working conditions to mitigate these risks.

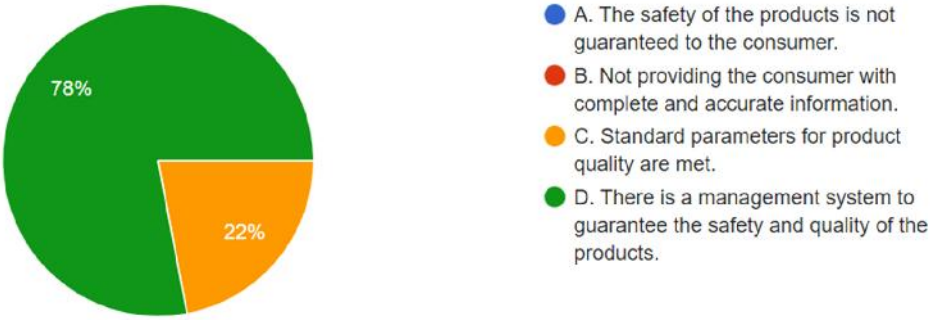
Graph 45: What is the contribution that the company provides to the Development of the Local Community?



Source; own processing

96% of those surveyed stated that they contributed to improving the quality of life of the community. In the open answers that were applied, the coffee growers mention that they not only contribute to the generation of employment, but also with additional training on differente topics like household finances, waste management and also made some activities for the families of the employees, especially their children, since as has been mentioned on several occasions, most of the employees are women heads of household.

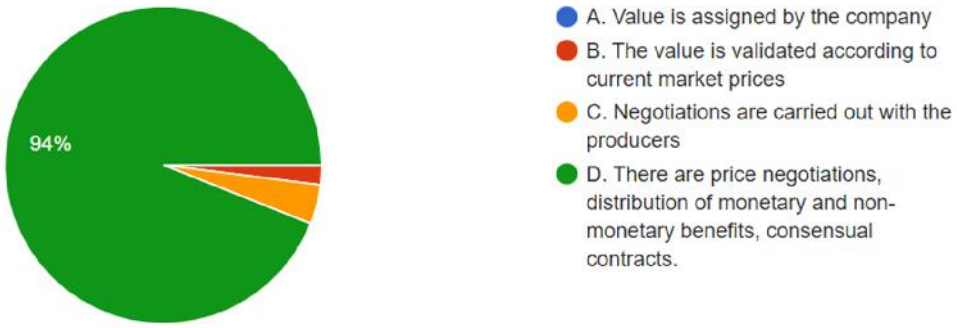
Graph 46: What practices are used regarding the safety and quality of the products?



Source; own processing

Being associated, the coffee farmers surveyed must meet the minimum parameters to be able to sell their coffee to the cooperative, and a great job has been done to achieve high quality standards, guaranteeing that the coffee is produced in a sustainable and ethical way, since it is not only a requirement of the cooperative to achieve the requested quotas, but also to meet the requirements of the certifications they have, that is the reason why almost all coffee growers worried about standard parameters.

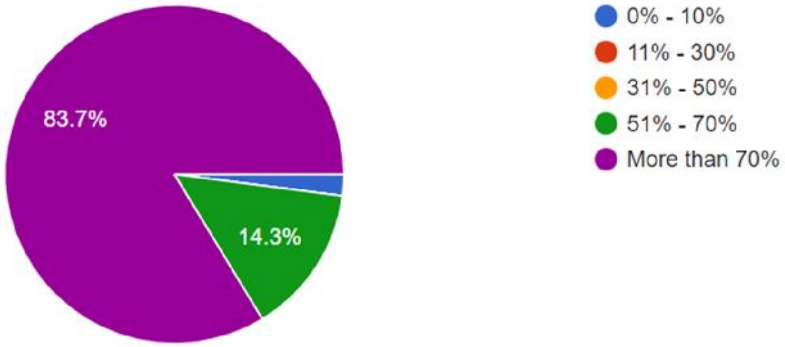
Graph 47: What practices are used for the supply of coffee?



Source; own processing

The commercialization of the final product, in the case of the study population, is done through the cooperative, which is in charge of selling the product, looking for a fair price and transferring the benefits of that negotiation to the coffee grower, that is why This answer is the most selected, to a lesser extent, specific negotiations are carried out with production surpluses, however these negotiations are carried out directly by coffee growers and the price will vary depending on the volume, however those surveyed state that they obtain better prices when volumes are negotiated high through the cooperative.

Graph 48: Indicators - Fair Trade: % of Certified Coffee Suppliers



Source; own processing

The surveyed coffee growers reported that when looking for suppliers, their criteria for choosing them are generally the certifications their products have; This is why the response rate is so high.

For suppliers, it is not a requirement that they have some type of certification so that the coffee grower can comply with the parameters of the certifications they have, however, due to their high degree of commitment to caring for the environment, Arhuaco coffee growers p refer to have a portfolio of suppliers that is aligned with its philosophy and that

meet certain requirements to verify that they are supporting fair and sustainable trade in the supply chain.

After applying the surveys to the coffee growers, the author met virtually with a manager of the cooperative that brings together these coffee growers and whose main objective is to help organize the economy of the native and farming community, especially in the Sierra Nevada de Santa Marta and the Perijá mountain range, in these areas they work with 4 indigenous communities, among them with the Arhuacos, their objective is aligned with the commercialization of high-quality organic coffee, which is produced in harmony and respect for nature.

The mission of this company is not only to market the products but to ensure the well-being of the associates and their families, guaranteeing quality and fair prices for them and being the link between coffee growers, customers, suppliers and even the government to generate prosperity in the zone of influence, and as the manager said during the interview "more than a cooperative, they feel that They are the bridge between the community and the commercial world, not only at the business level but also at the cultural level,,

The work of the association also includes accompaniment in the different stages, in fact, it has a quality laboratory, where coffee growers can analyze their coffees, the analysis is carried out by specialized people, and they also offer technical training in organic production so that coffee growers increase the production and quality of their products. They work for the training of coffee growers also at a technical level, in 2016 they achieved the certification of the first indigenous Q-grader Taster, as the manager said "this is a recognition of the community and the work of the cooperative,,.

The cooperative purchases the coffee and stores these coffees in its collection centers in Valledupar, Codazzi and Pueblo Bello, two municipalities that are geographically central to the extension with which this cooperative works.

Within the community there are common spaces, land that belongs to the community and even tools that everyone uses, additionally each family can have its own territory, which in this case is the one they use to cultivate.

The cooperative receives income from various parties, receives aid from foreign NGOs that seek to promote the well-being of indigenous communities, also development bonuses from some of the regulatory entities and also a brokerage margin that they charge for the sale of the products, these resources are used to pay the salaries of the people who work in the company, in training and technology that they put at the service of the community and use a large portion of this income in investments that they make punctually in the community such as social cinema, workshops recycling, planting trees, restoring schools, education for coffee growers, their employees and their children, health, culture, food sovereignty and security, and the environment. According with the manager, it is an important way of rewarding the community for the good work they do, not only in terms of cultivation but also in caring for the environment.

For this association, the issues of childhood education belonging to the community are important, since they are aware that these children will be the future leaders, that is why

they care about teaching them not only about topics that regular education does, but also about maintaining their indigenous heritage, so they teach them about their native language and traditions.

Additionally, microcredits are offered to coffee growers, since the association knows that agricultural activities have many limitations in order to access credit with the financial sector and due to the nature of their economic activity, they have financing needs from before they begin to sow the land so this is another way the cooperative supports coffee farmers.

The three fundamental pillars of the cooperative are cultural identity, community development and harmony with nature. In cultural identity, they have strong filters for, as mentioned above, they are concerned that even the children of the community continue to be educated on these issues and the culture of these communities is not lost.

Other additional information that the interviewee provided for the study consists of the concept of community that the Arhuacos have, where although it is true they have some common areas, and as the manager said “This creates a very important sense of belonging and teamwork,, where they share not only space but also the tools they have in this area, the vast majority of the families have their own space of land, where each one is autonomous in the type of crops they plant, how they manage them, following the guidelines of their traditions for cultivation and respect for the land.

On the other hand, regarding the certifications, because they are somehow responsible for the coffee that is produced, they manage to have better prices, since they negotiate for high volumes and manage to bring these benefits to the community, by negotiating with the Fairtrade seal, according to the regulations of fairtrade (Fair Trade, 2018) is to manage to negotiate 50 cents of a dollar more per pound, than if they had a traditional product, which makes it even more important for the coffee value chain to guarantee that all the parameters are met to continue maintaining these certifications.

Another advantage that organic crops have over traditional crops is that more than 80% of the inputs are of local origin and negotiations can also be done through the cooperative, this is important at this time in the economy, because for traditional crops, the proportion is different and significantly impacts the finances of coffee growers, because due to the devaluation of the Colombian peso by more than 54% in the last 2 years, added to the increase in the prices of agricultural products that came from Ukraine and Russia, has increased the cost of the product by almost 300%.

In the same way, he reports that one of the advantages of working with indigenous communities is their deep care and love for nature and their respect for its care, which guarantees that the product generated is 100% organic, since in other areas , where the people who grow around organic coffees, are not tuned in to this same way of growing, they use chemical fertilizers and pesticides such as glyphosate, which travels through the air and contaminates organic crops, making them unsellable the product as organic and that affects not only economically but also environmentally the land.

4.4.1 Economic impact

Organic coffee farming can have a positive and sustainable economic impact on farmers and the communities that depend on this economic activity. Some of the main economic impacts of growing coffee could be: improved income, since organic coffee prices are often higher than those of traditional coffee.

Another impact would be the reduction of production costs (Guerrero, 2021), especially in the long term, since having organic crops encourages the use of sustainable practices and natural methods for the control of pests and diseases of the shrubs, on the contrary, traditional crops must use chemicals to combat these and more than 40% of these inputs are imported, generating greater volatility due to dependence on the exchange rate, which in recent years has been hit (Colombian National Bank, 2023) by the pandemic and the crisis in Europe due to the invasion of Russia to Ukraine, the crisis of lack of containers worldwide in 2020 and the strikes in Colombia that do not allow the transfer of products locally, have significantly increased the costs of traditional crops, especially.

Another impact is linked to access to international markets, since organic products are valued in these markets and are willing to pay a fair price for them, increasing sales opportunities for coffee growers.

The cultivation of organic coffee in one way or another can promote community development through the creation of local jobs, giving priority in this specific case to the Arhuaca community, where not only employment is offered to these citizens but also other services such as education. and training in sustainable practices, as well as the support or financing of community projects.

Additionally, these crops are aligned with the ancestral practices of the Arhuaca community and their care and respect for Mother Nature, which allows them to be more conscious in the use of resources, promoting sustainable practices and maintaining soil and water quality.

In general, organic coffee can have a sustainable economic impact for coffee farmers and the community.

4.4.2 Social Impact

The social impacts of organic coffee crops can be significantly positive both for coffee growers and for the community in which these crops are grown, since on one hand it could improve the quality of life, by obtaining higher income for their activity, which can result in greater purchasing power to access food, housing, education and health care. On the other hand, and especially for the Arhuaca community that was studied, this type of cultivation strengthens cultural identity, since it promotes responsible, sustainable and environmentally friendly cultivation, thus respecting their beliefs and their ancestral descendants, which are It has passed from generation to generation and is part of the legacy that coffee growers leave to their children.

The social work they do by creating jobs, giving priority to people in the community and especially women heads of household, guarantees that the benefits and quality of life improve both for the owner of the crop and for each individual. one of its employees, as mentioned above, these crops are located in areas of high armed conflict and drug trafficking, and in one way or another, offering decent and well-paid jobs prevents family members from entering these illegal businesses.

Additionally, gender equality is another important factor that pertains to this study, since the cooperative that sells organic coffee from the Arhuaca community in the Sierra Nevada works mainly with female heads of household, allowing them to have a better quality of life. and that their children also benefit from this economic activity.

At the educational level, another impact is seen because the community and the cooperative that supports this community seek to constantly train people to produce high-quality coffee, but also that the practices carried out are sustainable and not only educate coffee growers and their employees, but they also seek to improve the educational conditions of the children of the community and are aware that these children are the future of the community.

4.4.3 Environmental Impact

The environmental impact generated by growing organic coffee is positive and sustainable. On the one hand, this type of crop promotes soil conservation, by promoting practices such as crop rotation, composting, and the use of organic fertilizers. For the Arhuaca community and its relationship with nature and respect for Mother Nature, these good practices have been done for many years, so with this they not only ensure the sustainability of the crop but also have a healthy soil, with good nutrients. and optimal to generate life in the coffee plantations and additionally reduce erosion.

On the other hand, this type of crop protects biodiversity, respecting the ecosystem and the fauna and flora that live in it, protecting and improving biological diversity in coffee crops, by not becoming a threat with the use of chemicals in pesticides. and herbicides.

The consumption of water and the contamination that occurs in water sources is less than in traditional crops, organic crops encourage water conservation, have a conscious use of this resource, and reduce the impact of climate change in the same way.

Energy is another factor that plays an important role in sustainability issues. For the community studied, energy consumption from renewable sources is still very low, but they are gradually making the change, however, they make conscious use of electricity.

4.4.4 Relationship between some variables

In this part of the study carried out for the thesis, the relationship that could exist between some variables will be analyzed through the results obtained through cross tables.

Graph 49: Relationship between Knowledge and appropriation of sustainability and % of certified suppliers with sustainability

		11.2 Indicators - Sustainable Procurement : % Certified Suppliers with Sustainability Criteria = ((Number of Certified Suppliers with Sustainability Criteria / Total Number of Suppliers)*100)			
		31% - 50%	51% - 70%	More than 70%	Total
4. What is the level of knowledge and appropriation of Sustainability by the company?	B. Low - We are exploring how to apply Sustainability in our company, our processes and products.	0	1	2	3
	C. Medium - We currently apply Good Sustainability Practices in our company.	3	10	19	32
	D. High - We are a benchmark in the coffee sector for the implementation of Good Sustainability Practices.	0	0	15	15
Total		3	11	36	50

Source; own processing in SPSS

In this table it can be seen that there is a high relationship between the knowledge that the company has on sustainability issues and the portfolio of suppliers that are selected with this criterion. As previously mentioned, the priority of coffee growers is not only to produce organic coffee, but that the suppliers are also aligned with the way of thinking and acting of the Arhuaca community, which cares about maintaining a balance and respect for Mother Earth and that they are aware that they must seek allies that are aligned with their beliefs.

Graph 50: Relationship between How is water consumption is currently manager and the % of annual saving value due reduction of water consumption

		37.1 Indicators - Efficiency Savings: % of Annual Savings Value due to reduction in water consumption			
		0% - 1%	2% - 3%	4% - 5%	Total
14. How is water consumption currently managed in the company's processes (Sowing-Postharvest-Processing)?	A. There is no measurement or indicators of water consumption.	0	1	2	3
	B. Follow-up of water consumption indicators is carried out.	4	23	11	38
	C. Indicators are monitored and growers and employees are encouraged to reduce water consumption.	0	3	1	4
	D. Solutions are developed to significantly reduce water consumption during the process (Sowing-Postharvest-Processing).	1	1	3	5
Total		5	28	17	50

Source; own processing in SPSS

As can be seen in the previous table, although it is true that 38 of those surveyed are aware of the water reduction indicator, by taking action on this indicator they only save between 2% and 3% per year. This indicates that although it is low, two important factors play a role: 1 the Arhuacos community is aware of the use of water and is concerned with minimizing the impact that crops have on water consumption, reusing the water that is

possible and on the other hand, by not having strict control, it is difficult to calculate the exact value of the efficiency in water consumption.

Graph 51: Relationship between How is energy consumption is currently manager and the % of annual saving value due reduction of energy consumption

		37.2 Indicators - Efficiency Savings: % of Annual Savings Value due to reduction in energy consumption				
		0% - 1%	2% - 3%	4% - 5%	5% - 7%	Total
16. How is energy consumption currently managed in the company's processes (Postharvest-Processing-Marketing)?	A. There is no measurement or indicators of energy consumption.	0	1	0	0	1
	B. Monitoring of energy consumption indicators is carried out.	7	16	14	2	39
	C. Indicators are monitored and employees are encouraged to save and reduce energy consumption.	0	3	5	1	9
	D. Energy Efficiency solutions are developed to significantly reduce or eliminate energy consumption during the process.	0	0	1	0	1
Total		7	20	20	3	50

Source; own processing in SPSS

This graph shows that despite the fact that the controls on energy consumption in crops are not so well designed, since 39 respondents stated that they only do monitoring but in a very superficial way, however, due to its ancestral nature, the use of resources they do very consciously, it can be seen that the financial savings of the actions they have taken in the last year, are between 2% and 5%.

Graph 52: Relationship between How is organic waste managed and the % of new income from the sale of those reused residues

		36.1 Indicators - New Income: % Income from the sale of Reused Residues			
		0% - 1%	2% - 3%	4% - 5%	Total
18. How is the Organic Waste generated during the planting, harvesting and processing of Coffee currently managed?	B. Currently exploring alternatives for its use.	1	0	1	2
	C. Composting processes are carried out.	5	7	3	15
	D. Composting processes are carried out that generate quality fertilizer for soil regeneration.	2	18	13	33
Total		8	25	17	50

Source; own processing in SPSS

The previous graph shows the relationship that exists between the composting strategies that coffee growers have with the percentage of income they receive from this activity, where it is important to mention that a high percentage of the compost they generate is used in their own crops and if they have more composted they try to sell it to other farmers or even outside of the community.

Graph 53: Relationship between How they managed the organic waste and the % of new clients of sustainable products portfolio

		38 Indicators - Market: % of Annual Number of New Clients of the Sustainable Products Portfolio			
		0% - 10%	11% - 30%	31% - 50%	Total
18. How is the Organic Waste generated during the planting, harvesting and processing of Coffee currently managed?	B. Currently exploring alternatives for its use.	2	0	0	2
	C. Composting processes are carried out.	13	2	0	15
	D. Composting processes are carried out that generate quality fertilizer for soil regeneration.	25	7	1	33
Total		40	9	1	50

Source; own processing in SPSS

This table confirms in some way the result of the previous table, because although it is true, the Arhuaca community is aligned with good environmental practices and is concerned about generating the minimum environmental impact with their crops, when carrying out recycling, composting and other actions that are aligned with being sustainable crops, most of these are used in the same crops and the remaining percentage is very low.

Graph 54: Relationship between Gender inclusion and the practices regarding the principles of non-discrimination

		25 Indicators - Gender Inclusion: % Gender Inclusion = ((Number of Women Hired / Total Staff Hired)*100)			
		11% - 30%	31% - 50%	51% - 70%	Total
24. What practices does the company employ regarding the principles of non-discrimination?	A. Only certain people aligned to race, religion, gender, culture are accepted.	0	0	1	1
	B. The performance and scope are limited according to race, religion, gender, culture.	0	2	2	4
	C. Opportunities are generated regardless of race, religion, gender, culture.	1	11	12	24
	D. There is a system for collecting and managing complaints related to discrimination. Cases of discrimination or non-respect for gender equality are exposed.	1	9	11	21
Total		2	22	26	50

Source; own processing in SPSS

Gender inclusion and non-discrimination principles are closely related, one of the most common forms of discrimination is gender discrimination, due to the fact that non-discrimination means that all people must be treated as equal, regardless of their gender, race, ethnicity, religion or any other characteristic.

For this cooperative and for the coffee growers surveyed, although it is true that there are no strict policies to avoid discrimination, they care about working in equal conditions for all their employees, regardless of their gender, race, religion or any type of characteristic that may bias in hiring, however, on the other hand, being a specific community, located in a territory where conditions do not make it freely accessible, they try to give priority to the people of their community and specifically to the women heads of family, thus also guaranteeing that the well-being that a job can generate and allows them to improve the quality of life, is also transferred to the Arhuaca community in general, however they are open to hiring people from outside the community, and they have done so when necessary they have needed, especially at harvest time.

Graph 55: Relationship between Working conditions to prevent occupational accidents and illnesses and % of annual number of work accidents

		29.1 Indicators - Employee Health and Safety Conditions: % Annual Number of Work Accidents		
		0% - 10%	11% - 30%	Total
28. Which of the following working conditions do employees currently have?	C. Some actions are taken to prevent occupational accidents and illnesses.	29	9	38
	D. Proactive action is taken against the prevention and mitigation of occupational risks and illnesses	12	0	12
Total		41	9	50

Source; own processing in SPSS

The work in the crops is still a very manual job and in some aspects very traditional, however, thanks to the certifications that the products of this community have, they have made a great effort in training their employees and in providing them with the necessary implements to make their work well and avoid any type of accidents, in the same way it is reflected in the accident rates that 82% are below 10%, an index that when validated with the coffee growers they again show that it is less than 5%, and these accidents are basically due to minor accidents suffered by workers due to small oversights and as a result of which they try to make improvements so that they do not happen again.

Graph 56: Relationship between Annual number of occupational risk prevention programs and % of annual number of work accidents

		29.1 Indicators - Employee Health and Safety Conditions: % Annual Number of Work Accidents		
		0% - 10%	11% - 30%	Total
29.2 Indicators - Employee Health and Safety Conditions: Annual Number of Occupational Risk and Disease Prevention Programs	1 - 3	1	0	1
	4-5	8	7	15
	5-7	13	2	15
	7-10	9	0	9
	More than 10	10	0	10
Total		41	9	50

Source; own processing in SPSS

The above graph confirms that coffee growers are concerned about maintaining prevention programs and that the greater the number of programs, the lower the accident rate among workers, which is why, although it is true that most coffee growers carry out an extensive training in various accident issues, such as handling tools, personal protection equipment, postures to take care of the back and legs at the time of collection, among others, they also have safety talks every day to be constantly alert to dangers that can occur in crops.

It is also important to mention that at harvest time the talks increase, since that is where the largest number of employees are concentrated and consequently, if preventive training is not carried out, the accident rate would be higher.

5 Results and Discussion

At the beginning of this thesis, objectives were raised about the positive and negative effects of organic coffee crops in the indigenous community of the Arhuacos in the Sierra Nevada de Santa Marta, a population that, due to its worldview, is highly committed to caring for the environment and that contributes to the development of society from its community and its values, additionally they contribute economically to the development of the country, because although it is true that agricultural activity in the country is only 6.3% of the GDP, in general terms they offer employment to 62% of the rural population (OECD, 2023), so this economic sector is vital for a country like Colombia. When putting on a balance the positive effects are more than the negative, however, both aspects must be evaluated.

In the social sphere, the impact is considered positive because this community is generating quality employment, with fair wages, which allow a good quality of life for its employees and their families, as well as safe working conditions, where not only personal protection elements, but are in constant training to make them more aware of the dangers to which they are exposed and minimize accidents. On the other hand, part of the profits received and the development bonuses to which one has access due to the fact of being certified, mean that these benefits are also transferred to the community, materializing this item in improvements made to schools, to roads, in replanting programs, education programs for coffee growers and their families, and even recreational activities for them, however, according with Rosalba Castillo (Castillo & Nigh, 1998) many times marketing makes you want to see global things and lose the sense of identity of the communities.

The most relevant negative aspect is the long working hours during the harvest season, which make the workers' fatigue visible; however, the coffee farmers remunerate this extra effort and also allow the workers to have rest time and active breaks to not affect your physical and mental health. Additionally, for other authors (Chica & Gracia, 2014), the fact that a crop has this type of certification does not guarantee that they have food security from the homes of the employees, although it is true that a scan cannot be made on this statement, the coffee growers surveyed, being part of an indigenous community such as the Arhuaca, ensure that the employees also have good food conditions.

The environmental aspect is another important pillar in this type of cultivation and is more relevant for the Arhuaca community, since they have a deep respect for nature and have always been concerned with treating it with respect and being aware of the use of resources. One of the main environmental strengths of organic coffee crops is that they do not use pesticides or chemical fertilizers, which favors the care of flora and fauna and even the care of water sources, since these chemicals do not reach them, additionally it improves the quality of the land where the crops are located, and the use of other tree species to create shade also improves the quality of the soil and prevents erosion on the land. Some authors (Vossen, 2005) found that in African countries mainly, these shade trees can negatively affect productivity due to strong competition with coffee for available soil moisture, however for the area of this study, humidity and rainfall conditions do not allow this conflict between species to exist.

The production of organic coffee at an economic level has two faces, one positive and one negative, the positive is that coffee farmers receive a higher value for this type of coffee in the market and in case the price drops too much by having certifications such as Fair Trade, they ensure a minimum sale price, which guarantees the cost of production and therefore this also translates into benefits for the coffee grower, their employees and their families. Additionally, as they are Premium coffees, it allows the cooperative, which is in charge of marketing the product, to access new markets and increase the demand for the product. On the other hand, from the point of view of the coffee grower, the negative financial impact is the limitations that exist to access credit, since it is due to the business circle, to start the harvest a high capital is required, which has a return over time, but the initial period is a dead period, so they must have a special repayment plan and these credits are difficult for small coffee growers to access, on the other hand, the cooperative that associates this specific community also supports at a financial level to these coffee growers, giving them access to lines of credit according to their needs.

Regarding the limitations of this study, on one hand, they are due to the fact that it was not possible to survey the entire population, however, as mentioned in the methodology, the sample has a confidence level of 90%, which continues to be representative for the total of the target population and useful in the results of the surveys. On the other hand, there is no other population with similar characteristics that can allow comparing the behavior of the Arhuacos with another community in the same region.

Some recommendations that can be offered to this community or for future research could be linked, on the one hand, to the measurement of the consumption of water, light, and their efficiencies for certain for these items, to seek renewable alternatives and financing for to be able to install them and, on the other hand, to look for allies that allow them to develop alternatives for the use of waste.

6 Conclusion

After the research work carried out, the collection of information and its analysis, the following conclusions can be reached:

There are more positive impacts that organic crops have economically than negative, because in the case of the Arhuaca community studied, having certifications that guarantee their quality of organic coffee, allows them to obtain fairer prices for their production and, in turn, also receive economic incentives that are transferred to the community, another important factor is that when they are members of the cooperative, in addition to having price benefits, they also have access to lines of credit that are difficult to obtain for coffee growers who are not members.

For the commercialization of organic products it is important to have certifications that accredit it as such, for coffee it is not the exception and this community has benefited from being able to have certifications such as FairTrade and USDA, which allow them to have access to markets in Europe and the United States, guarantee a fair price and additional benefits that translate into well-being for the community.

Being a community that genuinely cares about the environment, the circular economy is something that they have implicitly rooted in, as they care about reducing waste, circulating raw materials and regenerating nature, as they are aware that with this they do not only ensure a good quality product, but Mother Earth is not affected, additionally they know the importance of acting as corridors for migratory birds, pollinators and in general terms the environment.

The cultivation of organic coffee and especially that which is cultivated in the studied population, contributes to the fulfillment of the following sustainable development objectives: Eradication of poverty, Good Health and Wellness, Gender Equality, Clean Water and Sanitation, affordable and clean energy, Reduced of Inequelities, Responsible consumption and production and climate action.

In conclusion, coffee production in the Arhuaco community plays an important role within the community, not only at a social, environmental and financial level, but also with its ancestral philosophy and worldview of nature and its care.

7 References

Airhart, M. G. (2014). *Shade Grown Coffee Shrinking as a Proportion of Global Coffee Production*. https://cns.utexas.edu/news/shade-grown-coffee

Anei Coffee | Organic Coffee—Home. (n.d.). Anei Coffee | Organic Coffee. Retrieved March 22, 2023, from https://anei.org.co/

Arteta, D. A. P. (2013). *Concepciones sobre el buen vivir de los pueblos indígenas en Colombia, frente al concepto de desarrollo de la sociedad mayoritaria. Un estudio de casos, el pueblo Sikuani de la Orinoquía colombiana y el pueblo Arhuaco de la Sierra Nevada*.

Castillo, R. A. H., & Nigh, R. (1998). Global Processes and Local Identity among Mayan Coffee Growers in Chiapas, Mexico. *American Anthropologist*, *100*(1), 136–147. https://doi.org/10.1525/aa.1998.100.1.136

CEC. (2023). *CEC - Centro Economía Circular*. https://www.cec.expert/

Cenicafe. (2022). *Coffee varieties planted in colombia*. https://www.cenicafe.org/es/publications/C1.pdf

Chica, O. A. M., & Gracia, J. R. (2014). Seguridad e inocuidad alimentaria en hogares de jornaleros de fincas cafeteras con o sin certificación del suroeste de Antioquia-Colombia. *Vitae*, *21*(1), Article 1. https://doi.org/10.17533/udea.vitae.15767

Coffe&Climate. (2023). Growing Coffee in the Face of Climate Change. *Initiative for Coffee&climate*. https://coffeeandclimate.org/growing-coffee-in-the-face-of-climate-change/

Colombia travel. (2022). *Characteristic of Sierra Nevada de Santa Marta*. https://colombia.travel/es/blog/sierra-nevada-de-santa-marta-tierra-de-nieve-e-indigenas

Colombian Coffee. (2023). Colombian Coffee History. *Café de Colombia*. https://www.cafedecolombia.com/particulares/historia-del-cafe-de-colombia/

Colombian National Bank. (2023). *Tasa Representativa del Mercado (TRM - Peso por dólar) | Banco de la República*. https://www.banrep.gov.co/es/estadisticas/trm

Colombian National Parks Organization. (2022). *ORGANIZACIÓN COLPARQUES - Paraísos por descubrir en Colombia!* ORGANIZACIÓN COLPARQUES - Paraísos Por Descubrir En Colombia! http://www.colparques.net

Dane. (2019a). *Ethnic groups*. https://www.dane.gov.co/index.php/en/estadisticas-por-tema/demografia-y-poblacion/grupos-etnicos/informacion-tecnica

Dane. (2019b). *Etnical groups, presentation*. https://www.dane.gov.co/files/investigaciones/boletines/grupos-etnicos/presentacion-grupos-etnicos-2019.pdf

De Andreis, S. (2022). Colombian Map and Sierra Nevada de Santa Marta [Billet]. *IFEA*. https://ifea.hypotheses.org/5746

Ellen Macarthur Foundation. (2019a). *Circular economy*. https://ellenmacarthurfoundation.org/topics/circular-economy-introduction/overview

Ellen Macarthur Foundation. (2019b). *The butterfly diagram: Visualising the circular economy*. https://ellenmacarthurfoundation.org/circular-economy-diagram

Euromonitor. (2022a). *Global Market Overview of Coffee*. Euromonitor. https://www.euromonitor.com/global-market-overview-of-coffee/report

Euromonitor. (2022b). *Market Size*. https://www-portal-euromonitor-com.infozdroje.czu.cz/portal/statisticsevolution/index

Fair Trade. (2018). *Guidance_Document_for_Fairtrade_Coffee_Pricing_2_0_SP_Abril_2018.pdf*.

https://files.fairtrade.net/standards/Guidance_Document_for_Fairtrade_Coffee_Pricing_2_0_SP_Abril_2018.pdf

Fair Trade. (2023). *The Fairtrade Marks*. Fairtrade International. https://www.fairtrade.net/about/fairtrade-marks

Federacion Nacional de Cafeteros. (2022a). Concluye Encuentro Nacional de Mujeres Líderes Cafeteras. *Federación Nacional de Cafeteros Cauca*. https://cauca.federaciondecafeteros.org/listado-noticias/concluye-encuentro-nacional-de-mujeres-lideres-cafeteras/

Federacion Nacional de Cafeteros. (2022b). FEDERACION DE CAFETEROS, Quiénes Somos. *Federación Nacional de Cafeteros*. https://federaciondecafeteros.org/wp/federacion/quienes-somos/

Federacion Nacional de Cafeteros. (2023a). Colombian Coffee Statistic. *Federación Nacional de Cafeteros*. https://federaciondecafeteros.org/wp/estadisticas-cafeteras/

Federacion Nacional de Cafeteros. (2023b). Regístrese como exportador. *Federación Nacional de Cafeteros*. https://federaciondecafeteros.org/wp/garantizamos-la-calidad-del-cafe/registrese-como-exportador/

Food and Agriculture Organization of the United Nations. (2022). *FAO, varieties of plants*. https://www.fao.org/3/ae939e/ae939e03.htm#bm03.1.1

FUNDACION PUBLICA. (2011). *Ley 1482 de 2011—Gestor Normativo—Función Pública*. https://www.funcionpublica.gov.co/eva/gestornormativo/norma.php?i=44932

Global coffee Platform. (2021). *CoffeeSustainability*. https://www.globalcoffeeplatform.org/wp-content/uploads/2021/10/CSRC_CoffeeSustainabilityReferenceCode_OCT21.pdf

Guerrero, T. (2021). Cómo calcular el precio de venta de tu café. *Perfect Daily Grind Español*. https://perfectdailygrind.com/es/2021/10/06/como-calcular-el-precio-de-venta-de-tu-cafe/

ICO, Executive summary. (n.d.). Retrieved November 12, 2022, from http://www.ico.org/libser/executive%20summary.pdf

International Coffee Organization. (2004). *Sustainable Coffee*. http://www.ico.org/libser/executive%20summary.pdf

Labor Ministery. (2022). *Minimum wage in Colombia in 2023*. https://www.mintrabajo.gov.co/prensa/comunicados/2022/diciembre/-1.160.000-ser%C3%A1-el-salario-minimo-para-2023-y-auxilio-de-transporte-por-140.606

MacDonnell, K. (2022). 5 Coffee Certifications. *Coffee Affection*. https://coffeeaffection.com/what-do-coffee-certifications-mean/

Ministery of Environment. (2023). Minambiente amplía área de protección de la Sierra Nevada de Santa Marta. *Ministerio de Ambiente y Desarrollo Sostenible*. https://www.minambiente.gov.co/comunicado-de-prensa/minambiente-amplia-area-de-proteccion-de-la-sierra-nevada-de-santa-marta/

Nasdaq. (2023). *Coffee Price: Latest Futures Prices, Charts & Market News | Nasdaq*. https://www.nasdaq.com/market-activity/commodities/kt:nmx

Nerger, M. (2021). *Rainforest Alliance Certified Coffee*. Rainforest Alliance. https://www.rainforest-alliance.org/insights/rainforest-alliance-certified-coffee/

OECD. (2023). *Sustainable agriculture*. https://www.oecd.ilibrary.org/agriculture-and-food/sustainable-agriculture/indicator-group/english_22c0adbc-en#relatedtitles

Portafolio. (2023). *Entre septiembre y noviembre de 2022 hubo 13,09 millones de informales*. Portafolio.co. https://www.portafolio.co/economia/informalidad-laboral-en-colombia-2022-576942

Rain Forest Alliance ORG. (2018a). *UTZ Certification*. Rainforest Alliance. https://www.rainforest-alliance.org/utz/

Rain Forest Alliance ORG. (2018b). *UTZ Certification (Now Part of the Rainforest Alliance)*. Rainforest Alliance. https://www.rainforest-alliance.org/utz/

Rain Forest Alliance ORG. (2020, May 18). *Nuevo sello de certificación Rainforest Alliance*. Rainforest Alliance | Para empresas. https://www.rainforest-alliance.org/es/business-es/mercadeo-de-la-sostenibilidad/nuevo-sello/

Rain Forest Alliance ORG. (2021a). *2020 Sustainable Agriculture Standard: Farm Requirements*. Rainforest Alliance. https://www.rainforest-alliance.org/resource-item/2020-sustainable-agriculture-standard-farm-requirements/

Rain Forest Alliance ORG. (2021b). *2020 Sustainable Agriculture Standard: Supply Chain Requirements*. Rainforest Alliance. https://www.rainforest-alliance.org/resource-item/2020-sustainable-agriculture-standard-supply-chain-requirements/

Rain Forest Alliance ORG. (2022). *Logo Rainforest Alliance*. Rainforest Alliance. https://www.rainforest-alliance.org/business/marketing-sustainability/using-our-logo-and-seal/

Smithsonian's national zoo& conservation biology Institute. (2017). *Certification Agencies*. Smithsonian's National Zoo. https://nationalzoo.si.edu/migratory-birds/certification-agencies

Statista. (2022). *Worlwide Coffee Production 2003-2021*. Statista. https://es.statista.com/estadisticas/635187/mercado-del-cafe-produccion-mundial/

Statista. (2023). *Worldwide Coffee Production 2003-2022*. Statista. https://es.statista.com/estadisticas/635187/mercado-del-cafe-produccion-mundial/

Unesco. (2021). *UNESCO - Ancestral system of knowledge of the four indigenous peoples, Arhuaco, Kankuamo, Kogui and Wiwa of the Sierra Nevada de Santa Marta*.

https://ich.unesco.org/en/RL/ancestral-system-of-knowledge-of-the-four-indigenous-peoples-arhuaco-kankuamo-kogui-and-wiwa-of-the-sierra-nevada-de-santa-marta-01886

United Nations, O. on D. and C. (2022). *El cultivo de coca alcanzo niveles historicos en Colombia con 204.000 hectareas registradas en 2021*. https://www.unodc.org/colombia/es/el-cultivo-de-coca-alcanzo-niveles-historicos-en-colombia-con-204-000-hectareas-registradas-en-2021.html

U.S. Depatment of agriculture. (2023). *Organic4colorsealJPG.jpg (436×436)*. https://www.ams.usda.gov/sites/default/files/media/Organic4colorsealJPG.jpg

Vargas, O. M. B. (2017). *Hacia la sostenibilidad cafetera Un análisis de política pública*.

Vossen, H. a. M. V. D. (2005). A CRITICAL ANALYSIS OF THE AGRONOMIC AND ECONOMIC SUSTAINABILITY OF ORGANIC COFFEE PRODUCTION. *Experimental Agriculture*, *41*(4), 449–473. https://doi.org/10.1017/S0014479705002863

Worldmeters. (2023). *Colombian Map*. https://www.worldometers.info/maps/colombia-map/

Yahoo Finance. (2019). *10 Countries with the Highest Coffee Consumption in the World*. Yahoo Finance. https://finance.yahoo.com/news/10-countries-highest-coffee-consumption-045444069.html

Yahoo Finance. (2022). *Key market trends*. https://finance.yahoo.com/news/102-billion-global-coffee-market-132300785.html

8 List of pictures, tables, graphs and abbreviations

8.4 List of pictures

8.5 List of tables

8.6 List of graphs

8.7 List of abbreviations

DANE	National Administrative Department of Statistics
GDP	Growth Domestic Product
ICO	International Coffee Organization
CEC	Circular Economy Center

Appendix

Questionnaire		
Good morning, this questionnaire was created for educational purposes, it is an anonymous survey and the results will be used only for these purposes. Your data will be treated with strict confidentiality.		
1	How long have you had organic coffee crops?	
2	Before you had organic coffee crops, Did you grow coffee in the traditional way?	
3	If you had traditional crops before organic coffee crops, Why did you change those crops?	
1. CULTURE AND SUSTAINABILITY STRATEGY		
1.1 Knowledge and Appropriation of Sustainability		
4	**What is the level of knowledge and appropriation of Sustainability by the company?**	
	A. Lack of knowledge - This is a new topic for us.	
	B. Low - We are exploring how to apply Sustainability in our company, our processes and products.	
	C. Medium - We currently apply Good Sustainability Practices in our company.	
	D. High - We are a benchmark in the coffee sector for the implementation of Good Sustainability Practices.	
5	**Does the company currently have any Certification related to Sustainability?**	
	A. Yes	
	B. No	
6	**What Certifications does your Company have?**	
	A. BIC Society	
	B. Company B	
	C. Green Business	
	D. Zero Waste	
	E. ICONTEC Sustainability Seal	
	F. Colombian Environmental Seal SAC	
	G. Rainforest Alliance	
	H. FAIRTRADE	
	I. USDA ORGANIC	
	J. FSC - Forest Stewardship Council	
	K. Other, ¿Which one?	

1.2 Sustainability Strategy		
7	**Does the company contribute more directly to which of the 17 Sustainable Development Goals?**	
	1. End of Poverty	
	2. Zero Hunger	
	3. Good Health and Wellness	
	4. Quality Education	
	5. Gender Equality	
	6. Clean Water and Sanitation	
	7. Affordable and Clean Energy	
	8. Decent Work and Economic Growth	
	9. Industry, Innovation and Infrastructure	
	10. Reduced of Inequalities	
	11. Sustainable Cities and Communities	
	12. Responsible Production and Consumption	
	13. Climate Action	
	14. Life Bellow water	
	15. Life on land	
	16. Peace, Justice and Strong Institutions	
	17. Partnerships for the Goals	
	None	
8	**Does it describe what is the contribution to this Sustainable Development Goal and how is it materialized?**	
	Are these contributions currently measured? Describe indicators and values obtained	
9	**What is the main motivation of the company to implement Sustainability?**	
	Contribute to the care of the Environment	
	Contribute to Social Development	
	Contribute a Triple Impact (Development: Environmental - Social and Economic)	
	Make a difference in the world	
	Align with Global Trends	
	Contribute to the Mitigation of Climate Change	
	Be aligned with the regulation and respond to Market Barriers	
	Continue and preserve a Tradition and Ancestral Knowledge	
	Generate income contributing to Sustainable Development	
	None of the above	

2. ENVIRONMENTAL MANAGEMENT		
2.1 Sustainable Purchasing		
10	**How are the purchases of inputs for the company currently managed?**	
	A. The selection is prioritized according to price.	
	B. It is purchased according to the needs of the company.	
	C. Purchases from Local Suppliers are prioritized.	
	D. Sustainability Criteria are contemplated for the selection of suppliers - Supplier development is carried out - Suppliers of Inputs of Natural Origin.	
Indicators - Sustainable Procurement		
11	% Local Suppliers = ((Number of Local Suppliers / Total Number of Suppliers)*100)	
	% Certified Suppliers with Sustainability Criteria = ((Number of Certified Suppliers with Sustainability Criteria / Total Number of Suppliers)*100)	
2.2 Soil and Biodiversity Management		
12	**How is the soil currently managed in the Sowing processes?**	
	A. The forest is cut down to expand the cultivated hectares.	
	B. There are previously cultivated spaces that are expanded according to needs.	
	C. Planting spaces are clearly defined.	
	D. There are clearly defined planting spaces, with green corridors, protected areas, areas for rivers and streams, reserves with native and local vegetation.	
Indicators - Soil Management and Biodiversity		
13	% Cultivated Area = ((Number of Coffee Cultivated Hectares / Total Number of Hectares)*100)	
	% Reserve Area = ((Number of Reserve Hectares / Total Number of Hectares)*100)	
2.3 Water Management		
14	**How is water consumption currently managed in the company's processes (Sowing-Postharvest-Processing)?**	
	A. There is no measurement or indicators of water consumption.	
	B. Follow-up of water consumption indicators is carried out.	
	C. Indicators are monitored and growers and employees are encouraged to reduce water consumption.	
	D. Solutions are developed to significantly reduce water consumption during the process (Sowing-Postharvest-Processing).	
Indicators - Water Management and Consumption		
15	Total Number of Consumed Liters / Year	
	Number of Consumed Liters / Year from Reservoirs and Rainwater Tanks	
	C. Indicators are monitored and employees are encouraged to save and reduce energy consumption.	

	D. Energy Efficiency solutions are developed to significantly reduce or eliminate energy consumption during the process.	
2.4 Energy Management		
16	**How is energy consumption currently managed in the company's processes (Postharvest-Processing-Marketing)?**	
	A. There is no measurement or indicators of energy consumption.	
	B. Monitoring of energy consumption indicators is carried out.	
	C. Indicators are monitored and employees are encouraged to save and reduce energy consumption.	
	D. Energy Efficiency solutions are developed to significantly reduce or eliminate energy consumption during the process.	
17	**What type of energy is used in the production process (Postharvest-Processing-Marketing)?**	
	A. Electricity is not used	
	B. Conventional energy from the grid	
	C. Renewable Energy (Solar - Wind)	
2.5 Management and Use of Organic Waste - Biomass		
18	**How is the Organic Waste generated during the planting, harvesting and processing of Coffee currently managed?**	
	A. Nothing is done.	
	B. Currently exploring alternatives for its use.	
	C. Composting processes are carried out.	
	D. Composting processes are carried out that generate quality fertilizer for soil regeneration.	
2.6 Management and Use of Solid Waste		
19	**How is Solid Waste (packaging) generated during the planting, harvesting, processing and marketing of Coffee currently managed?**	
	A. They are piled up and mixed haphazardly and unsorted, left there.	
	B. They are stored in containers to be taken to the Sanitary Landfill.	
	C. They are classified and ordered according to usable, not usable.	
	D. We have allied companies and collaboration with external companies that collect, recycle and take advantage of our waste.	
2.7 Marketing and Use of Packaging		
20	**How is the marketing of the products currently carried out?**	
	A. The products have single-use packaging and/or packaging.	
	B. The products have reusable packaging and/or packaging.	
	C. The company has a Reverse Logistics and packaging collection program.	
	D. We have replaced the offer of products by the provision of services.	
21	**What other Good Environmental Practices are implemented in the company?**	

3. SOCIAL MANAGEMENT		
3.1 Occupational Safety & Dignified and Fair Treatment		
22	**How does the company engage its employees?**	
	A. No type of labor relationship is generated	
	B. There is a verbal agreement	
	C. There are contracts, however, not all the conditions are met: social benefits, social security, fair salary	
	D. All employees are bound to contracts that comply with current national labor laws and are paid fair wages.	
Indicators - Safety and Labor Relations		
23	Number of Employees with a Contract, Social Benefits and Social Security	
	Number of Employees with Salaries higher than the national average according to their functions	
24	**What practices does the company employ regarding the principles of non-discrimination?**	
	A. Only certain people aligned to race, religion, gender, culture are accepted.	
	B. The performance and scope are limited according to race, religion, gender, culture.	
	C. Opportunities are generated regardless of race, religion, gender, culture.	
	D. There is a system for collecting and managing complaints related to discrimination. Cases of discrimination or non-respect for gender equality are exposed.	
Indicators - Gender Inclusion		
25	% Gender Inclusion = ((Number of Women Hired / Total Staff Hired)*100)	
3.2 Respect for and Improvement of Employee Health and Safety Conditions		
26	**What working conditions are used to maintain a correct Mental Health of workers?**	
	A. There are no breaks or rest spaces during the Working Hours.	
	B. There is no vacation period - here you work on the go.	
	C. Spaces and break times are available.	
	D. The rights to rest and take vacations are respected, employees who have atypical hours or who work overtime are compensated.	
Indicators - Mental Health Conditions		
27	Number of Daily Hours of the Working Day	
28	**Which of the following working conditions do employees currently have?**	
	A. The occupational risks are not known. Employees are exposed to High Occupational Risks	
	B. The risks are known, however, Occupational Risks are not managed.	
	C. Some actions are taken to prevent occupational accidents and illnesses.	
	D. Proactive action is taken against the prevention and mitigation of occupational risks and illnesses	

Indicators - Employee Health and Safety Conditions		
29	Annual Number of Work Accidents	
	Annual Number of Occupational Risk and Disease Prevention Programs	
3.3 Contribution to Local Community Development		
30	**What is the contribution that the company provides to the Development of the Local Community?**	
	A. It is not contemplated that the company should contribute to Local development.	
	B. The contribution of the company to the Local Community is unknown.	
	C. Contributions are made sporadically	
	D. Contributes to local public finances, to reduce social impacts on the land where operations are carried out, participates in capacity building: training, support for local schools.	
Indicators - Employee Health and Safety Conditions		
31	Annual Number of Training Programs for the Community	
32	**What other contributions does the company make to promote Local Community Development?**	
3.4 Product Safety, Transparent Information and Responsible Relationship with Suppliers and Customers		
33	**What practices are used regarding the safety and quality of the products?**	
	A. The safety of the products is not guaranteed to the consumer.	
	B. Not providing the consumer with complete and accurate information.	
	C. Standard parameters for product quality are met.	
	D. There is a management system to guarantee the safety and quality of the products.	
34	**What practices are used for the supply of coffee?**	
	A. Value is assigned by the company	
	B. The value is validated according to current market prices	
	C. Negotiations are carried out with the producers	
	D. There are price negotiations, distribution of monetary and non-monetary benefits, consensual contracts.	
Indicators - Fair Trade		
35	% of Suppliers benefited from the Coffee Supplier Development Program	
	% of Certified Coffee Suppliers	
4. FINANCIAL MANAGEMENT		
Indicators - New Income		
36	% Income from the sale of Reused Residues	
	% Income per Portfolio of Sustainable Products	

Indicators - Efficiency Savings		
37	% of Annual Savings Value due to reduction in water consumption	
	% of Annual Savings Value due to reduction in energy consumption	
Indicators - Market		
38	% f Annual Number of New Clients of the Sustainable Products Portfolio	
Indicators - Investments		
39	% of the Budget dedicated to Sustainability and Circular Economy	
40	% de Financiación de los Proyectos de Sostenibilidad y Economía Circular	

Interview questionnaire

These questions were asked in a semi-structured interview for a leader of the cooperative that brings together the previously surveyed coffee growers and is for educational purposes only.

1. How long has the cooperative been in operation?
2. Which is the main goal of the cooperative (mission, values, etc.)?
3. How is the accompaniment that the cooperative does to the associates?
4. What is the added value of belonging to the cooperative?
5. What kind of training do you offer to the community?
6. How often do you do the training?
7. How is the coffee buying process?
8. How is the process of selling coffee?
9. Generalities of the Arhuaca community? how does it work?
10. What kind of hierarchy do they have?
11. What kind of freedom coffee farmers have to work their crops and to negotiate the harvests?
12. What type of income does the cooperative receive in addition to the intermediation margin for the sale of coffee?
13. What kind of additional economic benefits do the certifications of the coffees have?
14. How do you invest the additional resources than you receive?
15. What kind of activities do you do with the community?
16. What are the benefits of organic crops compared to traditional crops?