

Value chain analyses assist in informing policy dialogue and investment operations. They help the understanding of how agricultural development fits within market dynamics. They permit an assessment of the value chains' impact on smallholders, businesses, society and environment.

The European Commission has developed a standardised methodological framework for analysis (<https://europa.eu/capacity4dev/value-chain-analysis-for-development-vca4d/wiki/1-vca4d-methodology>). It aims to understand to what extent the value chain allows for inclusive growth and whether it is both socially and environmentally sustainable.

Context of the value chain

Coffee in Ecuador is produced by small producers that supply the industries of instant, toasted, ground coffee as well as a line of speciality coffee. The varied microclimates of the country favor the production of Arabica and Robusta coffee. However, the area for coffee cultivation has been reduced over the last few years. At present, the production of Robusta

coffee does not provide the raw materials demanded by the industry, which has to import materials for processing and export. Conventional coffee represents 90% of production (Figure 1). The development of new markets such as differentiated and speciality coffees, and the increase in coffee consumption amongst the younger population, have opened up opportunities both for the internal and external markets.

The European Union Intervention

Within the framework of the Multiannual Indicative Program for the period 2014/2021, the European Union (EU) and the government of Ecuador have focused their cooperation on two sectors totaling €67 million: (i) support for sustainable and inclusive growth at the local level; (ii) promotion of sustainable trade. The coffee value chain (VC) benefits from this support.

The EU granted €26 million through the Budget Support modality to support the Agenda for the Economic and Productive Reactivation of the areas affected by the earthquake of April 16, 2016 in accordance with the National Development Plan 2017-2021 "Toda Una Vida", which focuses on the provinces of Manabí and Esmeraldas. Under this framework, the EU Delegation started a short-term Technical Assistance at the end of 2021 to design a competitive improvement proposal for the industrial Arabica coffee sector in Manabí (ATI- Coffee Cluster).

café arábica de Manabí (ATI-Clúster café).

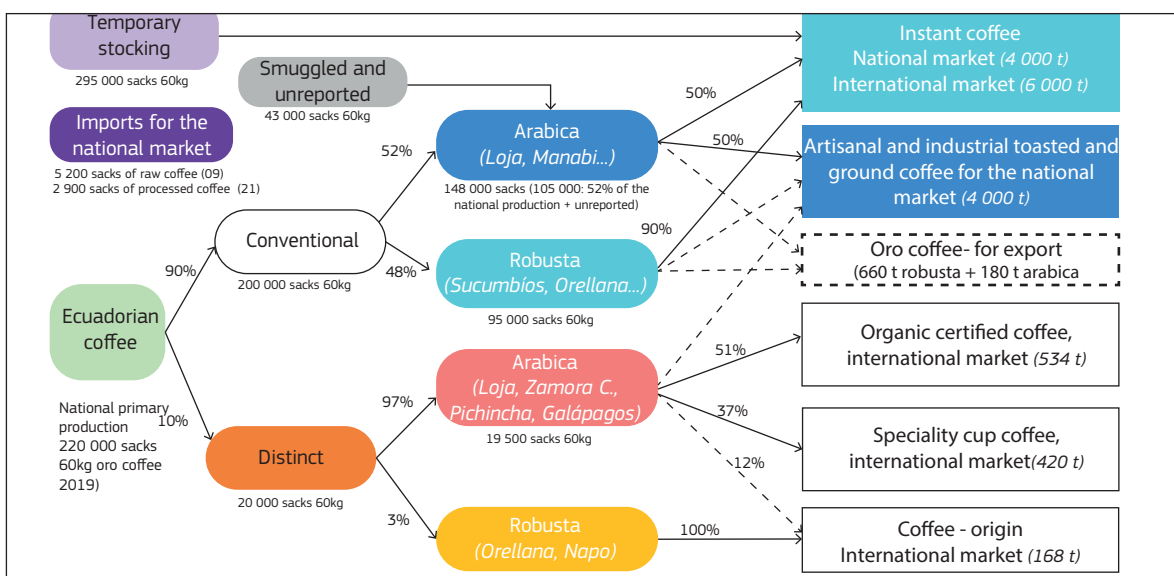


Figura 1: Map of the coffee VC in Ecuador

Functional analysis

A decreasing production

In 2019 (the reference year of the study), primary production was estimated at 220,000 of 60 kg sacks of raw coffee (13,200 t), produced by 37,000 producers on a harvested area of 38,500 ha.

Ecuadorian coffee growing has seen a drastic drop in the last 20 years. In 2001, the production was 150,000 t and the harvested area was 400,000 ha.

There are several factors that explain this decrease: the continuous decline in international coffee prices, rust and borer diseases, low production levels, the dollarisation of the economy that increased the cost of labour, the lack of credit, etc. which led to a gradual abandonment of coffee growing. This situation led producers to direct their activity towards other more profitable items such as cocoa, corn and livestock.

Coffee production is located in almost the entire country

The majority of production is located in the Oriental (40%) and Sierra (40%) regions, followed by the Coast (19%) and 1% of production in the Galapagos. 67% of the national surface is cultivated in Arabica coffee, concentrated in Manabí on the Coast (26%) and Loja in the Sierra (23%). The main Robusta coffee producing province is Sucumbíos in the Oriental region (38%).

There are several Denomination of Origin (DO) projects, more or less advanced. The 'Café de Galápagos' has already started. In Loja, the denomination 'Lojano Café de Origen' has already been authorised. The 'Café de Zaruma', and other areas are also likely to obtain this denomination.

Instant coffee industry

Ecuador has the most developed instant and freeze-dried coffee industry in the region, achieving 8% of the world total in 2014. Since national production is not enough, Ecuador imports a large amount of raw coffee to cover its needs, about 17,700 t (64% of the total raw material processed), especially Robusta from Vietnam and Brazil, as well as coffee from Honduras, amongst others.

The industrial sector has the requisite knowledge, workforce and adequate machinery which has allowed it to compete and remain in the international market, although its capacity has been underutilised. It may therefore be threatened by the booming instant coffee industry in Vietnam, which has access

Coffee in Ecuador	Area harvested (ha)	Yield (t/ha)	Production of oro coffee (t)
Arabica	25 830	0.26	6 643
Robusta	12 670	0.53	6 769
Total coffee	38 500	0.35	13 413

Table 1 : Production of Arabica and Robusta coffee

to cheap raw material and lower labour costs.

Two types of coffee: conventional and differentiated

Production is divided into two large groups: i) conventional coffee that represents 90% of primary production (about 12,000 t), whose prices are governed by the London Stock Exchange for Robusta and the New York Stock Exchange for Arabica. Most of its production is used in the instant and roasted/ground standard quality industry; and ii) differentiated coffees that represents 10% of the production destined for export, whose prices are governed by agreements between buyers and sellers (Figure 1).

Conventional coffees are divided into Arabica and Robusta (Table 1). In 2019, Robusta coffee represented 48% of total production, used by the instant coffee industry. Half of the conventional Arabica coffee was used by the instant industry and the other half by the roasting and grinding industry. The majority of the conventional coffee produced in Ecuador is destined as raw material for the instant coffee industry that is mainly destined for export.

Differentiated coffees are divided into four types: i) organic coffee; ii) special 'cup' coffee; iii) coffee with denomination of origin; and iv) differentiated Robusta coffee. They are intended for export.

Actors and sub-chains

It was estimated that the VC has 37,000 producers (96% of them with less than 5 ha planted), 130 collectors, 170 local processors, 30 national processors, 3 instant coffee factories and 70 roasting and grinding factories.

The structure of the VC is made up of seven clearly differentiated sub-chains: i) conventional Robusta coffee; ii) conventional Arabica coffee; iii) instant and freeze-dried coffee industries; iv) differentiated coffees with certification (organic and other sustainability); v) differentiated 'cup' coffees; vi) differentiated coffees with denomination of origin; and vii) differentiated Robusta coffees. Each one has its own characteristics in terms of producers, yields, products, prices and organization.



What is the contribution of the value chain to economic growth?

Financial viability of producers

The annual income (or net benefits) of the producers of the conventional sub-chains (\$470 for Arabica and \$578 for Robusta) is very low, unlike the income of the producers of the sub-chains of differentiated coffees (\$4,563 for organic coffee, \$21,310 for 'cup' coffee and up to \$27,000 for denomination of origin coffee), which is well below the annual minimum wage (\$5,400).

Impact on the national economy

The direct value added (DVA) of the VC is \$247 million, constituting 84% of the production value. The net benefits (including depreciation) of the actors and salaries are the elements that weigh the most with 78% and 16% of the DVA respectively.

The sub-chain by species and variety that contributes the most to the DVA is the conventional Robusta with 55%, followed by the differentiated 'cup' coffee with 30% and the conventional Arabica with 12%. The sub-chain by type of industry that contributes the most to the DVA is the instant industry with 58%, followed by differentiated 'cup' coffee with 30% and the roasting and grinding industry with 9% (Figure 2).

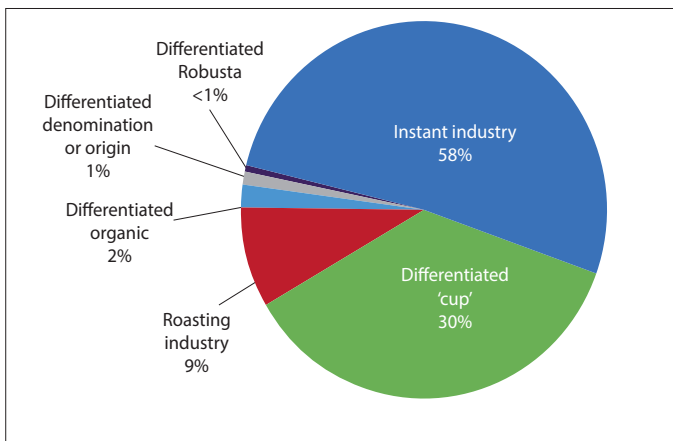


Figure 2: Direct value added of sub-chains by industry type

Given that coffee farming has been in free fall for more than 20 years, the contribution to the GDP and agricultural GDP is very low, less than 0.23% and 2.6%, respectively.

The rate of integration into the economy is 85%. This indicator is measured by the ratio between the total value added (also including VA by input suppliers) and the value of production. The actors of the chain generally use fewer inputs except coffee, but the industrial sub-chain uses 83% of inputs and is highly dependent on imported coffee.

The VC's contribution to public finances is low, at \$1.7 million, because input imports are exempt from import tariffs and most VC actors generally do not pay taxes, except for formal activities such as the instant industry.

The contribution to the trade balance can be measured by the difference between exports and imports of the VC. Exports in 2019 were \$80.1 million, which can be explained by exports from the instant coffee industry (90%). This value is higher than input imports (\$43.7 million), which gives a positive trade balance of \$36.4 million.

Sustainability within the global economy

The VC can be considered competitive in the international market, with a nominal coefficient protection of 1 and a domestic resource cost of 0.4, which means that there is a good remuneration for non-tradable domestic factors (labour, capital, land, environmental goods,...) mobilised in the VC.

The income of the producers is low. But for both conventional and differentiated types, these annual incomes are not the only sources of income for families.

Macro-economic indicators show that the value chain still has little impact on GDP, public finances and the trade balance.

However, Ecuadorian coffee growing has potential on two levels: on the one hand, conventional sub-chains can supply the instant industry if public policies were to be implemented that could strengthen governance and lead to increased yields; on the other hand, differentiated coffees have a higher potential and can increase production with the corresponding economic and social impacts that this entails.

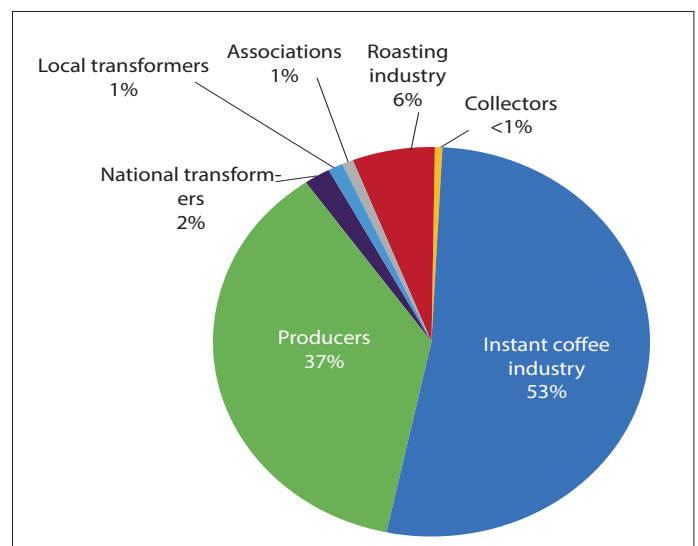


Figure 3: Distribution of direct benefits among the actors

Is the economic growth inclusive?

Income distribution

Total value added (TVA) is made up mainly of wages and benefits. Producer income represents \$76 million or 37% of direct benefits and the instant industry 53% (Figure 3).

The percentage of the final FOB price of coffee at the producer level shows that differentiated coffee is more interesting for producers than conventional coffee (100% for producers of 'cup' differentiated coffees, who carry out the entire process and sell directly to the exporter, compared to 42% for the Robusta 'cherry' producers and 69% for the Arabica producers). This confirms that the income of the producers of differentiated coffees is much higher than the conventional ones.

Job creation and vulnerable populations

The coffee VC generates the equivalent of 19,200 jobs, of which 73% are temporary (45% men and 28% women) and 27% are permanent.

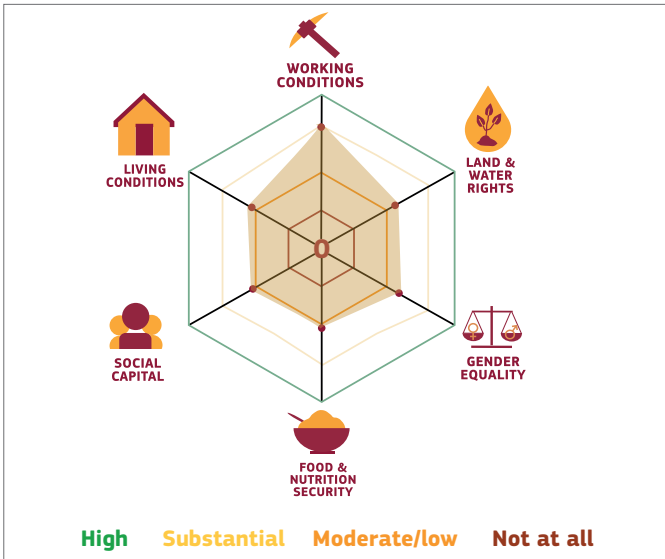
The conventional Arabica sub-chain generates the most employment with 35%, followed by the differentiated 'cup'

sub-chain with 31% and the conventional Robusta sub-chain with 24%. Between the three they represent 90% of employment within the chain. In the case of the conventional Arabica and Robusta sub-chains, employment is basically represented by family labour. In the case of the differentiated cup sub-chain, it needs to employ many workers for the care that this type of coffee requires in all processes, from planting and maintenance, to harvest and post-harvest.

The social inclusion of women is significant (37% of total employment) but is mainly concentrated in temporary unskilled employment. The indigenous populations are also involved in VC in the North Amazon, but coffee isn't becoming an engine of development in this region. The final price received by producers of specialised 'cup' coffee, as well as the high value added of this sub-chain encourages young people to venture into this production. However, young people do not have the resources to invest, so they are bound to the part-time modality (the value of the harvest is shared 50%-50% between the owner of the land and the young worker).

Is the value chain socially sustainable?

Figure 4 and the following table provide a picture of the main social consequences of VC activities in 6 domains.



The social sustainability of the value chain as a whole is low, mainly due to the poor technical and economic results in the conventional coffee sub-chains, where poverty and the lack of satisfaction of basic needs prevails. This social sustainability is significantly improved in specialty coffee sub-chains.

Working conditions	<ul style="list-style-type: none"> Working conditions are generally good, with the exception of the attractiveness for young people, who need to be able to switch to specialty coffees so that their income is high enough to avoid having to resort to migration.
Land and water rights	<ul style="list-style-type: none"> Rights to land and water are socially acceptable, although it's threatened by the development of the extractive industries, mining and oil.
Gender equality	<ul style="list-style-type: none"> A significant gender gap continues to exist despite undeniable progress, particularly at the legal level and participation in specialty coffee sub-chains. The lag in aspects related to decision-making, leadership and empowerment tends to be reduced in specialty coffee sub-chains.
Food and nutrition security	<ul style="list-style-type: none"> For the vast majority of conventional coffee producers, the income generated only allows them to buy some food goods in limited quantities. Therefore, coffee fails to contribute to their food and nutritional security, which causes high food insecurity. The situation in this field improves considerably in the organic coffee sub-chain. This problem is remedied in the case of producers of specialty 'cup' coffee and coffee under DO.
Social capital	<ul style="list-style-type: none"> Social capital is the main weak point of the VC, especially in terms of associations and the lack of trust between the actors.
Living conditions	<ul style="list-style-type: none"> Living conditions are characterised by a low degree of affiliation to the 'Seguro Social Campesino', highly variable housing conditions, and a lack of professional training exist.

Is the value chain environmentally sustainable?

For the environmental analysis, the Life Cycle Analysis (LCA) methodology was used, which measures the potential impact of the sub-chains on the VC. For this analysis, the Galapagos roasted and ground coffee destined for the local tourist market was modeled, as well as the impacts of coffee imports from Vietnam, and an example of the replacement of coffee by corn.

Contribution of sub-chains to damage areas

The depletion of resources (minerals and fossils) represents the additional costs that future extraction would generate. At the level of the sub-chains per ton of 'oro' coffee, instant coffee has the greatest impact on this area of damage, due to the energy and fuels used in processing and transportation. This is followed by the sub-chains of differentiated robusta coffee and differentiated coffee from the Galapagos for export, with greater impacts during cultivation and transport.

Regarding the degradation of the ecosystem quality, the sub-chain per ton of 'oro' coffee that has the greatest impact is Robusta differentiated coffee, due to low yields and transport of dry 'cherry' coffee.

For human health, the greatest impact comes from the instant coffee sub-chains and from the Galapagos coffee for export. The intermediate categories with the greatest contribution are global warming and the emission of fine particles that come from the use of energy (electricity and gas) used for processing and emissions from transport.

The estimated impact of instant coffee is multiplied by 4 if imports from Vietnam are modelled, in particular on the quality of ecosystem quality and human health.

The low level of operations translates into low performance and a high impact for indicators including climate change, that is measured in Greenhouse Gas (GHG) emissions. The high level of productivity of differentiated coffee helps to reduce the levels of emissions per ton. Coffee has few available and effective inputs. For conventional coffee, the largest source of emissions is the residues of the crop itself (Figure 5). If the model used is changed to that of land

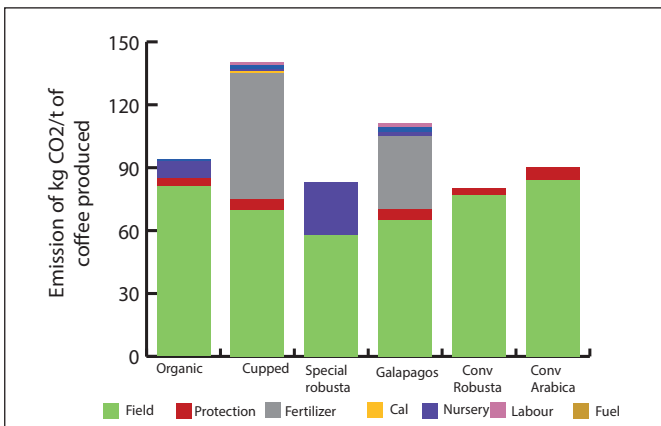


Figure 5: GHG emissions per ton of product and contribution analysis

use of maize for example, emissions increase between 3 and 30 times depending on the cropping system replaced. Depending on the region, the threats to biodiversity and possible deforestation are different. The cultivation of coffee helps preserve agroforestry environments in Manabí and the fight against invasive species in the Galapagos.

Critical points at the environmental level

The major critical points identified were (Figure 6):

- The high level of fuels and energy used (transport and processing).
- The indiscriminate use of phytosanitary products and pesticides due to lack of monitoring and knowledge of diseases, and the lack of technology and products for organic production.
- Wastewater from pulping and washing that is discharged directly on the farm without any treatment and that contains a high degree of organic matter, with potentially serious effects on ecosystems.
- Disposal of coffee pulp when processing is done on the farm. This element can be a source of significant emissions from fermentation if the composting process is poorly managed. The lack of crop management and application of inputs with little efficiency and risks for the soil. Very few growers do soil testing to make better use of fertilisation.

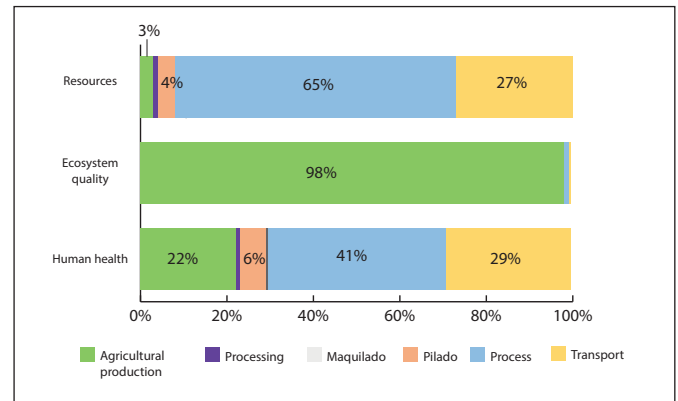


Figure 6: Relative contribution by VC operation to areas of environmental damage

The value chain could be more sustainable with more knowledge and support to producers, who today have low yields and little efficiency. Existing organic systems initiatives also deserve support (funding, research and technology) and monitoring and evaluation. The development policies of the sector would have to integrate the logic of multi-activity of the producers and improve the transport stages.

Conclusions

SWOT Analysis

Strength	Weaknesses
<ul style="list-style-type: none"> • Growing dynamics of differentiated coffees (special, origin, agroforestry). • Development of knowledge and appearance of new business producers in specialty coffees. 	<ul style="list-style-type: none"> • Strong dependence of the industry on imports. • Low governance of the chain, technical support and credits are required. • High costs and low productivity. • Lack of articulation between national actions, international cooperation and public policy directives. • Confusing legal framework for associations (diversity of responsible entities).
Opportunities	Threats
<ul style="list-style-type: none"> • Increased consumption at the national level - generates a culture to consume better quality coffee. • Possible improvement of product quality and yields with minor modifications to existing farming systems and crop selection. 	<ul style="list-style-type: none"> • High volatility of producer prices, which mainly affects conventional coffee. • Change of cultivation to short-cycle products (Manabí in particular).

General recommendations

The following general recommendations can favor a greater contribution to economic growth, inclusiveness and sustainability of the VC:

The new coffee industry must be fostered from the local to the national level. In the territories there are public and/or private actors that are carrying out actions to support the production sector, sometimes in an articulated manner between actors, other times, in an isolated manner. Through strategic alliances, the actors in the territories could join efforts, complement actions, coordinate on the ground and optimise their human and economic resources, for a better coordination of the direct actors of the chain. The factors of productivity and profitability of the coffee farm have to be improved, for this it is necessary to act at the level of genetics, ecology, prices and production costs.

Strategies for the future

Possible elements for defining strategies for the VC:

- Protection of agroforestry systems in socially and environmentally sensitive regions (10,000 remaining ha

of coffee in Manabí that could be conservation coffee versus short-cycle crops).

- Adaptation of varieties to the environment with better levels of productivity (eg 'Napo payamino' or others adapted to the environment) in particular for Amazonia.
- Support for differentiated and specialty coffees (Southern Region, Galapagos, Northwest, East...)
- Definition of modalities of use, administration and control of the denominations of origin.
- Exchange of experiences on denominations of origin with Central American actors (Regulatory Councils, SENADI, MPCEIP, MAG).
- Review of the legal framework of associations and cooperatives.
- Creation of technical assistance pilots (service operators) and managerial operation of the organizations.

Value Chain Analysis for Development (VCA4D) is a tool funded by the European Commission / INTPA and is implemented in partnership with Agrinatura. **Agrinatura** (<http://agrinatura-eu.eu>) is the European Alliance of Universities and Research Centers involved in agricultural research and capacity building for development. The information and knowledge produced through the value chain studies are intended to support **the Delegations of the European Union** and their partners in improving policy dialogue, investing in value chains and better understanding the changes linked to their actions. VCA4D uses a systematic methodological framework for analysing value chains in agriculture, livestock, fishery, aquaculture and agroforestry. More information including reports and communication material can be found at: <https://europa.eu/capacity4dev/value-chain-analysis-for-development-vca4d->

This document is based on the report "Análisis de la cadena de valor del café en Ecuador" Saldarriaga, G., Acosta-Alba, A., Sfez, P., Ullóa, W., Buriticá, A., 2021. Only the original report binds the authors.

