

The Coffee Guide

Fourth edition



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Fourth Edition



ABOUT THE GUIDE

The Coffee Guide is the world's most extensive, hands-on and neutral source of information on the international coffee trade. It covers trade issues relevant to coffee growers, traders, exporters, transportation companies, certifiers, associations and authorities, and other relevant actors. Many in the coffee industry consider it the go-to reference.

This fourth edition is directly informed by the coffee industry. It has updated technical information on finance, food safety measures, logistics and contracts. It has redefined quality and data segmentation and expanded digitalization coverage and information related to certifications and supply chain legislation. It also gives prime importance to issues like climate change, coffee price volatility, living wage and the inequitable distribution of power, profit and resources across the supply chain. It aims to be informative, useful and inclusive of all sector stakeholders.

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FOREWORD

We welcome the publication of this fourth edition of The Coffee Guide. It is part of our work to support a transformation of the coffee industry towards one that focuses on product, competitiveness and quality – while prioritizing people and planet. It reflects my wish to ensure that ITC’s technical assistance helps our partners countries reverse centuries of commodity dependence, turning exports into diversified growth and poverty reduction.

This edition reflects changes in the last 10 years and new dynamics that have come into play. First published as *Coffee - An exporter’s guide* in 1992 and subsequently updated in 2002 and 2012, this practical handbook has become the world’s most extensive publication on the international coffee trade.

Disruptions and changes in the coffee industry have punctuated the successive editions of this guide. This continuum has rendered tremendous opportunity for stakeholders to upgrade their roles in the global coffee value chain.

The guide retains the essence that has made it so popular over the years, with neutral, hands-on information from seed to cup. It addresses value chain stakeholders across all countries that produce and consume coffee. An overview of the coffee world is accompanied by advice on sustainable practices and competitiveness, certification, contracts, logistics, insurance, arbitration, futures markets, hedging, risk management, quality control, digital tools and more.

The third coffee wave has significantly reshaped the sector, bringing high-quality coffee and sustainability principles to consumers and value chain operators alike. Since the last edition, this niche concept has been scaled up through the medium of a ‘premium’ market segment: good-quality coffee accessible to mainstream consumers, centred around values of sustainability.

Today, we recognize a coffee market segmentation that this guide defines as standard, premium and specialized. This evolution towards higher-value markets underlines changing consumption patterns. To succeed, a product now requires economic and social impact. Consumers and producers start to associate product quality with sustainability, and consider how it affects the environment and the lives of the people ‘behind the cup’.

As part of this shift, we must ensure that gains are shared fairly across the supply chain. A coffee sector that values people and planet while enabling profit for all needs a competitive private sector. This includes producers, smallholder farmers, exporters, roasters and consumer-facing companies. It requires resilience from within, built through partnerships and investment, along with improved sector-specific policies and governance.

The time has come for the industry to build back better, but with the right foundations. Together we can tackle persistent and new issues and respond to opportunities. Farm-level income must grow sustainably to secure the coffee industry’s future. Public–private partnerships, alliances between supply chain operators, and policy are also instrumental to drive it towards widespread change. This guide is a step towards providing insights into making this possible.

We are committed to advancing the Sustainable Development Goals in the coffee sector, targeting inclusive growth through joint action. The International Trade Centre’s Alliances for Action programme, which leverages partnerships for sustainable food systems, led this new edition. It is the result of an incredible exercise in co-creation, drawing on the contributions of many worldwide industry stakeholders from across the value chain. This approach makes the guide as inclusive of all readers as possible, and presents realities and opportunities in the coffee sector today.

We wish to thank the many industry experts, companies and institutions that contributed to this guide. We hope it continues to serve as a vital training and knowledge-sharing tool to advance the interests of producers, exporters and those who support them in coffee-producing countries around the world.



Pamela Coke-Hamilton
Executive Director
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NOTE FROM THE AUTHORS

With this fourth edition of *The Coffee Guide*, we hope to mark a turning point for this pivotal publication that both honours its legacy and improves its relevance to the coffee industry today.

Our goal is to shift from a document that is updated every decade to a dynamic knowledge and information hub that contributes to a transformative solution for the people and planet behind coffee.

This comprehensive edition will be followed by standalone versions of the chapters, each with toolboxes of useful resources, on the same platform. These form part of our efforts to make this document as user-friendly and useful as possible to all readers.

We plan to capitalize on the coffee industry network that actively contributed to this edition, both for an accurate description of the sector in this publication and to feed into future ongoing efforts to keep its data and information updated, accurate and inclusive in stakeholder representation.

The coffee sector is a dynamic environment, ruled by volatile market prices, uncertainties linked to climate change, advancing technology and changing consumer patterns, to name a few. Over the short course of updating this guide alone, several drastic events shook the industry, from a global COVID-19 pandemic to hurricanes in Central America to a severe frost spell in Brazil. Positive changes are also afoot, such as greater value addition at origin and rising consumption in coffee-producing countries.

Persistent issues inherent to the current coffee supply chain system also remain. These include the generational issue, gender inequality, lack of a living income for producers and low enforcement of human rights due diligence.

Meanwhile, coffee demand continues to grow and shows no sign of abating.

The sector must be adaptable, resilient and strategic if it is to maintain healthy and inclusive growth. These qualities require joint action and a coalition of coffee stakeholders from across the chain. *The Coffee Guide* can play a role in this, raising awareness over time on the evolving issues that need to be addressed, the opportunities that should be explored, and mapping the best way forward.

The coffee network behind this guide is the tool that has enabled us to do that. We hope it will continue to do so from here onwards, so we can contribute together to shaping a coffee sector in which we can all take pride.

We hope you enjoy reading.

ACKNOWLEDGEMENTS

This new edition is the result of a co-creation process with coffee industry actors, from seed to cup. An advisory panel of more than 70 members from across the globe helped shape its structure and content.

The guide was made possible through the valuable contributions of the people and organizations below, whose guidance, expertise and time dedication are acknowledged with thanks and appreciation.

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ITC also wishes to thank **Morten Scholer** and **Hein Jan van Hilten**, who were responsible for the coordination and content of the third edition of the *Coffee Guide* and ensured continuity of the rich legacy of the ITC *Coffee Guide* in this fourth edition.

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ACRONYMS

Unless otherwise specified, all references to dollars (\$) are to United States dollars, and all references to tons are to metric tons.

4C	The Common Code for the Coffee Community	FTE	Forty-foot equivalent unit with a maximum total weight of 30.4 tons and a maximum payload of 26.4 tons
AfCFTA	African Continental Free Trade Area	g	Gram
CAFE	Starbucks Coffee and Farmer Equity programme	GAPs	Good Agricultural Practices
CATIE	Centro Agronómico Tropical de Investigación y Enseñanza / The Tropical Agricultural Research and Higher Education Centre	GCA	Green Coffee Association
CCP	Critical control point	GMPs	Good Manufacturing Practices
CFR	Cost and freight	GVC	Global value chains
CFS	Container freight station	ha	Hectare
CFTC	Commodity Futures Trading Commission	HACCP	Hazard Analysis Critical Control Points
CIF	Cost, insurance and freight	HARPC	Hazard Analysis and Risk-Based Preventive Controls
CLAC	Latin American and Caribbean Network of Fair Trade Small Producers and Workers	ICC	International Chamber of Commerce
CO ₂	Carbon dioxide	ICE	Intercontinental Exchange
cts	Dollar cents	ICO	International Coffee Organization
CY	Container yard	IDH	Sustainable Trade Initiative
DAP	Delivered at place	IFOAM	International Federation of Organic Agriculture Movements
DAT	Delivered at terminal	ISO	International Organization for Standardization
DDP	Delivered duty paid	ITC	International Trade Centre
ECF	European Coffee Federation	kg	Kilogram
EP	European Preparation	lb	Pound
ESCC	European Standard Contract for Coffee	LCL	Less than container load
EU	European Union	mg	Milligrams
F1	First generation	mm	Millimeters
FAO	Food and Agriculture Organization of the United Nations	NGO	Non-governmental organization
FAQ	Fair average quality	OTA	Ochratoxin A
FCA	Free carrier	ppb	Parts per billion
FCL	Full container load	PTBF	Price to be fixed
FDA	Food and Drug Administration	R&D	Research and development
FIBL	Research Institute of Organic Agriculture	SCGs	Spent coffee grounds
FOB	Free on board	SDGs	Sustainable Development Goals
FSMA	Food Safety Modernization Act	SMEs	Small and medium-sized enterprises
		TEU	Twenty-foot equivalent unit with a maximum total weight of 30.48 tons and a maximum gross payload of 28.28 tons

NOTES

Conversions to green bean equivalent

In accordance with internationally accepted practice, all quantity data in this guide represent bags of 60 kilograms (kg) net (132.28 pounds) of green coffee or the equivalent thereof, i.e. green bean equivalent. Green coffee means all coffee in the naked bean form before roasting. Although the 60kg bag is the most common size of bag in the trade, some countries use bags holding 46kg, 50kg, 69kg or 70kg.

The International Coffee Organization has approved the following conversion factors to convert different types of coffee to green bean equivalent:

Product to be converted	Product for multiplication	Conversion factor
Dried cherry to green bean	multiply the net weight of the cherry by...	0.5
Parchment to green bean	multiply the net weight of the parchment by...	0.8
Decaffeinated green bean to green bean	multiply the net weight by...	1.05
Regular roasted coffee to green bean	multiply the net weight of the regular roasted coffee by...	1.19
Decaffeinated roasted coffee to green bean	multiply the net weight of the decaffeinated roasted coffee by...	1.25
Regular soluble coffee to green bean	multiply the net weight of the regular soluble coffee by...	2.6
Decaffeinated soluble coffee to green bean	multiply the net weight of the decaffeinated soluble coffee by...	2.73
Regular liquid coffee to green bean	multiply the net weight of the dried coffee solids contained in the regular liquid coffee by...	2.6
Decaffeinated liquid coffee to green bean	multiply the net weight of the dried coffee solids contained in the decaffeinated liquid coffee by...	2.73

Alternatively, for statistical purposes, 60kg green coffee represent:

- 120kg dried cherry
- 75kg parchment



EXECUTIVE SUMMARY





EXECUTIVE SUMMARY

Coffee is commercially produced in more than 50 countries, and the world drinks upwards of 3 billion cups a day. The annual income of the coffee sector is estimated to exceed \$200 billion.

While the number of coffee drinkers continues to rise and producers work hard to keep up with demand, the coffee industry is faced today with unprecedented challenges and shifting dynamics that command change and adaptation. Business as usual is no longer an option.

The COVID-19 pandemic has hit actors across the coffee value chain hard and fast. Still reeling from the shock, they are pulling together to survive and rebuild in a more sustainable way. The effects of climate change, while certainly not new, are now more visible than ever – especially in producer countries, which are also the most vulnerable.

Environmental, social and economic inequities exist within value chains. Calls for fairer, more ethical systems of trade have become a global priority, shaping consumer trends. Meanwhile, economic developments in some producer countries are changing the geography of consumption and have the world considering new models of trade.

New partnerships, technology and greater participation of women and youth are contributing to a constructive evolution of the coffee industry. They alter the way we produce and consume coffee.

This guide explores the main forces driving change in the coffee industry and considers what trends are emerging as a result. It also offers an overview of market dynamics, with the latest data as well as examples and information that equip anyone interested in the sector with the right tools to navigate it.

The new edition of the International Trade Centre *Coffee Guide* highlights in particular:

Environmental and social sustainability as a driver for growth

Sustainability is the thread that brings all chapters of the guide together. It addresses topics of climate change, price volatility and unbalanced supply chain dynamics. It explores definitions of living income, the Project Drawdown logic for climate solutions, and the role that youth and women can play in taking coffee forward.

New quality definitions

Quality in coffee is an evolving concept, and definitions have varied over the years. Coffee traders used to look at quality from the perspective of what was, at a minimum, acceptable for their market. Gradients of quality had more to do with their market destination than any overarching definition of desired attributes. Today, definitions of quality are more precise and are also interlinked with concepts of sustainability.

New way to measure coffee data

In the past, statistics for coffee production and consumption were divided into two main categories: Arabica and Robusta. These are indications of coffee species rather than quality per se. To reflect the quality differentiation that exists in the coffee market today, this guide considers three quality segments across the entire coffee sector: standard, premium and specialized.

Digitalization from seed to cup

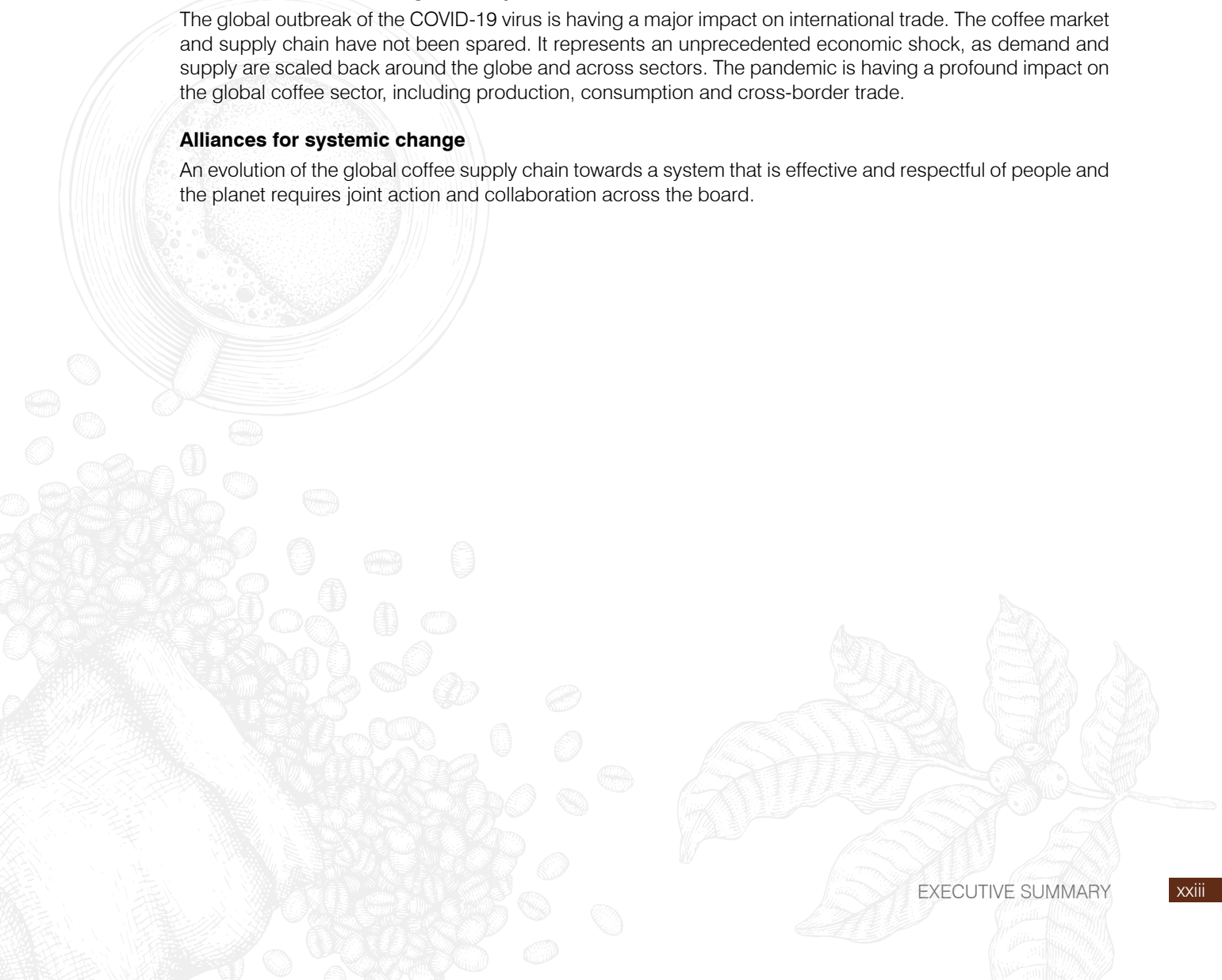
Online sales are not the only emerging trade in coffee. Digitalization is happening across the supply chain, allowing more productivity, quality control, consistency and efficiency than ever before.

COVID-19 short- and long-term impacts

The global outbreak of the COVID-19 virus is having a major impact on international trade. The coffee market and supply chain have not been spared. It represents an unprecedented economic shock, as demand and supply are scaled back around the globe and across sectors. The pandemic is having a profound impact on the global coffee sector, including production, consumption and cross-border trade.

Alliances for systemic change

An evolution of the global coffee supply chain towards a system that is effective and respectful of people and the planet requires joint action and collaboration across the board.





CHAPTER 1

THE WORLD OF COFFEE

SNAPSHOT: TODAY'S GLOBAL COFFEE INDUSTRY	2
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COFFEE AND HEALTH: DEBUNKING THE MYTHS	21
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© International Women's Coffee Alliance, Uganda Chapter

Coffee farmer harvesting ripe coffee cherries in Uganda.

THE WORLD OF COFFEE

Coffee is a large, complex industry with high growth potential and a long history of global trade. Retracing the story of coffee consumption gives insight into the dynamics of coffee production and trade across the centuries. Four successive waves have shaped the industry. Understanding them helps identify major patterns and trends in the coffee sector, what is changing and why.

Snapshot: Today's global coffee industry

Coffee is one of the most important tropical commodities. It provides economic benefits at each step of the global value chain that links growers to consumers. The coffee industry contributes to the economies of both exporting and importing countries. As a beverage, it is a favourite for a growing number of consumers around the world. It is one of the most traded agricultural commodities in the world. In 2017 alone, 70% of total coffee production was exported, worth \$19 billion. That same year, the sector had a retail market value of \$83 billion, providing jobs for 125 million people.¹



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providing jobs for **125 million**
people

There are 12.5 million coffee farms worldwide, according to Enveritas,² and about 95% of these are smaller than 5 hectares and considered 'smallholder'. These are predominantly located in 20 countries where the climate and soil are suitable for growing coffee.

1. International Institute for Sustainable Development Global Market Report: Coffee, 2019.

2. <https://www.enveritas.org/>

Almost half of these farms can be found in Ethiopia (2.2 million), Uganda (1.8 million) and Indonesia (1.3 million). Viet Nam, Burundi, Kenya and Colombia each have more than 500,000 farmers. Small producers are the backbone of this giant global industry and at least 5.5 million live below the international poverty line of \$3.20 a day. The highest levels of poverty are observed in Africa and Oceania.³

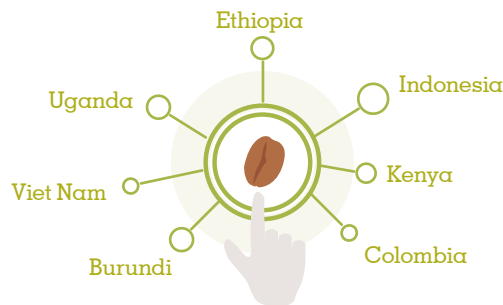


12.5 million coffee farms worldwide, according to Enveritas, and about **95%** of these are **smaller than 5 hectares** and considered 'smallholder'

These are predominantly located in **20 countries** where the **climate and soil are suitable for growing coffee**

The global coffee sector has expanded significantly over the past two decades as demand for coffee increased by 65%.⁴ The main driver of growth has been rising consumption in emerging economies and coffee-producing countries.

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Small producers are the backbone of this giant global industry and at least **5.5 million** live below the international **poverty line of \$3.20 a day**. The highest levels of poverty are observed in Africa and Oceania

The growth of high-value market segments such as specialty coffee, along with product innovations that provide new flavours and more convenience to consumers, have reinvigorated demand in traditional markets with already high per capita consumption.



The global coffee sector has expanded significantly over the **past two decades** as demand for coffee increased by **65%**

Coffee is of major economic importance for many producer countries. For some, this is reflected in its share of their national export revenue, which can be significant. Coffee accounts for more than a quarter of export earnings in Ethiopia and at least 20% of national export revenue in Burundi. Timor Leste, Uganda and Honduras follow with a share of 10%.⁵



Coffee accounts for more than a **quarter** of export earnings in **Ethiopia** and at least **20%** of national export revenue in **Burundi**. Timor Leste, Uganda and Honduras follow with a share of **10%**

3. Enveritas, 2019. <https://carto.com/blog/enveritas-coffee-poverty-visualization/>
 4. International Coffee Organization, 2019a.
 5. International Trade Centre.

Production and consumption

Coffee is commercially produced in more than 50 countries and the world drinks upwards of 3 billion cups a day. Millions of coffee growers, mostly smallholder farmers, increased production by 50% over the past two decades. Coffee-producing countries still export the bulk of their produce, earning around \$20 billion in exports a year.⁶

The annual income of the global coffee sector is estimated to top \$200 billion – more than 11 times the value of exports received by producing countries. At least 100 million families depend on coffee for their living. Many jobs and economic opportunities are created along the coffee global value chain.

These range from input providers to farmers, traders, processors, roasters, distributors, marketers, packaging suppliers, baristas and even those who deal with the disposal and reuse or recycling of coffee waste. Coffee is a growth market. Globally, consumption is growing at a healthy annual rate of 2.2%.⁷

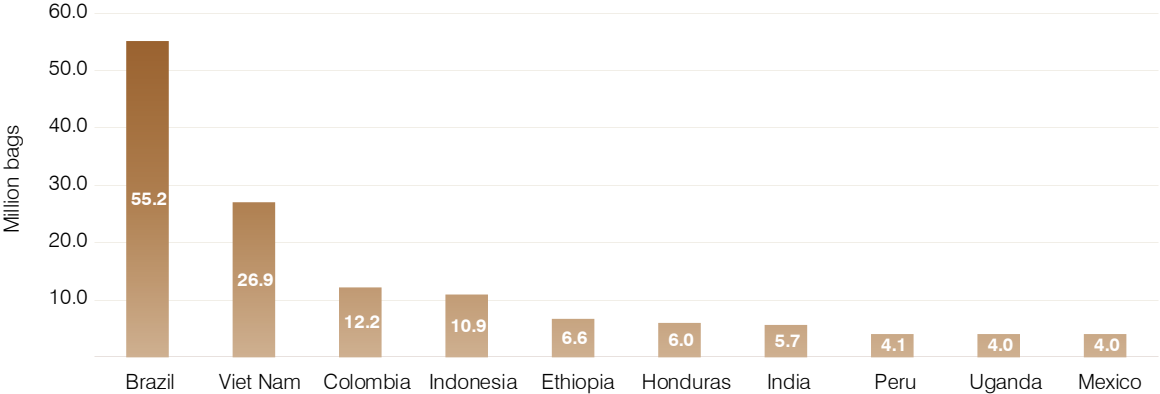
Despite positive market trends, significant differences exist among actors in the coffee value chain in terms of risks, income, access to resources and vulnerability to price volatility and climate change. These differences hinder the sustainability of coffee.

The drop in coffee prices by 30% over the last two years has had negative repercussions on the lives of many coffee farmers. How can we ensure equitable prosperity for all coffee stakeholders, and especially for millions of coffee farmers? They represent the weakest link in the value chain and often struggle to cover basic production costs at current price levels, especially considering increases in the cost of inputs and logistics.

The coffee world is largely split in two: producing countries, found geographically between the tropics, often with low- to lower-middle income status; and consuming countries, which are more economically developed.

The lowest value captured is in the production stage of the chain; the highest is in the marketing stage of the chain, concentrated in developed countries. Risks, market price fluctuations, socioeconomic shocks, health pandemics and climate change phenomena cause the greatest disruption at the bottom of the value chain, as producing countries typically are more vulnerable and less resilient.

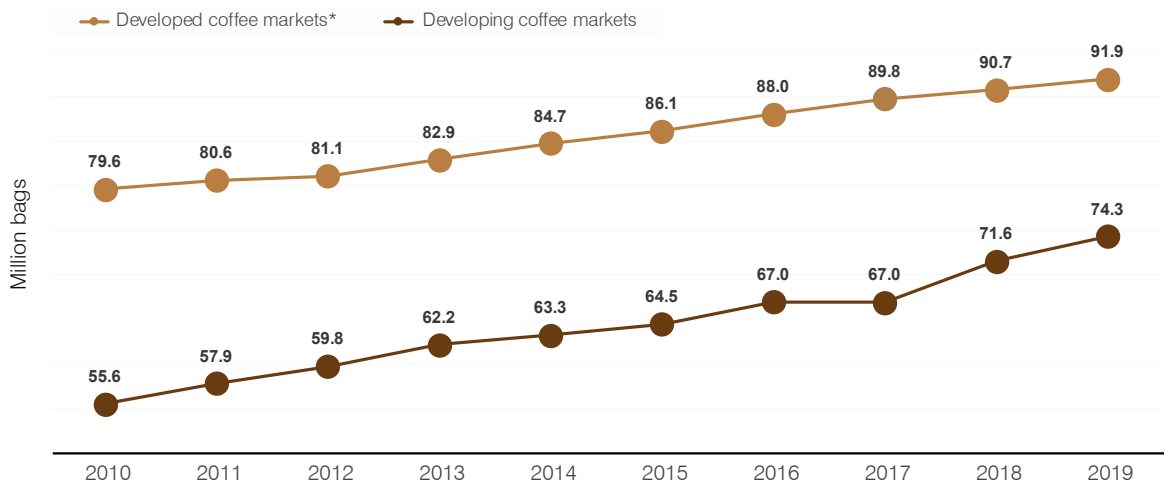
Figure 1: Brazil and Viet Nam: Leading coffee producers



Note: International Coffee Organization.
Source: Average annual production over 2010/2019 crop years.

6. ICO 2019a *Coffee Development Report 2019*.
 7. *Ibid.*

Figure 2: World coffee consumption: Steady growth



*- EU27, United Kingdom, Norway, Switzerland, United States, Canada, Republic of Korea, Japan, Australia, New Zealand, Singapore

Source: International Trade Centre (ITC).

The largest producing and exporting countries in 2019 were Brazil (\$5.1 billion), Viet Nam (\$2.7 billion) and Colombia (\$2.59 billion). The largest importing countries in 2019 were the United States (\$6.2 billion), Germany (\$3.5 billion) and France (\$2.8 billion).⁸

Chapter 3 examines the structures and dynamics of coffee production and consumption in more detail.

On average, compared to men, women entrepreneurs hold higher formal education qualifications but tend to work more often as self-employed persons with no employees. Women also tend to dedicate less time per week to their business and work more often as part-time entrepreneurs, which could be explained by gender disparities in time-use. Research from the European Institute for Gender Equality, shows that between 2005 and 2015, gender inequalities in time-use are persistently growing in the 28 member states of the EU.

More than 50% of women entrepreneurs work in wholesale and retail trade, professional, scientific and technical activities, human health and social work activities, as well as other service activities. Agriculture and manufacturing account for only 12.2% and 4.4% of total women entrepreneurs.



8. International Coffee Organization export and import data.

COVID-19: An unexpected opponent

The global outbreak of the COVID-19 virus has had a major impact on international trade. The coffee market and supply chain have not been spared. The pandemic is likely to have a profound impact on the global coffee sector, including production, consumption and international trade.

Supply recovers, for now

While coffee-consuming countries were largely the first to feel the sting of COVID-19, producing countries were hit soon after. With some adaptation from farm to shipping, producers quickly balanced and there have been few reports of major disruption. Most problems at producer level can be traced back to general COVID-19 restrictions rather than anything specific to coffee supply chains.

Cash flow shortages, currency fluctuations, labour shortages and disrupted milling and transportation affect supply. One major disruption was in terms of logistics: getting the coffee to the buying stations and mills in towns where restrictions were in force. For example, Peru had transport logistics challenges, border delays occurred in Africa and Indian ports were hamstrung at the height of the pandemic outbreak in-country. Many customers also had to cancel, postpone and/or rearrange shipments.

Producers catering to the specialty segment have been affected most. Direct sales to small specialty roasters mean the decline in coffee shop or 'out of house' business has an immediate impact on sales, as smaller shops lack the cash flow to cushion the effect on their suppliers.

Producers were quick to react and adapt. Lockdowns released local unemployed labour to harvest crops, replacing migrant workers, and producer countries were quick to draw up protocols and disseminate them to farms. This allowed activities to resume surprisingly quickly. Apart from some delays, ports also coped quite well.

Most bottlenecks are further down the chain. Roasters no longer want a lot of coffee that is set to ship. This means working capital is scarcer both at importer and producer level, as unsold coffee is not bringing in money. Worse still, it must be financed from already limited credit lines. Traders trying to manage risk for roasters by delaying or cancelling deliveries have been particularly affected. Warehouses in Europe are filling up, and late shipping from producer countries only places additional strain on coffee storage.

When it comes to exchange prices for producers, there are concerns about supply chain disruptions, making coffee more valuable. Uncertainty remains about the future of demand, making roasters reluctant to commit to buying coffee forward in a context of risk and instability. After the sharp drop in early 2021, prices for both Arabica and Brazilian naturals rose until mid-April. Robustas, however, continued to fall.

The Intercontinental Exchange (ICE) Arabica contract fell to a low of just over 95 cents per pound in June 2021. It then recovered and generally traded between \$1.10 and \$1.25 per pound in the following months.

Coronavirus is probably not the main cause of this decrease, however. A more likely cause is that farmers are discouraged due to long-term low prices, droughts and/or irregular climate conditions.

In Central America, for example, producers have accumulated problems over time because of consistently low prices – despite good weather conditions. Low prices force farmers to sell below the cost of production, causing many to abandon the coffee industry. At the other end of the spectrum, it must be noted that Brazil has experienced a surge in export activity and has done surprisingly well during this pandemic.

While coffee shops and roasters are faced with closure or looking for innovative ways to remain profitable, traders and producers contend with a different kind of problem: how to keep the industry running so that next year's coffees make it to retail – and a year's worth of income isn't lost.

The yearly harvest dates and global nature of the supply chain pose more particular challenges for the upstream sector of the coffee industry.

'My belief is that we will use the challenge of COVID-19 and the drive for more inclusiveness to evolve as an industry.'

David Behrends,
Managing Partner and Head
of Trading, Sucafina

Demand and sales strategies change

The pandemic threatens to push coffee back to where it was a decade ago, dominated by big roasters and a heavily damaged out-of-home market. Specialty sales have been reduced to a trickle. Coffee-to-go and delivery chains that have survived have had to compromise somewhat on quality because of financial constraints.

All countries are seeing major short-term shifts in coffee demand due to COVID-19. In the long term, some will return to old growth trajectories more quickly than others. COVID-19 has had the biggest impact in developing countries where gross domestic product increases per capita drove coffee growth.

Lockdown and social distancing measures have crimped consumption, hitting out-of-house sales hard and fast. At the first peak of the epidemic, sales at US out-of-house companies fell 60%–80%. Big international coffee shop chains report major losses due to COVID-19-related closures. Small independent businesses are suffering the most, with insufficient cash flow to cover rent and salaries due to the sudden decrease in sales. Cafés and restaurants around the world have closed their doors, some permanently.

It's not all doom and gloom for the coffee sector, though, as retail brands and e-commerce platforms report growth. Sales have peaked for well-known retail brands owned by large companies such as Nestlé, Folgers and Jacobs Douwe Egberts. With the sudden switch to retail, soluble coffee sales are booming. There has also been a switch to better coffee quality at home, with increased delivery and coffee machine sales as a result. The latter has propelled sales of pods, capsules and single-serve coffee to new heights.

The global recession triggered by the pandemic may lead to a more profound effect on coffee demand. Lower household incomes could translate into reduced demand for coffee in volume terms. In addition, price-sensitive consumers may substitute higher-value coffee with lower-value blends or brands. The income elasticity of coffee demand will probably be low, however, especially in high-income countries and traditional markets with high per capita consumption rates.⁹

What lies ahead?

COVID-19 began just as a health crisis, but the economic implications are increasingly evident. Actors along the coffee supply chain are supporting each other where possible to avoid bottlenecks, congestion and financial losses.

In the coming months, we might see still fewer specialty coffees and specialty roasters, as well as a permanent shift in how coffee is consumed as a result of this crisis. Decreased demand due to the global recession could severely affect producers and traders.

Coffee retailers have reviewed their sales strategies and are developing – or building – e-commerce platforms and investing in their social media visibility and online outreach tools. Many understand that selling online can help them get out of the COVID-19 slump, but also increase overall resilience and profit.

The financial strain on the coffee industry will be considerable. Trade banks are withdrawing finance because of the risks in trading coffee, made worse by the crisis. This means that a large portion of small trade could go under – especially in the specialty market. Farmers and exporters at origin will experience a marked loss of access to finance, which will have a domino effect across the supply chain.

As dire as the situation is today, many are hopeful of an eventual upturn. Many view coffee as one of the 'essentials' required to survive lockdown measures and maintain a semblance of normalcy. Coffee remains, for many people, the glue that keeps our daily routines intact, however disrupted at this point.

When the pandemic ends, coffee will be at the centre of the mass return to out-of-home activities and social interaction. The sector will be changed, but can recover. In fact, the pandemic has highlighted inequities and dysfunctions across the supply chain – causing stakeholders to reevaluate business as usual.

David Behrends, managing partner and head of trading at Sucafina, says: 'I don't believe the coffee industry will ever return to be the same as 2019. My belief is that we will use the challenge of COVID-19 and the drive for more inclusiveness to evolve as an industry.'¹⁰

We can only hope that the silver lining of the pandemic is a shift in mindset across the supply chain that translates into better and more inclusive policies, more enabling regulations and more sustainable practices from seed to cup.

9. International Coffee Organization (2020). 'Impact of COVID-19 on the global coffee sector: the demand side.' See <https://www.ico.org/documents/cy2019-20/coffee-break-series-1e.pdf>

10. <https://gcmag.com/coffee-in-the-time-of-covid-19/>



Coffee farmer harvesting ripe coffee cherries in Ethiopia.

The coffee value chain

Coffee differentiates itself from other commodities in that it cannot be simply packed for almost immediate sale and consumption, domestically or internationally. Once harvested, various methods of primary processing involve removing the outer layers of skin and pulp from the coffee cherry and drying the two beans it contains (see Chapter 5).

Once dry, the outer skin of the bean, known as parchment, is removed mechanically. The beans are sorted according to criteria such as size and density. They may be processed further for export to remove defective beans (due to insects or disease, for example).

At this point, the coffee is ready to be roasted and packed – either ground or as whole bean for onward sale, ultimately, to the final consumer. However, producers roast and sell little coffee for export. Most is shipped as raw (known in the trade as 'green') beans to the consuming countries, where it is roasted, packed, marketed and sold mainly through supermarkets, coffee shops and, increasingly, various e-commerce platforms.

It is important to understand that the coffee itself represents just a small percentage of the value of the final product. Despite estimates, only 10% of the coffee retail market is retained in the country of export.¹¹

The coffee global value chain can be divided into five categories: production, processing, trade, roasting and marketing. These categories each contain the main value chain stakeholder roles outlined in Figure 3. Chapter 3 presents the value chain and its complex roles and changing dynamics in more depth.

Arabica and Robusta are produced for consumption

From 124 known wild species, just two are produced for consumption – *Coffea arabica* and *Coffea canephora*.¹² *Coffea canephora* is the scientific name of the coffee plant that produces beans that are commercially referred to as Robusta in general. While the plants are of the same species, they are considered to be of different genetic 'groups'. Overall, two main coffee species are traded and consumed, referred to as Arabica and Robusta.

Arabica is used to make the world's finest-tasting coffees, often sold as single-origin or estate products, or in high-quality premium blends. It is also used in the average-quality coffee that is found in commercial,

11. Panhuysen, S. and Pierrot, J., 2020.

12. World Coffee Research, 2018 Annual Report.

Figure 3: The coffee value chain, from producer to consumer



Source: International Trade Centre (ITC).

blended products on supermarket shelves around the world. Arabica accounts for a slightly larger share of global production, with 55%–60% of the world’s supply in 2011–2017.¹³

Robusta is grown at lower altitudes and is hardier. It typically yields lower quality, much of which is used to produce soluble coffee. Generally, the world’s biggest canephora/Robusta buyers are major roasters and manufacturers. They use it in a variety of caffeinated products, including capsules, blends and energy drinks.

Robusta producers have been experimenting with quality development, achieving some significant results in improving the cup profile. Easier and less expensive to grow in a warm climate and more resilient to pests, diseases and harsh environmental conditions, Robusta could play a key role in meeting rising demand for coffee in a world increasingly threatened by climate change.

Demand for Robusta is also on the rise. The International Coffee Organization (ICO) reports that in the 12 months to May 2020, Arabica exports decreased, while Robusta exports expanded.















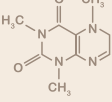
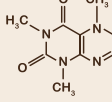




Coffee segmentation

In the past, statistics on coffee production and consumption were divided into two main categories: Arabica and Robusta. These are indications of coffee species rather than quality per se. To reflect the quality differentiation that exists in the coffee market today, this guide considers three quality segments across the entire sector: standard, premium and specialized. (Chapter 5 provides further detail.)

Post-harvest processing also plays a role in coffee segmentation, with a distinction between ‘washed’ coffees and ‘natural’ or ‘sun-dried’ coffees.

13. Daly, J., Hamrick, D., Bamber, P., and Fernandez-Stark, K. (2018) *Jamaica in the Arabica Coffee Global Value Chain*. Jamaica: Duke University.

Figure 4: Arabica and Robusta: Defining features

	 Arabica	 Robusta*
Origination	Ethiopia 	West and Central Africa 
Elevation¹	700-2200 masl 	0-900 masl (up to 1600 masl is possible) 
Ideal Temperature	16-24 °C 	21-30 °C 
Resistance²	Low 	High 
Natural tree height	5-8 m 	8-15 m 
Chromosomes	44 	22 
Caffeine content	0.8-1.7% 	1.5-2.5% (sometimes up to 4%) 
Annual production³	96 million bags 	73 million bags 
% total coffee production	60%+ 	40% 

* While Robusta is globally the most popular term for this species, the correct appellation is *Coffea canephora*.

1 Metres above sea level

2 Indicatively overall for each species

3 International Coffee Organization (ICO) stats for Oct. 2019 - Sept. 2020

Source: International Trade Centre (ITC).



Young Robusta (*Coffea canephora*) plants in a nursery in Cameroon.

A short history of coffee trade

It's hard to pinpoint the exact place and time of the discovery of coffee as a beverage. Legends abound, but there is wide consensus on tracing the discovery of *Coffea arabica* to the highlands of Ethiopia, possibly as early as the sixth century in its non-roasted form.

There, according to legend, a goatherd named Kaldi triggered the discovery when he noticed the stimulating effect berries from a certain tree had on his goats. After sharing his findings with the local monastery, the abbot made a drink with the berries and found that it kept him alert through the long hours of evening prayer. Word of the energizing berries spread east, the legend continues, reaching the Arabian Peninsula and marking the start of a global trade.

Coffee was introduced to Yemen around the twelfth century. The Sufis of Yemen roasted and drank it as early as the fourteenth century. By the fifteenth century, coffee was served in the Middle East to welcome guests at home and as a backdrop to negotiations. Although there is evidence of coffee drinking at that time, claims that the first coffee house opened in 1475 in Constantinople remain an anecdote.

By the sixteenth century, coffee was known in Persia, Egypt, Syria and Turkey. From there, the coffee house emerged, forging a social revolution and establishing a link between coffee, intellectual life and elite society. By the seventeenth century, coffee had made its way to Europe and the New World and was becoming popular across the continents.

As coffee consumption spread across the world, so too did production. The Dutch successfully planted seedlings on the island of Java (part of Indonesia), and later on the island of Martinique. In fact, Martinique is credited as the origin of all coffee trees throughout the Caribbean, South and Central America. Brazil adopted the crop in the first half of the eighteenth century, introduced by Portuguese–Brazilian army officer Francisco de Melo Palheta, and it is the world's leading producer of coffee today.

European colonial powers that established themselves in coffee-producing countries in the Caribbean, Asia and the Americas in the late eighteenth century largely orchestrated the mass production of this new commodity. Coffee consumption grew exponentially in the nineteenth century, as it became more accessible around the world. Rising demand called for mass production, and most European settlers responded by establishing coffee-growing estates in their colonies. To minimize production costs and maximize profit, many estates imported African slaves to work on coffee plantations.

IMPORTANT INFO

International Coffee Day is 1 October. It is also the first day of the 'coffee year' used by the International Coffee Organization for statistics on production and trade.

By the end of the eighteenth century, coffee had become one of the most profitable export crops in the world. Today, it is one of the most traded agricultural commodities.

The history and development of Robusta coffee is far less referenced than that of Arabica. Robusta – correct appellation *Coffea canephora* – was first discovered in the Congo in the 1800s. It is also indigenous to the tropical forests around Lake Victoria in Uganda. It was only cultivated outside of Africa in the nineteenth century, almost 300 years after Arabica plants left the continent.

Robusta accounts for 30%–40% of total world coffee production and is predominantly produced in West and Central Africa, Southeast Asia and Central and South America – mainly Brazil, where it is called Conilon.

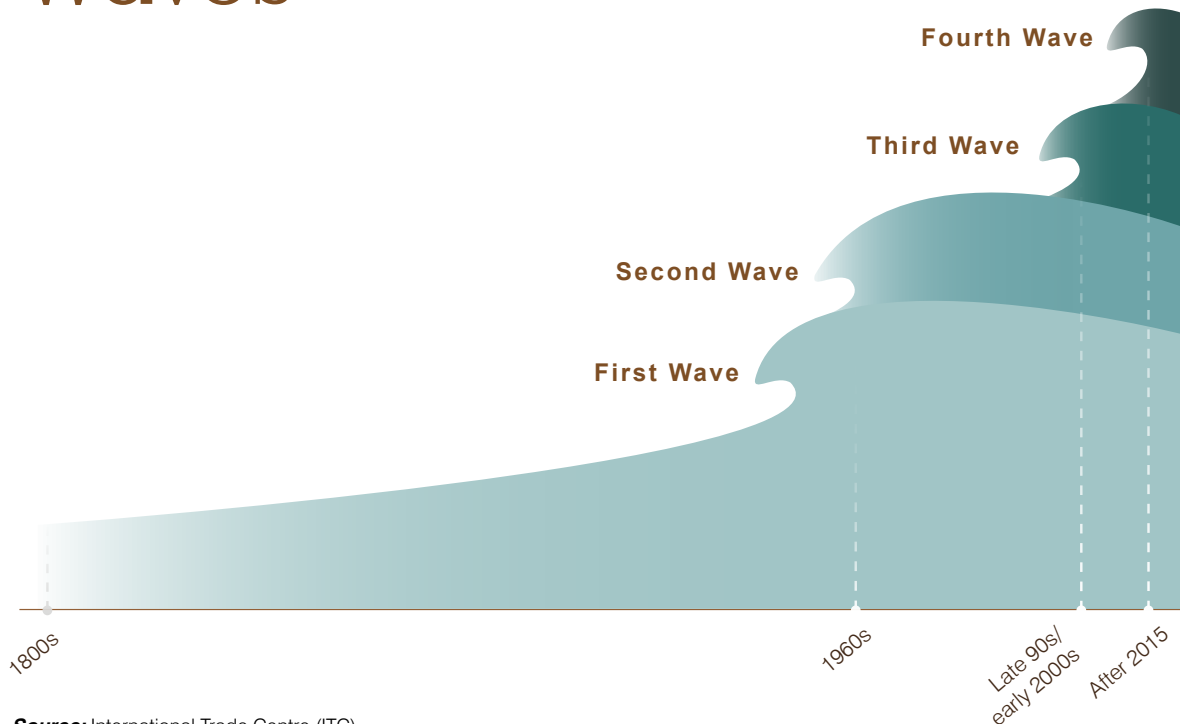


Arabica coffee tree in Jimma region, Ethiopia (Oromia Coffee Farmers Cooperative Union farm).



Coffee being served at YA Coffee shop in Addis Ababa from the traditional jebena.

The Coffee Waves



Source: International Trade Centre (ITC).

Coffee waves

The term 'wave of coffee' refers to successive movements in the coffee industry. These waves reflect significant changes in the global coffee culture and social discourse of the times.

Trish Rothgeb coined this term in 2002¹⁴ in the *Roasters Guild Publication*, defining the three coffee movements as waves in the mass production and distribution. These waves represent changes such as how coffee beans are sourced, how coffee is grown and harvested, how products are packaged and transported, and even how fresh beans are treated or roasted.



Source: International Trade Centre (ITC).

14. <https://www.coffeeinstitute.org/about-us/staff-board/trish-rothgeb-bio/>

Each wave starts with a strong disruptive change that permanently affects coffee industry dynamics, centred around pioneering figures or companies. Successive waves represent an organic evolution of the industry shaped by social change and events of their time. They do not necessarily represent progress in terms of quality, economic development or environmental and social sustainability.

While the start of each wave can be easily marked on a timeline, there is no 'end' per se. Each wave melts into the next one, retaining elements of the previous one(s). Elements of all four waves exist today, alongside each other.

Waves have distinct time periods and relate to coffee consumption and culture, and how changes within these affect the industry.

Coffee categories are not the same as industry waves. Coffee categories are standard, premium and specialized. (See Chapters 3 and 4 for more information.) These categories have no chronological order and all three are available today. Despite the successive waves in the industry, note that standard coffees – including soluble coffees – take up the largest market share.

Key coffee organizations and institutions worldwide formally accept three waves of coffee today. This guide proposes the existence of four main waves of coffee.

The following diagramme provides a brief overview of these four waves.

First wave: Consumption grows fast



Advertisement for Folger's coffee (undated, but early 1900s).

The first wave of coffee is defined by its increasing availability and commodification, or transformation into an object of global trade. Coffee was initially reserved for the higher social classes and intellectual circles. The first wave brought it into households and offices and became part of people's daily ritual.

Sudden exponential growth in consumption marked the 1800s. Consumers appreciated its energizing properties and association with ritual rather than quality, origin or even flavour. Accessibility and convenience made it popular.

This represented a golden opportunity for coffee entrepreneurs. Companies such as Folger's and Maxwell House led the first wave alongside the invention of the percolator – a simple way to brew coffee at home.

Satori Kato, a Japanese-American chemist, received the first US patent in 1903 for 'instant coffee', marking the start of a popular product's rise to fame. Nestlé launched soluble coffee brand Nescafé in the early 1930s, setting up a large-scale production line of coffee extraction and 'spray drying'. By April 1940, Nescafé was available in 30 countries.

Storage and brewing convenience gave another boost to the popularity of instant coffee during the two world wars. Nestlé unveiled another innovation in 1965 – freeze-dried soluble coffee Nescafé Gold Blend. Freeze-drying technology allowed coffee to stay good for longer, upgrading the quality of instant coffee.

Coffee sales shot up in the first wave thanks to mass demand and distribution through supermarkets. Both the percolator and instant coffee remained popular well into the 1970s, which marked the beginning of the second wave, which developed alongside the first wave.

Second wave: Better quality, social experience

Demand for better quality and a more social coffee experience marked the second wave. This wave introduced the concept of different origin countries to coffee consumers beyond a generic cup of coffee. Consumer curiosity drove this wave: People wanted to taste better qualities and learn about the origin of their coffee.

The second wave started in the late 1960s/early 1970s with the advent of Starbucks and Peet's Coffee & Tea, both of which considerably influenced the industry. Peet's Coffee is a San Francisco Bay Area-based specialty coffee roaster and retailer that introduced the mainstream American coffee consumer to hand-roasted 'gourmet' Arabica coffee in 1966. It was later acquired by a Starbucks' founder, but failed to keep up with competition. Starbucks evolved into the world's most famous multinational coffee chain.

Erna Knutsen, an early icon of the coffee industry, used the phrase 'specialty coffee' in the *Tea & Coffee Trade Journal* in 1974. Eight years later, the Specialty Coffee Association of America was founded. Interest in coffee quality was starting to shape the industry.

Starbucks capitalized on consumers' newfound appreciation for 'good coffee'. People wanted a more complete coffee experience – no longer just a quick and convenient beverage to drink at home, it became a daily luxury to be savoured.

Starbucks gave its customers the time and space to do that, pioneering a new coffee shop architecture and interior design focused on comfort and relaxation: a 'living room' space bridging the gap between office and home. Starbucks and many other coffee shops offered consumers a social experience with good-quality coffee beans and an indication of origin.



Starbucks Coffee building in New York City.

The second wave also marked a diversification into coffee-based drinks, such as frappuccinos, flavoured syrups and other inventions to appeal to a wider public, including younger people.

Numerous coffee shop chains quickly replicated this style, which became popular in many countries thanks to globalization. The trend got a further boost from celebrities who were photographed with take-away coffee cups, popularizing the trend of 'coffee to go'.

The 1970s also marked the rise of ecological thinking and environmental concerns, shaping consumer and industry stakeholder sustainability priorities. This, in turn, led to the start of coffee programmes and certifications with a focus on sustainability.

The new focus on coffee quality and its popularization as a social trend contributed to an increase in prices for the consumer – one that was met with little resistance.

Third wave: Focus on origin and 'artisan' coffee

The third wave shifted the focus to the story behind the cup, as consumers became more sophisticated and knowledgeable. Coffee became a craft experience.

In the late 1990s and early 2000s, the consumers started to understand that coffee variety, origin, processing, roast profile and brewing all affected the final taste. With the rise of the internet and knowledge becoming more available, consumer became curious. This paved the way for a modern generation of 'coffee aficionados'.

Quality became very important, along with other coffee aspects, such as formal training and professionalism of the barista, traceability of the coffee beans and micro roasters, just to name a few. This forms part of the cornerstone of third-wave coffee: specialty coffee.

The terms 'specialty coffee' and 'third-wave coffee' are often used interchangeably. This is a common misconception. Third-wave coffee is an experience. Specialty coffee is a product served within that experience.

The third wave heralded a new interest in complexity, greater acidity and how to manipulate brewing to taste the unique flavours of the coffee beans and cater to individual preferences. As consumers grew increasingly discerning, activities also shifted at the farm and roasting levels. Experimental processing methods emerged on some coffee farms, and innovation and much greater detail went into the roasting process to cater to this specific demand.

The third wave offered craftsmanship, specialty and individuality to a coffee industry that was, until then, largely mainstream. This was a direct response to a new generation of consumers concerned with more transparency, better quality and a desire for a product catering to the individual rather than the masses.

While better quality coffee and information became available – to an extent – on mainstream platforms such as supermarkets, the third wave really occurred in coffee shops and among roasters.

Service is central to the third-wave experience. Baristas went from 'coffee server' status to skilled artisans, respected for their knowledge and responsible for the creation of a great cup of coffee. A good barista knows the whole process, from the selection of the green beans to the roasting, to the brewing and preparation. As the barista became more knowledgeable and the consumer more curious, a dialogue began about the story behind the cup of coffee.

Coffee also got competitive. The Best of Panama and Cup of Excellence appeared in the late 1990s, and the first World Barista Championship took place in 2000. The Cup of Excellence was the first global internet auction platform for award-winning coffees.

These auctions represent a turning point for the coffee industry in general, and specialty coffee in particular. They allow exemplary farmers to realize a greater financial price for their coffees. Auction prices are much higher than through traditional sales methods.

'The third wave is, in many ways, a reaction. It is just as much a reply to bad coffee as it is a movement toward good coffee.'

Trish Rothgeb,
Director of Q and Educational Programs,
Coffee Quality Institute



Coffee professional cupping coffee at CLAC-Fairtrade's Taza Dorada (Golden Cup) event in Brazil, 2020.

The Cup of Excellence contributed to the rise of specialty coffee and global recognition of coffee farmers. It also helped increase the overall value of top specialty coffees globally, through the pricing transparency of the auctions. The idea of elite coffee varieties really appeared in 2004, after a rare pound of Panamanian Geisha sold at auction for \$21 – rising, in later years, to \$1,029 per pound (2016).

At producer level, the third wave represents mixed opportunities. Better coffee means better prices. The flipside: it also means extra costs for the producer as more care, time and resources are required. Overall, the third wave brought greater proximity and dialogue between exporter, roaster, consumer and producer and sparked increased investment – be it financial or technical – from buyers into their coffee providers.

The concept of direct trade was also introduced, aiming for better profit for the producer and more transparency on the production process for the buyer. The concept is harder to apply in practice than theory and has failed to take off as planned. Its objectives, though, remain at the core of the third-wave movement.

The emphasis on transparency and the story behind the cup is linked with the industry's focus on sustainability through the whole supply chain. Initiatives emerged that protect the producer, the environment and the consumer. These range from fair trade coffee, which ensures that exporting farmer cooperatives are paid a minimum 'fair' price, agricultural products that won't harm consumers or the environment, and collaboration between all coffee industry stakeholders to make the industry fairer and more sustainable.

The third wave of coffee highlighted new relationships and processes, such as *farmer to consumer* and *seed to cup*. The consumer became more responsible and curious, and all coffee value chain stakeholders had to respond.

Fourth wave: Scaling up specialty coffee

The fourth wave remains a blurred concept in the industry, with varying definitions – all of which indicate a period of change. Fourth-wave coffee, if we accept that term, represents the best that the third wave brought to the coffee movement, while borrowing elements from second-wave culture. It seeks innovations in quality that can generate commercial opportunities to reach more people and achieve greater impact.

Consumers, buyers, roasters and producers are acquiring greater coffee knowledge in terms of origin, production and processing. High-end coffee is becoming more accessible to the general public and less focused on an elite circle of coffee aficionados. Consumers and the industry are starting to accept that production automation doesn't necessarily detract from the quality or artisanal merit.

The third wave has limitations in scalability. Specialty coffee still represents a small percentage of overall consumption and targets small consumer segments. Many third-wave actors are coming to accept that economy of scale is needed for success. For them, it means moving away from the 'passion project' characteristic of the third wave and towards a more commercial focus that can yield long-term profit.

Global capitalism demands the industry continue to innovate and expand to appeal to new users. This has sparked commercial second-wave brands in specialty coffee, as they start to offer higher 'premium' quality products at accessible prices and through wider commercial distribution. Similarly, many specialty brands are embracing a more commercial approach, offering products such as capsules, instant coffee and ready-to-drink options.

Applying a second-wave commercial approach to third-wave sustainability concepts greatly increases the socioeconomic impact. Developing the premium coffee market segment means tapping into a much bigger consumer group while preserving parameters of quality and sustainability.

Ultimately, selling more coffee at a fair price benefits the coffee supply chain – and especially producers – far more than selling small amounts at a high price. The fourth wave is about injecting more value into the entire coffee supply chain through the wider commercialization of quality and sustainability concepts.



	Wave 1 Growing coffee consumption	Wave 2 Better quality and a social experience
Key concepts	<ul style="list-style-type: none"> • Commodification • Mass production • Accessibility & convenience • Focus on avoiding major defects rather than on quality attributes • Price sensitivity as a major driver 	<ul style="list-style-type: none"> • Better quality and 'Gourmet' coffee • Social experience • Increasing interest in origin • Coffee shop design as a 'third place between home and work' • Start of social and environmental awareness in coffee
Quality	<ul style="list-style-type: none"> • Minimum standard that will be accepted by customers 	<ul style="list-style-type: none"> • Premium and true birth of 'specialty'
Roasting & Processing	<ul style="list-style-type: none"> • Industry roast & ground • Soluble (spray-dried, agglomerated and freeze-dried, 3-in-1) • Vacuum packaging 	<ul style="list-style-type: none"> • Dark roast • Whole roasted beans • Italian espresso revival
Origin	<ul style="list-style-type: none"> • Continent or country or broad quality description 	<ul style="list-style-type: none"> • Country or region
Main distribution	<ul style="list-style-type: none"> • Supermarkets • Grocery stores • Wholesalers • Hotels • Restaurants • Catering (HORECA) 	<ul style="list-style-type: none"> • Branded coffee shop chains • Franchise as a possibility of growth
Social and Environmental focus	<ul style="list-style-type: none"> • Nil - Low 	<ul style="list-style-type: none"> • Low to Medium
Reinvestment at origin	<ul style="list-style-type: none"> • No 	<ul style="list-style-type: none"> • No
Milestones and innovations	<ul style="list-style-type: none"> • Percolator • Espresso machine • Soluble Coffee • Vacuum packaging • Grinding technology 	<ul style="list-style-type: none"> • Birth of the Specialty Coffee Association of America • Frappuccinos and other coffee drinks • The 'living-room' area in coffee shops • Rise environmental concerns • Rise of social concerns • Start of certifications
Leading figures/ brands	<ul style="list-style-type: none"> • Folgers • Maxwell House • Mr. Coffee • Nescafé • Hill Bros Coffee • Satori Kato • Lavazza • Tchibo • Jacobs • Melitta • Dowe Egberts 	<ul style="list-style-type: none"> • Starbucks • Peet's Coffee & Tea • George Howell • Howard Schultz • Erna Knutsen • Specialty Coffee Association of America

* Global overall indicators of key components of each wave - can vary depending on location.

Wave 3

Focus on origin and 'artisan' coffee

Wave 4

Commercializing specialty

Key concepts	<ul style="list-style-type: none"> • Specialty coffee • Niche/ elite • The story behind the cup • Artisan coffee & craft experience • Barista as expert • Tailored customer service • Latte-Art and Cupping competitions 	<ul style="list-style-type: none"> • Commercialization of specialty • Accessibility to more people • Innovation and technology • Focus on socioeconomic impact • Experimentation with new production processes (eg. Anaerobic Fermentation, Honey)
Quality	<ul style="list-style-type: none"> • Premium and specialty 	<ul style="list-style-type: none"> • Premium and specialty
Roasting & Processing	<ul style="list-style-type: none"> • Light roast • Small batch roasting • Craftsmanship 	<ul style="list-style-type: none"> • Dark, medium and light roast • Higher-quality soluble
Origin	<ul style="list-style-type: none"> • Region or growing area, • Specific farm (big/well known estate) • Small district, individual farmer • Farming plot • Specific varieties (Geisha) 	<ul style="list-style-type: none"> • Region or growing area, • Specific farm (big/well known estate) • Small district, individual farmer
Main distribution	<ul style="list-style-type: none"> • Small coffee brewers/ shops • Niche, independent roasters • Online gourmet shops 	<ul style="list-style-type: none"> • Supermarkets • Chain coffee shops • E-shops
Social and Environmental focus	<ul style="list-style-type: none"> • High 	<ul style="list-style-type: none"> • High
Reinvestment at origin	<ul style="list-style-type: none"> • Maybe 	<ul style="list-style-type: none"> • Yes
Milestones and innovations	<ul style="list-style-type: none"> • Experimental processing methods • Single origin and micro lots • Brewing methods: V60 Ceramic Dripper, Clever Dripper, Aeropress • Latte art • Direct trade • Artisan/ craft coffee • Cup of Excellence 	<ul style="list-style-type: none"> • Cold brew and expansion of ready-to-drink (RTD) • M&A of specialty brands to commercialize specialty coffee • Specialty and/or premium quality soluble
Leading figures/ brands	<ul style="list-style-type: none"> • Specialty Coffee Association • Trish Rothgeb • Intelligentsia • Counter Culture • Stumptown Roasters 	<ul style="list-style-type: none"> • La Colombe for ready-to-drink (RTD) • Nestle for innovation in brand acquisitions like Chameleon Cold Brew, Bluebottle, Nespresso and Roastelier • Coffee Island (Greece) and Double B (Russia) as coffee shop chains that have successfully and profitably scaled and who focus on origins and transparency

Coffee and health: Debunking the myths

Millions of people around the world enjoy coffee for its unique taste and aroma as well as its physiological benefits. Coffee is one of the most studied components of the modern diet. Extensively researched, it is also a subject of misinformation or claims that lack scientific research.

Most studies confirm that coffee can be enjoyed as part of a healthy, balanced diet and may even confer health benefits. The research in this section, carried out by the Institute for Scientific Information on Coffee, is backed by studies exploring associations between drinking coffee and its effect on the body. These include alertness, sleep and physical performance, as well as associations with health conditions such as type 2 diabetes, cardiovascular disease, cancer and neurological conditions.

Coffee in everyday life

Nutritional components

Coffee naturally contains numerous micronutrients, notably potassium, magnesium, niacin and antioxidants. Its nutritional composition varies, depending on the addition of milk, cream, sugar, etc. Coffee itself contains practically no calories. The main bioactive compound in coffee is caffeine, with a typical cup of coffee containing 75–100 milligrams (mg) of caffeine.

The European Food Safety Authority, in a review on caffeine safety, concluded that moderate caffeine consumption of 400mg caffeine a day (the equivalent of up to five cups of coffee), can be enjoyed as part of a healthy, balanced diet and an active lifestyle. Pregnant and breastfeeding women are advised to limit their daily caffeine intake to 200mg.

Alertness

The European Food Safety Authority evaluated numerous studies and concluded that 75mg of caffeine (the amount found in approximately one cup of coffee) increases both attention and alertness.

Sleep

The stimulant effects of caffeine in coffee may affect sleep patterns. Studies suggest an association between daily caffeine intake, sleep quality and daytime sleepiness. Sensitivity to caffeinated coffee does vary between individuals. Those who experience sleep problems may choose to switch to decaffeinated products in the afternoon and evening.

Physical performance

Research suggests that caffeine may improve physical performance during exercise. It is associated with increased endurance performance and endurance capacity and a reduction in perceived exertion during exercise. While most research has been undertaken on trained athletes, studies in people with lower levels of fitness or living sedentary lifestyles also suggest that caffeine can improve performance.

Hydration

While caffeine does have a mild, short-term diuretic effect, this is counterbalanced by the water in coffee. Drinking coffee in moderation does not lead to dehydration, or significant loss of body fluid – in fact, it contributes to daily fluid intake.

Health conditions

Type 2 diabetes

Research suggests that drinking 3–4 cups of coffee a day is associated with a roughly 25% lower risk of developing type 2 diabetes, compared to consuming none or less than two cups per day. The risk also seems to decline for every additional cup of coffee, within the recommended guidance of up to five cups a day. This is seen with both caffeinated and decaffeinated coffee and, at present, a clear explanation for the association is unclear.

Cancer risk

In 2016, the International Agency for Research on Cancer published its review into the carcinogenicity of drinking coffee, mate and very hot beverages. The agency revised its classification of coffee to Group 3: 'Not classifiable as to carcinogenicity.' It found no clear association between coffee intake and cancer anywhere in the body. In some cases, it concluded that drinking coffee may actually help reduce the occurrence of certain cancers, citing lower risks for cancers of the liver and uterine endometrium (innermost lining of the female uterus). Two other reviews show similar results.

The International Agency for Research on Cancer classified beverages consumed at very high temperatures (defined as over 65°C) as probably carcinogenic to the human oesophagus (the tube connecting the throat and stomach). This is considered hotter than most people typically comfortably drink coffee.

Cardiovascular health

In healthy people, daily consumption of 3–5 cups of coffee may reduce cardiovascular disease mortality risk. Higher consumption has not been linked to elevated cardiovascular disease risk. A 2017 review suggests that a moderate caffeine intake is not associated with increased risks of cardiovascular disease; arrhythmia (irregular heart rhythm); heart failure; blood pressure changes; or high blood pressure, among regular coffee drinkers.

Neurological health

Research has suggested that a regular lifetime intake of coffee may help protect against age-related cognitive decline and other neurodegenerative diseases, such as Alzheimer's and Parkinson's disease. Although the mechanisms are not yet fully understood, it is possible that both caffeine and other compounds naturally present in coffee are involved in this association.

Policies to transform supply chain mentalities

Value chains as we know them prioritize outputs over outcome or impact. Systems that operate mainly around profit, with little to no regard for people or planet, are jarring with our global social consciousness, as the world experiences social change. Rather than a revolution in our supply chains, we are moving towards constructive evolution of our food – and coffee – systems. A strategy based on values such as equity, sustainability and inclusion is central to this evolution.

In the coffee sector, the highest value is added – and absorbed in – the last stages. At the bottom of the chain, producers retain little profit, with scarce means and low incentive to continue production. This effectively makes the current coffee supply chain an unsustainable model. Coffee stakeholders and policymakers have never been more aware of the gaps in the status quo, and they are exploring ways to address them. They understand that reputational risk is as vital as performance risk and must be managed.

A more sustainable alternative is a values-based production chain that values people, planet and profit equally. Corporate social responsibility remains a voluntary choice today, not a mandatory global framework. For real impact, the coffee supply chain needs true transformation. It should integrate appropriate policies, rules and regulations that ensure sustainability in our supply chains.

Major consumer markets such as the European Union and the United States are drafting laws and regulations that aim to meet these objectives.

European Union

In the European Union (EU), there has been recent scrutiny on how its supply chains operate. The lack of a comprehensive EU framework has led to a patchwork of different national policies where the scope and requirements vary from one member country to another. The EU recognizes that sustainability should be further embedded into the corporate governance framework and is acting accordingly.

The EU's Green Deal is a milestone initiative that emphasizes people and sustainability. It is an integral part of EU efforts to implement the United Nations Sustainable Development Goals (SDGs). The Green Deal outlines the European Commission's commitment to the transformation of global value chains, by promoting new standards for sustainable growth.

The bloc aims to be climate neutral in 2050 and proposes a European Climate Law to turn this political commitment into a legal obligation. It includes more than 20 transformative policies, some of which are directly related to the coffee supply chain. These include:

■ **EU sustainable corporate governance and mandatory due diligence**

Globalization has given multinational companies unprecedented power and influence across the world. This enables them to avoid liability for their harmful impacts on local communities by hiding behind the 'corporate veil', exploiting weak and poorly enforced domestic regulations in developing countries, or abusing the international investors' protection system. Until now, the only directives¹⁵ to avoid this have been voluntary.

In a resolution of 17 April 2020 on EU coordinated action to combat the COVID-19 pandemic and its consequences, the European Parliament said 'corporate human rights and environmental due diligence are necessary conditions in order to prevent and mitigate future crises and ensure sustainable value chains'.¹⁶

Under the Green Deal, the European Union has developed a regulatory framework through mandatory due diligence that enforces sustainable corporate governance in the bloc.

■ **Non-financial reporting directive**

Under the same initiative, the EU has proposed new rules that require large companies to publish reports on the social, environmental and climate-related impacts of their activities.

■ **Biodiversity strategy**

This strategy introduces measures to tackle the global biodiversity challenge and prevent global deforestation.

■ **Farm to fork strategy**

This strategy attempts to accelerate the transition to sustainable food systems, by reducing the risks associated with the use of pesticides, for example.

■ **Regulation on forest commodities**

This includes regulatory and non-regulatory measures to increase supply chain transparency and to minimize the risk of deforestation and forest degradation associated with EU commodity imports.

United States

Responsible labour practices are a risk area for commercial coffee transactions. A growing body of US laws and regulations requires companies to disclose labour practices of their suppliers and ensure that goods from suppliers are produced in compliance with responsible practices. These include the absence of child labour, forced labour and involuntary labour.

Deliberate noncompliance with the relevant regulations may lead to rejection of shipments intended for import. To address this risk, exporters and importers must ensure that their supply chains are free from abusive labour practices and formally document the conditions and steps they have taken.

Collaboration at the European or US level alone will not ensure coffee exports into these markets. The global coffee community will have to pull together and work as one towards the common goal of a truly sustainable and inclusive supply chain.

New regulations have both a positive and negative impact on the producer community. Mandatory due diligence and increased transparency and requirements inevitably generate higher expectations of producers. Smallholder farmers, micro, small and medium-sized enterprises, and international buyers will need to adapt their production/marketing systems. Technical assistance and capacity building are key to support this transformation.

Prices at the smallholder farmer level may be affected, with production costs possibly rising due to these extra requirements. This is a concern for the grower community. Policymakers must place equal importance on achieving a fair price for farmers (mentioned in the European farm to fork strategy) to balance this out. Initiatives to boost prices for farmers are a top priority. Keeping communication channels open with producer organizations to monitor impact is also crucial.

15. A directive is a legislative act that sets out a goal that all EU countries must achieve. However, it is up to the individual countries to devise their own laws on how to reach these goals.

16. https://www.europarl.europa.eu/doceo/document/TA-9-2020-0054_EN.pdf

Trends in the coffee industry

While the global coffee industry enjoys steady growth, there have been important structural evolutions. Some specific trends are effectively shaping the future of the sector.

Climate change: New production methods

Climate change is set to halve the global area suitable for coffee production. Add to this pest infestations and declining coffee prices, and it's clear that the welfare and livelihoods of farmers are under threat. Heat waves, droughts and disease outbreaks in coffee-growing areas are increasing. Meanwhile, deforestation continues to meet the rising demand for land. As coffee is a delicate crop with highly specific temperature, rainfall pattern and environmental demands, this is all taking a toll on coffee production – and producers.

Smallholder farmers produce 80% of coffee, and they are the most vulnerable to this crisis. Many are unfinanced or underfinanced, and they often rely on just one crop – coffee – for a living. Climate change adds even more pressure on their bottom line, with coffee prices often low and volatile.

There are five main climate risks:

- loss of suitable areas for coffee production and shifts to higher altitudes;
- increased water stress;
- poor flowering and cherry development;
- more outbreaks of pests and diseases; and
- greater vulnerability of smallholder and women farmers.

Witnessing these effects first-hand, producers have started to apply methods of climate mitigation and adaptation at farm level – both to farming practices and post-harvest processing. Government policies, producer organizations, international donors and partnerships with the private sector support more climate-smart agriculture.



Coffee cupping session.

Transparency and sustainability: A competitive advantage

Transparency and sustainability benefits are evident in two product categories: specialty coffee and certified coffee.

Specialty coffee is sold based on its specific origin and the quality characteristics it gets from production in that location. This makes traceability a desirable – if not crucial – factor.

In certified coffee, the value of the product is in reassuring the consumer that it has been produced according to a specific set of economic, social and environmentally sustainable norms. This makes environmental sustainability, ethical production methods and a fair system of trade absolute must-haves. Some buyers and roasters prefer to go beyond certification and participate in tailored schemes for social impact and environmental protection.

Consumers hold brands increasingly accountable for sustainability and fair trade as public awareness has shot up in recent years, thanks to social media and online platforms. This is driving change across the supply chain, as demand helps shape a supply more respectful of both farmers and the environment.

Specialty coffee continues its ascent

Specialty coffee describes the emphasis on quality and origin – two defining features of third-wave coffee. These coffees usually command higher market prices due to the superiority of the beans, most of which are Arabica, although it is important to note that not all Arabicas are specialty coffees.

While both ‘specialty’ and ‘certified’ designations allow producers to access higher-value market niches, there are pros and cons to each approach. Certification is often expensive, but certifying agencies may offer technical assistance. Although specialty coffee does not require costly certifications, it needs a certain level of human capital so that growers can produce high-quality beans and effectively access specialty markets. Estimates of the size of the specialty market in the United States range from 5%–38% of the market for green coffee, depending on the definition of ‘specialty’.

Quality: Consistency over excellence

Quality never used to be noteworthy. Coffee just had to be, at a minimum, palatable. But with the rise of specialty coffees, demand for better quality has spread across the sector, even for more commercial use (standard and premium segments). Good, consistent quality for the masses has become a priority over outstanding quality for the few.

The industry is seeing the growth of an intermediate premium market segment that combines a higher quality than standard coffee, more accessible prices and better taste than specialty coffee, and third-wave concepts of environmental sustainability and social responsibility.

Sustainable single-serve capsules of premium-quality coffee, multinational merger and acquisition strategies target higher-quality coffee segments, and efforts to educate consumers and buyers on sustainability and quality all form part of efforts to develop the premium market segment.

The producer becomes consumer

Coffee consumption goes hand in hand with economic development and disposable income. As producer countries transition from a low-income status to one of lower-middle and solid middle income, increased consumption at origin is becoming a trend.

Some countries – such as Brazil, Indonesia and Ethiopia – already have high consumption at origin, with a large percentage of total coffee produced being consumed in-country. But market demand for coffee in many producer countries is very low.

Consumption at origin is on the rise, however, and demand for quality in countries with established coffee consumption is slowly increasing. Policies are being crafted to promote in-country coffee consumption and enable value addition at origin for domestic sales of roasted coffee. Value addition at origin could also serve a new dynamic of South-South trade as producer countries find new markets in other producer countries.



Coffee quality grader cupping coffee at an event in Cameroon.

Digitalization: From seed to cup

Online sales are not the only emerging trend in coffee. Farms are digitalizing, with technology use in agronomy, post-harvest processing, field mapping, farm management and even e-banking at origin all helping – or aiming – to increase productivity.

E-commerce is taking off as well, with green bean online marketplaces and online auctions becoming more common. Blockchain technology is being explored in the sales arena. It aims to bring all parties in the coffee supply chain together, simplify the exchange and tracking of information and payments, and enable more trust. Digital methods in shipping and logistics boost efficiency and traceability of the movement of coffee beans from producer to buyer.

Finally, roasting technology contributes to quality control, consistency, improvement and replication for both sample and production roasting. Cupping technology contributes to more exact and consistent scoring, and brewing technology improves the quality of the final served product and efficiency in coffee shops.

The digitalization of the coffee supply chain could have major social and economic implications and bring more balance to an industry with serious inequities in terms of access to markets, opportunities and capacity levels. For that to happen, policymakers, donors and investors must understand the need for investment in digitalization. The success of digital technologies in producing countries also depends heavily on necessary structural reforms, infrastructure development and capacity building.

Partnerships for systemic change

The real way forward for a true systemic change that has the sustainable outcomes and impact needed for a thriving coffee sector is through partnerships and alliances. Working in silos on single issues or value chain levels will not achieve a comprehensive – and effective – transformation. Public-private partnerships, impact investment, alliances between supply chain operators and enabling policies will be instrumental in driving the coffee industry forward.

An evolution of the global coffee supply chain towards a system that is effective and respectful of people and planet requires joint action and collaboration across the board. It involves 'the consolidation of power and information in the roasting and trading roles as well as the social and environmental systems that support the coffee system with water, sunlight and other resources'.¹⁷

17. Specialty Coffee Association, 2019.

CHAPTER 2

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Coffee-growing area in Colombia.

SUSTAINABLE IS THE NEW NORMAL

The livelihoods of many people depend on the coffee industry – as does the ever-increasing demand for one of the world's most popular beverages. Yet a web of challenging environmental, social and economic factors is putting these livelihoods, and the coffee sector at risk.

This chapter explores issues threatening the coffee supply chain, the sustainability framework in place today and sustainable pathways for tomorrow.

Business as usual?

With the rapid advance of climate change, maintaining production to meet growing demand is becoming difficult. Low incomes, volatile prices and the lack of an enabling operational framework continue to challenge the livelihoods of farmers. To keep going in the long term, the industry must re-examine business as usual.

Climate change is advancing

Climate change is one of the world's defining problems today. Rising temperatures, more severe and frequent extreme events such as droughts, floods, hurricanes and storms, greater pest and disease incidence, and soil degradation increasingly challenge millions of people because of climate change.¹⁸

The coffee industry could be hard hit. While climate change is just one of many factors affecting global coffee production, it is likely to be one of the most important ones. Smallholders, who produce most of the world's coffee, are both the most vulnerable and the least resilient to its effects. Women producers will be especially affected, as they typically have less access to resources such as land, credit and information. With an estimated 125 million people depending on coffee for their livelihoods, this could be a drastic problem.

18. Intergovernmental Panel on Climate Change, 2018.

Arable land for coffee may decrease

Rising temperatures, erratic rainfall and more frequent and intense extreme weather events are expected to render certain producing areas less suitable or even completely unsuitable for coffee growing given the existing technology. Some regional studies have found that by 2050, up to 75% of arable land will be lost for Arabica production and more than 60% for Robusta.^{19, 20}

There is still high uncertainty across these findings, and these trends are also projected to unfold unevenly across coffee varieties and regions. Volatility is clearly increasing, however, and some types of extreme weather events are becoming more common.

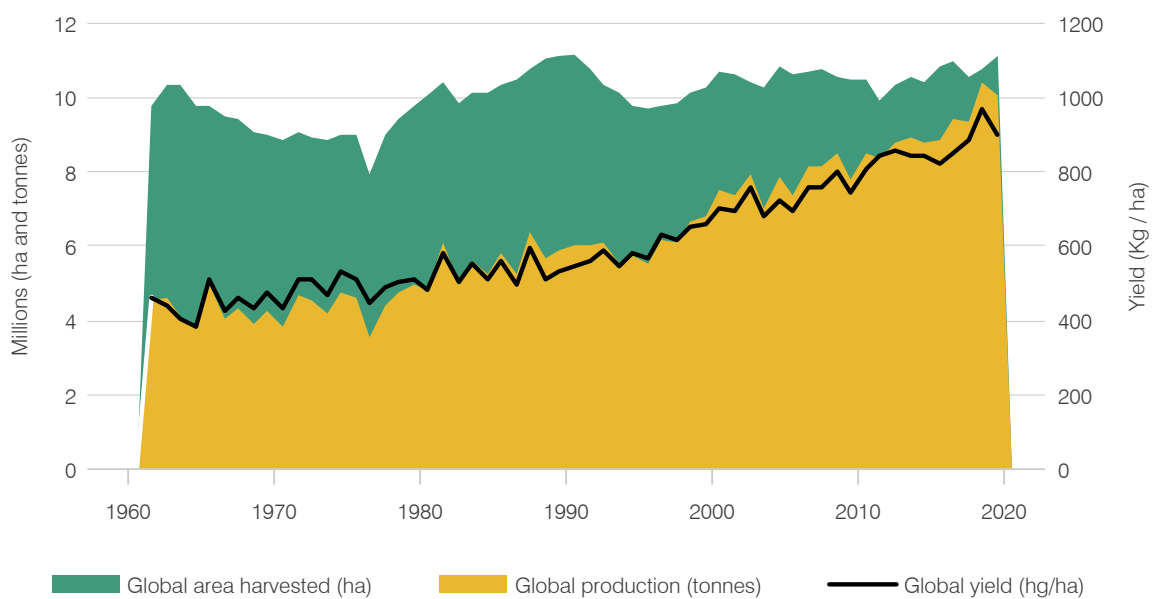
Coffee is a sensitive crop, and Arabica traditionally grows at high elevations. Climate change may affect the geography of coffee production, forcing producers to plant at higher elevations, for example. Land conversion for coffee production in new areas is a possible scenario that will have broader sustainability implications, such as loss of biodiversity and carbon sinks.

Unlike palm oil and cattle farming, coffee has played a relatively small role in global deforestation. However, climate models and field evidence show that climate change will gradually drive production into new areas. Such a development would threaten some of the last intact primary forests on our planet and the rich ecosystems and biodiversity within them.²¹

This scenario implies that suitable areas for coffee will remain stable or even decrease in size, a trend that is confirmed by data in the figure below.

Conversely, the data also show that global coffee production has expanded over the last 20 years, despite the operational bottlenecks described in Chapter 3.

Figure 1: Coffee production has shot up since 1960



Adapted from FAO and WCR

Source: Food and Agriculture Organization of the United Nations and World Coffee Research.

19. Sachs et al., 2019.

20. Läderach et al., 2017.

21. *Coffee Barometer 2020*.

How to keep up productivity sustainably?

Expanding land area for production can have negative consequences by contributing to climate change, especially when bringing non-agricultural lands into production. To address this concern, actors increase coffee production by focusing on input intensification instead, such as increased use of fertilizers.

Agricultural inputs such as fertilizers or pesticides can boost yields, but overuse or unsafe application can harm the environment or human health. To reduce land use conversion and achieve climate goals, improving productivity requires input options for farmers that are safe and effective.

Sustainable solutions exist to improve coffee yields, and many coffee-producing regions and countries have implemented them successfully. Research and development – backed by funding, policies, and an enabling environment for innovation and technology – can increase both productivity and sustainability in coffee farming. More efficient use of inputs, more resilient coffee varieties (including hybrids) and shade protection are ways to boost productivity in harmony with the environment.

Better access to technology and improved production practices hinge, however, on access to finance and information – two things that producer communities sorely lack.

Add declining or volatile coffee prices to the effects of a climate crisis and it becomes clear that, under the 'business as usual' scenario, the welfare and livelihoods of coffee producers are under threat.

Climate change affects women disproportionately

In many coffee-producing regions, a serious obstacle to increasing agricultural productivity and achieving a living income is the lack of land tenure security for rural women. An estimated 20%–30% of coffee farms are female-operated and women provide up to 70% of labour in coffee production, depending on the region.²²

A lack of tenure security translates into poor access to finance, at best. This, in turn, hinders access to production inputs, training opportunities and information in general – and climate-smart solutions in particular. These disparities are especially marked in areas where, for historical, cultural or institutional reasons, women's access to land involves right of use, but not ownership.

The 2030 Agenda for Sustainable Development,²³ through its Sustainable Development Goals, calls on the global community to 'take urgent actions to combat climate change and its impacts' (SDG 13) and 'end hunger, achieve food security and improved nutrition, and promote sustainable agriculture' (SDG 2). Achieving these objectives depends on the capacity of all value chain actors to boost productivity growth in a sustainable way and specifically from sustainable innovations that render physical and human capital more productive.²⁴

With women making up such an important percentage of the coffee cultivation workforce, it is vital to empower women in the coffee farming sector. This is crucial to meet the world's rising demand for coffee while lifting millions of producers out of poverty. To be viable and long-lasting, greater productivity must be balanced by environmental and social sustainability and enhanced resilience to a changing climate.

Adaptation on the farm and mitigation from seed to cup

Not only must coffee production adapt to a changing climate, but the entire supply chain needs to rally to lower the emission of greenhouse gases, which trigger climate change. This means an equal focus on climate change adaptation at producer level and mitigation of further climate change effects across the coffee industry.



KEY MESSAGE

Lack of land tenure for rural women – who represent a large share of coffee farmers – keeps agricultural productivity and wages low.

22. ICO, 2018. <http://www.ico.org/documents/cy2017-18/icc-122-11e-gender-equality.pdf>

23. United Nations, 2015.

24. Cirera and Maloney, 2017.



'Drawdown' is the ideal scenario in which greenhouse gases levels in the atmosphere stop climbing and start to decline steadily.²⁵ To achieve this, all aspects of the climate equation must be addressed. The coffee sector has the potential to contribute effectively and bring society to the drawdown.

To achieve this, a call for action must be made in three connected areas:

- **Reduce source:** Bringing emissions to zero.
- **Support sinks:** Uplifting nature's carbon cycle.
- **Improve society:** Fostering equality for all.

Coffee contributes significantly to climate change. It is a nitrogen-intensive plant with a long and complex value chain that requires energy-intensive preparation prior to consumption.^{26, 27} However, as coffee is a perennial production system (plants don't need to be replanted each year), an active area of inquiry is how coffee production systems can contribute to increased carbon sequestration and/or reduced greenhouse gas emissions. Perennials maintain the soil cover and soil structure and have deeper root systems than annuals and thus provide soil stability and enhanced soil health. They can also tap available soil nutrients, enhance biodiversity, make more water available to plants, and capture and sequester carbon.²⁸

To encourage mitigation, one can generate marketable carbon offset credits and establish carbon-neutral labelling systems to engage coffee consumers in climate change mitigation.²⁹

Reducing greenhouse gas emissions from agriculture and land use plays a central role in the way we address climate change. There is still untapped potential in the way agriculture and land use can go beyond just cutting greenhouse gas sources. Agricultural lands can also serve as 'sinks' to capture and store excess atmospheric carbon dioxide (CO₂).

Box 1: Climate change adaptation and mitigation

Climate change adaptation

Adaptation is 'the process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects'. This adjustment includes many areas such as infrastructure, agriculture and education.

In the coffee sector, climate change adaptation typically consists of technical solutions to adapt coffee production and processing to climate changes. Long-term strategies are needed to improve conditions to adapt to future climate risks and build capacities as required, including the development of financing mechanisms.

Climate change mitigation

Mitigation is a 'human intervention to reduce the sources or enhance the sinks of greenhouse gases'. Human interventions reduce the sources of other substances that may directly or indirectly limit climate change. These include reducing particulate matter emissions that can directly alter the radiation balance (e.g. black carbon) or measures that control emissions of carbon monoxide, nitrogen oxides, volatile organic compounds and other pollutants that can change the concentration of tropospheric ozone, which has an indirect effect on the climate.

In the coffee sector, climate change mitigation often refers to measures to reduce greenhouse gases to help protect the climate generate carbon credits. It targets all value chain actors, from producer to consumer.

Source: Intergovernmental Panel on Climate Change (2014) and ITC (2012).

25. Project Drawdown, 2020. 'Farming Our Way Out of the Climate Crisis.'

26. Birkenberg et al., 2021.

27. Kilian et al., 2013.

28. FAO, 2011. <http://www.fao.org/fileadmin/templates/agphome/documents/scpi/PerennialPolicyBrief.pdf>

29. Birkenberg et al., 2021; Reinecke et al., 2012.

Climate change adaptation and mitigation are two different concepts, though closely intertwined.

Adaptation strategies include more sustainable and climate-smart farming practices and more efficient on-farm processing. Few smallholders have the necessary resources and/or knowledge to embrace these.

Longer-term adaptation strategies include capacity building, mapping of climate data, improving soil fertility, examining different production models and developing/planting drought- and disease-resistant varieties. Diversifying with crops other than coffee and/or shifting production to more suitable growing areas are other possible strategies, though more extreme.

Mitigation strategies include calculating and reducing the on-farm carbon footprint and determining the feasibility of creating carbon sinks. A strategy in the long term would be to link producers – smallholders in particular – with carbon markets to exploit carbon footprint opportunities.

The carbon footprint is not the only issue related to unsustainable practices in the coffee value chain. The sector's impact on water resources (e.g. water overuse or contamination) and waste management across the value chain are environmental areas that also face heavy scrutiny.

Box 2: The 'big five' critical climate challenges facing coffee

- Loss of suitable area for coffee production and shifts to higher altitudes.
- Greater water stress. Coffee quality losses due to unseasonal rainfall during harvest. Yield losses due to erratic rainfall, especially during the flowering stage.
- Poor flowering and cherry development due to rising temperatures.
- More outbreaks of pests and diseases.
- Increased vulnerability of female and male smallholder farmers.

For more information by country, see https://www.idhsustainabletrade.com/uploaded/2019/08/CountryProfile_Climate_Coffee_ALL.pdf

Source: Adapted from the Sustainable Trade Initiative (2019).

Predicting climate change impact

Uncertainty about the environmental changes expected in coffee-growing regions – and on how the sector adapts – makes it hard predict how the industry will be affected. Some anticipated areas of impact across coffee varieties have, however, been widely acknowledged.

- **Yields are at risk.** Weather extremes such as exceptionally hot or cold temperatures, unusual wind intensity during sensitive cultivation periods, and erratic and unseasonal rain during the dry season (flowering stage) can affect how coffee cherries set and lead to significant loss in production. These effects can be harsher on Robusta varieties because of hampered cross pollination, especially when accompanied by soil degradation.

Most available coffee varieties have lower yields when cultivated under shade – the more sustainable approach. There are two main methods of coffee cultivation: sun grown and shade grown. Shade-grown coffee is the more traditional approach; it mimics the natural way coffee grows, underneath a forest canopy.

Many regions, particularly in Latin America, switched to growing coffee in full sun in the 1970s, seeking to increase production. Full sunlight boosts the potential for higher yields – and possibly higher profits for the farmers in the short term – but it also requires a greater input of nutrients into the soil.³⁰ This, in turn, affects the sustainability of future production.

30. Hernandez-Aguilera et al., 2019

- **The quality of the beans could decline, due to warmer temperatures and erratic rains.** Warmer temperatures and drought cause coffee beans to ripen more quickly. The quality of beans declines as they lose ripening time, altering their taste and aromas.

Late rains also affect coffee cherry size. Smaller bean size is associated with lower price, which is reflected in lower income for the producer. As sun-drying techniques still predominate in many countries, unseasonal rains during harvesting and drying processes complicate these production stages. This can further threaten coffee bean quality, for example, due to a higher incidence of moulds and ochratoxin-A contamination. This phenomenon is explained in more detail in Chapter 5.

- **Deforestation, full-sunlight cultivation systems and loss of biodiversity can intensify soil degradation,** leaving it more exposed and vulnerable to the elements and less held together as plant root systems are removed, leading to soil erosion. Loss of biodiversity is a vicious cycle in coffee production. It is often caused by unsustainable agricultural practices, which in turn affects productivity, which further drives deforestation and more loss of biodiversity. Cicadas are another growing menace in many regions. While they used to feed on the roots of indigenous trees, they now feed on coffee and can kill the trees.

Deforestation exacerbates climate-change impacts and fuels climate change, reducing the CO₂ storage capacity due to reduced biomass. This causes atmospheric carbon concentrations to soar and further aggravates the problem.

Reduced genetic diversity that underpins the variation among coffee varieties is another threat to agricultural biodiversity, particularly for Arabica coffee. There are 124 known coffee species, growing wild in tropical Africa, Madagascar, Asia and Australasia. This wild species gene pool could have great potential for the long-term future of coffee farming. Although wild coffee species could be essential to the sustainability of commercial coffee production, 60% are endangered due to habitat loss.³¹



© Meklit Merisha for ITC-Alliances for Action

Coffee cherries ruined by the effects of climate change in Ethiopia.

31. Davis, 2019.

- **Pests and diseases are likely to increase due to rising temperatures, erratic rainfall and biodiversity loss.** A hotter climate not only encourages the proliferation of both pests and diseases, but it also increases the area of land available for them to spread. Biodiversity loss due to deforestation and conversion to monocrop coffee undermine the crop resilience against pests and pathogens.

These factors, along with farm management decisions, contribute to the onset of epidemics. The La Roya fungus (coffee leaf rust) phenomenon, for example, was a direct result of the El Niño/La Niña climate phenomena in the Pacific Ocean. This fungal disease has particularly affected the Andes coffee-producing region in the last decade.

A detailed table of common diseases and pests in coffee trees and coffee cherries is presented in Chapter 5.

The coffee industry cannot afford a drastic loss of output or output quality. The capacity of smallholders to cope with climate change is limited – the onus cannot be on them alone to keep up production. Innovations can improve environmental outcomes, increase productivity sustainably and enhance coffee quality.

All supply chain actors – agro-input manufacturers (especially fertilizer producers), farmers, exporters, roasters, coffee shop owners and coffee drinkers – contribute to climate change by emitting greenhouse gases. Prioritizing and financing innovations is crucial to help mitigate further impact. Greenhouse gas emissions must be reduced at every stage of the coffee value chain. These efforts are commonly referred to as climate change mitigation, which is high on most government agendas.

Methods of climate-change adaptation and mitigation exist across the coffee sector. However, predictions based on a business-as-usual scenario suggest the sector will reach an unsustainable tipping point. Improving the status quo may not suffice. Instead, the coffee industry and the way it works must be truly transformed to avoid irreversible damage and turn threats into opportunities.

By clearly articulating the challenges specific to coffee and noting action in other parts of the food and beverage industry, relevant innovations can be developed or adapted.

Unsustainable industry practices may lead to short-term gains. In the long term, however, these will hike up production costs, harm the environment and undermine the viability of coffee farming businesses. Worse still, the livelihoods of present and future generations of farmers could be compromised.

Producers cannot bear the weight of responsibility for the sustainability of the coffee sector. Stakeholders along the value chain can make important contributions through targeted innovations, from seed to cup.

Farmers' livelihoods are compromised

The recent decline in world coffee prices – and their increasing volatility – has heightened pressure on coffee producers and thrown a huge number of them below the global extreme poverty line of \$1.90 a day.³² The outbreak of COVID-19 adds a new layer of complexity and challenges, as demand and supply dynamics are shaken around the globe and across sectors.

A decent standard of living for smallholder coffee farmers is the foundation of sustainable global coffee supply chains, prosperous rural communities and the natural environment. At a minimum, economic sustainability requires coffee production to be economically viable in the long term. This demands a strategy that takes into consideration the social and environmental aspects of production.

What is a living income?

Enhancing the livelihoods of coffee producers means providing better opportunities for up to 125 million farmers, including their families.³³ There is not, however, a 'one size fits all' solution. Coffee farmers have different circumstances and needs.

Recent studies and market analysis identify at least four farmer archetypes, ranging from producers of conventional mainstream coffee to producers of specialty coffee (see, for example, the Sustainable Trade Initiative, 2020). Living income, and possible solutions to address living income gaps, can vary greatly across these – or otherwise defined – sourcing archetypes.

'Living income is the net annual income required for a household in a particular place to afford a decent standard of living for all members of that household.'

Living Income
Community of Practice, 2019

32. Sachs, 2019.

33. ICO, 2019.

Living income is defined as sufficient income to afford a decent standard of living for all household members – including a nutritious diet, clean water, decent housing, education, healthcare and other essential needs, plus a little extra for emergencies and savings – once farm costs are covered. A growing number of producers and their families live below the formally defined 'living income' benchmark.³⁴

Many coffee producers cannot earn sufficient income from their activities to improve their business and provide their families with basic food security, health and education. In many parts of the world, farmers involved in coffee production have limited income diversification opportunities, as most of their annual income depends on sales of green coffee beans.

Growth opportunities remain limited



Coffee farmers in Mexico.

Profitable value addition opportunities in the coffee value chain also remain constrained in coffee-producing countries, despite their growing importance in world consumption.

In countries where economic development creates opportunities for higher-paying employment, many male farmers migrate to urban areas or abroad. Farm management activities are then assumed by their wives and children, who are not registered as coffee farmers. More often than not, they face specific constraints in accessing resources that hamper their agricultural productivity and business opportunities and harm household welfare in the long run.³⁵

Women perform an estimated 70% of the labour in coffee production. Despite this, they remain an invisible, less empowered, workforce. The International Coffee Organization (ICO) estimates that women are only 20% of the household heads or landowners in coffee-producing families.³⁶

The allocation of tasks can vary by gender. For example, women typically perform a substantial part of weeding, harvesting and processing, while men are more involved in pruning, applying pesticides and logistics. Women earn less income, own less land and have fewer training and leadership opportunities.

Even in those cases where women-led coffee farms are successful in term of productivity, environmental and social sustainability, they still lack the support framework necessary to make a better profit and develop market

34. The Sustainable Trade Initiative, 2019.

35. Food and Agricultural Organization of the United Nations, 2011.

36. International Coffee Organization (2018). 'Gender Equality in the Coffee Sector: An insight report,' p. 9.

Box 3: Poverty benchmarks

The most commonly used benchmark for poverty is the **international poverty line**. The international or extreme poverty line for low-income countries has been set at purchasing power parity of \$1.90 per capita per day since 2011 (World Bank, 2015).

The global extreme poverty line established by the World Bank was set to reflect the value of national poverty lines in the world's poorest countries. While the elimination of poverty by 2030 is a core Sustainable Development Goal (SDG1), poor people aspire to rise above the poverty line, educate their children and receive fair payments for their labour and products.

The need to address social injustice in international supply chains of key agricultural commodities such as coffee has intensified the focus on the **living wage** for producers. The concept of living wage is mostly applied in the context of hired workers (in factories, on farms, etc.).

An extension of this approach is the more recently but widely adopted concept of **living income**. A living income is a benchmark that indicates the net income required for a household in a particular place to afford a decent standard of living for all household members. A living income is defined as sufficient income to afford a nutritious diet, clean water, decent housing, education, healthcare, transport, clothing and other essential needs, plus a little extra for emergencies and savings – once farm costs are covered. The Anker Methodology is the most adopted methodology for calculating the living wage and living income benchmarks.

Earning a living income is an essential step in helping farmers achieve **sustainable livelihoods**. The latter entails having the means, capacity and income to cover basic needs – and earning at the very least a living income. Farmers also need to be economically resilient, meaning they are able to withstand or recover from shocks and unexpected events without undermining natural resources.

Farmers earning a living income can cover their basic needs and make a living. However, to achieve a sustainable livelihood, they also need to be able to invest in their farm or business to have enough for the future, as well. The difference between surviving and thriving is economic resilience, and greater opportunities for men, women and youths.

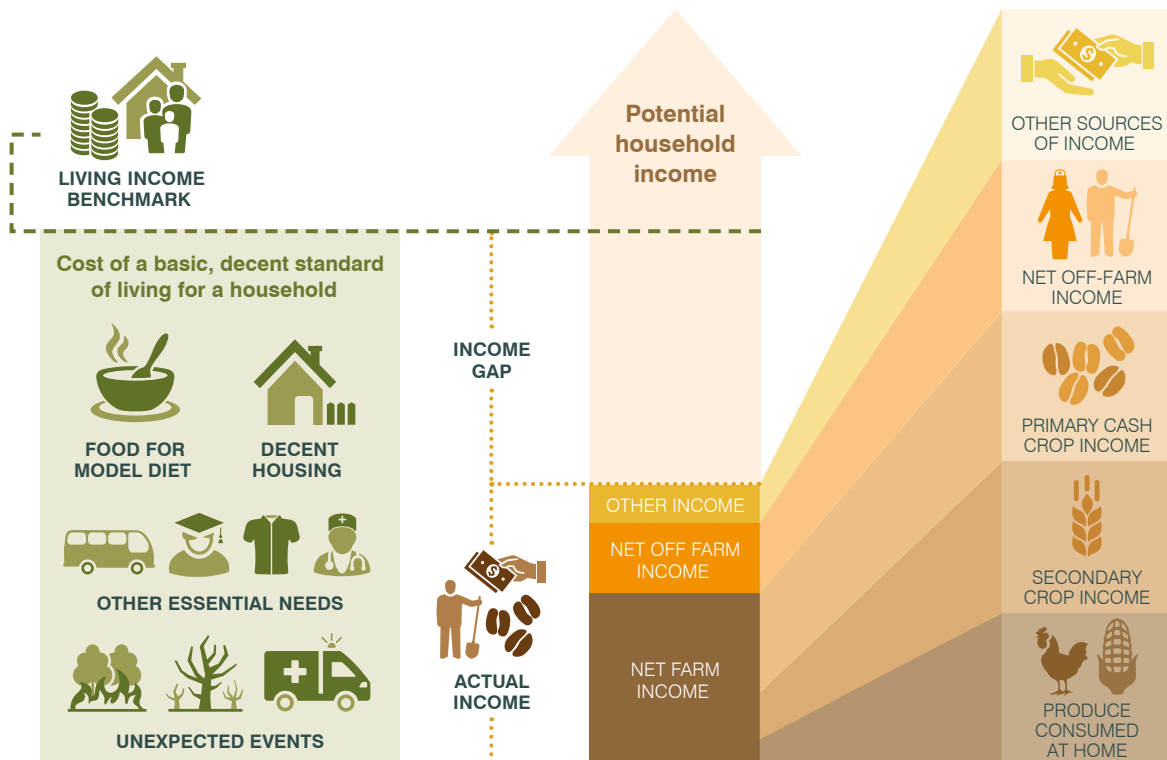
Source: ITC.

linkages for their product. Providing technical training on cultivation, processing and marketing is crucial to promoting gender equity in coffee production.

Excluding women from leadership positions, access to information and input and output markets raises inherent gender equity concerns and can negatively affect the health and nutritional status of children. When women gain more economic strength, their families and communities benefit.



Figure 2: The living income narrative



Source: The Living Income Community of Practice.³⁷

Incentives to keep farming become scarce

Low prices, excessive price volatility and low yields not only affect farmers' incomes; they also demotivate current farmers and future generations from staying in coffee farming and cause labour shortages during harvest time.³⁸

Coffee farming is typically a family business, but many youths perceive it as an unattractive activity with low prospects for growth. When access to education provides opportunities for employment outside the coffee sector, youth are therefore prone to leave. Having experienced poor remuneration and lack of prospects first-hand, parents usually encourage their children to pursue other more profitable careers or activities.

The social costs of unrewarding farming activities also include health and safety concerns for workers, child labour and the widespread informality of employment, due in part to the rural and seasonal nature of the work.

Coffee production and harvesting has several specific health risks, such as injuries from sharp tools or repetitive movements, lifting heavy loads, pesticide exposure or poisoning, respiratory illness from exposure to coffee dust, and exposure to sun and heat.³⁹

KEY MESSAGE

Coffee culture is at the heart of the millennial consumer lifestyle, and glamorized on social media.

Meanwhile, youth in coffee-producing countries dream of better lives away from the coffee farm.

This alone highlights the disparities in the sector.

37. https://c69aa8ac-6965-42b2-abb7-0f0b86c23d2e.filesusr.com/ugd/0c5ab3_eb3ecfb51f234b3cb7881f30f13240f4.pdf Accessed on 15 November 2020.

38. *Coffee Barometer* 2018.

39. *Coffee Barometer* 2020; International Labour Organization, 2019.

Child labour remains a key determinant of the persistence of poverty in producing countries.⁴⁰ Working children are often displaced from school, which affects both their current well-being and learning and their potential future earnings and opportunities.^{41, 42} Child labour usually occurs in the poorest households, out of economic necessity. This has the effect of an intergenerational poverty trap: Poor parents send their children out to work, and they then obtain less schooling and end up in low-productivity, low-wage jobs in the future.⁴³

In a world of increasing climate change, global interconnectedness of value chains and rapid diffusion of pandemics, it is essential to study how different shocks affect producers and their children. Finding ways to guarantee a living income and opportunities for youth and children with positive, lasting impact is a priority for systemic change.

As farmers struggle to earn a living income, they forgo vital but costly farm maintenance activities, resulting in diminished quality and yields, with some farmers even transitioning out of coffee altogether. If the current scenario of low and volatile prices continues, the volume, quality and diversity of the global coffee supply will be severely diminished.⁴⁴

Low productivity, low and volatile prices, high production costs and poor access to training, research and development are at the core of this poverty trap, especially for women. If labour productivity can be increased through innovations, then returns to farmers will improve and they will be more likely to remain engaged in the coffee farming sector.

Research and technology that can improve yields, access to finance, extension services and enabling policies are some of the solutions to secure a sustainable future for coffee farmers – and the coffee industry at large.

Sharing value: Where do we stand?

Historically, value has been inequitably distributed across the supply chain. Several factors are at play that need to be addressed to rectify this imbalance.

Volatile and low prices challenge producers

The volatility and slump of coffee prices have severe economic and social consequences for producing countries. The most acute symptoms of low and volatile prices on the producers' side of the value chain are the lack of profit, increase in uncertainty and an inability to flourish.

Fair prices that reward quality and offer greater stability and reliability in supply are one way to address this imbalance. Innovation, technology and a range of capacity-building activities are also required to lower the cost of inputs at one end and increase labour productivity at the other. This helps reduce the total cost of production and improve yields.

The International Coffee Organization estimates that the coffee retail market generates revenues of more than \$200 billion annually.⁴⁵

Consumption is highest in Europe, the United States and Brazil, but South-East Asia is catching up. Rising incomes and an increase in the standard of living of the growing middle class have given coffee consumption a boost – for both high-quality coffees and instant or flavoured coffees.

While many consumers willingly pay a relatively high price for the popular beverage, the question of whether producers receive a fair fraction of that retail price is highly debated and controversial. The coffee industry suggests that the average green coffee export value accounts for about 10% of this amount.⁴⁶

The industry needs to rally so farmers can receive a share of the retail price that ensures a living income, and so coffee production remains attractive to today's youth – the next generation of coffee farmers.⁴⁷

THE COFFEE PARADOX

The stark divide between decreasing and unstable prices for farmers and increasing prices for consumers.

Daviron and Ponte, 2005

40. Soares, Kruger and Berthelon, 2012.

41. US Department of Labor, 2020.

42. *Coffee Barometer 2020*.

43. Kruger, 2007.

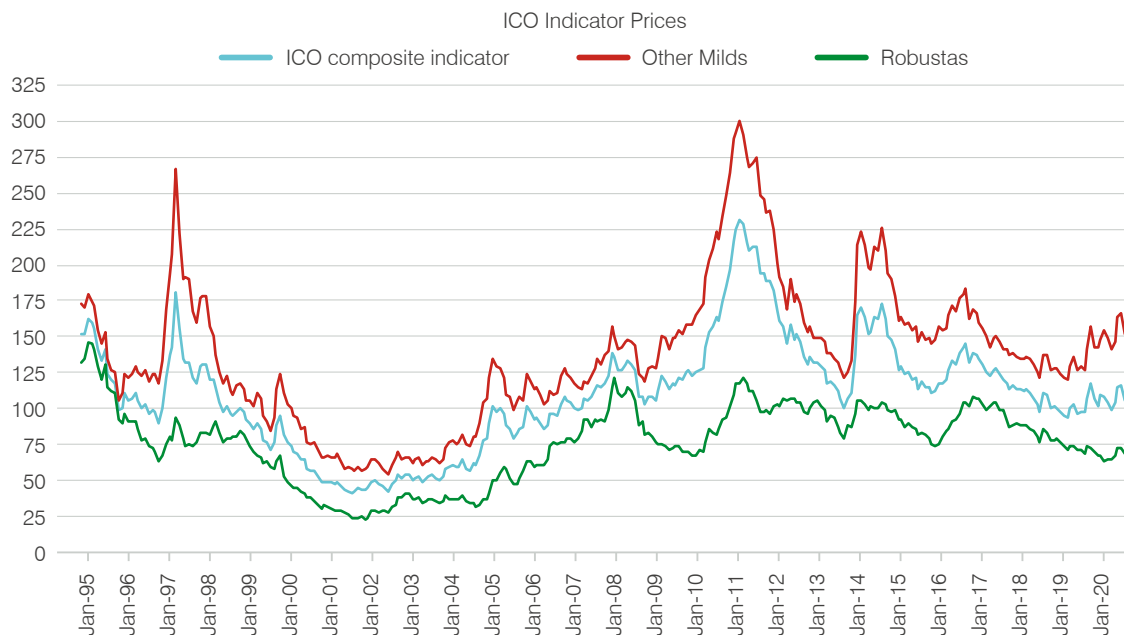
44. Specialty Coffee Association, 2019.

45. ICO *Coffee Development Report 2020*.

46. Samper et al., 2017; Sachs et al., 2019; *Coffee Barometer 2020*.

47. Sachs, 2019.

Figure 3: Volatile coffee prices



Note: Indicator prices are representative prices for coffee, including a composite indicator price for coffee as a whole and group indicator prices for Other Mild Arabicas and Robustas. For the purpose of the ICO Agreement, exporting member countries are grouped according to the type of coffee they produce. The following groups have been established under the ICO Agreement: Colombian Mild Arabicas, Other Mild (Arabicas), Brazilian Natural Arabicas and Robustas.

Source: International Coffee Organization.

The ICO Composite Indicator Price, which is a weighted average of all major coffee origins and types, clearly highlights that prices have historically been highly volatile, in line with other price indicators. The last 10 years also show a downward trend. The year 2020 was no exception and for most of the year coffee prices remained up to 30% below the average price level of the past decade. Meanwhile, production costs have increased in many producing countries, constraining incomes and livelihoods of many farmers.

Many factors can influence a farm's profitability. These include farm size, labour costs, the incidence of pests and diseases, the cost of fertilizer and other inputs. Factors leading to inefficiency and, in turn, higher prices are often beyond the control of farmers and their business partners. The price problem may emerge at any stage of the supply chain. A range of issues including inefficiencies in the logistics networks, the tax infrastructure, exchange rates, market access, lack of access to capital and insurance may hike up prices.

Costs related to logistics are often overlooked as important determinants of the distribution of value across the coffee supply chain. Poorly designed or implemented policies and administrative procedures at national, regional and local level can also affect the distribution of value. Discontinuity, jeopardized reliability and increased risk are some of the potential consequences.

Countries that have seen the highest growth, investment and eradication of producer poverty in their coffee sector are those that have engaged partnerships for investment and sustainable development. When governments, local coffee authorities and associations come together to design and implement policies to manage economic and environmental resources sustainably, the likelihood of coffee sector growth increases dramatically.

These policies and structural investments trigger higher export earnings and ensure stable production, paving the way for private sector-driven growth of the value of coffee. Viet Nam owes much of its success in the coffee sector to targeted government policies, which played a pivotal role in the country's integration and achievements in the global market.^{48, 49}

How much revenue farmers make depends on quantities sold and farm-gate prices. Farm-gate prices vary by variety, quality, operating costs and market destination. As coffee moves from producing countries to its final destination, new costs are generated at each step and the price rises accordingly.

48. International Coffee Organization (2019). Country Coffee Profile: Viet Nam. ICC-124-9. London: ICO.

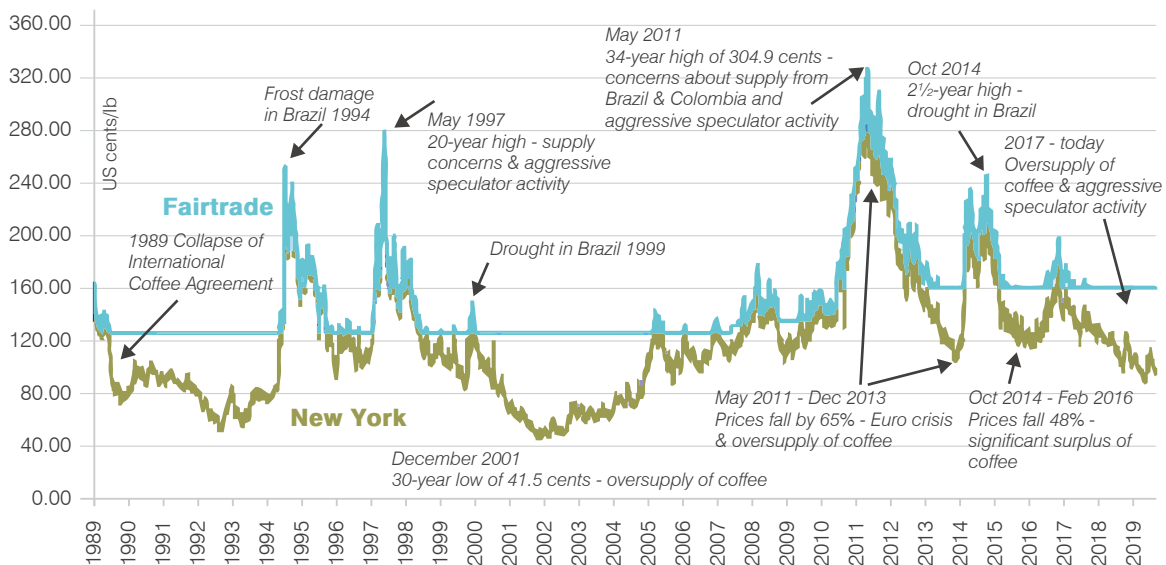
49. *Coffee Barometer 2020*.

Whether the share of the final consumer price that goes to producers is fair has been a recurring debate in recent years. When coffee prices drop below the cost of sustainable production, the impact is felt at both the individual and global level.

Low prices prevent farmers from making a profit and flourishing. This puts the livelihoods of entire coffee farming communities at risk and disincentivizes youth to remain in the business, ultimately putting the future of global coffee production at risk.

Some certifications, such as Fairtrade, aim at a fairer distribution of profit along the value chain, transferring wealth directly from the consumer to the farmer to achieve stable livelihoods and higher incomes.

Figure 4: How do Fairtrade and New York Arabica prices compare?



Note: Note: Fairtrade Price = Fairtrade Minimum Price* (currently 140 cents/lb) + Fairtrade Premium** (currently 20 cents/lb) When the New York price exceeds the Fairtrade Minimum Price, Fairtrade Price = New York price + Fairtrade Premium
 *Fairtrade Minimum Price was increased on 1 June 2008 & 1 April 2011 **Fairtrade Premium was increased on 1 June 2007 & 1 April 2011
 The New York price is the daily settlement price of the 2nd position Coffee 'C' contract at ICE Futures U.S.

Source: Fairtrade International <https://www.fairtrade.net/news/wake-up-six-reasons-to-choose-fairtrade-coffee>

Certified coffee markets procure only a portion of standard-compliant coffee, while farmers sell the rest to conventional channels. All voluntary sustainability standards have managed to boost their volumes of certified coffee at farm level over the last decade.

Meanwhile, the gap between the certified volume available and the volume sold on certified markets has widened.⁵⁰ According to *Coffee Barometer 2020*, the total volume that was sold under voluntary sustainability standards in 2019–2020 covered 55% of global coffee production (this figure is not adjusted for double or triple verification/certification).

Although this is an impressive result, the direct benefits to farmers – such as price premiums or access to new markets – are limited by the extent to which markets absorb the total volume of certified coffee. This situation could improve with roasters' long-term purchasing commitments and improved capacity of the voluntary sustainability standards to manage certified coffee supply.

IMPORTANT INFO

In 2019, less than 25% of coffee produced under voluntary sustainability standards was procured as standard-compliant coffee by the industry. In other words: 75% of this coffee is still sold as conventional coffee.

Coffee Barometer 2020

50. *Coffee Barometer 2020*.

In 2019, less than 25% of the coffee produced under voluntary sustainability standards was procured as standard-compliant coffee by the industry, according to *Coffee Barometer 2020*. In other words: 75% of this coffee is still sold as conventional coffee. This gap potential negatively impacts the profitability of certified producers who made upfront investments for compliance. It reduces their financial capacity and motivation to invest in continuous improvement practices.

Benchmarking: Free on board and farm-gate prices

Analysts often compare retail coffee price with the price of coffee paid to the farmer. This can be misleading if insufficient context is provided on the economics of selling coffee at retail and the economics of producing coffee. This section provides context on the economics of producing coffee.

The table below shows comparative benchmarks at two important stages of price transmission: FOB (free on board, the price at producing country's port) and at farm gate. The FOB price data are based on interviews with coffee importers and exporters in late 2020 by the International Trade Centre, in collaboration with Enveritas and the Zurich University of Applied Sciences.

The data illustrate a prevailing market price for a specific type of coffee produced in a given country, not the average export price for the entire country. The farm-gate price data come from Enveritas surveys of more than 10,000 farmers across various producing regions. These data were converted from local to standard units and adjusted for market and exchange rate fluctuations over time.

Table 1: Ex-farmgate to FOB price analysis along 7 exemplifying case studies

Market	Origin	Example	\$ per kg green bean equivalent		Transmission ratio
			Avg FOB price	Avg farm-gate price	Farm / FOB
Specialized	Ethiopia	Natural Arabica Gr1 Micro-lot	8.80	4.03	46%
Premium	Indonesia	Wet-hulled Arabica Gr1	4.73	3.51	74%
Premium	Colombia	Washed Excelso	3.63	2.75	76%
Premium	Honduras	Washed Arabica HG	2.97	2.22	75%
Standard	Brazil	Natural Arabica NY2/3, 17/18, mtgb fc	2.13	1.89	89%
Standard	Uganda	Robusta SS 15+	1.55	1.11	72%
Standard	Viet Nam	Robusta Gr 2	1.50	1.40	93%

Source: ITC and Enveritas.

These figures highlight the pricing difference between countries and qualities, and the transmission ratio of value from FOB to farm gate. This ratio enables a first analysis of the efficiency of the supply chain.

A high transmission rate (as seen in Brazil and Viet Nam) represents a high value being transmitted to the farmer. A lower transmission rate means that supply chain inefficiencies erode a substantial part of what farmers could be getting for their coffee. It then becomes evident that investments in infrastructure and streamlining bureaucracy have a major effect when trying to improve the farmers' business case.

For example, an FOB price benchmark of \$8.80 per kilogram for Ethiopia and \$2.13/kg for Brazil shows corresponding transmission ratios (the ratio between farm price and FOB price) of 46% and 89%, respectively. With both countries producing natural Arabicas, an analysis of these prices is necessary.

- **There is value in rarity.**

Ethiopian micro-lots are scarcer – and more valuable – than Brazilian bulk blends. Micro-lot buyers also are willing to pay higher prices.

- **Higher quality means higher prices.**

Ethiopian coffee has higher quality and intrinsic value. Certain quality differences, such as cup score and defect count, are measurable. Other qualities, including buyer preference for a specific flavour profile, are less quantifiable, but still reflected in higher prices.

■ **Production costs hike up the final prices.**

It is more expensive to produce a micro-lot than a bulk blend, as the process is more labour- and resource-intensive. In addition, the marketing and sampling effort required to sell micro-lots is higher than for bulk blends, both on a fixed and per kilo sold basis.

■ **The cost of doing business influences prices.**

Value chain structures and the cost of doing business across origins differ. Interest rates, distances to port, taxes on coffee, exporter and processor margins, milling capacity and other factors are at play.

In Brazil, farms are typically larger and farmers produce higher volumes – benefiting from the associated economy of scale. They also often process their coffee on-farm. As the leading Arabica producer in the world, Brazil plays a major role in global coffee pricing. Farmers in Ethiopia are usually smallholders, and their coffee is aggregated with coffee from other farmers before processing, which increases the cost.

■ **There is usually more than one end buyer, which drives prices up.**

■ **The issue of how much of the farmer's coffee is ultimately sold at a given export price.**

Despite the call from the sector and consumers for more transparency and traceability, reliable information on the coffee chain's profit distribution is still a high-priority challenge for the industry at large.

While Table 1 provides a useful comparison of prices, its conclusions are broad. Numerous variables may come into play, from farm types to value chains and final destinations.

In Ethiopia, for example, contracts for farmers who sell micro-lots may only represent 5%–10% of the coffee they produce. The remainder of the farmer's production likely receives prices in the 'premium' and 'standard' ranges. The net farm-gate price represents a weighted average of prices across these different sales channels.

The way roasters use green coffee varies across shipments. For example, a given coffee bean could be included in a premium quality espresso capsule or in a standard blend. The value chain price structure behind these two final products is completely different.

Data are rarely standalone. They require a deeper understanding of context and the most relevant drivers of price and transmission in a given market.

Data sets are often fragmented and relatively small. They lack the knowledge-sharing framework to make them useful. Moreover, there is a growing but unresolved debate around the ethics of farm data management and ownership. Roasters, traders, farmer organizations and producing country governments all have their own methods of collecting data, and mainstreaming actions remain relatively ineffective and scattered.⁵¹

The sustainability framework today

Sustainability has become a buzzword. As such, it has lost meaning and gravitas over the years. Before breaking down what sustainability framework is in place today, it is important to first define what sustainability means.

In 2005, the World Summit on Social Development identified three core areas that contribute to the philosophy of sustainable development: economic development, social development and environmental protection. These 'pillars' in many national standards and certification schemes form the backbone of tackling the challenges that the world now faces.

The Brundtland Report of the World Commission on Environment and Development describes sustainability as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs'.⁵² This means we must consider the future when making decisions about the present.



DEFINITION

SUSTAINABLE DEVELOPMENT

Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Brundtland Commission Report, 1987

51. IDH, 2019.

52. http://cmsdata.iucn.org/downloads/iucn_future_of_sustainability.pdf



Barista Keyla Quiñones Cordova at the Apu Café, Lima, Peru.

Box 4: Certification and verification: What's the difference?

Certification guarantees (through a certificate) that specific rules and regulations of voluntary standards are met in a particular environment (e.g. individual producer, producer group, cooperative or even region). These producers must meet certain requirements – social, economic and/or environmental.

Certification calls for independent third-party confirmation of this status, conducted by an accredited auditor. Typically, certifications must be renewed annually and are designed to protect both buyers and suppliers.

Roasters buying certified coffee benefit from the guarantee provided by the certificate and by using the sustainable branding on their retail packaging. This contributes to better marketing opportunities because of a specific market demand for certified goods.

Verification enforces certain agreed criteria and practices, but does not use a certificate to market the claim to the final consumer. Instead, company standards or internal supply chain standards rely on verification processes that are not as rigid and costly as a certification process that has to be conducted by appointed auditors.

Local third-party actors such as NGOs – or even second-party actors – may be asked to verify adherence to specific criteria. The timing between repeat verifications may be significantly less onerous than an annual recertification process.

Source: ITC.

The rise of sustainability in coffee

Concerns about socioeconomic disparities and harmful environmental consequences in coffee production are not new. The 1960s was a period of growth for the environmental movement and the start of a global awakening about the social and economic injustices prevalent in agricultural supply chains – coffee included.

The coffee sector was quick to embrace environmental sustainability. The world's first organic-certified coffee farm, the Finca Irlanda in the state of Chiapas in Mexico, pioneered producing and exporting certified organic coffee in 1967, decades before sustainability movements such as Fairtrade and other certifications.

In 1988, the Netherlands-based non-governmental organization Solidaridad engineered the start of the Max Havelaar certification system for Fairtrade coffee (and subsequently other products) with the goal of bringing these coffees into conventional supermarket channels. This, in turn, spurred the creation of other certification labels oriented towards sustainability.

Retailers and manufacturers were quick to embrace these labels, identifying cause-related marketing as a powerful means of product differentiation. This enabled them to promote sustainability, fulfil their corporate social responsibility objectives and remain competitive.

Certification or verification is not essential to sustainability. In fact, a certified product is not necessarily sustainable. In the same way, a product may be completely sustainable despite having no certifications. Sustainable certification and verification are merely schemes that provide incentives for environmental protection and ethical business practices, and help monitor and evaluate them.

They also have the added value of providing a guarantee to consumers that a product is environmentally and socially responsible – a competitive asset for brands. In the coffee industry, such a product is sometimes referred to as 'no-worry coffee'.

Today, a designated set of standards leads efforts for a more sustainable coffee sector. These cannot fully address the complex challenges the sector faces, however, and a true sustainable transformation of the coffee supply chain has yet to be achieved.

Sustainability standards in coffee

Organic certification

The organic sector is well established and has grown steadily since its inception.

Organic farmland and organic retail sales continue to grow. In 2018, 71.5 million hectares (ha) worldwide were certified organic, representing 1.5% of all agricultural land. At least 2.8 million producers in 181 countries were practicing organic farming – most of them certified through group certification. On the consumer side, organic products with a total value of \$96.7 billion were sold globally.⁵³

The organic coffee area has expanded five-fold since 2004. More than 890,000 hectares of coffee were grown organically in 2017, led by Brazil, Indonesia and Côte d'Ivoire.⁵⁴ Among certification schemes in voluntary sustainability standard-certified coffee areas, organic expanded the most (33%) in 2013–2017.⁵⁵

DEFINITION

Organic agriculture is a production system that sustains the health of soils, ecosystems and people.

It combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved.

IFOAM – Organics International

53. Research Institute of Organic Agriculture (FiBL) and IFOAM – Organics International, 'The World of Organic Agriculture, Statistics and Emerging trends 2020'. <https://www.fibl.org/fileadmin/documents/shop/5011-organic-world-2020.pdf>

54. FiBL-IFOAM-SÖL surveys 2006–2019; based on information from the private sector, certifiers and governments. FiBL and IFOAM – Organics International (2019), The World of Organic Agriculture. Frick and Bonn.

55. 'State of Sustainable Markets 2019: Statistics and Emerging Trends.' ITC in collaboration with FiBL and the International Institute for Sustainable Development, <https://www.intracen.org/publication/Sustainable-Markets-2019>

Today, regulatory frameworks determine how organic goods are traded around the world and have a tremendous impact on organic market development. This contrasts markedly with their early beginnings, when there was no legal definition of organic food. Inevitably, farmer organizations and other actors formulated their own standards and issued certificates and seals to offer guarantees to consumers.

The **International Federation of Organic Agriculture Movements (IFOAM – Organics International)** is the leading international organization for agriculture organic standards. It has united the different standards into its IFOAM Standard for Organic Production and Processing. The Family of Standards is the core of the IFOAM Organic Guarantee System and contains all standards officially endorsed as organic by the organic movement.

These standards provide a framework for certification bodies and standard-setting organizations worldwide to develop their own certification standards in harmony with global requirements. IFOAM – Organics International's Organic Guarantee System clearly defines what is organic and what is not.

IFOAM – Organics International defines organic agriculture as a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, as opposed to using chemical inputs with adverse effects on the environment. Organic agriculture combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved.

The standards formulated by IFOAM – Organics International are the basis of legislation (regulations) that has been introduced in the European Union (1992), the United States (2000), Japan (2001) and a growing number of other countries including, notably, Brazil and India.

The conditions that must be met before coffee can be marketed as organic are comprehensive and well defined. Imports and sales of both green and processed coffee as organic must comply with the legal regulations of the consuming countries. A third party accredited by the importing country must verify compliance.

Different rules apply in different countries. When exporting to multiple countries, multiple certifications may be required. Differences in rules may be minor, for example, differing rules on the use of medicine for livestock or different allowable inputs for pest control. Detailed understanding of the standard being used for certification is required and certifying bodies can help clarify these details.

There is a clear distinction between the certification of an operator to produce organic coffee and the certification of an export shipment to be imported as organic coffee. Certification needs to be applied across all steps of the supply chain, not just at production level. On-farm processing, storage, transport, export processing, shipping, export, import, roasting, packaging, distribution and retailing all must be certified organic.

'Organic certification is granted for a process. It is not the products as such that are certified.'

Contact with conventionally produced coffee must be excluded, entailing a separation in space and/or time. Spraying or fumigation with toxic/prohibited agents is never permitted and special measures must be taken to prevent contact with areas where fumigation has occurred.

Morten Scholer,
Coffee and Wine, 2018

Adequate records of incoming and outgoing coffee must be kept so the entire product flow can be documented and accounted for – a process often referred to as traceability. As such, all steps in the chain should be documented and administered in a way that makes it possible to trace the origin of the product from one step to the next (track and trace), ensuring that no contamination with conventional coffee has occurred. This traceability minimizes the risk of fraud at all stages and is a very important part of the inspection process by certifying organizations.

The certification process includes an assessment of the grower's production and export capacity or volume against which the authenticity of future export transactions will be tested. This is to ensure that sellers of organic products do not exceed their registered capacity. In regulated markets such as the European Union, Japan and the United States, organic products can be labelled as such only once the entire production and handling chain – from the grower to the importer – has been inspected and certified.

The different types of organic labels:



BE-BIO-02 - Non-EU Agriculture

In the EU, the light green leaf logo must appear on all organic packaged foods produced and sold as organic in the bloc as well as imported goods where the product conforms to EU rules on the import of organic food. The logo must be accompanied by the International Organization for Standardization (ISO) code of the country where the control took place, the code number of the control body and the place where the agricultural raw materials were farmed.

Most certifying bodies also have their own quality labels. As a result, many different labels exist in the European Union for the designation of organic products. Increasingly, trade in roasted coffee in the EU forces roasters to display several labels on their retail packets, an arrangement that does not provide the clarity one would expect.



Before 2002, private and state agency certified-organic practices and national certification requirements did not exist in the United States. This means there were no guarantees that the term 'organic' meant the same thing from state to state, or even locally from certifier to certifier. As required by the Organic Foods Production Act, the National Organic Standards (part of the National Organic Program) became effective on 21 October 2002.

Today, organizations that are fully compliant with the National Organic Program (certified) are allowed to label their products or ingredients as organic, irrespective of whether they are produced domestically or imported. As a result of the programme, there is a single national label in the United States to designate organic products.



The Japan Agricultural Standard for Organic Agricultural Products regulates production and labelling of organic food items produced in Japan. Although coffee is not grown in Japan, the standard nevertheless also covers organic coffee (and tea) under 'organic agricultural products'. Only ministry-accredited certifying bodies can issue Japan Agricultural Standard organic certification for coffee to be imported into the country. Subject to meeting the standard for their products, set by the agriculture ministry, suppliers of organic coffee and tea may display the JAS mark, which gives Japan a single organic label for the entire Japanese market.



Organic certification labels from various countries:

For more information or organic certification requirements, see <https://www.ifoam.bio/our-work/how/standards-certification>.



Fairtrade International

The main goal of Fairtrade certification is to guarantee a minimum price at the farmer level by imposing a price premium on consumers. All certified producers receive a price premium over the coffee price on the world market. It also aims to shorten the chain by excluding the middlemen in producing countries and to promote long-term relationships between supplies and buyers.

Fairtrade standards for coffee are essentially a set of social standards. The environmental development standards are not as comprehensive as the social development standards. Basic environmental aspects are covered, such as use of pesticides, protection of natural waters, erosion and waste management.

Achieving living incomes for Fairtrade producers is at the heart of the organization's mission. Fairtrade developed its first Living Income Strategy in 2017 and outlined a roadmap for making tangible progress towards living incomes.

Fairtrade joins forces with farmers and other partners to advocate with local, national and transnational entities on policies to benefit small-scale producers. It also partners with companies looking to strengthen their supply chains in human rights or other areas, such as investing in additional components necessary to achieve living incomes, opportunities for women or agroforestry, among others.

Some believe the Fairtrade certification can mark up coffee retail prices significantly, while providing growers with only marginally higher prices. It has been argued that the system enlarges the total income size of the chain, by asking a price premium of consumers, with only a small positive impact on producers.

Fairtrade International has reviewed its strategy and taken lessons learned on board. It is revising its coffee standards and recently released a new version.⁵⁶

Fairtrade International coordinates activities for its member organizations and owns the FAIRTRADE Mark, a registered trademark that appears on more than 35,000 items including 8,500 coffee products. Worldwide sales of Fairtrade-certified coffee in 2018 amounted to 207,649 tons, whereas the coffee production was 745,516 tons.



Woman sorting coffee beans from Megah Berseri Cooperative, at exporter Sumatera Jaya Kopi's facility.

56. Global Strategy: <https://www.fairtrade.net/library/the-future-is-fair-an-introduction-to-our-strategy>
New Coffee Standard: <https://www.fairtrade.net/news/updating-our-coffee-standard-to-be-future-fit>

Rainforest Alliance and UTZ

Rainforest Alliance Certified is a label that sets certifiable standards for eco-friendly coffee, otherwise known as shade-grown coffee. Its mission is to 'protect ecosystems and the people and the wildlife that live within them by developing and implementing best management practices and standards for commodity crops, providing incentives to farmers to meet those standards and encouraging the marketing industries and consumers to support farmers who are making on-farm improvements towards sustainability'.

Two of the largest certification schemes, Rainforest Alliance and UTZ, merged in 2018, forming a new organization. In 2019, the Rainforest Alliance and UTZ coffee programmes reached 400,000 coffee farmers in 26 countries. The combined estimated coffee production area of the two programmes is about 1 million hectares. The Rainforest Alliance and UTZ certification programmes ran in parallel until mid-2021. Today, the UTZ certification has been phased out and the Rainforest Alliance 2020 remains the applicable certification programme.

Rainforest Alliance and UTZ standards encompass all three pillars of sustainability – social, economic and environmental – and have credible systems in place to verify that their requirements are followed. They help to address four main areas of sustainability:

- Conserve forests
- Advance the human rights of rural people
- Improve the livelihoods of farmers
- Build climate resilience

The 2020 Certification Programme aims to bring together the best elements of both standards, increase the positive impact for farmers and environment, and deliver more value to businesses that use certification. It includes the new Sustainable Agriculture Standard with requirements for farmers and companies in the areas of human rights, livelihoods, climate-smart agriculture, deforestation and biodiversity, as well as a new risk-based assurance system and tools for management and assessment.

The Rainforest Alliance has been criticized because it lacks a minimum price guarantee, which leaves farmers vulnerable to market price variations. To address this, the new programme requires buyers to pay a sustainability differential, a mandatory additional cash payment to certified farms over and above the market price. At the time of drafting this guide, a minimum sustainability differential for the coffee programme had not been introduced.

Light auditing practices have also arisen as a recent issue. The organization is now addressing this with reinforced monitoring and evaluation of system actors and processes.

In addition, the Rainforest Alliance introduced a sustainability investment requirement for buyers, who must make cash or in-kind investments to farmers based on the needs identified in their own investment plans.

The Common Code for the Coffee Community

The Common Code for the Coffee Community (4C) launched in January 2003 as an attempt to create a voluntary scheme among major stakeholders in the coffee industry. The 4C seeks to develop 'a global code for the sustainable growing, processing and trading of mainstream coffee', but it involves other agents in the coffee chain apart from transnational corporations.⁵⁷

In 2016, to separate the commercial certification-related activities from its pre-competitive activities,⁵⁸ the 4C Association evolved into the Global Coffee Platform and Coffee Assurance Services. The latter was renamed 4C Services and operates as a unique and independent company responsible for managing the 4C certification system.

Participants of the 4C have to pay minimum salaries, abandon child labour, allow trade union membership and stick to international standards on pesticide and water pollution. The code stresses compliance with International Labour Organization regulations and good environmental practices. The 4C Code of Conduct includes baseline requirements for the sustainable production, processing and trading of coffee and eliminates unacceptable practices.⁵⁹

57. Muradian, R. (2005). Governing the coffee chain: the role of voluntary regulatory systems. *World Development*, 33.

58. Pre-competitive collaboration involves two or more companies in the same industry, coming together to address a shared problem or pain point that doesn't affect direct business competition and is often focused on joint social or environmental impacts.

59. 4C Association. *In a nutshell: a short summary of 4C*.

Major improvements were incorporated into the 4C certification system from 2016 onwards. These include adopting stricter assurance measures and audit procedures: through the 4C integrity programme, improving internal controls such as database features and enhancing data collection.

More than 305,000 farmers in 20 countries produced 4C coffee in 2021.

Other sustainability schemes

Biodynamic

Biodynamic coffee is usually high-quality Arabica at high premiums with a low market share. Biodynamic products are organic and can be marketed as such, but they meet even higher stricter production standards and represent a truly niche market.

A well-known example is coffee from the Finca Irlanda (Chiapas, Mexico), where organic cultivation began in the 1960s.

The regulating body for biodynamic certification is Demeter. It owns the trademarks Biodynamic® and Demeter®. For more, see <https://www.demeter.net/>.

Bird-friendly

The market for so-called bird-friendly or shade-grown coffee is large, especially in the United States and Canada. Limited use of agrochemicals is permitted, and the emphasis is on the conservation of shade trees on plantations to preserve bird life and biodiversity.

Shade-grown coffee is not the same as organic coffee, but there are specific standards. The Smithsonian Migratory Bird Center and other institutions and NGOs in Canada, the United States and Mexico have developed certification systems.

Shade grown represents a step towards environmentally sustainable coffee. So far, the market for such coffees is small and mostly limited to North America.

The Certifica Minas Coffee programme



Bird-friendly farm in Brazil.

This is a local standard in Brazil, developed by the government of the state of Minas Gerais. The initiative is designed to enable coffee producers in Minas Gerais to increase production while operating legally and sustainably. It is a holistic standard that includes production costs and farm yields as elements of sustainability. It also offers farmers a low-cost audit and a Certifica Minas Coffee certificate.

To achieve Certifica Minas Coffee certification, producers must follow a set of best practices and procedures for sustainable coffee production. They must also comply with Brazil's environmental and social legislation. The state government funds private extension services to provide training and capacity building on the standard and certification procedures, while the Agriculture and Livestock Institute of Minas Gerais offers technical support for the internal audit process.

To expand market access for certified farmers, particularly to international markets, the Certifica Minas Coffee programme has collaborated with UTZ, the largest international sustainability standard for coffee (now merged with Rainforest Alliance). In 2013, the government of Minas Gerais and UTZ signed a long-term collaboration agreement, establishing a framework for mutual recognition. This was possible because the content of the two standards was broadly aligned. The agreement recognizes Certifica Minas Coffee certification as equivalent to the first year of the UTZ programme, which is based on a process of continuous improvement.

Since October 2017, the partnership has enabled 70 farms to receive UTZ certification, helping them meet the rising demand for environmentally sustainable coffee. The partnership is expected to benefit 1,800 coffee farmers in Minas Gerais, including many smaller producers.

Beyond certification: Sustainability initiatives

Box 5: Coffee certification: Pointers for producers

Producers wishing to obtain organic certification, take note:

Coffee can be sold as organic only after organic cultivation has been practiced for at least three years before the first marketable harvest. This also means three years of inspection. This is called the conversion period.

In specific cases, depending on previous agricultural practices, this conversion period may be reduced, but only after approval of the certifying organization. Producers who can prove that no agrochemicals were used in the past should try to reduce the conversion period. If a producer can document that no agrochemicals were used recently, it is certainly worthwhile discussing the possibility with the certifier.

Organic farming might lead to higher production costs and sometimes a decline in the yield per hectare. This means that the producer must not only bear inspection and certification costs, but production might also fall, at least for a couple of years. Some sources suggest yields may decrease by 20%.

Costs of certification depend on the time needed for preparation, travel, reporting and the fees charged by the certification organization.

Producers wishing to obtain any kind of certification, take note:

Obtain quotations from various certifiers and ask for clear conditions (especially how many days will be charged) and timelines. Conditions are usually negotiable. Remember that certifiers are offering a service, not favours, and they should serve their clients, not the other way around.

Check which certifier is the most acceptable and appropriate for the selected target export market. If possible, determine which certifier the prospective buyer(s) may prefer. Make sure the preferred certifier is accredited and approved in the target market.

Ensure your potential export production warrants the conversion cost, i.e. calculate the opportunity cost of converting to organic production.

Source: International Trade Centre.

Certification is not the essence of a sustainable coffee supply chain. While it certainly helps encourage more sector-wide sustainable practices, no single certification addresses all target areas at once.

Supply chain actors have rallied to find their own solutions through self-promoted, self-implemented sustainability programmes, as well as multistakeholder initiatives. Producers and buyers are also finding other ways to achieve concrete impact. Having more control over variables is part of the attraction. These might range from coffee quality to social issues and environmental concerns at origin.

Coffee sector collaboration for sustainability

Many international and national multistakeholder sustainability initiatives have emerged in the coffee sector in recent years to address damaging social and environmental practices. Individual organizations also promote non-competitive collaboration between public and private actors to mainstream sustainability in the coffee industry.

The most prominent platforms and organizations are:

■ **The Global Coffee Platform and the Sustainable Coffee Challenge**

The Global Coffee Platform⁶⁰ is the result of the merger of the 4C Association and the Sustainable Trade Initiative's (IDH) Sustainable Coffee Program. It follows a bottom-up approach by bringing together producers, intermediaries, roasters and cafés in an effort to establish coordinated sustainability initiatives in coffee-producing communities around the world.

The Sustainable Coffee Challenge,⁶¹ led by Conservation International, aims to make coffee the world's first sustainable agricultural product by strengthening demand for sustainably produced coffee and promoting accountability on progress within the sector.

The Global Coffee Platform and the Sustainable Coffee Challenge have jointly developed a Sustainability Framework for Coffee that includes 15 pathways to advance sustainability.⁶²

■ **World Coffee Research**

World Coffee Research⁶³ is an agricultural R&D organization focused on improving coffee productivity and quality at origin, across all market segments (standard, premium and specialty) through partnership with national coffee research institutes. It serves as a bridge between farmers, national coffee research institutes and the industry to align and define the shared global agricultural R&D agenda to strengthen origin diversity.

World Coffee Research targets improved coffee productivity to enhance the economic benefits of coffee for farmers. It sets a collaborative agenda with national partners and provides technical assistance to national researchers. Its focus on variety development positions climate change at the centre of the coffee agricultural R&D agenda. This follows the logic that better productivity is a critical step to reduce land use change and that improved varieties can make it easier for farmers to adapt to less reliable production conditions.

■ **Enveritas**

While not a certification per se, Enveritas is a fairly recent voluntary sustainability standard that emerged in 2016. Enveritas is a not-for-profit organization that offers a new model of responsible sourcing.

Enveritas uses technology and field teams to trace each coffee purchase, assess sustainability conditions and make improvements over time. It targets the highest standards in terms of data quality and rigour, enabling roasters to make robust, statistically significant claims about their purchases and impact. Participation is free for producers (there are no auditing, licensing or documentation costs).

Enveritas seeks to represent farmers who have been excluded from other schemes because they are small, in hard-to-reach places, not organized into groups or not tied to a single buyer.

As of 2020, Enveritas verification covered more than 50% of production and one-third of coffee farms globally. Its eventual goal is 100% coverage. Many coffee roasters have started using Enveritas for all or at least a substantial portion of their responsible sourcing commitments.

SMALLER SPECIALIZED SUSTAINABILITY PLATFORMS

60. <https://globalcoffeeplatform.org>

61. <https://www.sustaincoffee.org>

62. <https://www.sustaincoffee.org/framework>

63. www.worldcoffeeresearch.org



International Women's Coffee Alliance Viet Nam chapter.

Other smaller scale pre-competitive collective platforms exist in the sustainability landscape.

- **The Initiative for Coffee & Climate**

This initiative is an open global partnership of coffee companies and public partners. It aims to help coffee-farming families address climate change effectively by providing training, access to appropriate methods and know-how on climate-smart agriculture practices.⁶⁴

- **The Sustainable Agriculture Food and Environment Platform**

The Sustainable Agriculture Food and Environment Platform supports land-transforming coffee and cocoa projects in four main strategic areas: value chain improvements and responsible sourcing, climate-smart agriculture and resilient landscapes, access to financial services, and women and youth inclusion.⁶⁵

- **The World Coffee Producers Forum**

The World Coffee Producers Forum⁶⁶ was established in 2017 to provide an inclusive environment for discussions with an agenda prepared by coffee growers. Discussions cover a range of topics concerning the sustainability of the coffee global value chain and the decline of coffee producers' incomes.

WOMEN'S COFFEE ASSOCIATIONS

Women's coffee associations promote women's rights in the coffee sector. Topics at the top of the agenda of such associations include the lack of access to land (linked to heritage legislation); inadequate education and skills; the lack of access to capital and options for savings; and the inability to locate good markets for coffee.

64. <https://coffeeandclimate.org>

65. www.safeplatform.org

66. <https://www.worldcoffeeproducersforum.com>

■ The International Women's Coffee Alliance

This is the largest women's association in the coffee sector. It was founded in 2003 as a cooperation between coffee-producing women in Central America and coffee-importing women in North America.

Today, the International Women's Coffee Alliance⁶⁷ is a global network of national self-driven 'chapters' in more than 26 countries. It aims to empower women in the international coffee community to achieve meaningful and sustainable lives and to encourage and recognize the participation of women in all aspects of the coffee industry.

Each chapter sets and pursues its own goals and conducts itself according to the alliance's code of conduct. The alliance promotes empowerment through leadership development, strategic partnerships and greater market visibility. It facilitates organizational partnerships and delivers several programmes to connect, empower and advance women in coffee, including through webinar programmes and virtual communities of practices. It also operates a logo-licensing programme.

■ Café Femenino

Peruvian women farmers and Organic Products Trading Company co-founded Café Femenino⁶⁸ in 2003. The programme was meant to tackle the host of challenges that keep women in remote and rural coffee communities trapped in poverty.

Café Femenino promotes an ethical sourcing model committed to ending the cycle of poverty affecting women coffee farmers around the globe. Apart from Peru, operations are now spread in the Plurinational State of Bolivia, Brazil, Colombia, Guatemala, Mexico, Nicaragua, Rwanda and Sumatra. The Café Femenino Foundation,⁶⁹ set up in 2004 as a volunteer organization, works through a grant request programme.

Most recent initiatives target a participatory approach, dialogue and collective multistakeholder action at all levels of the supply chain. This contrasts with earlier initiatives such as the 4C Association and IDH that promote change through voluntary sustainability standards.



Samson Koskei, Kabngeturu Farmers Cooperative Society LTD's chairman, speaks at the annual general assembly in Kenya.

67. <https://www.womenincoffee.org>

68. <https://www.cafefemenino.com>

69. <https://cffoundation.org>

What is being done at producer level?

Several initiatives that address sustainability challenges exist at producer level in the form of cooperatives, unions and federations. These structures offer better farmer representation at policy level, stronger negotiation on their behalf in the coffee market, skills' development and social protection schemes.

They are often a way of centralizing organization and negotiating power – both of which smallholder farmers often struggle with because of the large number of actors involved and a lack of resources and know-how at individual farmer level.

While no perfect system is in place and much improvement is still needed, the general goal of these initiatives is producer empowerment and protection. This, in turn, contributes to the broader aim of keeping the coffee sector going, and under fairer terms that are in line with producer needs and realities.

- In Colombia, the National Federation of Coffee Growers⁷⁰ (Federación Nacional de Cafeteros) – founded in 1927 – aims to improve the living conditions of Colombian coffee growers. Through its Extension Service Programme, some 80,227 hectares of coffee-growing land were renewed in January–November 2019. One of the federation's key programmes, the 100/100 Plan, seeks to make all Colombian coffee sustainable by 2027. This goal was set during the first World Coffee Producers Forum, held in Medellin in 2017.
- The Latin American and Caribbean Network of Fair Trade Small Producers and Workers (CLAC) is a network of producers that co-owns the Fairtrade International system and represents all organizations certified as Fairtrade in Latin America and the Caribbean. It encompasses about 450 coffee organizations with close to 250,069 small coffee producers in Latin America and the Caribbean. CLAC works to support the empowerment of these organizations and seek market access, with a focus on improving quality of life of small producers and their communities.

Other national platforms that address critical sustainability challenges at origin include:

- The National Advisory Board and Brazil Working Group (Brazil)
- The Sustainable Trade Platform (Colombia)
- The National Coffee Stakeholder Committee (United Republic of Tanzania)
- The Sustainable Coffee Platform (Indonesia)
- The Viet Nam Coffee Coordination Board
- The Association of Southeast Asian Nations Coffee Federation

Meanwhile, international development and cooperation donors including the EU, ITC, the Department for International Development (now the Foreign, Commonwealth & Development Office), the German Agency for International Cooperation, the US Agency for International Development, the US Department of Agriculture and the Australian Centre for International Agricultural Research increasingly provide financial support to coffee supply chains in Central America, Peru, East Africa and Papua New Guinea.

They specifically support technical assistance to farmers in the areas of agricultural sustainability and productivity, help build market linkages and provide capacity building on business, negotiation and marketing skills to supply chain stakeholders.

ITC's Alliances for Action is one example of an international development initiative that focuses on a comprehensive methodology of support from seed to cup, at every step of the value chain. It combines development goals and methodology with a market-based approach.

70. www.federaciondefcafeteros.org



Farmer holding harvested coffee cherries in Mexico.

What is being done at buyer level?

Corporate guidelines or buying standards broadly pursue the same objectives and set standards that aim at improving sustainability. They are company-specific and can only be claimed by the buyer who initiated that standard. Some companies are also deploying their own sustainability programmes in producing countries through targeted projects.

Some well-known examples are the Starbucks Coffee and Farmer Equity (CAFE) Practices programme, the Nespresso AAA Sustainable Quality™ Program and the Giuseppe e Pericle Lavazza Onlus Foundation.

■ Starbucks CAFE Practices

In collaboration with Conservation International, Starbucks has developed an ethical sourcing approach called the CAFE Practices. It is a set of guidelines covering four key areas: quality, economic accountability and transparency, social responsibility and environmental leadership.

More than 400,000 coffee farmers in 28 countries are part of the CAFE programme. Starbucks says it has been able to source 99% of its consistently growing volumes of coffee according to standards in line with its CAFE Practices guidelines.

■ The Giuseppe e Pericle Lavazza Onlus Foundation

It promotes and implements economic, social and environmental sustainability projects to support coffee-producing communities around the world.

To achieve meaningful results, the foundation undertakes development projects in partnership with public and private bodies, international organizations and NGOs.

The sustainability certificates that the Lavazza Group adopts for its products are Rainforest Alliance, Bio-Organic and Fairtrade. *iTierra!* project was founded in 2002 with the aim of supporting the social and economic development of local communities, promoting good agricultural practices on coffee plantations. Initially active in small farming communities in Colombia, Honduras and Peru, *iTierra!* has expanded over the years to an additional 17 countries, individually involving farmers and their families.

What's more, in certain areas it has become possible to produce high-quality washed Arabica blends destined for *iTierra!*. This coffee comes from 100% sustainable agriculture certified by Rainforest Alliance, which promotes the use of agricultural practices that safeguard the environment and guarantees dignified living conditions for farmers.

■ **Nespresso AAA Sustainable Quality™ Program**⁷¹

In collaboration with Rainforest Alliance, Nespresso launched a holistic, sustainable approach to coffee sourcing in 2003. The programme is based on three pillars: good-quality coffee, productivity, and social and environmental sustainability of farming communities.

Farmers can choose to apply for certifications through Rainforest Alliance, Fairtrade International and Fairtrade USA. The AAA sustainable quality sourcing programme has reached more than 110,000 farmers in 14 countries, and about 95% of Nespresso coffee is sourced through it.

Other large roasting and coffee trading houses are developing sustainability schemes to help their partners and clients meet their sustainability needs. Such initiatives are sometimes carried out in collaboration with non-profit organizations and/or with the support of the donor community. Activities may span from capacity building at origin through agronomic training and access to financial services to development of digital tools and blockchain applications designed to improve farmers' livelihoods.

Many buyers also invest in sustainable practices by offering agronomic services, technical assistance, financial services and digital sustainability initiatives. Examples include:

- **Neumann Kaffee Gruppe** launched NKG BLOOM⁷² – an initiative to improve the livelihoods of coffee farmers, strengthen the company's coffee supply chains and ensure the healthy future of coffee. It aims to reach 300,000 coffee families by 2030 and combines field-based educational efforts, real-time mobile technology and the industry's first impact banking-backed initiative for coffee production.

At the core of NKG BLOOM is the Coffee Smallholder Livelihoods Facility, a \$25 million revolving facility engaging leading European banks ABN AMRO, Rabobank and BNP Paribas. For the first time, partner banks share the direct risks on farmer defaults. Two complementary default guarantees by the US Agency for International Development and IDH further back the facility.

- A decade ago, **ECOM Agroindustrial**'s Sustainability Management Services⁷³ focused on certification and agronomic services. It has now evolved into a full-scale goods and services provider to farmers, responding to needs ranging from seed supply to financing services.

A field network of more than 1,100 agronomists and staff offers various services to farmers to increase their profitability while ensuring better quality and traceability for buyers in each of ECOM's supply chains.

- **Olam** launched its own sustainability platform in 2018 called AtSource⁷⁴ as part of the company's mission to 're-imagine global agriculture'. It describes itself as a comprehensive sustainable sourcing package in the business-to-business marketplace. AtSource is designed to capture key sustainability metrics of agricultural products through coffee.

- In 2014, ED&F Man **Volcafe** undertook a two-year initiative to research and develop a global approach to source high-quality coffees sustainably. The 'Volcafe Way'⁷⁵ is a support organization that provides direct technical assistance to farmers.

One of its flagship training methods is creating 'business-model farms' that offer local learning hubs where surrounding communities can exchange best practices – whether they work directly with Volcafe or not.

It also implements community projects in most coffee origins including building schools, supporting coffee nurseries, encouraging climate-change mitigation and fighting child labour.

71. www.sustainability.nespresso.com/aaa-sustainable-quality-program

72. <https://nkgbloom.coffee>

73. <https://www.ecomsms.com>

74. <https://www.atsource.io>

75. <https://volcafeway.com>



Joska Oscar, a woman from the Rugu coffee farmer cooperative in United Republic of Tanzania, harvesting coffee cherries.

- **SUCAFINA** has launched the [Farmer Hub](https://www.sucafina.com/na),⁷⁶ which supports various livelihood improvement projects for farmers within or living near coffee supply chains. Current projects range from helping farmers access financial services to crop diversification. Sufacina has also launched the [Farm Gate Initiative](https://www.sucafina.com/na/lp/about-Farmgate),⁷⁷ which allows roasters to make additional cash payments directly to farmers to increase the farm-gate price. This project has already achieved some positive impact in Burundi, Ethiopia, Kenya, Papua New Guinea and Rwanda. It has generated [farmer connect](https://www.farmerconnect.com),⁷⁸ a now independent company that works with blockchain to enable traceability for consumers and a connection to the digital supply chain for farmers. This is accomplished by using Farmer ID, a self-sovereign identity solution that allows producers to safely store and manage digital versions of transaction receipts and/or digital credentials in one place.
- **MERCON Coffee Group** has introduced the LIFT⁷⁹ sustainable production programme, which provides tools, training and services to coffee farmers. The programme offers training and technical assistance to new producers every year and is built around three pillars: productivity, environment and social development. Agronomists provide trainings that cover topics such as coffee plant physiology and nutrition, protection and recovery of water resources, farm and pest management, and financial literacy. LIFT also monitors and trains producers through digital platforms – straight from the farm. Mercon secured a \$450 million sustainability-linked senior secured revolving credit facility led by Rabobank. The pricing on this facility is tied to key sustainability initiatives measured by performance indicators.

More on digital sustainability activities can be found in Chapter 4.

76. <https://www.sucafina.com/na>

77. <https://www.sucafina.com/na/lp/about-Farmgate>

78. <https://www.farmerconnect.com>

79. <http://merconcoffeegroup.com/lift/>

Are current sustainability efforts enough?

Numerous reports, data and analyses question whether sustainability initiatives and certification and verification schemes have a truly positive impact on producers. Despite the undeniable social, environmental and economic benefits that certifications have brought to local communities, criticisms remain.

One, for example, is that certification schemes may be cost-prohibitive, excluding the poorest and most marginalized producers who may already implement sustainable practices independently. Another is the fact that producers are not sufficiently compensated for their corporate social responsibility efforts, which is unsustainable in the long run. Furthermore, critics note the absence of platforms for dialogue among all value chain actors.

Standards and sustainability initiatives use different methods to report and measure impact. This lack of uniformity makes comparison and benchmarking a challenging task. Consensus is needed on a framework that both measures sustainability progress and reports on it in a consistent manner.

Producers who shift from conventional to more sustainable practices must be more methodological and keep accurate records. An underlying gain is the adoption of bookkeeping of new routines and the guidance and inspections that come with these.⁸⁰

Changing old habits and starting new routines often results in higher productivity – except, perhaps, in the case of organic farming, where yields typically drop in the initial years. More organized work practices typically translate into higher productivity in the long run. This may even happen with reduced inputs in terms of land allocated, time spent and fertilizers used, and without compromising on quality.

Apart from certification and verification schemes and sustainability initiatives, other useful tools are available to value chain actors so they can assess their sustainability and select the path that is right for them. ITC, for example, has developed the Standards Map and Self-Assessment Tool for Companies.

The Standards Map helps companies choose the right voluntary sustainable standard with which to certify their goods or services. This allows them to access a broader range of sustainable markets and become more competitive, and result in greener supply chains. Accessing the Standards Map does not require affiliation with an ITC project.

The map covers more than 260 standards. Businesses can find general information on a standard, its requirements and how it operates. Additionally, users can make an in-depth comparison between standards based on five sustainability dimensions: environment, social, management, quality and ethics.

The Standards Map also provides a free online self-assessment for companies with reference to their selected standards.

Further information: https://sustainabilitymap.org/standards_intro



KEY MESSAGE

The total certified coffee in 2019-2020 covers 55% of global coffee production. This is not translated though in price premiums for farmers as the market does not absorb the total volume of certified coffee (...)

This loss of differentiation potential negatively impacts the profitability of certified producers who made upfront investments for compliance.

It reduces their financial capacity and motivation to invest in continuous improvement practices.

Coffee Barometer 2020



80. Morten Scholer (2018). *Coffee and Wine: Two worlds compared*.

Framework for resilience

A focus on the social and economic inequities in value chains and a call for fairer, more ethical systems of trade have become a global priority, shaping both producer and consumer trends.

Putting 'value' back in the coffee value chain

Value chains that prioritize outputs over outcome or impact are becoming obsolete and 'a thing of the past'. Systems operating mainly around profit, with little to no regard for people or planet, are increasingly jarring with our global social consciousness, as the world experiences social change – and development.

Economic development alone is no longer a satisfactory, or indeed sustainable, option. Rather than a revolution in our supply chains, there is a movement towards a constructive evolution of our food – and coffee – systems. A values-based philosophy and strategy are central to this evolution.

Recent economic development in some producer countries also changes the geography of consumption and has the world considering new trade models. Social and environmental practices help farms and other businesses sense and seize long-term opportunities and mitigate threats, which contributes to their resilience.⁸¹

Sustained efforts towards sustainable practices adopted across the value chain can mitigate the coffee sector challenges along its business-as-usual path. These include greater vulnerability to climate change, low prices for standard-grade coffee and a gradual exit from the coffee farming business by many farmers, especially youth.

The coffee sector at large has rolled up its sleeves to deal with challenges proactively, innovatively and with determination.

Transforming supply-chain mentality

The concept of value chain describes all processes that go into the final product – from design to raw materials, processing and delivery to the final customer. Value is added at each stage. In the coffee sector, the highest value is added – and absorbed by – the last stages.

When inefficiencies accumulate along the value chain, the bottom of the chain – the producers – retain little profit, scarce means and low incentive to continue production. This makes the current coffee supply chain an unsustainable model.

Coffee stakeholders and policymakers have never been more aware of the gaps in the current status quo, and they are exploring ways to address them. A more sustainable alternative could be a values-based production chain, one that puts sustainability at its core. It would not only be designed to add economic or financial value, but to achieve ethical, social and environmental objectives as well. Its objectives would be to generate and distribute value in a manner that is effective, equitable and sustainable. This system would value planet, people and profit.

While some actors have embraced such a philosophy, it remains more of a voluntary individual choice and less of a mandatory global framework. To achieve real impact, the coffee supply chain must undergo a true transformation and integrate appropriate policies, rules and regulations that ensure sustainability in our supply chains. Several actors from both the private and public sector are actively taking this direction.

A future in which coffee production, livelihood aspirations and climate change impact are accounted for requires radical and systemic changes in the coffee industry's business model.

The transition implies a shift of focus from costs to values.

Coffee Barometer 2020

81. Ortiz-de-Mandojana and Bansal, 2016

EU CORPORATE RESPONSIBILITY FRAMEWORK

An EU framework on corporate responsibility for supply chains with due diligence regulation for businesses could be the start of a global transformation.

In the EU, there has been scrutiny on how its supply chains operate. There is also debate around voluntary versus mandatory due diligence rules. The lack of a comprehensive EU framework has led to a patchwork of national policies, where the scope and requirements vary among member countries.

Member states and members of the European Parliament pressured the European Commission to come up with voluntary and mandatory measures to foster fair trade and responsible production and management of supply chains. Companies that have implemented modern due diligence increasingly call for legislation, arguing that competitors should not get away with murky practices. At the same time, others fear they will have to check each step of their supply chain for imports that have gone through dozens of production steps, sometimes across several continents.

The executive body put forth a legislative proposal in 2021, requiring companies to ensure that their suppliers and partners respect human rights and environmental goals. The proposal comes after Brussels published a study stressing the need to address human rights abuses and polluting practices through more responsible corporate governance.⁸²

Coffee value chains supplying Europe also will be influenced by the European Green Deal, the EU growth strategy aimed at transforming the bloc into a modern, resource-efficient and competitive economy. It aims to create an inclusive, competitive and environmentally friendly future for Europe through targeted strategies and mandatory due diligence.

The interrelated Biodiversity and farm to fork strategies are at the heart of the European Green Deal, aiming to make food systems fair, healthy and environmentally friendly. The EU's aim is to support the global transition to sustainable agrifood systems through its trade policies and international cooperation instruments.

The farm to fork strategy action plan proposes a 2021 initiative to improve the corporate governance framework, including a requirement for the food industry to integrate sustainability into corporate strategies; and to develop an EU code and monitoring framework for responsible business and marketing conduct in the food supply chain.

New regulations have both positive and negative impacts on producers. Mandatory due diligence and increased transparency and requirements inevitably generate higher expectations of producers. Smallholder farmers, small firms and international buyers need to adapt their current production/marketing systems. Technical assistance and capacity building are key to support this transformation.

Smallholder farmers' prices may rise, with the possibility of production costs increasing due to additional requirements. This is a concern for the grower community. The European Commission must place equal importance on achieving a fair price for farmers (mentioned in the farm to fork strategy) to balance this out. Supporting the Living Income Differential, a clear initiative to boost the price for farmers, is vital. Keeping communication channels open with producer groups to monitor impact is also crucial.

LEVERAGING COFFEE VALUE CHAINS

Enlarging coffee value chains can help address challenges faced by coffee growers, according to the International Coffee Organization. As the private sector primarily drives value chain expansion, positive outcomes include long-term contracts, closer relationships along the global value chain, vertical coordination and foreign direct investment.⁸³

Value chains have brought the coffee sector has experienced growth in production, productivity, value addition, employment and international trade. Three distinct opportunities and strategies for upgrading are available to add value to agricultural products:⁸⁴

- **Product upgrades or 'decommodification' of green coffee.** Value is added through enhanced product quality, unique geographical characteristics and other attributes (e.g. safety and sustainability). This often results from integrated supply chain relationships through which (multinational) lead firms or even small coffee shops link farmers to high-value markets.

82. <https://www.politico.eu/event/csr-for-supply-chains/>

83. ICO, *Coffee Development Report 2020*.

84. *Ibid.*

Box 6: Looking at the future: The sector vision

The Global Coffee Platform believes the economic viability of coffee farming is central to ensuring sustainable livelihoods in coffee-producing communities across the world. However, current and persistent low international coffee prices have damaged the viability of sustainable coffee production and are harming coffee-farming families.

The Global Coffee Platform calls for urgent global collective action to overcome this crisis, which threatens the lives of millions of smallholder coffee farmers, the environment and the coffee industry itself. (Global Coffee Platform, 2019).

International Coffee Organization – Coffee Public-Private Task Force, preliminary long-term vision (2030):

‘A sustainable and prosperous future for coffee producers and the sector as a whole.’ (ICO, 2020):

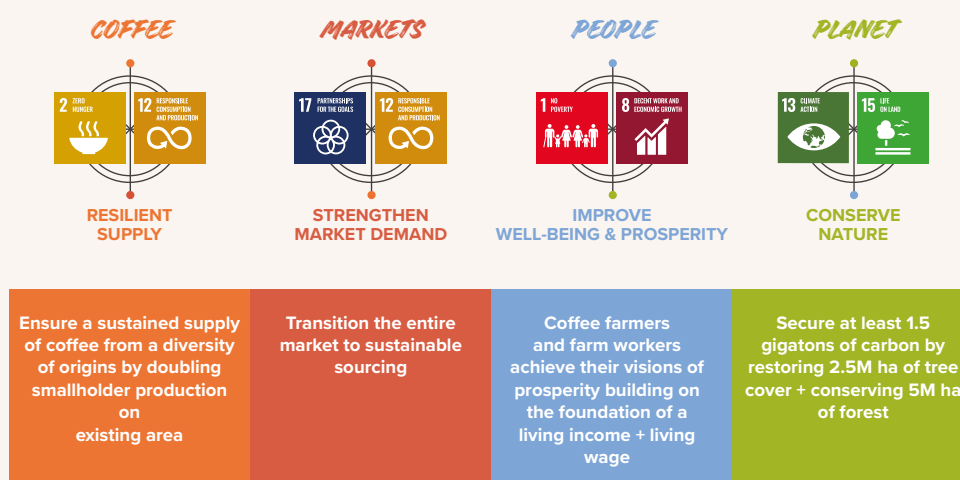
- Economic resilience and social sustainability
- Environmental sustainability through sustainable production
- Better balanced demand and supply, responsible consumption and diversity of origins
- Effective enabling conditions

Specialty Coffee Association – Price Crisis Response Initiative, vision:

‘A specialty coffee sector that distributes value equitably, fosters resilient coffee farming communities that are economically prosperous and values diverse producers of differentiated coffees.’ (Sustainable Coffee Challenge, 2020).

Sustainable Coffee Challenge has the vision to make coffee the world’s first sustainable agricultural product. Its ‘Collective Commitment’ includes short-term 2025 targets and four long-term 2050 goals:

SCC 2050 Goals:



Source: *Coffee Barometer 2020* and International Trade Centre (2021).

- **Functional upgrades.** Some countries have moved up the value chain by engaging in other steps of the supply chain – for instance, processing green coffee. Traditional importing countries not only serve their own domestic markets, but increasingly re-export coffee in processed form to end-consumers worldwide. On the other hand, coffee-producing countries and non-traditional consuming countries also take on more export-oriented processing activities or target local and regional markets.
- **Process upgrades** at farm level and in the roasting industry has led to higher efficiency and productivity. The results are lower costs per unit and greater competitiveness of some green coffee origins. Advanced processing techniques that are now available to many countries have increased the supply of processed coffee – especially soluble coffee.

Leveraging consumer power

Climate change, the price of coffee and policymaking will invariably shape the future of coffee. Practices at producer and buyer level will also influence what is to come. Finally, the power of coffee consumers also cannot be ignored – it has grown steadily, along with the rise of social media, globalization and digitalization.

The individual consumer wields more power than ever, with open access to information and multiple platforms to voice preferences and concerns. This holds the industry more accountable for its practices than ever before and compels coffee suppliers from across the chain to respond to trends quickly and creatively. Coffee has become an extremely competitive arena.

MILLENNIALS: A FORCE FOR GOOD

As the next generation of spenders, millennials are in a strong position of influence. This group has witnessed the rising effects of climate change either first-hand or through heavy media coverage. Thanks to social media and increasing social activism, millennials are also more aware than previous generations of the bad social and environmental practices behind fast fashion and other major consumer products. It is an activist generation that has produced Greta Thunberg, #whomademyclothes and #blacklivesmatter, and one that drives social movements for good.

Today's youth are helping shape a society that increasingly holds people accountable for being responsible citizens.

Social media and the internet have also dramatically reduced the cultural divide between the Global North and South by democratizing trends and popular culture. Millennials feel more accountable for global social and economic inequities, as they seem much closer to home than in the past.

SUSTAINABILITY AS A COMPETITIVE ASSET

Acquisitions by big, multinational brands of smaller, more disruptive brands with an independent image are becoming increasingly common in the coffee industry. Millennial consumers associate large multinationals with lower quality and bad environmental and social practices. Operating through smaller, more identifiable and niche brands allows big brands to access millennial and other 'responsible' consumers.

Coffee industry stakeholders recognize this rising consumer power and are leveraging it by volunteering access to knowledge and information. By helping educate consumers, brands can build a market for more high-quality, sustainable – and therefore higher value – products.⁸⁵ Lavazza, for example, heavily invests in raising awareness on issues of sustainability and promoting better-quality coffee.

Sustainable production and consumption:

What we need to know

Creating a coffee supply chain that protects the environment, rewards its producers fairly and remains a competitive business for everyone means mainstreaming certain practices across the sector and engaging all actors.

An industry-wide approach

Strategic planning and investments at country-level can help producers withstand external shocks and prepare for a more resilient future. As some areas become less productive due to climate change, producers need support in adopting climate-adaptation measures, diversifying crops and products, and even in transitioning from coffee if necessary.

Coffee producers could be more productive and profitable through increased access to new research, better inputs, better options for credit and insurance, and more support for direct marketing, among others. Alongside these producer-led efforts, roasters, retailers and traders can contribute through new business strategies such as long-term relationships with fixed contracts that could underpin increased producer viability and resilience.

An industry-wide, pre-competitive approach is needed to protect the future of coffee and realize sustainability.

Sachs et al., 2019

85. Hernandez-Aguilera et al., 2018



Poster on Farmer Incentives and Value Chain Governance, at a Specialty Coffee Association event.

Box 7: What strategies can increase coffee farm resilience?

- Further research on Good Agricultural Practices and the impacts of climate change on coffee
- Invest in adaptation breeding and development of more resistant coffee varieties
- Site-specific on-farm and processing investments
- Design and implement financial mechanisms to facilitate investments
- Strengthen national development and environmental policies
- Strengthen and empower farmer organizations, women farmers and youth
- Measure the environmental impact of coffee consumption through Life Cycle Analysis studies
- Efficient and measured use of fertilizers, bearing in mind that they are a major polluter
- Intercropping
- Carbon uptake/sequestration. How much carbon can coffee farms store?
- Coffee quality and sun-drying techniques. Innovations that reduce emissions should be considered.
- Pyrolysis technology is a viable way to turn coffee husks into biochar and energy for mechanical coffee drying. This is a climate-smart solution to enhance coffee quality and soil fertility, while mitigating CO₂ emissions.
- Significant increases in productivity combined with support for strengthening governance of forests to reduce land use conversion – the single greatest factor from agriculture driving climate emissions (Searchinger, 2019)

Source: Adapted from IDH (2019).

Child labour and gender inequalities could be drastically reduced through concerted efforts to make coffee production economically viable, step up enforcement of relevant labour laws and improve access to basic services in coffee-growing regions. Improved access to basic services – such as healthcare, clean water, electricity and quality education – means broader sustainable development along coffee supply chains.⁸⁶

Key areas for action to promote growth for prosperity in the coffee sector are set at production, market and sector governance levels.⁸⁷

Actions at the **production level** include mechanisms that can enhance farm performance (productivity, quality and resilience), promote income diversification, improve access to insurance against agricultural and price risks, assess when to encourage aggregation of growers and create added value. These can be driven by supply chain actors, producer organizations, the public sector or specialized service providers.

At the **market level**, solutions include price and premium management, trading practices, demand promotion, value addition and investment strategies by value chain actors. For example, price-setting mechanisms can be decoupled from international market prices and be defined against different benchmarks, such as the costs of sustainable production (cost-plus model) or income benchmarks including the poverty line and a living income.

Trading practices, in combination with stable prices or premiums, should help to share risks among value chain actors and provide coffee producers with a predictability that incentivizes investment in their farms.

At **sector governance level**, governments and governing bodies at the national, regional and international level can use a wide range of measures, including purchase guarantee mechanisms, price setting, stabilization funds, supply management and demand promotion. For example, some industry players have advocated the creation of an international price stabilization mechanism as a possible remedy to extreme price fluctuations and a means to provide much-needed stability to the incomes of smallholder farmers.

Sector-level interventions must balance short- and long-term objectives. Transparency and accountability are the cornerstones of sector governance. A diversified funding strategy can finance the measures needed to promote sector-wide competitiveness. Both national and international mechanisms need to be built on multistakeholder governance and independent decision-making and evaluation.

The circular economy

The coffee industry is exploring circular economy practices as a way to foster systemic change into long-term economic sustainability of the sector. The circular economy paradigm challenges the traditional linear model of production – the ‘take-make-dispose’ approach, which is an unsustainable model as the coffee sector continues to grow.

As demand for coffee rises, the sector must ensure that circularity become central to the development of coffee supply chain strategies. The circular economy is designed in a way that allows products to be reused, either in the biological or technical cycles.

Adopting circular economy models comes with its own challenges and opportunities.

For example, products such as used coffee grounds, previously considered as waste, can create value through circular models around the creation of biofuels and clean energy products. State-of-the-art pyrolysis technology – turning coffee husks into biochar and energy for mechanical coffee drying – is a climate-smart solution to enhance coffee quality and soil fertility, while mitigating CO₂ emissions.

DEFINITION

State-of-the-art pyrolysis technology – turning coffee husks into biochar and energy for mechanical coffee drying – is a climate-smart solution to enhance coffee quality and soil fertility, while mitigating CO₂ emissions.

Zellweger, Vinh and Schmid (2017)

86. Sachs et al., 2019, p. 12.

87. ICO, *Coffee Development Report 2019*, p. 13.

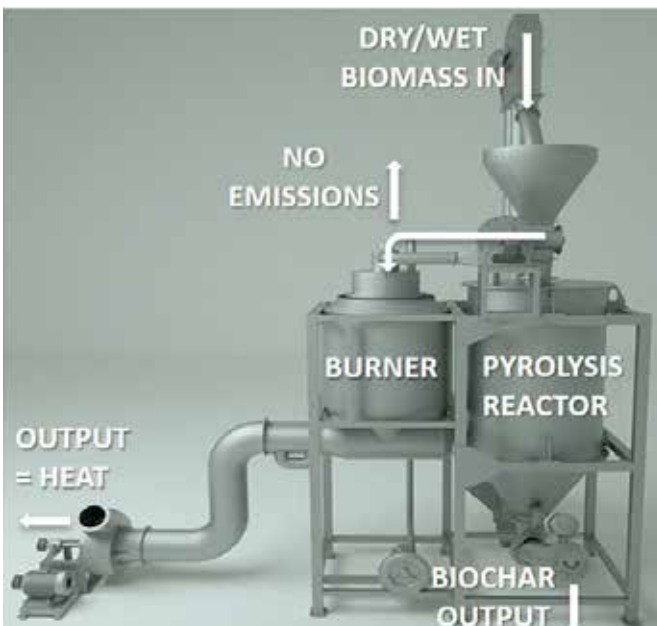


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In Ethiopia, the Bench Maji Coffee Farmers' Cooperative Union diversifies its crops with spices and honey for extra income streams for farmers.

Some cooperatives in Viet Nam have been at the forefront of successfully combining the newly designed pyrolysis technology with mechanical drying. In turn, improved drying systems using the excess heat mean farmers receive a better market price for their coffee, because of fewer price deductions for coffee quality defects.⁸⁸

The circular economy is a markedly different way to do business, forcing stakeholders at different stage of the value chain to rethink everything from how to design and manufacture products to their relationships with customers. To capture circular value, it is important to consider the entire supply chain.



Biochar equipment. © Dave d'Haeye



© Dave d'Haeye

Coffee husks turned into biochar – a biofuel – in Viet Nam.

88. Zellweger, Vinh and Schmid (2017). 'Pyrolysis Based Coffee Drying - Binh Minh Cooperative, Viet Nam Report.'

Figure 5: Idealized circular economy model in the coffee sector



Source: ITC.

COFFEE PRODUCTION AND PROCESSING

Coffee production and processing, including sorting, pulping, washing and drying, produce significant amounts of organic material (e.g. cherry pulp, husks and honey water or *aguas mieles*, wastewater from coffee washing after the mucilage fermentation process). These materials contain residual nutrients including phosphorous, potassium and nitrogen, which, when composted and/or spread directly onto the soil, break down, releasing these nutrients for uptake by the coffee plants. Innovation and opportunities at this stage relate to both recycling opportunities and resource efficiency.

Coffee pulp is a residue that represents about 29% dry-weight of cherry and is obtained during coffee wet processing. One ton of coffee produces two tons of coffee pulp.⁸⁹

The most common practice at the farm level to recycle and reduce costs related to waste is to compost the used cherry pulp to create organic fertilizer that can be recirculated back to the farm to increase the nutrient content of the soil.

89. Murthy and Madhava Naidu, 2012.

Other methods to use the coffee cherry pulp as raw materials create products that are suitable for human consumption. These include drying cherry pulp to make 'cascara tea' (a fruity infusion with notes of sweet molasses), Qishr, a sweet tea, that originated in Ethiopia, or even fruit juices/smoothies or energy drinks. Some companies in the sector have used the cherry pulp to create 'coffee flour' that can be used as a gluten-free alternative to regular, grain-based flours. Other initiatives include the transformation of the 'honey water' into consumable sweet syrup often referred to as 'coffee honey'.

Coffee pulp can also be used as animal feed (livestock, pigs, rabbits and fish), replacing to some extent traditional animal feed (although the high caffeine content can be a negative factor). Additionally, this material can be used as substrate for the culture of fungi.

Innovative options also exist to recycle the coffee husks, the dry parchment between the coffee bean and the fruity pulp layer. These involve the production of biofuels (biogas and alcohol production or converted into fuel pellets); biosorbents (for the removal of dyes from aqueous solutions), for defluoridation of water, lead or oil; and the production of cups or other utensils (e.g. huskee coffee cups).

PACKAGING, SHIPPING AND TRANSPORT

Many concerns relate to the sustainability and 'circularity' of packing materials used to store the raw coffee parchment of green beans. These include initiatives that focus on re-introducing jute sacks and biodegradable sacks for shipping green coffee beans. These considerations, however, must be set against the need to protect the quality and integrity of the product, including from water and odour, as significant drivers of innovation.

Innovations aim to support organic, chemical-free procedures and materials for storing, drying and transporting coffee and other agricultural commodities.

Logistics and shipping partners can play a crucial role in reducing the impact of food miles (or coffee miles), and therefore the impact on environmental sustainability of the coffee industry.

Warehousing efficiency and consolidating or decreasing the number of operational warehouses can be an effective way to increase efficiency, while also reducing waste associated with a smaller carbon footprint.

ENHANCING SUSTAINABILITY THROUGH CONSOLIDATED/COMBINED TRANSPORT

Improved due diligence around supply chain assessments can be an effective mechanism to make the most of logistical opportunities along the value chain. Along with the traditional routes and modes of transport, multi-modal transport (road, rail and sea) can be considered when it offers fuel-efficient and therefore less polluting and less wasteful alternatives.

COFFEE GRINDS AFTER USE

Spent coffee grounds (SCGs) are the residue left behind after coffee beans are brewed, whether on an industrial scale or individual scale from home brews. About 0.91 gram (g) of SCGs are produced per 1g of ground coffee, and up to 2kg of wet SCGs are produced from every kilogram of instant coffee. They are composed of many compounds including fatty acids, amino acids, polyphenols, minerals and polysaccharides.

Earlier innovation saw the extraction of components such as oil, flavour and alcohols as value-added products that justified coffee's valorization. Today, the potential of the by-products resulting from SCGs are being recognized.

Spent coffee grounds can be used directly as fertilizers with no modification necessary. They are nutrient-rich and can often be used on their own as a soil. They are particularly useful to cultivate fungi such as oyster mushrooms.

Extracting oil from SCGs is a straightforward process that makes for a potentially low-cost but high-quality source of fatty acid methyl esters in feedstock.

SCGs are especially useful as biofuels. They can serve as organic material used in anaerobic digestion, an increasingly popular technique for developing biogas from organic waste. Alternatively, they can be converted into a solid, combustible, waxless fire log. Pellets from SCGs can be used as a fuel source of some coffee machines, offering a truly circular economic approach to the coffee shop industry. Offering this life cycle for SCGs results in 80% less carbon-dioxide emissions than if they were to be landfilled.

Some entrepreneurs have developed a method to use the extraction oil from SCGs as biosorbents, removing dyes, oils and metal ions, for example, from aqueous solutions. Incredibly, this oil is also an alternative to

palm oil, which is globally known for its widespread biodiversity destruction and environmental degradation. Demand for palm oil is high and it is found in almost everything we eat or use cosmetically.

SCGs can also be used in materials production; one common use is to turn them into coffee cups.

Less common material uses include fabrics and textiles for shoes and clothing, moulds for household items such as lamps or furniture, three-dimensional printing or even as an art supply.

COFFEE PODS/CAPSULES

Coffee pods are widely used around the world, providing convenient and fairly affordable coffee to those who have the machine to use them. Their convenience comes at a price, however. Many brands use aluminium and mixed plastics to contain each portion of coffee, and as it is reported that 20 billion of these pods end up in landfills every year. They can take up to 500 years to decompose, releasing harmful gases into the atmosphere that exacerbate global warming.

Despite this, pods are among the most widely recyclable waste products out there – it is only when they are not disposed of correctly that they become harmful to the environment. Brands including Nespresso and Keurig have faced backlash in the past for using Plastic #7, a particularly tough plastic to break down that could contain toxins. These brands have signalled their intention to rectify this, by pairing up with TerraCycle (as other major coffee names have done), which is now a global leader in recycling those hard-to-recycle materials.

Most coffee pods can be discarded in a standard household recycling bin, so the aluminium and plastic can be separated and used to make new products (given the extensive use of the two raw materials).

Many coffee shops, with Starbucks at the helm, offer a coffee pod return scheme providing customers with a disposal bag to collect their pods in and give them back to their local Starbucks or Nespresso store. These are then correctly handled and sent to an appropriate recycling centre.

Other companies such as Lavazza are using new 'Eco Caps' that are made of a biopolymer that breaks down into compost in as little as six months after being combined with food waste. That means these compostable capsules can be deposited in a standard food waste collection bin.



In Ethiopia, the Bench Maji Coffee Farmers' Cooperative Union diversifies its crops with spices and honey for extra income streams for farmers.

COFFEE CUPS

Coffee cups, one of the most visible forms of waste from coffee shops, have received considerable attention in recent years. The massive number of disposable coffee cups has been an issue in the mainstream media and a focus of numerous consumer and environmental activist campaigns at local and international level. Some of these campaigns have targeted large coffee shop chains to pressure them into taking action.

On-the-go paper cups are difficult to recycle because they are lined with a polyethylene plastic that is hard to separate, unless the cups reach specialist recycling locations. Options for retailers include:

Provide **in-store recycling facilities**. Some high-street retailers are also incentivizing the waste industry to collect cups by subsidizing the cost per ton.

Push for **reusable cups**: Offer discounts on the price of a beverage and/or loyalty card rewards to increase the use of reusable cups and reduce the use of take-away paper cups.

Compostable cups: Another area of innovation involves the creation of biodegradable and compostable cups.

Improving livelihoods: From survive to thrive

The loss of coffee farmers because of climate change, the price crisis and a general lack of incentives, along with the fact that the sector is very male-dominated and the agricultural workforce is ageing, threatens the future of coffee. There is an emerging focus on youth inclusion and a gender-inclusive coffee supply chain to drive production forward and ensure the sustainability of the sector.

Digitalization and culture of partnerships for development could further improve the long-term prospects of the coffee sector.

The rise of women in a male-dominated sector

Across the supply chain, the coffee sector is often more favourable to – and dominated by – men. There are inequalities at production level in terms of pay, working hours, professional opportunities, decision-making roles and basic rights.

It is necessary to increase representation, agency and pay for women until they are on the same footing as men. This starts with understanding the challenges women face at all levels of the industry – as well as how they vary according to country, culture, race, sexuality, disability and more.

Women empowerment and a movement towards a gender-inclusive coffee supply chain is happening at every level, from farm to cup.

■ Production level

Women in the agricultural labour force are especially disadvantaged, with fewer endowments and entitlements than men, more limited access to information and services, gender-determined household responsibilities and increasingly heavy agricultural workloads due to male out-migration.⁹¹

Although women are the backbone of the coffee business at farm level, they often face the 'double burden' of both working on the farm and doing the housework. A 2015 white paper by the Specialty Coffee Association of America found that men have an 8-hour workday, while women work up to 15 hours a day.⁹²

Women-owned cooperatives and initiatives that create opportunities for women in coffee production to access funding for their groups, build their capacities, access markets and build strategic partnerships are growing and gaining traction.

'Women have been and remain champions in the coffee sector, contributing to development from seed to cup. It is important that we recognize their invaluable contributions and provide avenues for their continued empowerment.'

Jhannel Tomlinson,
Board Secretary for the International
Women's Coffee Alliance, Jamaica

KEY MESSAGE

In 2011, the Food and Agricultural Organization of the United Nations (FAO) stated:

*'Just giving women the same access as men to agricultural resources could increase production on women's farms in developing countries by 20%–30%. This could raise total agricultural production in developing countries by 2.5%–4%, which could, in turn, reduce the number of hungry people in the world by 12%–17%, or 100 to 150 million people.'*⁹³

90. <http://www.fao.org/news/story/en/item/52011/icode/>

91. <http://www.fao.org/3/a-i6030e.pdf>

92. <https://www.scaa.org/PDF/scaa-white-paper-gender-equality.pdf>

Roasters, barista champions and the coffee shop: Roaster and barista champions are almost always male. The World Barista Championship, the World Brewer's Cup and roaster championships all record low participation of women, and few ever win. Is this indicative of fewer women competing or fewer qualifying?

Judging bias, the way the competitions are marketed, how women are often culturally conditioned to be less competitive, the lack of training and resources available to women, and fewer women in managerial positions in coffee shops are all possible reasons behind this phenomenon.⁹³

Gender inequality also exists at coffee shop level. Like in coffee production, there is a striking division of labour. In 2017, PayScale recorded a gender pay gap of 13.6% in the United States for accommodation and food services. It identified 'equal opportunity' as the biggest barrier to equal pay, saying that in addition to the pay gap between men and women with the same job title, women were also less likely to hold higher-paid positions.⁹⁴

When women are not in positions of power, they are not just paid less – they also have less job stability and face more harassment and discrimination.

- **Organizations for a gender-inclusive coffee sector:** Many organizations are working to improve conditions for women in the coffee industry.

The International Women's Coffee Alliance, which has chapters around the world, works to 'empower women in the international coffee community to achieve meaningful and sustainable lives; and to encourage and recognize the participation of women in all aspects of the coffee industry'.⁹⁵ The organization conducts various national projects based on improving equity and coffee production in general, through activities such as building infrastructure, providing training and conducting research.

The Partnership for Gender Equity,⁹⁶ part of the Coffee Quality Institute, has taken a methodological approach to the issue of gender inequality. It has drawn up seven principles for the coffee industry to follow and is also developing tools for businesses.

Barista Connect⁹⁷ is a series of coffee events 'dedicated to improving equality by empowering and inspiring women in various roles within the international coffee community'. Speakers from across the supply chain lead presentations and workshops for the female attendees.

shestheroaster⁹⁸ is working to support women in the coffee-roasting industry by offering events, raising and distributing funds, and changing the face of coffee roasters.

#coffetoo is a grassroots movement designed to counter sexual harassment and assault in the coffee industry – something that predominantly affects women.

Youth to keep coffee going and growing

Sustainability of coffee is linked youth in coffee communities today.

On the supply side, younger generations are not motivated to stay in agriculture. There are many entry barriers, making other options more attractive for their future.

On the demand side, there is growing demand for coffee, especially higher-value specialty coffee. To meet this demand, stakeholders must motivate youth to choose coffee and ensure coffee can provide them a stable future.

'If coffee is to be sustained as a crop that delivers well-being to communities in the generations to come, it must offer a promising future for youth in coffee-growing countries',⁹⁹ says a report by Hanns R. Neumann Stiftung and the Sustainable Agriculture, Food and Environment platform on 'Investing in Youth in Coffee Growing Communities'.

When coffee production and supply chains are modernized, production and trade of coffee can deliver good returns and provide motivation to stay in rural areas. The biggest constraint is the lack of access to land and benefits.

93. <https://perfectdailygrind.com/2018/03/women-in-the-coffee-industry-what-you-should-know/>

94. <https://www.payscale.com/data-packages/gender-pay-gap>

95. <http://womenincoffee.org/>

96. <http://www.genderincoffee.org/>

97. <http://baristaconnect.com/>

98. <http://www.shestheroaster.org/>

99. https://sustainablefoodlab.org/wp-content/uploads/2018/12/Investing_In_Youth_In_Coffee_Growing_Communities_web.pdf



Women coffee farmers in Jamaica.

If these are addressed, youth is an ideal catalyst for change, given the greater propensity and willingness to adopt new ideas, concepts and technology. These are all critical in changing the way coffee farming is practiced and perceived. It is important to seek innovative ways to tempt younger persons to join the coffee value chain.¹⁰⁰

The coffee sector can leverage the technological and entrepreneurial skill sets of today's youth by combining it with the knowledge and experience of the older workforce. Initiatives – government and other – are popping up increasingly in coffee-producing countries to support this idea. Youth-led initiatives are also becoming popular and could well give coffee production the make-over it needs to keep going and growing.

The private sector is supporting interventions that focus on either making the farm more sustainable and profitable or on developing new skills for work in the coffee sector. Producer groups and NGOs support these efforts and work directly with young people on broader social and economic issues and developing their entrepreneurial and life skills.

Turning to digitalization for coffee production

Science and technology have changed the face of modern farming, boosting yields and reducing waste. The coffee sector is no exception to these trends. Emerging technologies can help farmers to grow better coffee, and to adapt to the trials of global warming and other environmental challenges.

A growing spectrum of tools, technologies and platforms is available to farmers. However, many remain too costly for farmers with small holdings or those operating in poorer countries. Cooperative mechanisms through which farmers share the cost of technology address this challenge. In addition, some corporations offer these services free to farmers they work with as an incentive, promotional action or as a way of cooperating to improve the quality and reliability of the coffee grown.

Even when cost is not a barrier, infrastructure can hinder the spread of new technologies. Technology not only requires a reliable electricity supply, but also often broadband connectivity and access to computers or smartphones.

100. https://www.idhsustainabletrade.com/uploaded/2016/08/toolkit_total.pdf

Awareness also remains a challenge. Although knowledge among farmers of novel solutions and new technologies has improved greatly, many are still not up to speed on alternatives to the conventional practices they use. In addition, some resist change, preferring the tried and tested.

From agronomy to field mapping, farm management and even digital banking, tools and platforms have been developed that help modernize farms and increase their efficiency and productivity.

Digital innovations can support farmers' decision-making and help them become more productive. They also create better access to finance and markets, improve efficiency, traceability and transparency in value chains, and bring producers closer to consumers. These aspects are discussed in more detail in Chapter 4.

Alliances for sustainable growth

The real way forward for a true system change that has the sustainable outcomes and impact needed for a thriving coffee sector is through partnerships and alliances. Working in silos on single issues or value chain levels will not achieve a comprehensive – and effective – transformation. Public-private partnerships, impact investment, alliances between supply chain operators and enabling policies are instrumental in driving the coffee industry forward.

A public-private alliance

Agribusiness organizations and rural producers in developing countries face multiple challenges: food price volatility, declining productivity, climate change, political instability and regional and global trade disruptions. Reshaping how production and trade are organized is an absolute priority to address such challenges. It is essential to structure any transformative effort in a holistic way.

Strong partnerships among private and public sector stakeholders can provide the platform to embrace the complex, multidisciplinary and heterogeneous nature of today's social and environmental sustainability.

In the coffee industry, commercially-driven partnerships involve lead multinational enterprises, roasters, producer organizations, standard setters, financial institutions and governments. They have generated cross-cutting change in the dynamics of production and trade. The success of these partnerships depends on the ability to build governance mechanisms that integrate shared approaches, tailoring solutions to sustainability issues at the bottom of the chain.

Greening production by introducing shade-grown coffee or piloting agroforestry systems in a cooperative are empty sustainability promises – if the conditions do not exist for producer organizations to achieve commercialization volumes, increase household income, build resilience from market and environmental disruptions, and gain access to healthcare and education.

Effective public-private partnerships provide the economic and knowledge resources to address those needs simultaneously across coffee value chains. They offer the space to find common ground among divergent interests, select win-win commercial and policy scenarios for value chain actors, and build concrete interventions.

The governance of good public-private partnerships for sustainability harmonizes the development of tailored policy support to coffee organizations, the strengthening of market linkages locally, regionally and globally, and the design of targeted capacity building for conventional, sustainable and niche production. It also stimulates the voluntary contributions of each stakeholder in the partnership in the form of infrastructural investments, technical assistance and the adoption of fairer and greener practices – despite the higher costs these might entail in the short term.

Public-private partnerships for a sustainable coffee industry aim at the long-term resilience and social and environmental justice of the way production is organized.

Collaboration from farm to fork

A coffee supply chain divided into segments that function independently of each other is becoming an outdated concept. It is widely recognized that working in silos is not a sustainable model.

A coffee system that works for all must be gender and youth inclusive, promote diversity from seed to cup and recognize that roles are all interlinked and best leveraged through synergy and collaboration.

An evolution of the global coffee supply chain towards a system that is effective and respectful of people and planet requires joint action and collaboration across the board. It involves 'the consolidation of power and information in the roasting and trading roles as well as the social and environmental systems that support the coffee system with water, sunlight, and other resources'.¹⁰¹

The Specialty Coffee Association has already designed a collaborative specialty sector model that views roles as interlinked and action collective. As part of its work on the Price Crisis Response Initiative, the association developed the SCA Systems Map. It presents a systems approach that shifts the focus from the individual parts of a system to how the parts are organized, recognizing that the interactions of the parts are not static, but dynamic and fluid.

This approach also acknowledges that change is non-linear and happens at multiple levels over multiple time scales.

The map outlines the relationships between key actors and actions in the specialty coffee industry, thereby illustrating the complexity of this global value-generating ecosystem, while recognizing previously invisible actors and telling multiple stories.

The central column of the map depicts the most recognizable activities of a specialty coffee value chain. Each activity corresponds to a primary actor, the (English) names of which often mirror the verb – farming is done by farmers, roasting by roasters – but may also involve other actors. Sometimes, the same actor is involved in multiple activities. The outer ring of the map depicts additional actors who facilitate coffee's journey and the stages of its transformation.¹⁰²

This systems approach is very much in line with ITC's Alliances for Action approach for sustainable agricultural value chains. It promotes inclusive and sustainable supply chains through a model that works holistically to increase producer and micro, small and medium-sized enterprise competitiveness and compliance with environmental, economic and social requirements. The goal is to strengthen and diversify investment as well as productive and value-addition capabilities.

Alliances for Action, as reflected in its name, works on the assumption that true value chain transformation can only happen through strong partnerships and strategic alliances including, but not limited to:

- Policymakers
- Finance actors
- Research bodies
- Farmers and farmer groups
- Exporters and importers
- Processors
- Brands and marketing
- Media
- Consumers

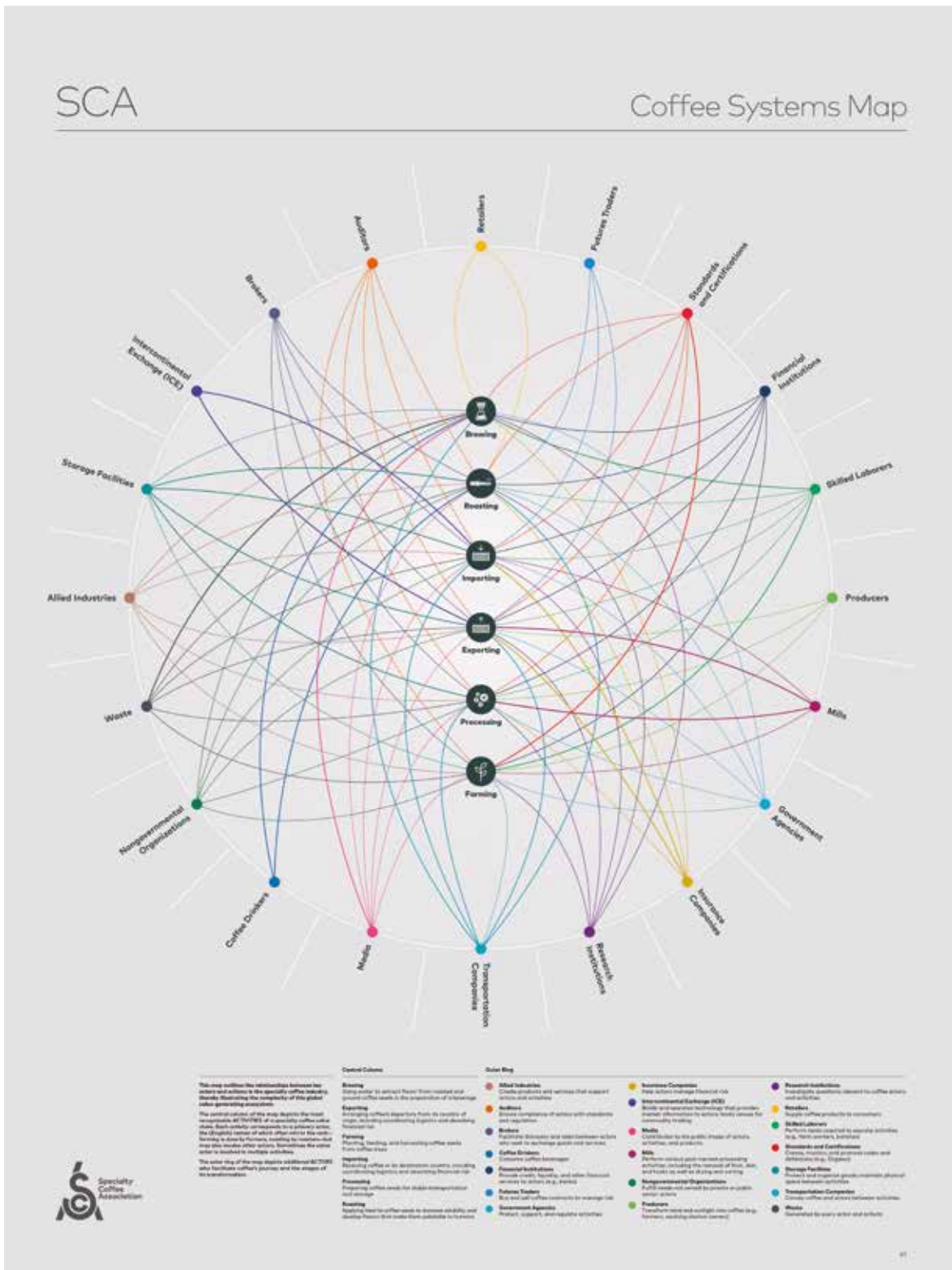
System change requires 'the consolidation of power and information in the roasting and trading roles, as well as the social and environmental systems that support the coffee system with water, sunlight and other resources'.

Specialty Coffee Association, 2020

101. Specialty Coffee Association, 2020.

102. <https://store.sca.coffee/products/sca-coffee-systems-map-digital-version?variant=31838306762854>

Figure 6: Specialty coffee: A web of linkages

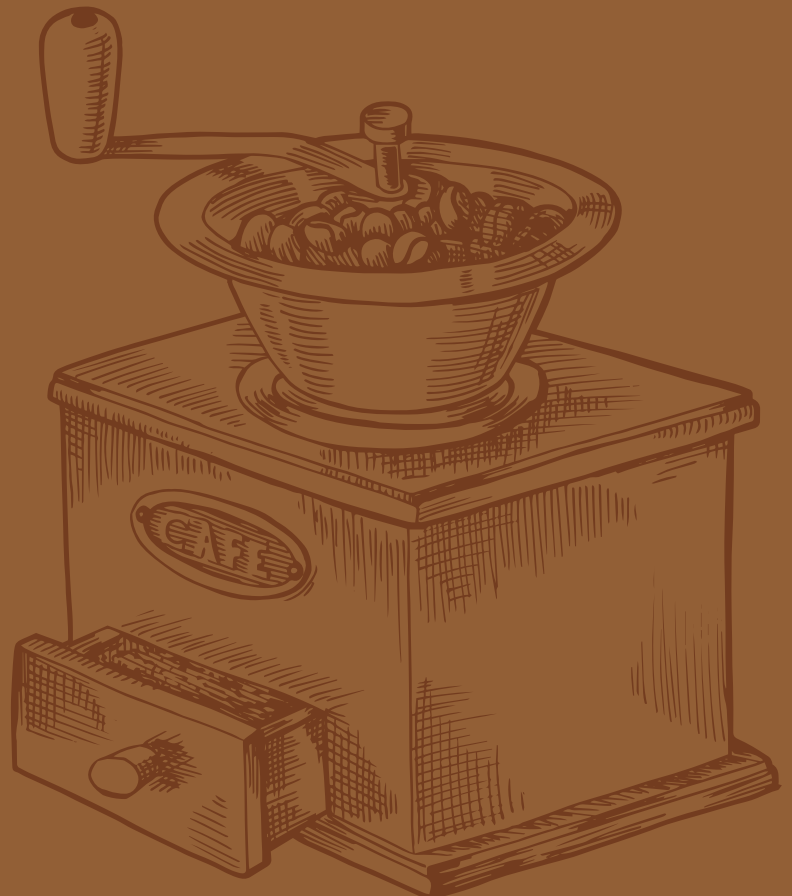


Source: Specialty Coffee Association.

CHAPTER 3

UNDERSTANDING THE COFFEE MARKET

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Aerial view of various cafes.

UNDERSTANDING THE COFFEE MARKET

Since the entrance of coffee in the world market, global consumption and production trends have changed markedly. The last decade marks a particularly rapid period of transformation.

The global coffee market today

Changes can be seen in climate, the socioeconomic landscape, new policy priorities and a steady increase in demand for coffee at 2.2% a year. Changes are taking place at every step of the coffee value chain, from producer to consumer, and from seed to cup.

Global coffee consumption continues to rise steadily, with demand predicted at 300 million bags by 2050.¹⁰³ But the industry must tackle systemic and ecological threats to ensure that production keeps pace.

This chapter presents the dynamics in place today for producers and consumers. It also looks at the emerging trends in coffee that provide a taste of what is to come. (Chapter 2 outlined the environmental and systemic obstacles that could interfere with meeting the rising demand for coffee.)

103. Panhuysen, S. and Pierrot, J., *op. cit.*



A snapshot of coffee sector dynamics

Global trade today is valued at \$17.5 trillion. The value of all globally traded commodities is \$2.8 trillion and of this, \$1.5 trillion is agricultural trade – split among many agricultural commodities.

Coffee is a major player, considering that leading soft commodities such as soybeans (\$57.7 billion), cocoa (\$48.8 billion) and sugar (\$42.7 billion) make about 3.85%, 3.25% and 2.85% respectively of total agricultural trade.¹⁰⁴ Green coffee exports account for roughly \$20 billion. Decaffeinated, roasted and other derivatives of coffee account for an additional \$18 billion. This means coffee trade represents an estimated total amount of \$38 billion.

Growth and disparities

Coffee is a growth market. Production has climbed by 50% over the last 20 years and demand has been rising steadily, with notable increases expected in the coming years. Yet important differences exist among actors in the coffee value chain in terms of risks, income, access to resources and vulnerability to price volatility and climate change.

A more equitable prosperity across all coffee stakeholders – especially the most vulnerable – is the key for the coffee industry to flourish in the future.

Geography of production

Latin America is the dominant producing region of Arabica coffee, while Asia takes the lead in producing Robusta. Africa grows both species quite equally, with about 55% Arabica produced in East Africa and 45% of Robusta production across East and West Africa. Brazil, India, Indonesia, Uganda and Viet Nam also grow both Arabica and Robusta coffee. Other producing countries typically focus on one species or the other.

Arabica originates in East Africa and Robusta in West Africa. How the species were subsequently scattered across the coffee belt is rooted in historical dynamics of trade and colonialism. Throughout history, traders have brought seeding material to other countries, as explained in Chapters 1 and 4.

Climatic conditions linked to geography also influenced location of production, as some species grow better in certain conditions than others. Later on, specific policy interventions in certain countries contributed to the development of new coffee-producing regions.

Productive development policies

Coffee farming in Viet Nam is an excellent example of a successful productive development policy for rural development. The country has successfully diversified into Robusta coffee, both in terms of the size of the industry and the speed of growth over the last 30 years.

Several factors contributed to Viet Nam's success, but government policy support in particular played an important role. Key planning and subsidies supported/initiated the industry through collective farming systems in the late 1970s and early 1980s. When this was found to restrict growth, the Government liberalized the market and carried out land reforms in the late 1980s and 1990s that enabled farmers to expand the industry and reap the benefits from the profits created.

While this success is largely referred to as a best practice, it must be noted that growth of the Vietnamese coffee industry has not been without costs, both human and environmental.¹⁰⁵

Brazil is another example of successful productive development policies. In the 1970s, the Government acknowledged that the policy adopted in the previous decade of ending incentives for coffee – and even eliminating plantations in some areas – had been a mistake. It created a sector growth strategy based on three main pillars: evaluations to reduce spacing in plantations, creation of new coffee cultivars and improvements in land fertilization techniques, soil management and pruning.

With the return of government incentives, Brazilian coffee crops began to expand again, developing and modernizing processes to increase the yield and sustainability of coffee plantations.

104. International Trade Centre, 2021.

105. <http://www.fao.org/3/ap301e/ap301e.pdf>

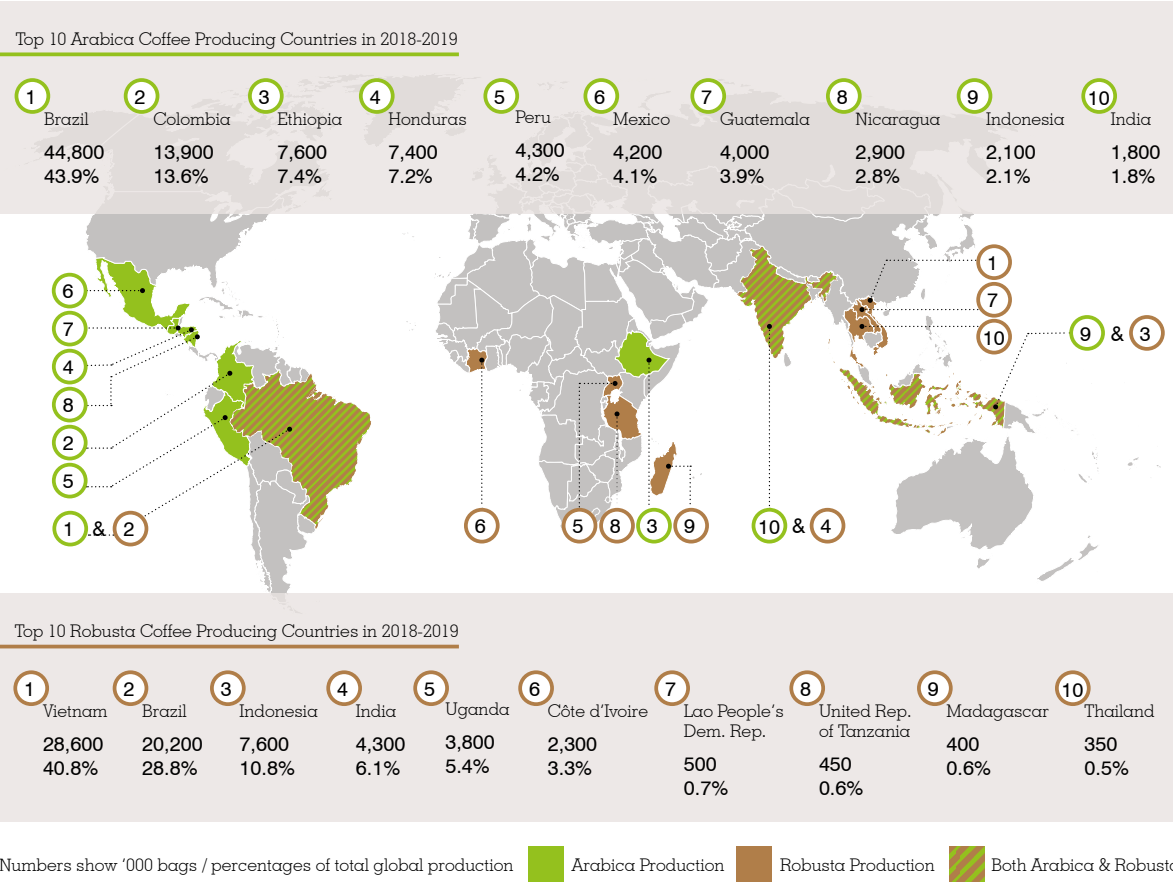
Looking to Viet Nam and Brazil as examples of best practices, Uganda, Colombia and Honduras are trying to follow suit today with their own productive growth strategies.

Besides policy interventions, the main driver behind successful coffee production is usually good business potential for the farmer. This requires a thriving 'coffee ecosystem' (further defined in Chapter 5) that balances effective policies, sound logistical infrastructure and access to extension services, education, training and finance.

Global production and consumption patterns

Global production and consumption dynamics have distinct patterns based on the geography of coffee production and market power. These are illustrated in the two figures below based on the global top 10 producing and consuming countries.

Figure 1: Brazil is top Arabica grower, Viet Nam leads Robusta production

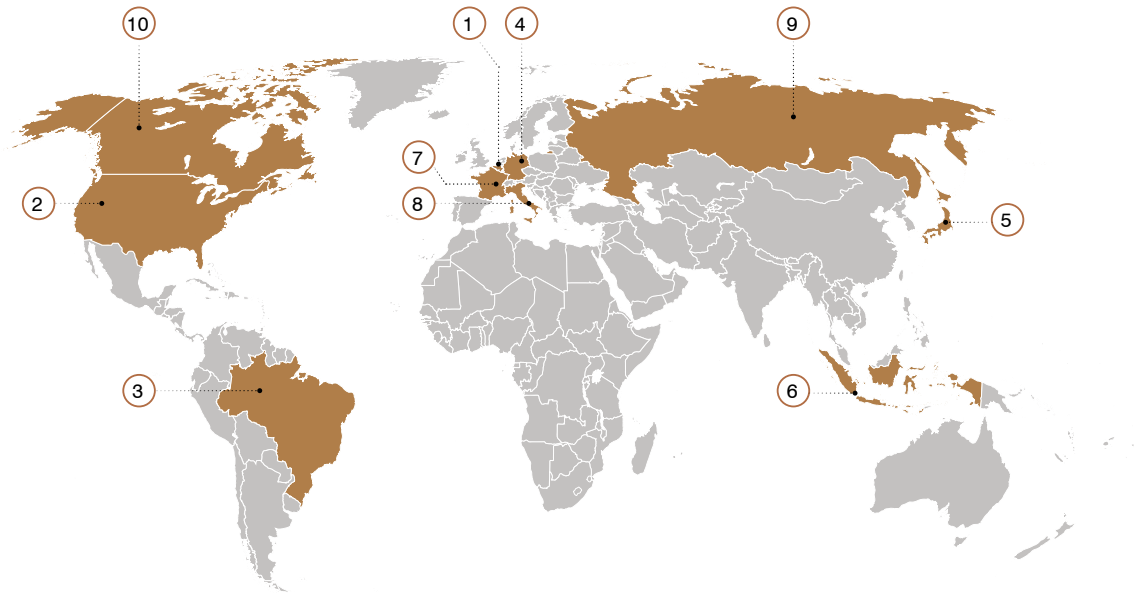


Source: ITC.



Figure 2: Europe consumes 28% of the world's coffee

Top 10 Coffee Consuming Countries in 2018-2019									
1	2	3	4	5	6	7	8	9	10
EU (28)	United States of America	Brazil	Germany	Japan	Indonesia	France	Italy	Russian Federation	Canada
46,800	26,900	22,900	9,500	7,900	5,500	5,400	5,500	4,900	4,100
28.1%	16.1%	13.7%	5.7%	4.7%	3.3%	3.2%	3.1%	2.9%	2.4%



Numbers show '000 bags / percentages of total global consumption

Source: ITC.

PRODUCTION AND EXPORT

About 70 countries produce coffee¹⁰⁶ and the top five (Brazil, Viet Nam, Colombia, Indonesia and Honduras) cover roughly 75% of the world's production.

For the past three years, Arabica has accounted for a slightly larger share of global production, with almost 60% of the world's production. Brazil takes the lead in Arabica production, followed by Colombia, Ethiopia and Honduras.

The leading Robusta producers are Viet Nam, Brazil, Indonesia, India and Uganda. Some Arabica-producing countries such as Mexico, Nicaragua and Guatemala are starting up production of Robusta coffees as well, adding to the competition. In West Africa, countries including Cameroon, Côte d'Ivoire, Madagascar and Ghana are actively trying to reactivate previously abandoned Robusta production.

Arabica coffee has traditionally generated higher prices than Robusta coffee. However, with a yield of up to 7,000kg green bean equivalent per hectare and more resilient characteristics, Robusta remains an attractive cash crop. Arabica prices per kilo are typically higher than Robusta prices, but production costs as well as yields per hectare must be considered when looking at plain export values.










Of the leading Arabica coffee exporters, Panama, Costa Rica, Kenya, Ethiopia and Guatemala have the highest unit value prices for their exports.¹⁰⁷ All these countries except Guatemala produce and export Arabica only, with high participation in the specialized and premium coffee quality segments.

Coffee exports are a major contributor to gross domestic product in many countries. These exports generate foreign exchange earnings as well as tax income.

106. <https://worldpopulationreview.com/country-rankings/coffee-producing-countries>











107. UNComtrade, 2017; US Agency for International Development, 2010. In Costa Rica, for example, by 2010, 80% of coffee production was for the specialty market, making it the fourth-largest specialty coffee producer in the world.

Table 1: Top 10 Arabica-producing countries in 2018–2019

COUNTRY	PRODUCTION	RANK	
Brazil	44 764	1	
Colombia	13 858	2	
Ethiopia	7 541	3	
Honduras	7 328	4	
Peru	4 263	5	
Mexico	4 133	6	
Guatemala	3 967	7	
Nicaragua	2 820	8	
Indonesia	2 020	9	
India	1 800	10	

Note: '000 bags.
Source: ITC.

Table 2: Top 10 Robusta coffee-producing countries in 2018–2019

COUNTRY	PRODUCTION	RANK	
Viet Nam	28 523	1	
Brazil	20 111	2	
Indonesia	7 598	3	
India	4 202	4	
Uganda	3 763	5	
Côte d'Ivoire	2 294	6	
Lao People's Dem. Rep.	503	7	
United Rep. of Tanzania	447	8	
Madagascar	396	9	
Thailand	352	10	

Note: '000 bags.
Source: ITC.

CONSUMPTION











Global consumption of roasted coffee is primarily concentrated in the world's more developed economies. The leading importing countries of green beans are the member states of the European Union, the United States of America and Japan.

Today, we are seeing a gradual shift in coffee consumption patterns. While imports have traditionally been generated by high-income nations, a string of new countries has joined the ranks – and more may follow.

China, Colombia, Indonesia, Malaysia, Mexico, the Philippines, Thailand and Turkey are some examples of low- and medium-income countries that increased their import of green coffee in 2011–2016.¹⁰⁸ Granted, these countries account for less than 10% of the global market and imports primarily target Robusta.¹⁰⁹ However, it is a solid indication of continued exponential growth of the coffee sector, as demand rises in line with global incomes and knowledge of coffee.

China is a particularly salient example. Starbucks, for instance, recently announced aggressive expansion plans in China and targets the establishment of 500 additional stores a year for the foreseeable future.¹¹⁰

Table 3: Top 10 coffee-consuming countries in 2018–2019

COUNTRY	CONSUMPTION	RANK
EU (28)	46 799	1 
United States of America	26 891	2 
Brazil	22 830	3 
Germany	9 490	4 
Japan	7 806	5 
Indonesia	5 429	6 
France	5 340	7 
Italy	5 203	8 
Russian Federation	4 801	9 
Canada	4 011	10 

Note: '000 bags.

Source: ITC.

The supply chain is evolving

Coffee is a complex commodity. Even in its green form, it requires numerous processing steps before it is ready for export. From the time it leaves the farm, coffee changes ownership several times and passes through the hands of many service providers.

At origin, these include local buyers, warehouse, exporters, transporters, shipping companies and customs and inspection agents. At the consumer end, importers, roasters, wholesalers, distributors and retail outlets are the intermediaries that complete the coffee beans' long journey to consumers.

108. ITC, 2020.

109. Chinese, Malaysian and Thai green bean imports are primarily Robusta from Viet Nam and Indonesia (ED&F MAN-Volcafe, 2014). These beans are used almost exclusively to produce instant/soluble coffees and mixes. Some are for the instant markets, while others are for regional export.

110. Sorkin, 2017.

One major noticeable shift in recent years has been shifting from a supply chain with clearly defined roles to a more fluid model with cross-cutting roles and categories at every level. Organizational duties and functions today have adapted to the more demanding and specific nature of consumer and buyer requirements. The latter have imposed the need for each link of the value chain to have a wider scope of control, interaction and accountability.

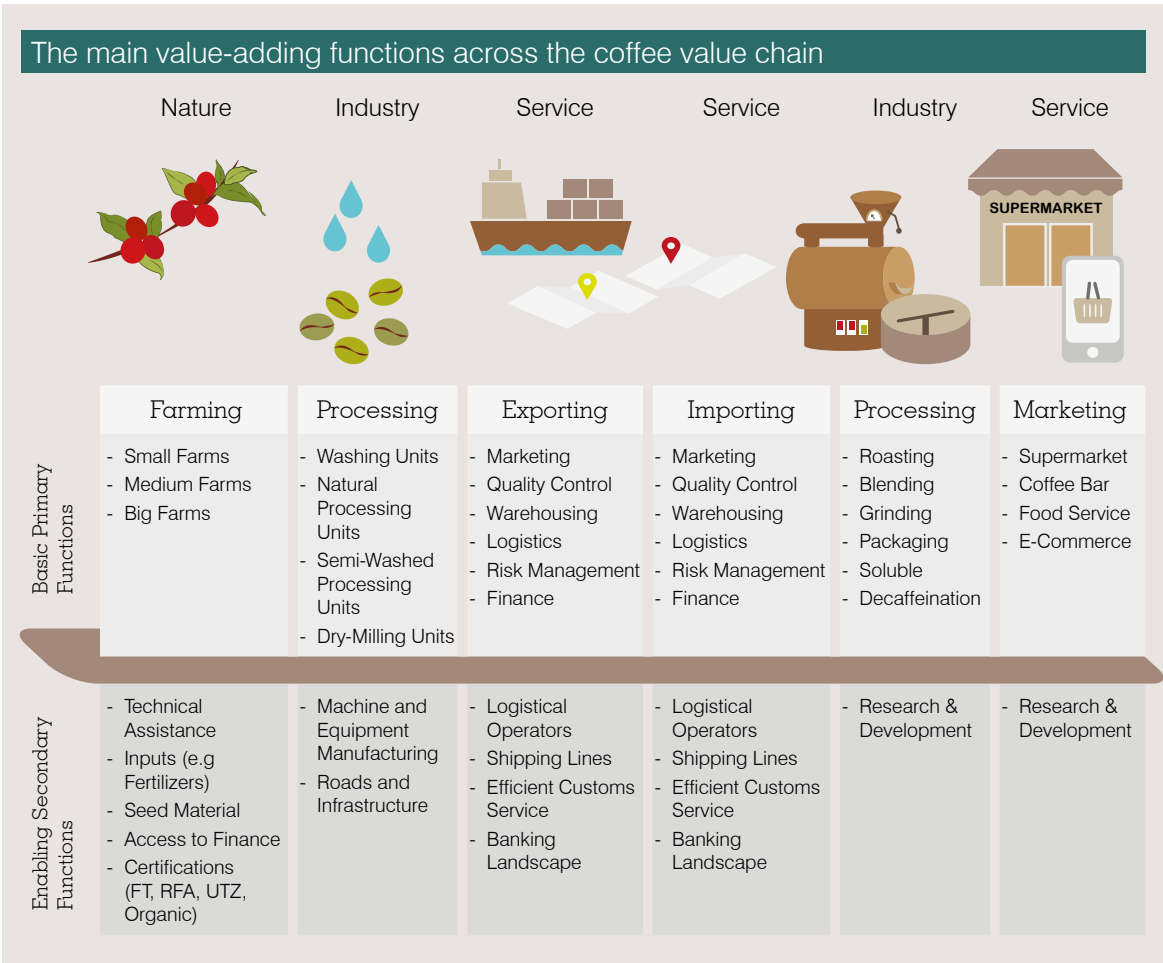
Direct results are more partnerships and cooperation across the sector and a diversification of activities for many coffee supply chain actors. At a commercial level, this translates into a surge of strategic mergers and acquisitions, with multinational roasteries and trade-houses intensifying their activities along the value chain.

Mergers and acquisitions in the coffee industry are part of a strategy to reach new markets and better target consumers through multiple sales channels and consumer touch points. Major multinational companies buying smaller specialty coffee brands and labels is a recent phenomenon in the sector.

Meanwhile, other types of enterprises are also engaging in new activities outside of their respective value chains. Examples range from green coffee exporting companies opening their own roasteries in higher-income countries to multinational roasteries starting up coffee farm operations. For now, this shuffling of roles is still experimental, but it could develop into a strategic and long-term shift in business practices.

Another recent phenomenon in terms of partnerships and cooperation is the alliance of multistakeholder platforms and pre-competitive initiatives. These have been quite successful in connecting all actors of the coffee sector and transforming supply chains into sustainable value chains working to offer a living income to producers.

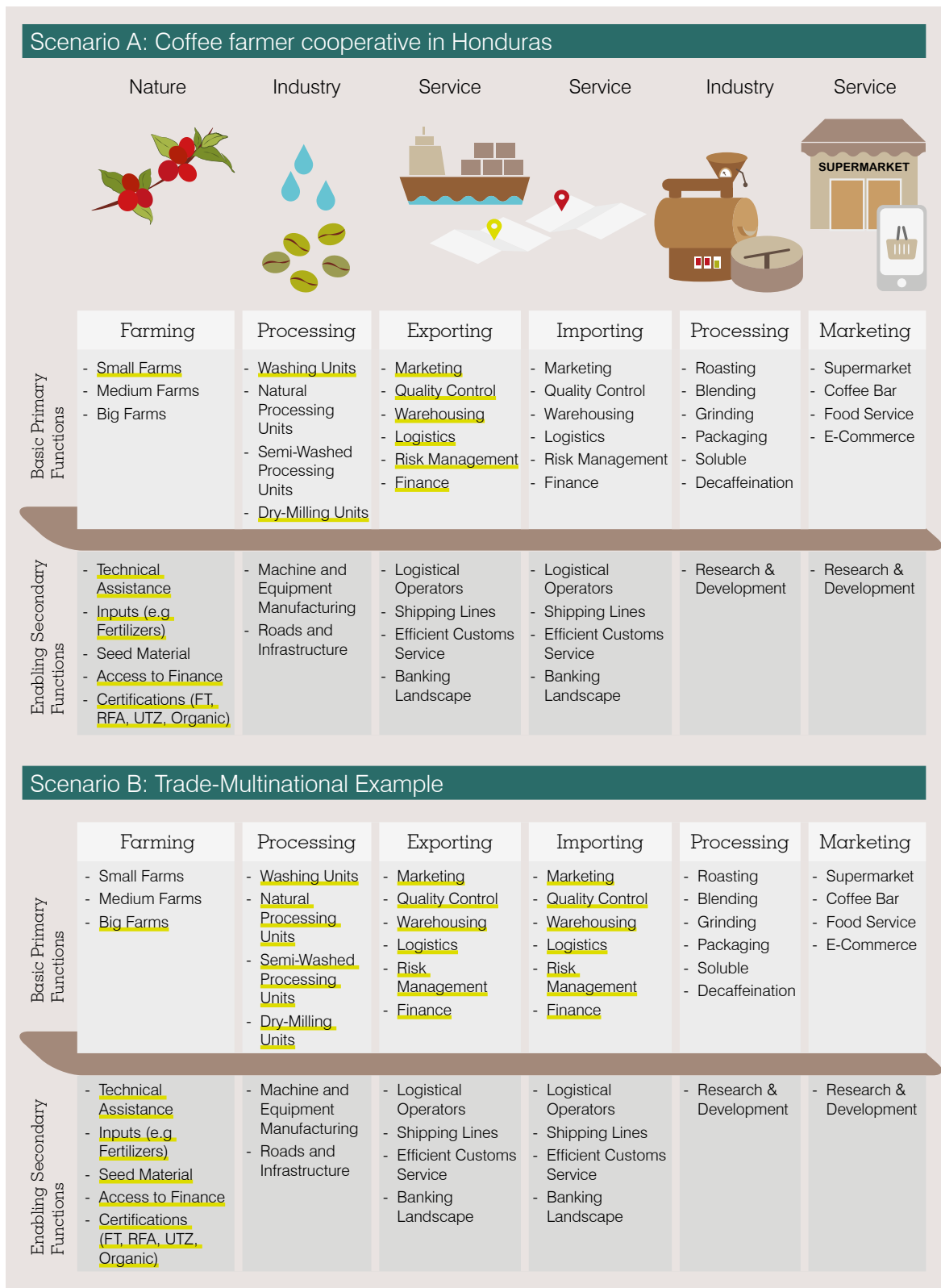
Figure 3: How is value added across the coffee value chain?



Source: ITC.

The following figure highlights the increasingly cross-cutting nature of previously well-segregated roles and value chain segments.

Figure 4: The coffee value chain and its actors: Three scenarios



Scenario C: Multinational Roaster Example



Source: ITC.

What is happening at production level?

Not all coffee-producing countries have equal production capacity. Some have productivity at scale, a high degree of professionalization and government support. The latter comes in the form of policies that promote investment in agricultural R&D and efficient extension services, support infrastructure development and enable access to finance and investment.

Examples of successful cases are Brazil and Viet Nam, whose productivity and competitiveness on the world coffee market rapidly took off as a result of productive development policies, regulatory policy reforms and incentives for investment providing an enabling environment. Today, Brazil and Viet Nam are respectively the first- and second-largest coffee producers in the world – with Brazil alone producing a third of all coffee.

Other countries with a lower degree of professionalization, low mechanization and little technical assistance or governance support are hard pressed to keep up with the competition. This creates a competitive divide between producer countries that is reflected in their productivity levels and degree of market access.



Table 4: Coffee production in 24 countries (bags per hectare) 2019–2020

Country	Arabica	Robusta	Arabica + Robusta
World average			12
Brazil	28	40	32
Viet Nam	25	44	
Rest of world average			9
United States (Hawaii)	22		
Mexico	11		
Guatemala	13		
El Salvador	11		
Honduras	17		
Nicaragua	16		
Costa Rica	16		
Colombia	18		
Ecuador			6
Peru	11		
Ethiopia	9		
Kenya	7		
Uganda			11
Rwanda	6		
Burundi	6		
United Republic of Tanzania			5
Cameroon			4
Togo		2	
India	8	18	13
Indonesia			9
Papua New Guinea	11		
China	15		

Note: One bag = 60kg = 132lb. 1 hectare = 2.47 acres.

'Rest of world' is the world minus Brazil and Viet Nam – two countries that combined produce 50% of the world's coffee on 25% of the world's area allocated to coffee.

The yields are averages, and behind the figures are big variations as some countries have both smallholders and large coffee farms. Kenya, for example, has a span of yields from less than five bags per hectare for many smallholders to more than 17 bags per hectare for the farms.

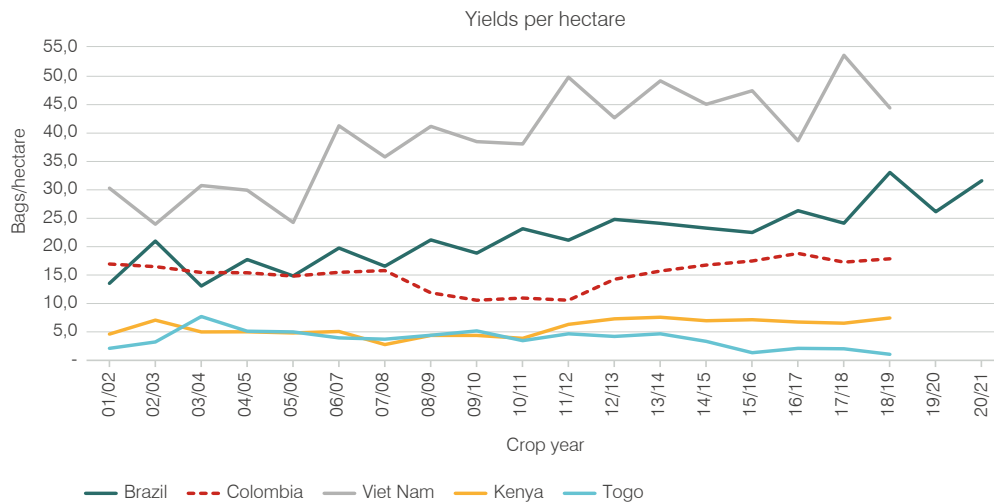
Some of the countries listed under Arabica have a small production of Robusta.

In Brazil and India, some areas with irrigated and fertilized Robusta produce more than 60 bags (3,600kg) of green beans per hectare.

The average yield in Colombia has recovered from around eight bags (480kg) per hectare in 2009–2011 to 18 bags. It was low during a nationwide replanting programme with more resistant trees. A few farms in Colombia produce more than 40 bags per hectare.

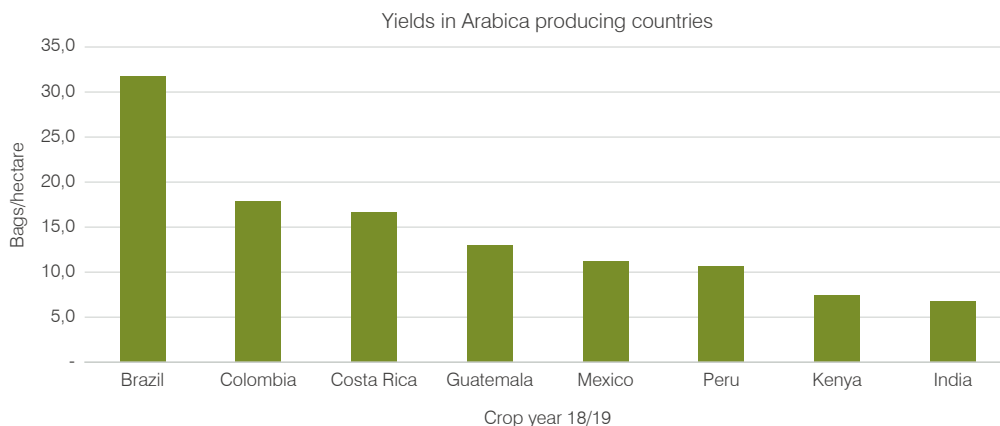
Source: Morten Scholer (2018), *Coffee and Wine*, with updates from ICO, ITC, Food and Agriculture Organization, Humanist Institute for Development Cooperation.

Figure 5: Arabica and Robusta yields per hectare 2001–2021



Source: Companhia Nacional de Abastecimento, National Federation of Coffee Growers of Colombia, Food and Agriculture Organization of the United Nations, trade estimates.

Figure 6: Brazil, Colombia and Costa Rica lead Arabica production



Source: Conab, FNC, FAO, trade estimates

A breakdown of global coffee production

Arabica and Robusta are the main categories that have been used for statistics. This guide suggests that segmentation should be based on standard, premium and specialized quality (Chapter 5 provides further detail).

This model of quality segmentation also splits Arabica and Robusta into three further groups along the post-harvest production process: washed, natural and pulped natural/honey. This gives the reader a more precise idea of the volumes of coffee traded in each category. No statistics measure the quality segmentation, so a set of indicative parameters has been defined (there may be some overlap).

The combination of both quality segmentation and splitting along the post-harvest production process shows how the coffee market has developed in recent years.

The combination of both quality segmentation and splitting along the post-harvest production process shows how the coffee market has developed in recent years.

An overall aggregation of all quality segments back to Arabica or Robusta guarantees the consistency of the numbers across time and make them comparable with coffee statistics from previous guides.

Table 5 presents a detailed overview of global production per country over a 5-year period (2014–2019). Table 6 provides production data for the 2018/19 crop year, split into the three quality segments defined above (standard, premium and specialized).

Table 5: In 2014–2019, 55 countries produced coffee

Exporting countries: Total production
Crop years covering 2014–2019
(‘000 bags)

	Arabica / Robusta	Crop year	2014	2015	2016	2017	2018	2019
World total production			150 631	155 059	160 932	161 108	173 842	166 863
Angola	(R/A)	Apr-Mar	39	41	45	35	40	35
Bolivia (Plurinational State of)	(A)	Apr-Mar	100	84	78	84	83	80
Brazil	(A/R)	Apr-Mar	53 305	52 871	56 788	52 740	64 875	57 000
Burundi	(A/R)	Apr-Mar	248	274	249	202	178	210
Cameroon	(R/A)	Oct-Sep	483	391	292	370	311	325
Central African Republic	(R)	Oct-Sep	63	100	37	60	58	60
China	(A)	Oct-Sep	1 070	1 270	1 170	1 330	1 000	850
Colombia	(A)	Oct-Sep	13 333	14 009	14 634	13 824	13 858	14 100
Congo	(R)	Jul-Jun	3	3	3	3	3	3
Costa Rica	(A)	Oct-Sep	1 475	1 440	1 372	1 561	1 427	1 500
Côte d'Ivoire	(R)	Oct-Sep	1 728	1 289	817	1 474	2 294	2 200
Cuba	(A)	Jul-Jun	101	100	103	113	118	110
Democratic Republic of Congo	(R/A)	Oct-Sep	335	371	279	382	397	350
Dominican Republic	(A/R)	Jul-Jun	397	400	412	412	431	440
Ecuador	(A/R)	Apr-Mar	644	644	645	624	601	650
El Salvador	(A)	Oct-Sep	665	565	610	760	761	625
Ethiopia	(A)	Oct-Sep	6 383	6 515	7 143	7 347	7 541	7 550
Gabon	(R)	Oct-Sep	1	1	1	0	1	1
Ghana	(R)	Oct-Sep	35	36	26	13	15	10
Guatemala	(A/R)	Oct-Sep	3 310	3 410	3 684	3 734	4 007	3 960
Guinea	(R)	Oct-Sep	165	286	270	229	248	270
Guyana	(R)	Oct-Sep	9	11	10	10	10	10
Haiti	(A)	Jul-Jun	343	341	342	342	347	345
Honduras	(A)	Oct-Sep	5 268	5 786	7 457	7 560	7 328	7 000
India	(R/A)	Oct-Sep	5 450	5 830	6 161	5 813	6 002	5 850
Indonesia	(R/A)	Apr-Mar	10 946	12 585	11 541	10 852	9 618	11 200
Jamaica	(A)	Oct-Sep	21	20	18	19	18	20
Kenya	(A)	Oct-Sep	770	799	793	790	930	850
Lao People's Democratic Republic	(R)	Oct-Sep	552	535	510	533	503	500
Liberia	(R)	Oct-Sep	7	10	12	16	7	10
Madagascar	(R)	Apr-Mar	501	425	421	409	396	400
Malawi	(A)	Apr-Mar	25	21	20	14	13	12

Exporting countries: Total production
 Crop years covering 2014–2019
 ('000 bags)

	Arabica / Robusta	Crop year	2014	2015	2016	2017	2018	2019
Mexico	(A/R)	Oct-Sep	3 636	2 772	3 635	4 485	4 351	4 100
Nepal	(A)	Oct-Sep	2	2	1	2	1	2
Nicaragua	(A)	Oct-Sep	1 898	2 130	2 555	2 617	2 820	2 600
Nigeria	(R)	Oct-Sep	43	41	43	42	42	40
Panama	(A)	Oct-Sep	106	127	120	105	130	120
Papua New Guinea	(A/R)	Apr-Mar	798	712	1 171	734	930	752
Paraguay	(A)	Apr-Mar	20	20	20	20	20	20
Peru	(A)	Apr-Mar	2 883	3 304	4 223	4 279	4 263	3 900
Philippines	(R/A)	Jul-Jun	193	208	215	203	206	210
Rwanda	(A)	Apr-Mar	238	293	231	264	342	400
Sierra Leone	(R)	Oct-Sep	46	46	38	38	31	30
Sri Lanka	(R/A)	Oct-Sep	36	36	37	37	36	40
Thailand	(R/A)	Oct-Sep	845	762	538	638	482	450
Timor-Leste	(A)	Apr-Mar	111	59	82	65	139	115
Togo	(R)	Oct-Sep	143	81	23	115	54	70
Trinidad & Tobago	(R)	Oct-Sep	12	12	12	12	12	10
Uganda	(R/A)	Oct-Sep	3 744	3 650	4 962	4 597	4 704	4 775
United Republic of Tanzania	(A/R)	Jul-Jun	753	930	846	783	1 175	875
Venezuela	(A)	Oct-Sep	650	500	525	572	525	500
Viet Nam	(R/A)	Oct-Sep	26 500	28 737	25 540	29 688	30 024	31 200
Yemen	(A)	Oct-Sep	178	156	143	132	106	100
Zambia	(A)	Jul-Jun	3	4	13	19	20	18
Zimbabwe	(A)	Apr-Mar	15	14	15	7	9	10

Source: ITC and International Coffee Organization.

Table 6: World produced 172 million bags of coffee in 2018/19

Production data 2018/19 crop year
 ('000 bags)

Country	Category	Total bags	Arabica washed	Arabica natural	Arabica others	Robustas
WORLD						
6%	Specialized	10 800	7 900	2 100	500	200
18%	Premium	30 600	15 800	7 800	2 200	4 800
76%	Standard	130 700	26 800	35 700	3 200	65 000
100%	Total	172 100	50 500	45 600	5 900	70 000
Brazil						
3%	Specialized	2 000	100	1 500	500	0
17%	Premium	11 100	400	6 700	2 200	1 700
80%	Standard	51 800	0	30 200	3 200	18 400
100%	Total	64 900	500	38 400	5 900	20 100

Production data 2018/19 crop year
('000 bags)

Country	Category	Total bags	Arabica washed	Arabica natural	Arabica others	Robustas
Colombia						
25%	Specialized	3 500	3 500	0	0	0
24%	Premium	3 300	3 300	0	0	0
51%	Standard	7 000	7 000	0	0	0
100%	Total	13 800	13 800	0	0	0
Central America						
14%	Specialized	2 900	2 900	0	0	0
39%	Premium	8 100	8 000	0	0	100
47%	Standard	9 700	8 900	500	0	300
100%	Total	20 700	19 800	500	0	400
Rest of Americas						
3%	Specialized	200	200	0	0	0
17%	Premium	1 100	1 100	0	0	0
80%	Standard	5 300	4 400	600	0	300
100%	Total	6 600	5 700	600	0	300
Asia						
1%	Specialized	700	100	300	0	200
7%	Premium	3 400	1 300	100	0	2 000
92%	Standard	45 000	4 800	1 100	0	39 100
100%	Total	49 100	6 200	1 500	0	41 300
Africa						
9%	Specialized	1 500	1 100	400	0	0
22%	Premium	3 700	1 700	1 100	0	1 000
70%	Standard	11 900	1 600	3 300	0	7 000
100%	Total	17 100	4 400	4 800	0	8 000

Note: Numbers may not sum due to rounding.

Source: International Coffee Organization production data (adjusted for China and Ethiopia) and ITC estimates.

Main producer structures

Coffee production starts at the farm. Coffee is cultivated through a family-farming system (often described as smallholders) or an entrepreneurial business structure. In both cases, sustainability can be achieved by balancing economic viability in coffee production with environmental protection and social responsibility.

The structure and size of farms varies from one country to another. Some countries can count on a highly professionalized farming base while others – the vast majority – need much more efficiency.

FARM SIZE

Of the world's 12.5 million coffee farms, it is estimated that smallholder farms account for up to 80% of global production while large farms produce the rest. Definitions of 'large' farms vary by country, from more than 50 hectares in Brazil to less than 5 hectares in Kenya. Nevertheless, it is clear that small farms are the backbone of the coffee business and need adequate external support to remain up and running in the long term.

Table 7: More than half of all smallholder coffee farms are in Africa

Region	Estimated farmer numbers			Share of coffee production	
	Smallholder farms	Estate farms	Total	Smallholder farms	Estate farms
Africa	6 851 326	5 389	6 856 715	90%	10%
Asia	3 167 720	33 509	3 201 229	94%	6%
Americas	2 349 491	90 609	2 440 100	70%	30%
Brazil	273 740	14 360	288 100	70%	30%
Central America	1 156 466	23 614	1 180 080	69%	31%
Rest of South America	919 285	52 635	971 920	71%	29%
Global	12 368 537	129 507	12 498 044	80%	20%

Note:

- All data come from Enveritas' Global Farm Study, conducted in 2018.
- Production numbers took an average of multiple crop years. In most cases, this was the four most recent crops before 2018 (see Global Farm Study for more details on production estimates).
- Definitions of smallholder vs estate vary by country (see Global Farm Study for specific definitions where they exist for each country).
- Farm size distributions are modeled using the empirical distributions provided in the Global Farm Study.

Source: Enveritas.

Globally, 94.5% of coffee farms are smaller than five hectares, and about 84% of all coffee farms are smaller than two hectares. These farms would be considered smallholders in any country. Enveritas estimates that smallholders with fewer than five hectares contribute up to 67% of global production. Around 4.6% of all coffee farms cover 5–20 ha, and only 0.9% of all coffee farms are bigger than 20 hectares. Coffee farms that are bigger than 20 hectares are considered 'large' in all countries except Brazil.

Coffee farms bigger than 50 hectares are most common in Central and South America. Brazil in particular has an evenly spread farmer structure, with smallholder farms, mid-sized farms and bigger coffee farms. In general, Brazilian farm structures are larger than in most other coffee-producing countries. The high level of mechanization used by Brazilian farmers improves their business case through continuous cost reduction and efficiency in production.

Table 8: Almost 95% of coffee farms are smaller than 5 hectares

Region	Farm size distribution		
	< 5 ha	5–20 ha	20 ha +
Africa	99.4%	0.5%	0.1%
Asia	96.6%	3.2%	0.2%
Americas	78.0%	17.6%	4.4%
Brazil	46.8%	41.6%	11.6%
Central America	82.5%	14.4%	3.0%
Rest of South America	81.8%	14.4%	3.8%
Global	94.5%	4.6%	0.9%

Note: All data come from Enveritas' Global Farm Study, conducted in 2018. Farm size distributions are modeled using the empirical distributions provided in the Global Farm Study.

Source: Enveritas.

COFFEE FARMING VS COFFEE GARDENING

Farms are usually a family business – passed on from one generation to the next. In most coffee-producing countries, farms are divided into smaller parcels through inheritance, as a way of distributing them to family members. This has caused a gradual decrease of plot size over time.

In some countries (in Africa especially), coffee plot size has become so small that its designation as either a coffee garden or farm becomes difficult to pinpoint. In such cases, a minimum size definition is required as a capacity indicator for a source of income. This indicator can clarify if farming in a particular region and on a certain size farm is economically sustainable.

EMPOWERING SMALLHOLDER FARMERS

Raising awareness and harmonizing required minimum sizes for farming activities is urgent. Bringing small farmers together into organized operations such as cooperatives and farmer associations can help them build economies of scale. They should avoid further fragmentation of coffee-producing units.

Many factors influence a farmer's business case: international coffee prices, market access, productivity, cost of labour and inputs, geographical location, topography and microclimate, to name a few. Intercropping and crop diversification are examples of constructive ways to adapt to price volatility and climate change. To increase the resilience of growers, they need to be coordinated across an entire farming system.

Smallholder farming structures provide coffee farmers and their families with a safe work environment and a viable, sustainable business. Through diversity in production of varieties and qualities, they reduce risk and add value. This contributes to the resilience of the entire coffee supply chain. Parallel economic activities can provide additional income streams, making coffee farmers more resilient to price fluctuations, weather events, pests and diseases.

An enabling environment beyond the farm's gate is extremely important. Prosperous producing countries with a functioning smallholder farmer structure, such as Brazil and Viet Nam, invest heavily in road infrastructure, modernize communication facilities and improve access to finance markets.

Investing in smallholder structures is necessary for both coffee farmers and the future of the coffee industry. Providing smallholder farmers with the external support they need to help them move from survive to thrive is a clear priority for the sector.

Investments at production level

Much of coffee's value is acquired at the production stage. Farming and post-harvest processing methods can greatly influence coffee products, in both quality and value. This makes producer, government and buyer investment in the production process a sensible – if not essential – business move.

■ Agricultural research and development

Government investment in agricultural R&D, which boosts productivity per hectare, can help coffee-producing countries perform exceptionally well. Local agricultural research organizations such as Embrapa in Brazil and Cenicafé in Colombia and international organizations including World Coffee Research are trying to breed modern coffee tree varieties.

Modern varieties target higher productivity, better cup profiles and, above all, climate resilience. They aim to maximize individual farmers' incomes and secure sustainable development of the coffee sector.

For instance, the Brazilian coffee sector developed through the professionalization of farming practices for higher production and better efficiency. Integration of more efficient and suitable technologies (in terms of farm size and topography) can help maximize production at a minimal cost for a better profit.

Productivity in Brazil jumped fourfold from 8 to 32 bags/hectare in roughly 20 years, thanks to the Embrapa Consortium's work. This impressive result was achieved by a combination of innovative production methods, such as greater planting density, improved cultivation and husbandry, and new planting materials/varieties.

Digitalization across the agricultural sector (also known as farming 4.0 or smart farming) also has been key in making agricultural production more efficient. These information and data technologies optimize complex farming systems. Information technologies help farmers make better-informed decisions based on concrete data.

Some of these agricultural methods are finding their way into the coffee world. They are being tested in coffee-producing countries of similar size and structure. Coffee-producing countries are made up of thousands of small farms, and with a complicated mountainous topography, they often require other tailor-made solutions to improve productivity and efficiency.

For digitalization of coffee production to be successful, however, the right policies, infrastructure and capacity-building facilities need to be in place. This groundwork must be implemented before the deployment of any digitalization strategy.

■ Post-harvest processing: From experimentation to innovation and modernization

Another area in which producers have been experimenting and innovating is coffee processing after the collection of cherries. This is known as 'post-harvest processing' or 'primary processing'. The traditional post-harvest processes are washed, pulped natural and natural processes. (Chapter 5 provides details.)

Traditional methods are still predominantly used across coffee production and are constantly being improved. Innovative eco-friendly equipment is now on offer on the market, for example, with higher energy efficiency and lower water usage.

Farmers and agripreneurs are actively experimenting with new post-harvest processes such as anaerobic fermentation and yeast fermentation. New technologies for more specific measurements during the different stages of the process are also being developed, allowing for better and more precise monitoring and controlling of procedures and results. These are still in their infancy, however, and not yet widely used.

The downside of experimentation in primary processing is the difficulty to replicate and scale up. Combined with the considerable amount of time, skill and resources required, it can be a high-risk, low-return activity for producers who are not in a situation to absorb risk.

Producers catering to the specialty market through direct trade – or who have loyal clients with specific quality demands for large volumes of green coffee – may derive more value than others from experimentation and innovation in processing.

Eco-efficient technologies at post-harvest processing level is another recent development, as part of climate change mitigation efforts (explained in Chapter 2). Producers are also embracing climate change adaptation in drying techniques to avoid losing the quality of their harvests to mould or uneven drying due to unseasonal rains caused by climate change.



Farmers washing coffee in Ethiopia's Jimma area (Oromia Coffee Farmers Cooperative Union).

Post-harvest processing is an important step in coffee production that heavily influences the quality – and value – of the final product. Multinationals and local cooperatives acknowledge this today and are investing heavily in the dry milling step of the coffee production operation.

Modern equipment and technologies in the dry mill allow for a better segregation of qualities and a clearer overview of the defects. This enables a significant return on investment for exporters of premium and standard qualities as quality consistency is ensured, allowing them to match the exact quality parameters defined by international buyers.



Natural drying process in Costa Rica.

Box 1: Coffee processing methods

Washed coffee

Also known as the 'wet process', the coffee cherry is pulped by a machine, removing the red or yellow outer skin of the cherry. Once this is done, the seeds with their mucilage are then fermented in water for 1–2 days, or sometimes longer.

Of all the coffee-processing methods, the washing method is the most common and often produces the highest quality coffee. However, it requires high skill and water usage to be performed correctly. Some of the world's most expensive coffees are produced through this process.

Natural coffee

Known as 'natural coffee processing' or the 'dry process', this is the oldest preparation method, and has been used for hundreds of years. Farmers place the coffee cherries on a flat surface where they are then dried naturally in the sun. This process normally takes 2–6 weeks, and the beans are raked and rotated so they roast evenly.

Once the seeds have dried, they are removed from the cherry. Coffee producers around the world use this method more often because it is less costly and slightly easier than the washed processing method.

It is most popular in locations with low humidity, low rainfall or undependable access to water.

Pulped natural coffee (includes pulped natural/honey-processed and others)

The pulped natural method is a more modern, hybrid method, combining aspects of both the washed and unwashed methods. First, machines remove the outer skins and the beans are exposed to dry in the sun. Once the drying process is complete, farmers store the seeds for about 24 hours and then dry them.

Semi-washing coffee beans involves fewer steps and allows for faster processing of them.

Source: International Trade Centre.

■ Increasingly sustainable practices

Local and international exporters and traders have adapted and refined their methods as well. They have tried to integrate sustainable practices across the coffee value chain. Many exporters have invested in sustainable sourcing projects and are increasingly hiring teams of agronomists and technical advisers to assist farmers at origin.

Greater sustainability awareness in both producing and consuming countries has resulted in efforts at both ends of the value chain. Producing sustainable coffees is no longer uniquely a matter of social and environmental awareness or responsibility; it has become a market requirement and a competitive asset.

Value addition at origin

Aside from improvements and investment in green coffee processing or post-harvest processing, some producing countries are seeing investments in value addition at origin. This marks a shift from the role of a producer of a raw commodity (green coffee) to that of a producer of a final, marketable product. Roasting or processing green coffee at origin adds considerable value, creates better profit and boosts jobs, incomes and national prosperity.

Farmers are often price takers, unable to dictate when and at what price they sell their coffee. Very little coffee is sold as roasted coffee – less than 0.5% is exported as a finished roasted and ground product.¹¹¹ Although some producing countries have a healthy domestic market, many have required high-level government intervention to promote local coffee drinking.

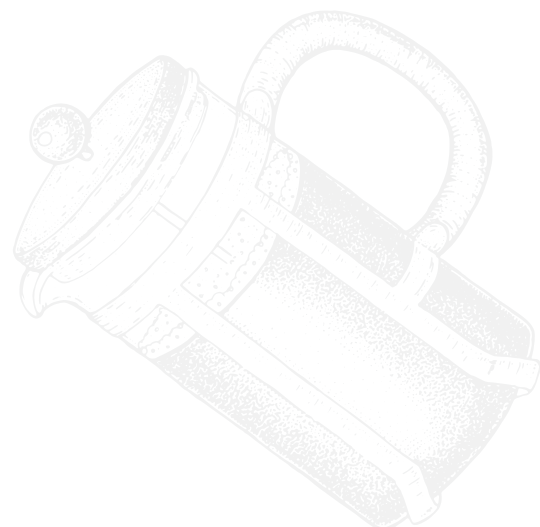
National and international roasting companies have been roasting coffee at origin in countries such as Brazil, Colombia and Costa Rica for a long time. For Brazil in particular, this has been an effective way to decrease dependency on international markets and strengthen its economy.

With a strong domestic market for coffee (Brazilian consumption, some 22 million bags a year, is growing steadily, accounting for 35%–40% of production), Brazil is a major soluble coffee producer. About 80% of Brazilian soluble production is exported.

In producing countries with established coffee consumption, standard quality is typically most consumed. In Brazil, 95% of consumption is roasted and ground coffee, while 5% is soluble coffee. Ethiopia, Costa Rica and Colombia are also keen coffee consumers (Ethiopia consumes half of its total production). Other producing countries, such as Indonesia, are just starting to consume soluble coffee (mostly 3-in-1 packages).

Premium and specialized quality segments are only beginning to emerge. They represent a marginal share of consumption and value addition at origin. Quality awareness and access go hand in hand with disposable income. As incomes rise in these countries, consumer demand will shift to higher-quality coffee segments.

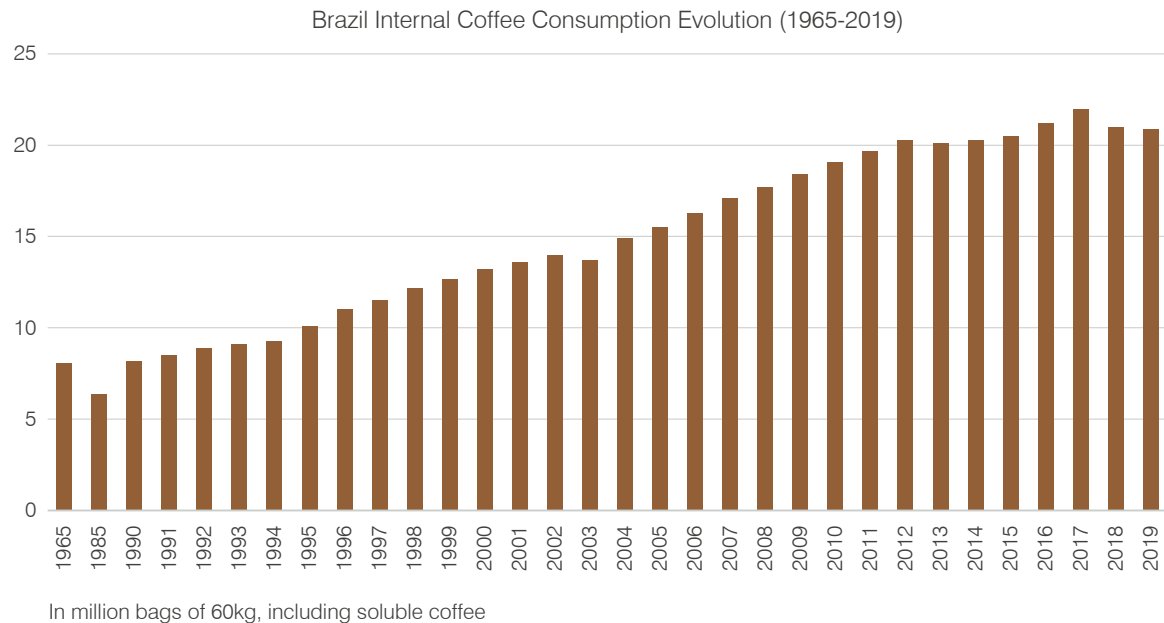
In Brazil, Colombia and Viet Nam, investments have been made in soluble coffee production facilities and decaffeination plants. These facilities represent intensive capital investments.



111.ICO statistics.

Figure 7: Coffee consumption in Brazil has more than doubled since 1995

In million bags, including soluble coffee



Source: Brazil Specialty Coffee Association.

Adding value to coffee in producing countries creates a huge potential for development. It can be a difficult task often fraught with obstacles. Generally, more than 90% of coffee exported from producing countries is in green (raw) form.

This begs the question of why value addition in coffee-producing countries is so low. The reasons are primarily technical and logistical:

- **Preservation of quality:** Green coffee beans have a much longer shelf life than roasted (and ground) coffee. Despite improved packaging for roasted coffee, it needs to be consumed quickly for optimum quality and taste.
- **Market-adapted blends and brands:** Most roasted and ground coffees are blends sold as branded products. Roasters are reluctant to change their blends. The availability of alternative coffees in the blends, seasonality and fluctuations in both supply and demand are also important. Blends can be very difficult to handle in producing countries, which usually have a great distance to cover before getting the product to consumers.
- **Just-in-time delivery:** Supermarkets and retail centres do not carry large stocks. They face rapidly changing customers demand and swiftly adapt delivery orders to roasters. Both demand and requirements change quickly. Certain pallet type requirements or deliveries of 500g packs instead of the usual 1kg bags are some examples. This fluctuation in demand requires a flexibility that cannot be easily handled from a great distance – the reaction time is too long to enable it.

What is happening at consumption level?

Coffee demand is directly linked to population growth and disposable income. The world's population expands by 1% a year and global coffee consumption has grown almost 2% a year for the last 20 years.

Table 9: United States has been top coffee consumer for decades

Largest Coffee Consumers (‘000 green equivalent bags)

COUNTRY	2000	COUNTRY	2005	COUNTRY	2010	COUNTRY	2015	COUNTRY	2019	
United States	18.856	United States	20.851	United States	21.242	United States	24.008	United States	26.891	1
Brazil	12.700	Brazil	14.900	Brazil	18.400	Brazil	20.300	Brazil	22.830	2
Germany	9.142	Germany	8.382	Germany	8.781	Germany	9.240	Germany	9.490	3
Japan	6.671	Japan	7.255	Japan	7.179	Japan	7.646	Japan	7.806	4
France	5.451	Italy	5.397	Italy	5.224	France	5.277	Indonesia	5.429	5
Italy	5.086	France	5.257	France	5.149	Italy	5.076	France	5.340	6
Spain	3.124	Spain	2.989	Russia	3.683	Indonesia	4.375	Italy	5.203	7
United Kingdom	2.543	Russia	2.976	Canada	3.443	Canada	3.786	Russia	4.801	8
Canada	2.376	Canada	2.761	Indonesia	3.116	Russia	3.777	Canada	4.011	9
Netherlands	2.374	United Kingdom	2.620	Poland	3.018	United Kingdom	3.301	United Kingdom	3.811	10
Russia	1.621	Netherlands	2.343	Spain	2.959	Poland	2.992	Poland	3.153	11
Poland	1.908	Poland	2.138	United Kingdom	2.944	Spain	2.923	Viet Nam	3.075	12
Algeria	1.648	Algeria	2.026	Netherlands	2.393	Netherlands	2.494	Spain	2.966	13
Ethiopia	1.500	Indonesia	1.963	Algeria	2.081	Mexico	2.458	Philippines	2.792	14
Sweden	1.495	Mexico	1.807	Mexico	1.935	Philippines	2.266	Netherlands	2.575	15
Colombia	1.405	Ethiopia	1.700	Philippines	1.821	Algeria	2.161	Mexico	2.397	16
Mexico	1.363	Sweden	1.580	Ethiopia	1.650	Vietnam	2.131	Korea, Rep. of	2.373	17
Indonesia	1.325	Colombia	1.513	Sweden	1.626	Korea, Rep. of	1.905	Algeria	2.331	18
Belgium/ Luxembourg	1.216	Korea, Rep. of	1.293	Colombia	1.544	Ethiopia	1.800	China	2.207	19
Korea, Rep. of	1.195	Belgium/ Luxembourg	1.230	Korea, Rep. of	1.365	Thailand	1.755	Thailand	2.169	20
Finland	989	India	1.196	Finland	1.344	Sweden	1.725	Colombia	1.847	21
Philippines	985	Philippines	1.084	Thailand	1.302	Australia	1.659	Sweden	1.812	22
Austria	970	Finland	1.026	Vietnam	1.296	Colombia	1.629	Ethiopia	1.811	23
Switzerland	900	Austria	999	India	1.250	Finland	1.396	Australia	1.807	24
Denmark	843	Switzerland	996	Belgium/ Luxembourg	1.225	China	1.359	Turkey	1.513	25
India	834	Greece	913	Australia	1.213	Venezuela	1.293	Finland	1.448	26
Norway	719	Vietnam	891	Venezuela	1.077	India	1.242	India	1.342	27
Venezuela	716	Australia	881	Switzerland	1.029	Belgium/ Luxembourg	1.237	Denmark	1.300	28
Australia	713	Thailand	871	Austria	1.019	Denmark	1.129	Czech Rep./ Slovakia	1.300	29
Portugal	683	Denmark	817	Greece	1.017	Czech Rep./ Slovakia	1.129	Belgium/ Luxembourg	1.293	30
EU (28)	39.613	EU (28)	39.972	EU (28)	43.409	EU (28)	45.054	EU (28)	46.799	
World Total	107.211	World Total	120.327	World Total	135.188	World Total	150.792	World Total	166.517	

Source: ITC.

The world consumes more than 165 million bags of coffee annually. This equates to almost 3 billion cups of coffee a day. Apart from the European Union, which consumes almost 50 million bags of coffee each year, the United States is the largest single coffee market in the world, with annual consumption of nearly 27 million bags. It is closely followed by Brazil, with almost 23 million bags per year. These three markets account for up to 60% of the world's annual demand for coffee.

When looking at consumption, it should be noted that green coffee is consumed mainly in three bulk categories:

ROAST AND GROUND COFFEE

This is by far the biggest category, accounting for approximately 75% of all coffee consumed worldwide. It includes the coffees roasted and consumed in producing countries. Large multinationals mostly dominate associated markets.

Coffee blends are a common product on offer in this category. Industry roasters often blend coffee to guarantee a preset cup profile and uniformity in the finished product. Blending increases the flexibility of roasters, so they depend less on a single origin or quality. It also enables them to compensate for seasonal changes in the cup taste and switch to other qualities if there is a coffee shortage or unexpected price volatility.

Industry roasters offer their coffees not only roasted, but also ground. Roasters use industrial grinders and adapted packaging facilities as ground coffees perish quickly. Methods to prolong the shelf life of roasted coffee beans include vacuum packaging and gas-flash protection.

Meanwhile, there has been a resurgence of small, locally based specialty roasters, which focus on high-quality coffee and produce small 'artisanal' batches. Every major city can count at least one, and they have become hot spots for young and coffee aficionado crowds. In some countries, specialty roasters are now an intrinsic part of the national coffee culture, offering beautiful shops and selling a lifestyle, not just coffee.

INSTANT OR SOLUBLE COFFEE

The term 'instant coffee' or 'soluble coffee' includes spray-dried and freeze-dried powders as well as liquid concentrates. These methods of coffee processing are all based on a common procedure. First, the coffee is roasted, ground and brewed. The liquid coffee is then dehydrated and converted into a syrup-like concentrate or a powder. Dehydration is done by heating or freezing the brewed coffee. The flavour is better conserved through freeze-drying, which often produces a better quality.

For most non-coffee-drinking cultures, instant coffee is widely considered as the first touchpoint to coffee consumption. In Eastern Europe, East Asia and South-East Asia especially, soluble coffee enjoys a high market share. Demand for so-called 3-in-1 beverages in these regions has grown steadily. These products combine soluble coffee, non-dairy creamer and sugar and come in single-serve sachets or cans. They are very convenient and extremely popular.

Most prominent Robusta-producing countries, including Brazil, India, Indonesia and Viet Nam, have soluble plants, those facilities belong to major international companies such as Nestlé and Jacobs Douwe Egberts. Soluble coffee allows coffee-producing countries to add more value locally.

Table 10: Brazil and India lead soluble imports into European Union

COUNTRY	2015	2016	2017	2018	2019
Brazil	607	611	487	478	570
India	197	246	280	350	323
Viet Nam	227	201	273	307	290
Switzerland	274	271	252	276	275
Ecuador	593	432	383	277	235
Colombia	189	214	215	219	214
Mexico	75	120	167	166	97
Russian Federation	5	34	8	19	21
China	17	31	23	16	11
Malaysia	15	42	20	14	10
Ukraine	79	83	66	67	84
Islamic Republic of Iran	3	1	0	1	2

COUNTRY	2015	2016	2017	2018	2019
Thailand	41	36	33	35	35
Cote d'Ivoire	56	17	22	1	1
Philippines	1	0	0	0	0
Canada	9	3	4	0	0
Norway	3	4	3	2	2
South Africa	0	1	0	1	0
TOTAL IMPORTS EU	2 390	2 348	2 234	2 231	2 169

Note: '000 bags.

Source: ITC and trade sources.

DECAFFEINATED COFFEE

Decaffeinated coffee was first introduced to the market in Europe. Accurate data on decaffeinated consumption are not readily available, so most statistics are an educated guess.

The way coffee consumption is spread throughout the world is interesting to observe and often surprising. The highest consumption per capita is in Scandinavian countries, ranging from 9kg in Sweden and Denmark to 12kg in Finland. In contrast, Italians and Slovenians drink the equivalent of 6kg of coffee per person each year.

Table 11: Per capita consumption is highest in Finland and Norway

COUNTRY	kg/year	COUNTRY	kg/year
Finland	12	Japan	3.7
Norway	10	United Kingdom	3.5
Sweden	9	Costa Rica	3.5
Denmark	9	Algeria	3.2
Netherlands	8	South Africa	3
Belgium	8	Rep. of Korea	2.9
Austria	8	Saudi Arabia	2.7
Switzerland	7	El Salvador	2.5
Germany	7	Ethiopia	2.4
Canada	7	Russian Federa-tion	1.8
Brazil	6	Ukraine	1.4
Italy	6	Indonesia	1.3
Slovenia	6	Mexico	1.3
France	5	World	1.2
European Union	5	Philippines	1.2
United States	5	Viet Nam	1.2
Australia	4.6	Turkey	1.1
Portugal	4	China	0.13
Spain	4	India	0.08
Poland	4		

Source: ITC, ICO, P&A Marketing, US Department of Agriculture, national and company statistics, Morten Scholer (2018), *Coffee and Wine: Two Worlds Compared*.

Traditional markets

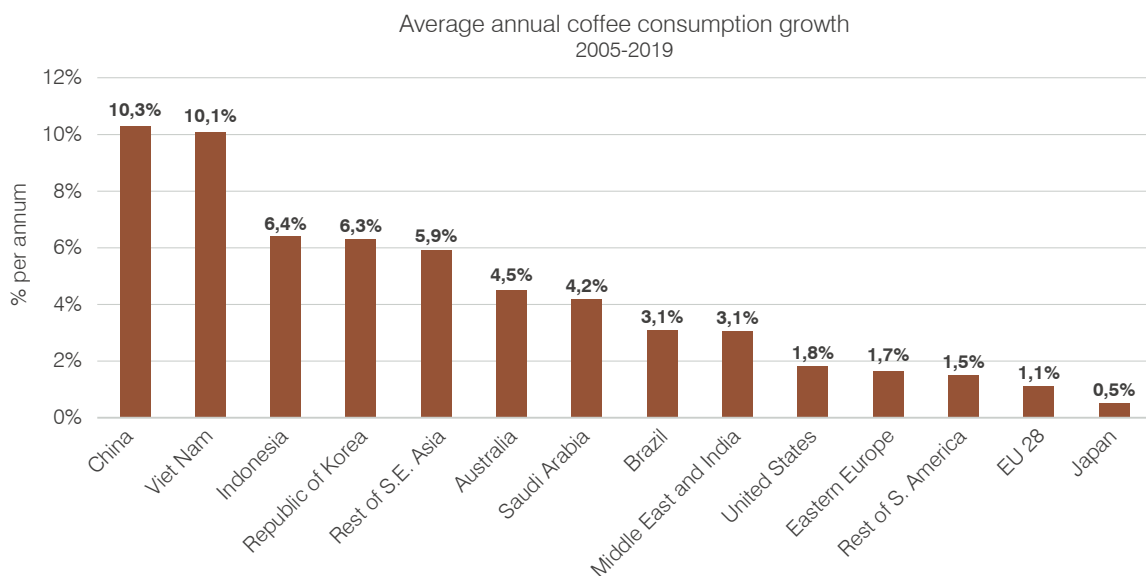
Much production covers the demand for standard coffee, which is mainly mass-produced, average-quality coffee either for roasted and ground products or instant coffee. Much of this is Robusta coffee. Although specialty coffees comprise just a small percentage of total market volume, this sector has the most growth potential because of changing consumer habits – including demand for more beverage variety, a better experience or more ethically sourced products.

The traditional coffee-drinking markets are described as having reached maturity, and overall growth has declined. The compound annual growth rate in Western Europe, the largest and most mature market in the world, was just 1% in 2012–2017 and a similar level of growth is expected in 2017–2022.¹¹² The Italian market is predicted to expand the most in that period, driven by the single-serve pod.

Within these markets, the three quality segments of standard, premium and specialized coffee continue to occupy consistent shares (of different size). Today, global demand for all three quality segments remains steady, depending on the customer structure of the markets to which they are catering.

Euromonitor forecasts that the value of the US coffee market will increase by 2.9% in 2018–2023, though volume will decline 1%. Coffee value is also rising in the five biggest European markets.

Figure 8: Coffee consumption grows the most in China and Viet Nam



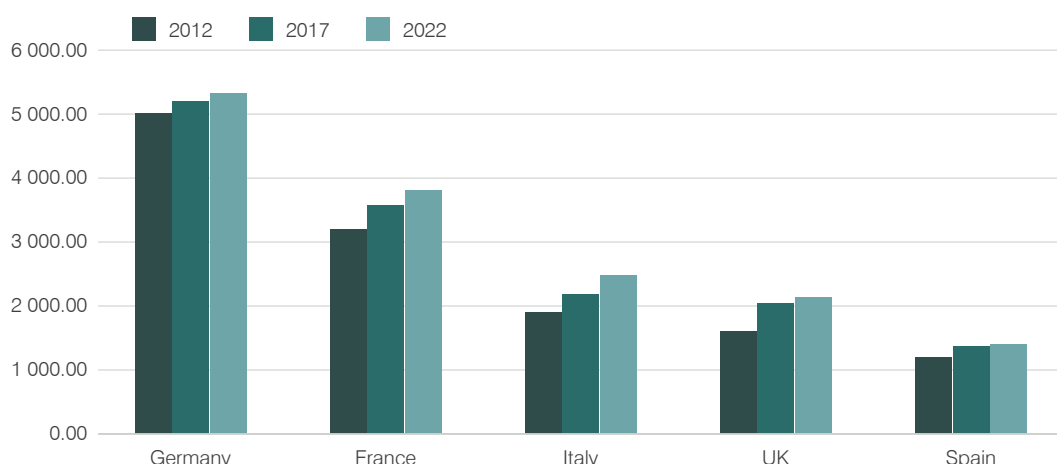
Note: Rest of S.E. Asia includes South-East Asia and Oceania except countries in the graph.

North America includes the United States, Canada and Mexico.

Eastern Europe includes Albania, Kosovo, Bosnia, North Macedonia, the Russian Federation and former Commonwealth of Independent States area, and Serbia.

Source: ITC.

Figure 9: Germany is the most valuable European coffee market



Note: Value shown in millions of dollars.

Source: Euromonitor, Passport Hot Drinks: Coffee in Western Europe (2018).

112. Euromonitor International (March 2018). Passport Hot Drinks: Coffee in Western Europe.

Some of the newer actors in the global coffee market use modern marketing tools such as social media and other online platforms to increase their outreach. The entire industry profits from these efforts, as coffee popularity soars and demand continues to rise rapidly and steadily.

Although modern coffee concepts and shops have popped up on many street corners in North America, Europe, the Republic of Korea and Australia, coffee consumption in these markets has remained steady since 2000, rather than rising as expected. Some reasons are:

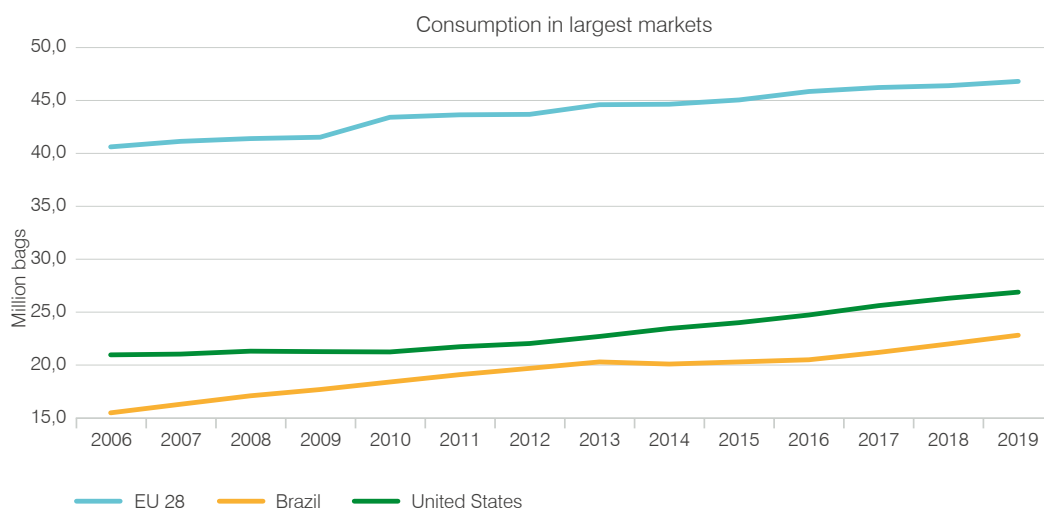
- **Fewer grams per coffee cup.** New roasting, blending, grinding and brewing technologies make it possible to extract more from each single coffee bean. Thirty years ago, the norm for a home-brewed cup of coffee in North America and Europe was 7–8g of roast and ground coffee. Today, modern extraction rates of fully automated single-serve coffee machines only need 6–7g of coffee; capsule systems require just 5g of coffee. Using only 1g less per serving may seem insignificant, but it is a reduction of about 13%. From a global perspective, 13% is equivalent to the share of global coffee production coming from Central America (21 million bags).
- **Less waste in coffee preparation.** Sink spillage has dramatically decreased over time. Single-serve machines in offices and homes avoid sink spillage (identified as a major coffee consumer). Out-of-home coffee preparation in bars, cafés and restaurants also relies heavily on precise equipment and focuses on minimizing spillage.
- **Greater efficiency.** There is growth potential to continue doing more with less. The trend is towards the continued combination of higher extraction rates and fewer errors in coffee servings, together with slightly increasing imports of green coffee.

Coffee continues to be marketed as part of a culture or lifestyle that consumers desire, rather than a mere product. A major reason for its popularity worldwide lies in this marketing strategy, as it becomes what consumers consider to be an 'essential' product.

Coffee consumption has remained stable since the start of the COVID-19 pandemic. After the initial frenzy of people stocking up on their coffee provisions, consumption patterns returned to normal. The pandemic caused a shift in consumption from 'out-of-home' to 'at-home', proving that coffee is a crisis-resistant product.

COVID-19's final effect on consumption habits cannot yet be assessed. The move to at-home consumption has benefited many established brands offering coffee products at the supermarket. This could indicate growing demand for standard and premium-quality coffees. Roasters selling coffees in the specialized quality segment through their high-end coffee bars may encounter hard times. E-commerce platforms and web shops might be a good alternative and the only way to compensate for loss of business in the coffee shop.

Figure 10: Consumption in largest markets (in millions of bags)

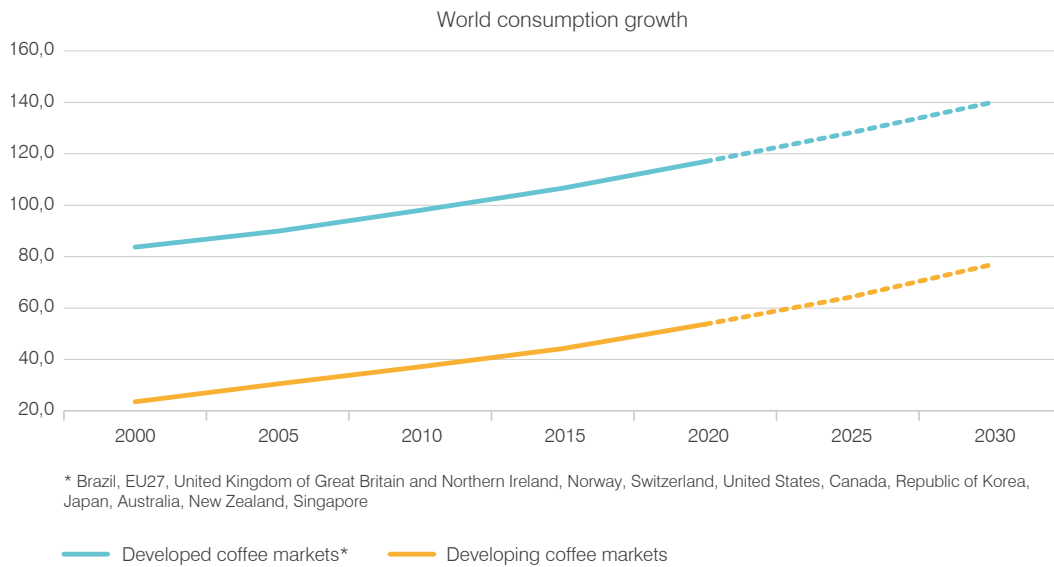


Source: ITC.

Emerging or 'non-traditional' markets

Most growth in 1990–2016 occurred in coffee-producing countries and emerging markets, where expansion has been rapid – in Brazil especially – although per capita consumption is still low.

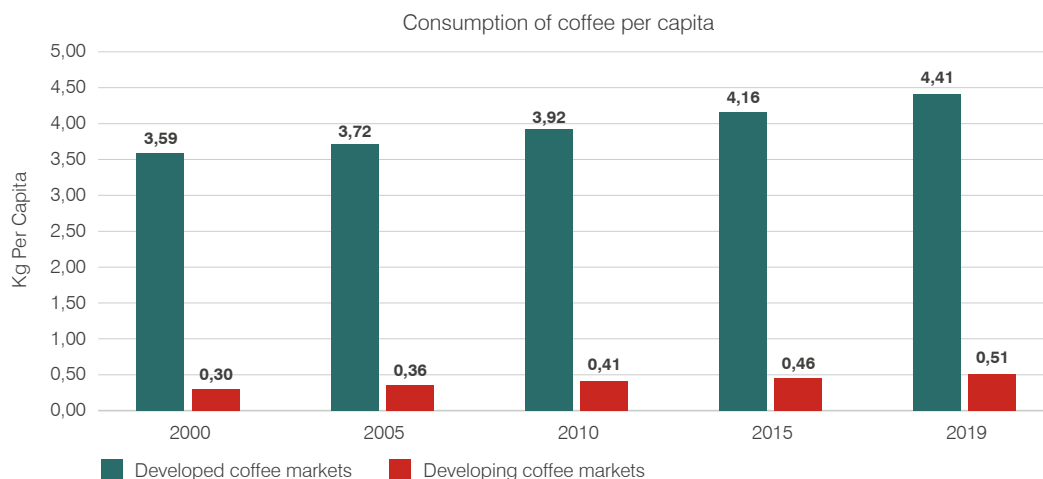
Figure 11: Developing coffee markets keep pace with developed markets



Source: ITC.

Until recently, the traditional coffee-drinking markets were the United States, Canada, Western Europe and Japan. Brazil has become the world's top producer-consumer and, as the second-largest consuming country, must be included in this market segment. Australia, New Zealand, the Republic of Korea and Singapore have recently joined this main coffee consumption market segment. They collectively represent 1.1 billion people and have an average per capita consumption of 5kg of coffee, with a steady annual growth rate of 1%.

Figure 12: Per capita coffee consumption climbs in developing countries



Notes:

Developed*: population 1.57 billion in 2019: Average consumption growth 2000–2019 1.8% per annum

Developing: population 6.1 billion in 2019: Average consumption growth 2000–2019 3.7% per annum

*- Brazil, EU27, United Kingdom, Norway, Switzerland, United States, Canada, Republic of Korea, Japan, Australia, New Zealand, Singapore.

Source: Trade for consumption data and World Bank for population data.

More than 6.7 billion people live in developing countries, where per capita consumption of coffee is a very low 0.6kg. Nevertheless, the growth rate of these markets is more than 4% a year – evidence of their high potential to influence global coffee market dynamics in the years to come.

China has seen annual increases of 15% in coffee consumption. Indonesia is the leading coffee consumer in South-East Asia, though much of the growth is in 3-in-1 products. The situation is similar in Viet Nam, where consumption of instant coffee has increased.

Producer countries become consumers

Few producing countries – with the notable exception of Brazil and Ethiopia – consume their own coffee. Most of the coffee grown in producing countries is exported to overseas markets, such as Europe and the United States and, more recently, countries in South-East Asia.

Consumption levels are measured per capita – the total amount of coffee consumed in a year divided by the population of a country. Many of the countries with the highest level of per capita coffee consumption are in Europe, including Finland (around 12kg), Norway (10kg) and Iceland (9kg).

In comparison, Brazil – which produces the most coffee in the world – has a per capita consumption of around 6kg. This figure rises by about 3% year-on-year on average. Consumption levels in other producing countries such as Colombia (2.1kg), Ethiopia (2kg), Viet Nam (1.6kg) and Indonesia (1.1kg) are considerably lower.

THE EXAMPLE OF BRAZIL

Increased domestic consumption can trigger major benefits, including greater product demand, fewer hurdles for producers and more opportunities for growers to maximize income. Brazil is a fine example of a producer country that has successfully developed its domestic consumption of coffee – and profited from it.

Brazil carried out a very effective campaign that began in the late 1980s to boost domestic consumption.¹¹³ The campaign was a pre-competitive programme financed by the industry and orchestrated through the Brazilian Coffee Roasters' Association.

The campaign promoted coffee in schools and in the countryside, educating children and communities on the positive health and wellness benefits of coffee. This had the effect of building a new generation of coffee drinkers and coffee farmers. This marketing campaign took Brazil from domestic consumption of 6.5 million bags in 1985 to 22 million bags in 2018. There was a corresponding per capita rise in consumption from 2.27kg a year to slightly more than 6kg a year.¹¹⁴

After 2002, roasters progressively campaigned directly for their brands and the role of the programme began to wane.

Colombia has taken a similar approach to promote internal consumption with its 'Toma Café' campaign.

THE EXAMPLE OF INDONESIA

Another success story took place in Indonesia, through the large-scale production and consumption of 3-in-1 products, sold in packets. This product owes its popularity to its accessibility (low price and convenience), making it a great stepping-stone into coffee consumption.

Brazil and Indonesia are in a league of their own, however. Most other producer countries face a host of barriers, from a lack of consumer knowledge to logistical and bureaucratic hurdles.

DISPOSABLE INCOME: THE X FACTOR

Disposable income is a major obstacle to the development of coffee consumption at origin. While many producing countries are working to expand their middle class and improve their citizens' quality of life, many citizens lack the disposable income required for a regular coffee habit.

113. The actual cost of this campaign was only \$27 million in 1989–2002, under \$1 million a year in the following decade, and even less in subsequent years.

114. Brazilian Coffee Industry Association statistics, www.abic.com

For example, while Viet Nam is the world's second-largest producer of coffee beans and the World Bank¹¹⁵ estimates that about 70% of its population is economically secure – only 13% are middle class and have an income that covers discretionary spending. This means that many may view coffee as an unattainable luxury. This is a reality in other producing countries as well.

Product access is also an issue. To encourage exports, many countries can make it difficult for producers to sell coffee domestically. If there is no financial incentive to sell coffee to the domestic market rather exporting it, and if country policies and regulations encourage or force producers to sell their coffee to the international market, consumption at origin will be difficult to promote.

Box 2: Toma Café: Colombia gets a taste of its own coffee

Numerous initiatives have emerged in recent years to encourage coffee consumption in producing countries.

To facilitate this, the International Coffee Organization released its Step-by-Step Guide to Promote Coffee Consumption in Producing Countries, which drew on the experience of several countries, including Brazil's very successful case. The guide helped develop and put into place programmes to increase consumption in countries as diverse as India, Mexico and Costa Rica.

The longest lasting and most successful of these was Colombia's Toma Café (Drink Coffee) programme. Coffee consumption in Colombia grew by 36% in volume in 2009–2017, more or less wiping out the 40% decline that had occurred over the preceding two decades. The Toma Café programme used the recommendations of the ICO guide wisely, adapting them to local conditions and innovating beyond them.

The campaign was financed and run by a coalition of companies represented by a board composed of the four leading roasters, the National Federation of Coffee Growers, representatives of mid-size and small roasters, and a full-time executive director who managed strategy development, project design and implementation.

Brewing up success

Toma Café focused on the benefits of coffee to health and well-being, training and education about coffee, as well as public relations. The programme developed strategies to reduce barriers to consumption and give people more reasons to drink coffee. It also raised awareness of the main distribution channels, including the corner shops that sell the largest share of all coffee consumed in Colombia.

In addition, the campaign successfully leveraged public relations to reach a much wider audience. An investment of \$250,000 generated an estimated \$8.5 million of coverage in the mass media. Furthermore, the involvement of institutional training services helped disseminate coffee knowledge to shopkeepers and retail outlets.

The programme worked both to attract new consumers and to boost consumption among existing ones by promoting coffee drinking at home and outside. The main engine behind the success of Toma Café was the creation of a new mindset to stimulate demand.



Source: Carlos Brando, P&A International Marketing for ITC.

115. The World Bank. 'Climbing the ladder: Poverty reduction and shared prosperity in Viet Nam,' Update Report 2018. (<http://documents1.worldbank.org/curated/en/206981522843253122/pdf/124916-WP-PULIC-P161323-VietnamPovertyUpdateReportENG.pdf>)

Promoting consumption of quality coffee at origin will be even harder. This is because consumers in countries where incomes are markedly lower than in traditional consumer countries must be educated to recognize the value of spending more on quality.

Most producing countries therefore focus on delivering quality coffee for export. The coffee that is consumed in-country is either the 'leftover' coffee that does not meet export quality standards or it is imported. And while some other producing countries (Colombia, Costa Rica, Mexico and India) have launched initiatives to increase internal consumption, others have made little to no progress.

Increased consumption could improve incomes and outcomes for producers. While most specialized and premium quality coffee is exported, a domestic market could be an extra outlet for standard-grade coffee. This could provide producers with an additional income stream that enables them to invest in and expand their farm, achieve a living income and eventually make a profit.

Having access to both internal and overseas markets also gives producers more stability. If their export sales decrease for whatever reason, good internal demand for coffee gives them another source of income.

To increase local consumption of national coffees, targeted awareness-raising and education campaigns aimed at local consumers need to be deployed. Standard coffee qualities are a great steppingstone for that purpose, as most people can afford them.

Promoting only specialty coffees will probably not generate much impact in producing countries. While it can be a useful complement and trendsetter targeting a niche segment, pushing specialized or even premium coffee was never the focus of the most successful internal consumption strategies (as deployed in Brazil).

A breakdown of demand by product and geographical area

EUROPE

The European region covers a vast territory stretching from Western Europe to Central and Eastern Europe. In the following breakdown, the region is split into two main areas:

- **Western Europe** covers all 27 European Union members¹¹⁶ plus Switzerland, Norway, Iceland and – since 31 January 2021 – the United Kingdom, as a non-member of the European Union.
- **Central and Eastern Europe** includes Albania, Belarus, Bosnia and Herzegovina, Georgia, North Macedonia, Moldova, Montenegro, the Russian Federation, Serbia and Ukraine.

Coffee demand in the European region has grown at a steady rate of around 1.3% a year for the last three decades. The EU region (the United Kingdom included) accounts for about 81% of total green coffee imports (roughly 57 million bags in 2018). The Russian Federation ranks second, accounting for about 9% of green coffee intake (5.5 million bags), followed by Switzerland with green coffee imports of 5% (equivalent to 2.4 million bags).

It is important to note that green coffee imports are not exclusively for internal consumption. For example, Belgium re-exports most of the coffee that is shipped in via the port of Antwerp. Spain uses much of its green coffee imports to manufacture soluble coffee that is then exported.

According to the European Commission, the EU is the largest barrier-free market in the world, bigger than the United States, Canada and Mexico combined. Within the European Union, the single biggest markets are Germany, Italy, Belgium, Spain and France. Together, these five countries account for more than 70% of the green coffee imports into the bloc.

Table 12: Germany and Italy import most green coffee in Europe

	2016	2017	2018	2019
Austria	268 917	282 317	282 933	303 250
Belgium	5 170 150	4 607 933	4 689 033	5 125 767
Bulgaria	541 383	484 483	497 967	547 650

¹¹⁶The EU27 consists of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Sweden, and Spain. The EU28 is the EU27 plus the United Kingdom.

	2016	2017	2018	2019
Croatia	299 583	196 783	260 883	258 667
Cyprus	26 700	25 567	51 283	47 167
Czech Republic	308 167	206 950	302 733	324 483
Denmark	332 550	256 917	285 700	291 500
Estonia	13 667	22 233	1 433	3 567
Finland	1 188 733	1 123 200	1 020 500	1 250 850
France	3 502 650	3 414 583	3 791 033	3 833 633
Germany	19 016 550	18 313 883	18 749 717	18 909 450
Greece	820 733	302 450	542 383	647 433
Hungary	34 817	45 067	48 667	63 067
Ireland	176 333	208 633	200 300	183 317
Italy	9 671 900	9 498 600	10 116 583	10 266 200
Latvia	56 000	63 983	50 733	40 750
Lithuania	20 583	24 133	27 417	34 200
Luxembourg	11 683	14 983	13 767	12 900
Malta	217	350	683	3 567
Netherlands	3 064 800	3 170 233	3 378 267	3 423 283
Poland	1 701 650	1 897 567	2 049 717	2 057 117
Portugal	895 317	867 683	1 008 983	953 317
Romania	339 600	321 983	300 167	296 750
Slovakia	57 300	79 800	90 583	96 683
Slovenia	222 333	294 233	411 033	488 683
Spain	4 792 067	4 565 650	4 823 183	5 080 583
Sweden	1 844 650	1 807 067	1 779 550	1 860 133
United Kingdom	3 235 933	2 773 817	3 285 950	3 171 733
EU28 TOTAL	57 614 967	54 871 083	58 061 183	59 575 700
Switzerland	2 527 600	2 605 267	2 792 283	2 921 967
Norway	585 983	585 383	524 667	563 900
Iceland	19 183	18 117	15 550	15 967
Western Europe total	60 747 733	58 079 850	61 393 683	63 077 533
Albania	106 067	52 933	77 767	61 083
Belarus	15 200	22 217	31 683	23 350
Bosnia and Herzegovina	348 617	335 533	344 700	341 517
Georgia	74 683	80 133	81 350	88 433
North Macedonia	108 317	101 567	106 467	107 233
Moldova, Republic of	250	200	350	467
Montenegro	44 617	43 433	42 933	125 117
Russian Federation	2 515 533	2 756 833	2 809 000	3 093 533
Serbia	485 433	481 883	466 283	497 567
Ukraine	274 783	286 567	407 250	243 200
Central and Eastern Europe	3 973 500	4 161 300	4 367 783	4 581 500
EUROPE TOTAL	64 721 233	62 241 150	65 761 467	67 659 033

Note: In 60kg bags.

Source: ITC calculations based on UN COMTRADE and ITC statistics.

One consequence of the EU's single market is that imports or exports do not have a single EU country as final destination. Goods move from one country to another within the region, which means that a great deal of coffee is imported at the place it first arrives in Europe and not at the point of destination. This increases imports in countries that have major ports.

■ Green coffee

In 2019, Brazil was the biggest source of green coffee imports for EU countries (which included the United Kingdom at the time), supplying more than 16 million bags (or 32.2%) of total EU27 and British green coffee imports. Viet Nam furnished 12 million bags (23.8% of total imports). These two origins have consistently ranked as the top two suppliers to the EU, typically supplying around 55% of all green coffee the bloc imports.

The third top exporting country is Honduras, which provides about 7.7% of green coffee (more than 3.9 million bags) to the EU27 and the United Kingdom. Colombia ranked fourth, exporting about 3 million bags (5.9%), followed by Uganda and India.

Table 13: Brazil and Viet Nam ship the most green coffee to Europe

PARTNER/REPORTER	EU GREEN COFFEE IMPORTS – 60 kg bags			
	2018		2019	
	in 60 kg bags	% of TOTAL	IN 60 KG BAGS	% of TOTAL
BRAZIL	15 003 273	30.1%	16 337 702	32.2%
VIET NAM	12 640 720	25.4%	12 092 085	23.8%
HONDURAS	3 801 208	7.6%	3 918 145	7.7%
COLOMBIA	2 873 455	5.8%	3 003 785	5.9%
PERU	2 122 000	4.3%	1 996 658	3.9%
INDIA	2 616 547	5.2%	2 328 138	4.6%
UGANDA	2 689 913	5.4%	2 434 993	4.8%
ETHIOPIA	1 453 783	2.9%	1 395 370	2.7%
INDONESIA	1 075 223	2.2%	1 426 913	2.8%
GUATEMALA	730 050	1.5%	619 552	1.2%
NICARAGUA	717 045	1.4%	736 118	1.4%
KENYA	364 275	0.7%	415 613	0.8%
MEXICO	456 343	0.9%	536 882	1.1%
UNITED REPUBLIC OF TANZANIA	333 672	0.7%	511 465	1.0%
CHINA	705 810	1.4%	513 737	1.0%
PAPUA NEW GUINEA	348 322	0.7%	416 252	0.8%
COSTA RICA	266 233	0.5%	220 593	0.4%
COTE D'IVOIRE	317 063	0.6%	426 950	0.8%
EL SALVADOR	190 503	0.4%	191 040	0.4%
BURUNDI	151 810	0.3%	220 262	0.4%
Others	984 585	2.0%	1 043 488	2.1%
EU28_EXTRA	49 841 835	100.0%	50 785 742	100.0%

Notes: Excluding roasted and decaffeinated.

EU28 (AT, BE, BG, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IT, LT, LU, LV, MT, NL, PL, PT, RO, SE, SI, SK)

Source: Developed with data from European Coffee Report.

■ Soluble coffee

SOLUBLE COFFEE IMPORTS FROM NON-EUROPEAN ORIGINS

EU27 and British imports of soluble coffee from non-EU origins have been declining for several years. Imports amounted to 2.17 million bags in 2019, down 11% from 2015. The seven biggest suppliers of soluble coffee are coffee-producing countries, except Switzerland, whose exports to the EU28 were relatively stable in 2015–2019.

Brazil, India and Viet Nam were the leading suppliers of soluble coffee to the EU28 in 2019. Brazil has been the top supplier since 2015, furnishing 570,000 bags of soluble coffee in 2019 (though its exports fell by 21% in 2018 compared to 2015). India jumped from fifth place in 2015 to second place in 2019. Vietnamese soluble coffee exports to Europe grew 27% in 2015–2019.

Ecuador was the second-biggest supplier of soluble coffee to the EU28 in 2015. However, its exports to the bloc declined by about 60% in 2015–2019.

EU27 AND BRITISH EXPORTS OF SOLUBLE COFFEE TO NON-EU DESTINATIONS

Exports of soluble coffees to non-EU countries have grown steadily in recent years. The Russian Federation is a major buyer of this type of processed coffee. However, it has lost some ground to Ukraine and countries including Australia, South Africa and the United States, which are developing their markets for convenient and high-quality soluble coffees made in Europe.

■ Decaf

As previously noted, green coffee comprises more than 95% of the total volume of coffee and coffee-related products imported into the EU27 and the United Kingdom. However, analysing other coffee products helps develop a clearer picture of the European coffee market.

Green decaffeinated coffee imports have increased substantially in the last few years, rising about 40% in volume since 2015. They advanced 10.8% to 14,609 tons in 2018 from a year earlier. It should be noted that the EU is a major exporter of green coffee and coffee-based finished products. EU imports of green decaffeinated coffee and regular roasted coffee are modest compared to its exports of these products, while imports and exports of decaffeinated roasted coffee and coffee extracts (soluble coffee) are within the same order of magnitude. EU exports of green decaffeinated coffee fell for the third straight year in 2018, slipping 5.3% to 92,406 tons.

NORTH AMERICA (UNITED STATES AND CANADA)

North America¹¹⁷ is one of the largest coffee markets in the world, ranking third after the European Union and South America (mainly driven by Brazil). Annual demand in North America, which accounts for 19% of world coffee consumption, averages more than 31 million bags of coffee.

Asian coffee consumption has grown steadily in recent years, and Asia is now competing head-to-head with North America and South America for second and third place.

Within the North American region, the US market consumes about 27 million bags a year, while Canada accounts for about 4 million bags a year. In this respect, the United States is the biggest coffee-consuming country in the world. About 62% of Americans drink coffee on a daily basis, making it their favourite beverage.¹¹⁸

As is the case in most mature coffee-consuming countries, coffee choices reflect regional, cultural and generational tastes.

The North American market is not only home to well-known brands such as Folgers and Millstone, but it has also pioneered the specialty coffee scene. A range of innovative products come from the United States, including high-end soluble coffees, cold-brew and nitro-coffee, and other kinds of ready-to-drink items.

Alongside these innovative coffee niche markets, there is a strong tradition of premium coffee products targeting a broader public. Well-established brands such as Peet's Coffee, Starbucks, Caribou Coffee, the Coffee Bean and Tea Leaf, McDonalds, Dunkin Donuts and Tim Hortons are the main providers of these premium products.

Annual growth of the North American market has averaged around 2% in recent years, led by the specialized and premium quality sections. However, the COVID-19 pandemic has caused demand in the United States to shrink.

117. Mexico is also in North America, but accurate coffee data are not available.

118. National Coffee Association, trade sources.

According to the US National Coffee Association, about 53% of coffee drinkers want to consume coffee that is good for both the environment and the people who produce it. The association also notes that most coffee preparation takes place at home, while consumption outside the home declines. The assumption is that this trend to continue because of the COVID-19 pandemic.

Another interesting fact is that coffee is grown in the United States. Coffee is one of Hawaii's top agricultural products and is well known for its excellent quality. California has also started to grow coffee, and initial quality assessments look promising.

Table 14: Most US coffee imports are standard quality (million bags)

ALL COFFEE IMPORTS IN 2019	Category	Total bags	Arabica washed	Arabica nat-ural	ARABICA OTHERS	Robustas
World						
16%	Specialty	4.4	4.0	0.3	0.1	0.0
22%	Premium	5.9	3.7	1.5	0.4	0.1
61%	Standard	16.4	7.6	4.5	0.6	4.1
100%	Total	26.7	15.3	6.3	1.0	4.3

Note: Numbers may not sum due to rounding.

Source: ITC estimates.

The United States imports about 86% of its coffee as green coffee. The remainder is divided equally between roasted coffee and soluble coffee.

About 70% of all US green coffee imports come from five producing countries: Brazil, Colombia, Viet Nam, Mexico and Honduras.

The United States also exports green coffee (from Hawaii), roasted coffee (about 1.1 million bags) and some soluble coffee (about 500,000 bags).¹¹⁹

■ Asia and Australasia

Coffee consumption in Asia and Australia has been growing steadily and some markets have a well-established international reputation. Japan, Republic of Korea, Australia and New Zealand are among the most prominent examples, with developed markets and consistent growth.

Other countries are becoming coffee consumers: India, Indonesia, Malaysia, Viet Nam and China are drinking more and more of the beverage, partly due to higher disposable incomes.

Japan consumed almost no coffee 70 years ago. But starting in 1950, a growing number of Japanese began to drink coffee, and the country is now the largest coffee-consuming market in Asia. Japan imports more than 8 million bags of green coffee yearly covering all quality segments, from standard to premium and specialized (green, soluble and decaf).

More than half of Japan's green coffee comes from Brazil (31%, 2.3 million bags) and Viet Nam (22%, 1.6 million bags). Other top exporters to Japan are Colombia, Guatemala, Indonesia, Ethiopia, United Republic of Tanzania, El Salvador and Nicaragua.

Coffee consumption is evenly spread across the four main consumption channels: 22% of roasted coffee is consumed in shops, 22% is drunk at home, 25% is drunk as canned (ready-to-drink) coffee and about 31% is soluble coffee. Canned coffee is a popular choice across the Japanese market. The most famous brands of canned coffee are Coca Cola (27% market share), Suntory (22% market share) and Asahi (11%).¹²⁰

The Republic of Korea, Australia, New Zealand and Singapore are other prominent examples of established coffee markets in the region.

Meanwhile, younger markets such as China are quickly gaining traction. China produces Arabica coffee and its principal growing area is in Yunnan Province. Most Chinese coffee is either consumed locally or exported to Europe and the United States.

¹¹⁹ ICO, trade sources.

¹²⁰ Coffee Market in Japan, Wataru & Co., 2017.

Nestlé has a firmly established presence in China, where its Nescafé ready-to-serve soluble coffee mixes are popular. Major cities, especially along the Chinese coast, have also discovered specialty coffee, which is proving successful. This trend has been well supported by multinational coffee shop chains. Starbucks, for example, has adopted an aggressive growth strategy in China, opening new shops almost on a weekly basis.

India, Indonesia, Viet Nam and Malaysia are also becoming more attractive markets for coffee consumption. With more disposable income at hand, the quality of the coffee consumed also improves. For most new coffee-drinking nations, soluble coffee is the first stepping stone on the journey to developing national coffee consumption.

Market consolidation

Consolidation has been taking place at the consumer end of the value chain for the last 20 years in the trade, roasting, supermarket and coffee shop sectors. This is part of a strategy to establish a presence in all quality segments of coffee. It is a trend that benefits the top end of the value chain (coffee industry) and to place additional strain on the bottom end (producers).

According to *Coffee Barometer 2018*, 'Billions are spent on countless acquisitions and mergers, positioning famous coffee brands in new markets. As the global coffee industry consolidates, it cuts cost to optimize profits, which causes additional downward pressure in the value chain which is increasingly felt by the producers at the farm level.'¹²¹

■ Mergers and acquisitions

Some major roasters are investing in specialty businesses to expand their specialty offer. On the flip side, they are experiencing a general decline in instant coffee (with the exception of 3-in-1 coffee mixes).

The 10 biggest roasters control more than 35% of all coffee sales. Nestlé and JAB Holding have been investing, entering new markets and acquiring knowledge across the sector, buying into well-established and well-known specialty brands. This suggests that the specialty segment of the market is likely to continue to expand.

Nestlé, for example, has acquired high-end coffee shop chains such as Blue Bottle and Chameleon Cold Brew – enabling it to increase its visibility in the specialty and premium market segments. It has also signed a license agreement with Starbucks, managing Starbucks sales at the more mainstream retail level.

JAB Holding Company brings together famous international brands such as DE Master Blenders, Mondelez Coffee (Jacobs, Tassimo, Gevalia), Keurig Green Mountain and Peet's Coffee, to name a few. JAB has also bought smaller, more specialty brands such as Intelligentsia and Stumptown Coffee Roasters.

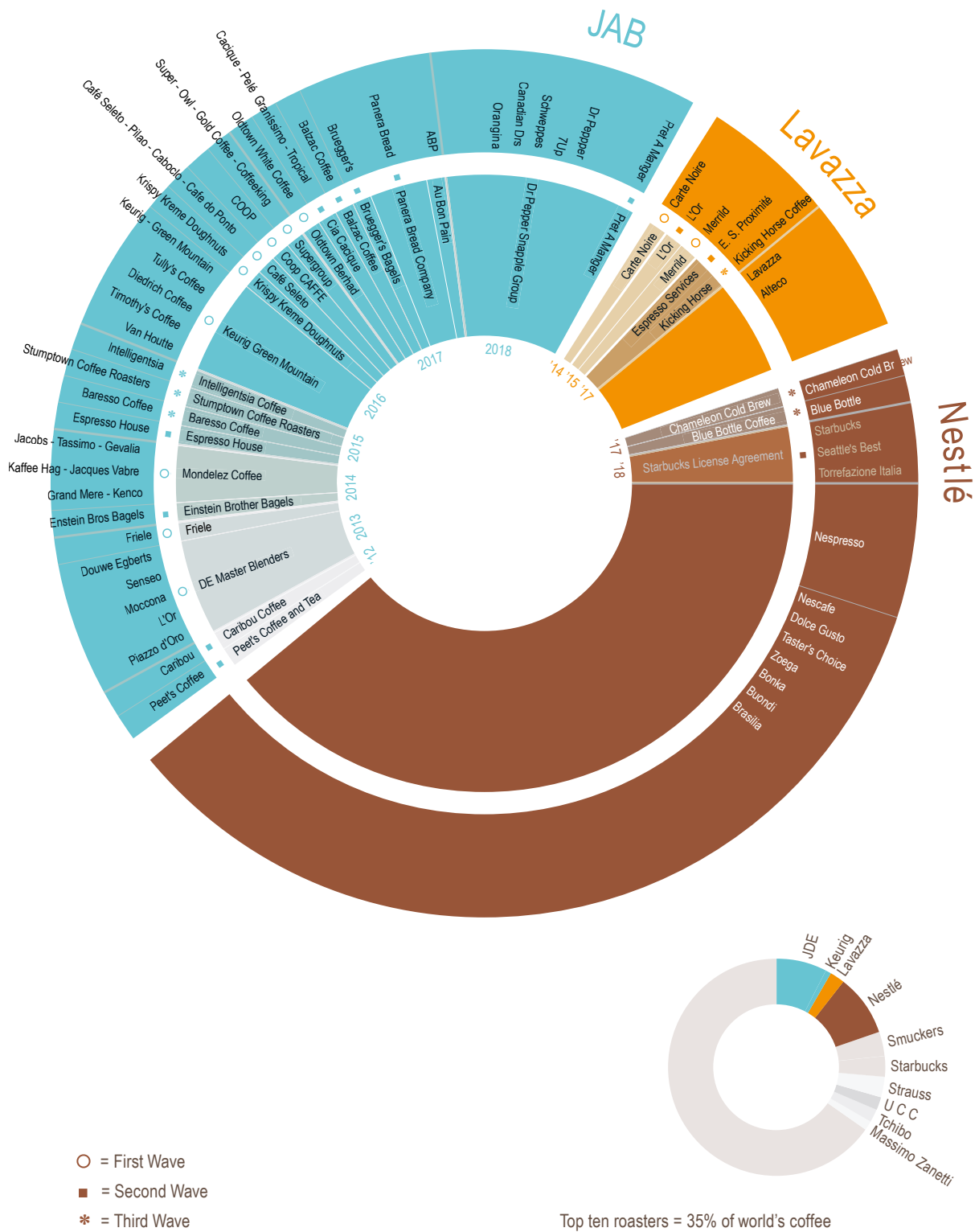
Lavazza has diversified its traditional quality brand by purchasing high-end or niche brands such as Carte Noire, Merrild and third-wave coffee brands such as Kicking Horse.

Another significant acquisition in late 2018 to early 2019 was the purchase of Costa Coffee by the Coca-Cola Company. Through this transaction, Coca-Cola took charge of one of the world's largest coffee chains.

Joint ventures and cooperative arrangements are becoming increasingly common in the coffee industry, as multinationals try to consolidate their market coverage of all three quality segments.

121. Panhuysen, S., and Pierrot, J. (2018). *Coffee Barometer 2018*.

Figure 13: Top 10 roasters control 35% of global coffee market



Source: Panhuysen, S., and Pierrot, J. (2018). *Coffee Barometer 2018*, adapted by ITC.

▪ **New marketing channels for established brands**

Another way for established coffee brands and multinationals to extend consumer reach across the market segments is by diversifying products and marketing strategies.

One coffee product segment that has enjoyed considerable growth in recent years is coffee capsules such as Nespresso, Nestlé’s Dolce Gusto and pods such as Lavazza’s Senseo line. These products have a loyal customer base and combine convenience with a modern lifestyle.

The popularity of single-serve options can be attributed to a cleaner, easier, quicker way of preparing coffee at home with professional-looking results. Marketing strategies focus on making this a convenient but glamorous way of preparing coffee, bringing the coffee shop experience into the home. It is marketed as a luxury or high-end product and prices – while ranging widely across brands – reflect that.

Another notable trend is established brands tapping into the specialty segment by promoting experience-based retail. In 2014, Starbucks launched Starbucks Reserve, a very high-end coffee experience combining a state-of-the-art coffee bar with an open roastery and a shop. Other similar hotspots of specialty coffee degustation are concentrated in major cities such as Seattle, Washington, New York, Tokyo, Shanghai and Milan, and contribute to the cultivation of the specialty coffee culture.

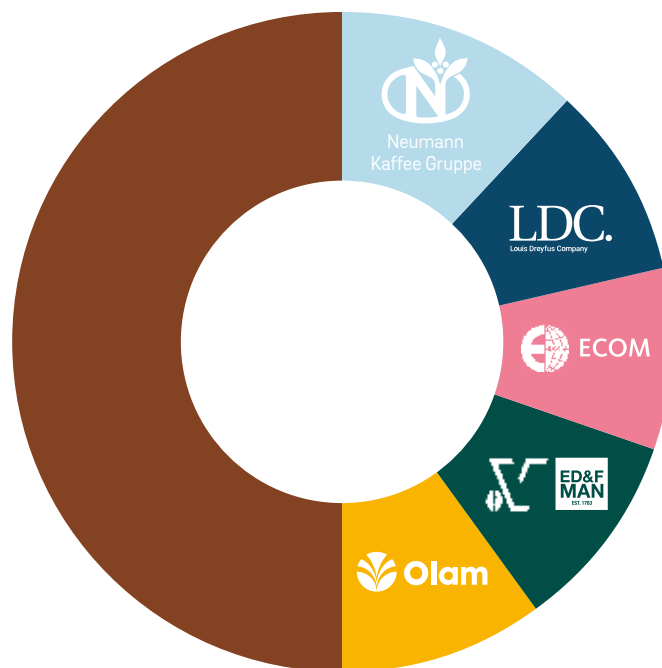
Linking production and consumption

The way green beans are traded and marketed to roasters has evolved considerably in the past 10 years. New traders and importers have taken up activities in all three market segments.

New ways of trading are also emerging, such as direct trade and transparent pricing, which reflect a global movement towards a fairer, more sustainable value chain. In the same way that green coffee importers have set up operations at origin, some exporters in producing countries have begun opening their own importing and trading hubs at destination.

Multinational trading and exporting companies have started to follow a clear ‘make or buy’ strategy. They either acquire existing specialty-focused companies such as Atlas Coffee Importers (by Neumann Kaffee Gruppe), Mercanta (ECOM) and Schluter (Olam), and/or they build their own specialty divisions to cover that market segment. Examples of this include Interamerican Coffee (Neumann Kaffee Gruppe), Olam Specialty, 32cup (now Sucafina Specialty) and Volcafe Specialty – to mention a few.

Figure 14: Five biggest coffee traders control half of the market



Source: Coffee Barometer 2020.

Meanwhile, more established coffee merchants are focusing on premium coffee quality. List + Beisler, DR Wakefields and EFICO are among the few privately held importing companies that do not belong to a multinational. Other younger coffee traders, such as Nordic Approach, have also been able to define their own market segment and are adding value to the coffee value chain.

Supply, demand and pricing

Basic economic theory explains that price is based on the relationship between supply and demand. In a competitive market, the price varies until it settles at a point where the seller's offer and the buyer's bid meet in equilibrium for price and quantity. The coffee futures markets, explained in detail in Chapter 6, are an excellent example of this theory.

In reality, the situation is more complex. There is no single coffee price, because coffee is a complex natural product full of variation and differentiation. Overriding these complexities, the most common prices for coffee can be distinguished as:

- Price for green or physical coffee
 - Outright price
 - Futures price and differentials
- Price for futures of coffee
- Indicator prices

Price for green or physical coffee

Prices for green coffee fluctuate daily in line with supply and demand. The quality and availability of a particular coffee at a determined point in time are the main drivers of negotiations around the price. Other factors that influence the price are climatic disruptions, market expectations, speculative actions and changes in currencies.

The green coffee price can be fixed (outright price) or unfixed (price to be fixed later). In the latter case, customer and supplier first agree on a price differential – a price difference between the futures market price and the price for specific coffee quality. The differential considers the physical availability of a particular quality, terms and conditions on which it is offered for sale, currency conversion rates to US dollars, etc. Differentials can be extremely volatile, and no mechanisms are in place to offset the differential risk.

Once the price is fixed, the differential is added to the futures coffee price of that specific moment in time for a final (and then also finally fixed) price.

Box 3: Coffee auctions

This is a sales platform that dominates the marketplace in some countries, where regional auctions or sales are held daily or weekly to attract the best prices. Countries such as Brazil, Ethiopia, Kenya and the United Republic of Tanzania commercialize a portion of their coffees either through an auction or a national commodity exchange.

Industry experts say this is the best price discovery mechanism, as buyers from around the globe are represented by their local agents or exporters and auctions depend heavily on supply and demand on the day of sale.

It is not a perfect system, however, and is typically said to be lacking transparency and traceability. Coffee farmers view auctions with suspicion and often accuse the system of falling victim to cartels and price collusion.

Some specialty auctions have been established to showcase coffees to the world. Examples include the Cup of Excellence and Best of Panama.

Although these events attract serious buyers and coffee can sell for extremely high prices, the point of such auctions is to sell very small amounts of high-quality coffee for the purpose of promoting and marketing a particular single-estate/cooperative coffee or a single-origin coffee.

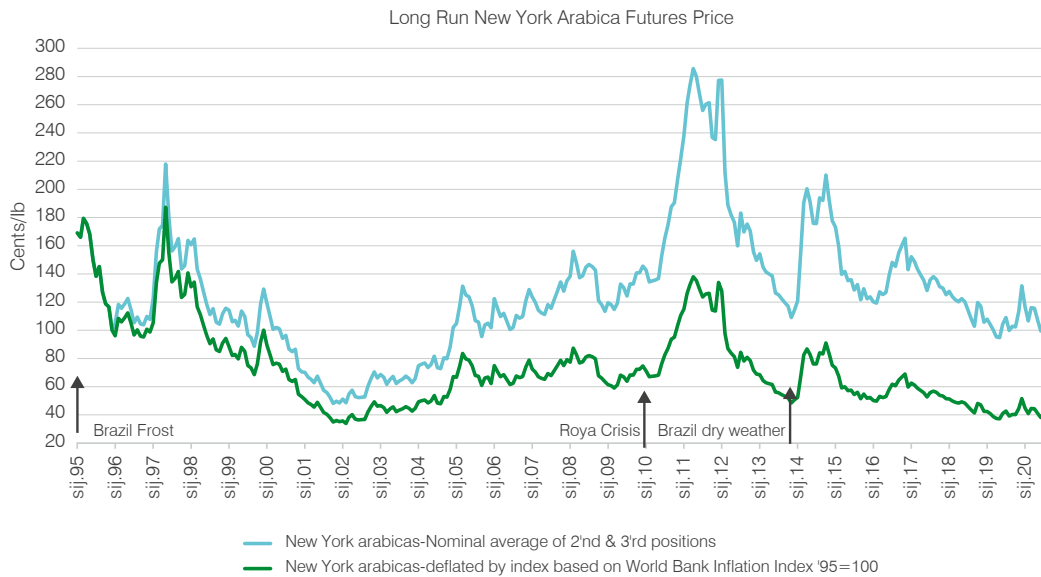
Source: International Trade Centre.

Price for futures of coffee

The coffee futures markets in New York (for Arabica coffees) and London (for Robusta coffees) project the future prices for standardized coffee qualities. This is a classic method for pricing commodities.

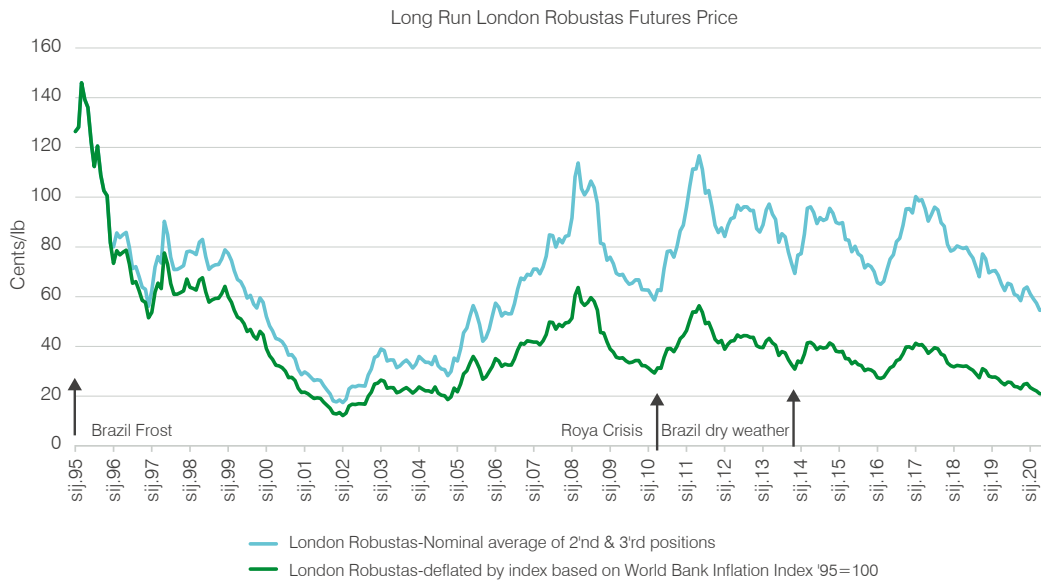
The prices reflect the estimated availability and demand of coffee of the Arabica (commodity code KC at www.theice.com) or Robusta (commodity code RM at www.theice.com) type.

Figure 15: New York Arabica futures prices remain volatile



Source: ITC.

Figure 16: London Robusta futures price fluctuated



Source: ITC.

Indicator prices

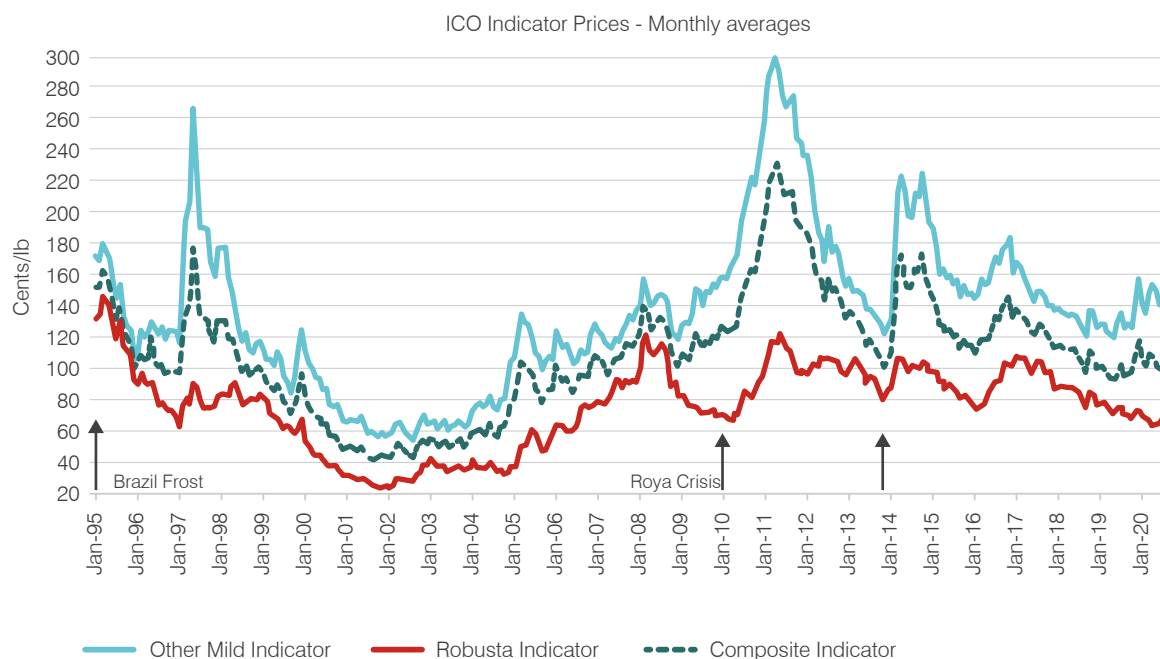
For research purposes and to get a better overview of the worldwide price development for coffee, different organizations have established their own price indicators. International Coffee Organization indicator prices, published daily by ICO in London, represent and track prices of four main types of coffee qualities:

- Colombian mild Arabicas (washed Arabica from Colombia and countries with a similar cupping profile);
- Other mild Arabicas (washed Arabica coffee, mainly from Central America);
- Brazilian and other natural Arabicas;
- Robustas.

These indicator prices are for coffees that have arrived in the consuming countries and are immediately available. As well as the pricing of these four broad categories, ICO has agreed on a widely accepted formula of combining the four categories' prices into a single price representing all coffee qualities. Published daily, it represents a worldwide amalgamated price indication for coffee.

This and other historical price information is freely available at www.ico.org.

Figure 17: ICO's monthly adjusted prices



Source: ICO.

Emerging trends, shifting dynamics

From commodity to product: More qualities for more consumers

Coffee consumption has grown steadily over the last 30 years and the habits of coffee drinkers have changed dramatically. Coffee has shifted from a simple commodity to a movement. Although coffee is still traded on commodity markets, marketing has raised consumer awareness of not just coffee quality, but also its origin, type and flavour profile as well as the social and environmental conditions under which it is produced. This has been driven in part by the third-wave movement and its focus on quality differentiation showcasing origin.

This is not new. Coffee is being traded more as a product and less as a commodity – at least for the premium and specialized quality segments. Differentiation of coffee qualities and recognition of coffee value at the green coffee stage could benefit producer countries and redistribute profit more equitably along the value chain.

Historically, quality differentiation was largely between the standard and specialty market segments. The emergence of the premium market segment in recent years is something in between. Good quality, a clear focus on origin and accessible prices for the average consumer mean higher qualities are more accessible to traditional consumer groups as well as non-traditional markets.

The third wave has been successful and very popular among millennials. What has been less successful is achievement of its social and environmental objectives at scale, as the third wave leverages specialty coffee to target a niche market that usually appeals to consumers with disposable incomes.

This elite consumer group represents a small percentage of global consumption, achieving impact at scale through the third wave is difficult. Transferring specialty market social and environmental objectives to the premium segment could help achieve social and environmental results on a larger scale.

Multinationals such as Nestlé, Nespresso, Jacobs Douwe Egberts, Peet's and Lavazza are increasingly tapping into higher quality, even specialty markets, through mergers and acquisitions, while investing more in the social and environmental sustainability of their coffee. Awareness-raising and consumer education campaigns on coffee quality and sustainability accompany this strategy, creating a market willing to spend more on better products.

This development of the premium quality segment merges the second-wave focus on commercialization and accessibility with third-wave priorities of superior quality and sustainability.

While this movement is gaining momentum, it presents risks. If the premium market becomes mainstream and profitable, it will be difficult to ensure true sustainability and benefit at origin. Production at scale inevitably leads to cost cutting, which pushes down prices. The most vulnerable and least resilient value chain link – the producer – always benefits the least and suffers the most.

Recognizing coffee as a high-value product from the green coffee stage, rather than a low-value commodity, could bring considerable benefits to coffee producers. While de-commoditization of coffee has progressively taken place among consumers in the last 20 years, trends point to quality differentiation from production level.

As the coffee industry is increasingly held accountable for sustainable and fair practices, coffee actors are seeking a middle ground to make quality as accessible as possible, and with the highest sustainability impact possible. The goal is to achieve quality consistency and production efficiency that is economically viable for all, from producer to consumer.

Consumer power

Climate change, the price of coffee and policymaking in the sector will invariably shape the future of coffee. Practices at producer and buyer level will also influence what is to come. Another power to reckon with is that of coffee consumers, which has been steadily growing, along with the rise of social media, globalization and the digital age.

Coffee, like any business, has always been about supply and demand and catering to consumer preferences. In the past, however, it responded to the demand of an established majority. Today, the individual consumer wields more power than ever, with open access to information and multiple platforms to voice preferences and concerns.

This holds the industry more accountable for its practices than ever before. It compels coffee suppliers from across the chain to respond to trends quickly and creatively. Coffee has become an extremely competitive arena.

Emerging countries in coffee influence dynamics

The global coffee market has grown in size by more than 60% over the past two decades. At the same time, the global base for coffee demand has significantly broadened beyond mature markets such as the EU, the United States and Japan.

Domestic consumption in coffee-exporting countries is rising while emerging markets that often were traditionally tea-consuming countries have developed a stronger taste for coffee, providing new market opportunities for coffee producers.

The recent rise of coffee consumption in South-East Asia could affect global market dynamics in the coffee sector. The coffee markets in China, India, Indonesia, Philippines, the Republic of Korea, Chinese Taipei and Viet Nam in particular are growing rapidly.

India, Indonesia, the Philippines and Viet Nam represent 95% of the coffee produced by ICO members in South and East Asia and are also becoming increasingly important coffee consumers. China, the Republic of Korea and Chinese Taipei are non-members and net importers of coffee.¹²²

Imports are also skyrocketing in the Middle East, where the younger generation is pushing a specialty coffee scene. According to ICO, Saudi Arabian coffee imports rose by 42.8% in 2008–2018. Imports jumped almost 193% in Turkey, while there was an incredible 249% increase in the United Arab Emirates.

Focusing on percentage growth could bias the view of overall consumption. The United States, for example, consumed 26 times more coffee than Saudi Arabia in 2008. Yet Saudi Arabia's growth is worth noting and explains the fledgling interest in the region. High spending power combined with low alcohol consumption in these countries make the perfect combination for the successful and rapid development of the coffee market.

Adding value at origin in more countries

Today, a lighter investment wave is emerging in producing countries: specialty roasteries are opening. They are ramping up in big, international cities, and also in smaller coffee towns in the interior of producing countries. Some farms are also roasting directly on-premises.

This adds value at source.

Roasteries and local coffee-shop chains are popping up in big cities in Brazil, Colombia, Ethiopia, Kenya and Rwanda and across Central America, to name a few examples. This phenomenon also can be observed in remote rural areas, as well as directly on coffee farms or the premises of producer associations.

Government policies can capture higher value in the coffee supply chain more systemically, by encouraging roasted coffee production in countries of origin. For example, some Ethiopian cooperatives now roast coffee locally on their premises and sell the roasted beans in local supermarkets and through other sales channels. They target local markets and the traditional consuming markets in Europe and North America.

Emerging (and reemerging) producers

While just a handful of countries dominate coffee production, sourcing coffee from emerging regions might be a way to satisfy future demand in a changing climate and meet rising expectations from the specialty market.

Emerging regions are countries that have been producing coffee for years and are expanding production areas or scope; those just beginning production; and those that resume production after years of inactivity due to war, disease or natural disaster.

Brazil, Colombia and Viet Nam produce most of the world's coffee,¹²³ together accounting for about 74% of total production. With climate change set to affect bean-belt countries,¹²⁴ there is a need to invest in new coffee-producing regions, as current producing countries may not be able to meet future demand.

These regions could play an important role in the specialty coffee industry as new markets increase their coffee consumption. For example, China has one of the largest populations in the world, and its coffee consumption rises every year. This could affect the specialty coffee supply-and-demand balance.

New coffee producers and exporters are tapping into the specialty coffee market. If buyers and roasters follow suit and invest in these areas, it could ensure a more sustainable future for the specialty coffee industry.

122. <http://www.ico.org/documents/cy2017-18/icc-122-6e-emerging-markets-south-and-east-asia.pdf>

123. <http://www.ico.org/prices/po-production.pdf>

124. <http://www.climateinstitute.org.au/coffee.html>

Asia, the Pacific region and Central and South America are among the areas where coffee producers are rapidly gaining interest from specialized coffee buyers, as well as from other segments.

Small-scale production, a lack of training in specialty coffee production, variable or substandard processing, infrastructure limitations, inefficient supply chains and a coffee trading status quo are among the challenges confronting producers. For producers in emerging and reemerging regions, however, these challenges may be opportunities.

These opportunities could be roaster/buyer-producer collaborations, communities drawing together for knowledge-sharing and training, and capacity building and professional development (Q-grading and Q-processing certifications). They can also include building a network of producers, traders and buyers with common goals for economic development, as well as improved coffee quality and livelihoods.

Value chain upgrades: Which way is up?

Upgrading international coffee value chains is key to country-level economic performance and to equitable, resilient supply chains. It has three dimensions: economic, social and environmental.

Economic upgrades aim to improve competitiveness. The idea is to innovate constantly to create niche markets and/or increase value added and profit margins. Upgrading charts a trajectory for countries, companies and farmer organizations to improve profits, meet complex market demands and, in some cases, move up the 'value chain ladder' towards more technologically sophisticated, skill-intensive operations.

Economic upgrades relevant to the coffee sector include process, product and functional upgrades. In the past two decades, social and environmental upgrades, driven by lead firms, have been central to meeting coffee roasters' market demands. These models trickled down from international traders to local value chain operators and, finally, to farmers in coffee-producing countries.

Process upgrading refers to a more efficient transformation of inputs into outputs, by reorganizing production systems or adopting better technologies. An example in coffee farming is to introduce more resilient, yield-boosting varieties.

Product upgrading creates more sophisticated goods with a higher unit value. Examples in coffee are improved farming and post-harvest processing activities that enable growers to tap into specialty and/or premium markets.

Costa Rica's ICAFE has upgraded into specialty coffee through several initiatives. ICAFE instituted a quality improvement agreement with coffee-producing regions to ensure that best practices were distributed to all stakeholders. It worked with the government in parallel to create minimum floors for coffee prices through the National Fund for Coffee Stabilization. This made it easier for Costa Rica to expand its capacity in sustainable, organic and single-origin product lines.¹²⁵

Functional upgrading is acquiring new functions that increase the skill and value content of value chain activities. For instance, coffee growing could shift into roasting, branding and retail marketing.

The Pachamama is a successful case of functional upgrade, as it has expanded into roasting and coffee shops outside the country of origin.

In summary, economic upgrades require investment to deepen existing and/or acquire new capabilities.

Social upgrading generally draws from the International Labour Organization's 'Better Work' framework. The aim is to improve practices that guarantee the safety and health of farmers and workers, and improve the socioeconomic rights and entitlements of farmers, workers and their family members. Examples are to pay equal or above minimum wage, guarantee children's right to education and implement child labour policies.

Environmental upgrading refers to processes whereby value chain operators modify production systems and practices to improve environmental outcomes.

However, farmers and small and medium-sized enterprises do not always see economic benefits. They often find themselves obliged to comply with sustainability requirements without investment support or financial gains from the investment.

At the same time, sustainability systems prove economically useful because they provide assurance, traceability, premium prices and plausible deniability of wrongdoing for buyers who must defend their products to consumers.

125. Daly, J., et al., *op. cit.*

New business models for trading coffee

Relationship coffee

Relationship coffee is central to the third-wave movement. The relationship between buyer and producer at the core of the coffee business. The intention is to break down silos along the supply chain and build a meaningful relationship based on trust and collaboration. It should generate better coffee quality for the buyer, increased social and economic benefits for the producer, and a smoother transaction overall. It helps lower the chances of contractual default and/or lack of delivery on product, payment and quality.

Relationship coffee also enables better transparency, direct access to information and new markets, and opportunities to collaborate on quality, productivity and research. For example, some roasters develop recipes for fermentation to share with producers from whom they buy. They are also investing more in technical assistance for farmers, as well as better equipment and facilities to both improve the quality of the coffee they buy and the returns of the producers. Relationship coffee is at the core of direct trade, which is described below.

Contract farming

Contract farming is a model where long-term contracts are in place for farmers to produce fixed volumes at a price that is predetermined or periodically reviewed or set. This requires a direct relationship between the buyer and seller, with contract terms that cover volumes, quality and frequency of delivery. This type of arrangement is typically for larger volumes – that is, container loads of consistent quality replicated year after year – rather than highly differentiated, small-lot coffees.

For many, contract farming has a negative connotation. It can be an exploitative set-up for farmers, who find themselves forced to sell their coffee at unsustainably low prices for many years. There are associated issues of exporters providing high-interest loans to farmers through this scheme, further pushing farmers into a cycle of poverty.

E-commerce platforms

In recent years, e-commerce has become mainstream. This avenue offers growers more direct contact with both roasters and consumers. Green coffee is marketed through industry sites such as Cropster (www.cropster.com) and Algrano (www.algrano.com). Farmers can offer coffee for shipment from origin just as easily as importing companies can post their inventory for sale.

The most popular major e-commerce platforms, including Amazon and eBay, can be an option for roasted coffee. Online grocery shopping sites also provide a marketplace for roasted coffee. With more and more business conducted online, there is a good argument for producers to have their own website, which gives them control over the content and intellectual property as well as direct contact with their buyers.

Box 4: Direct trade

The term 'direct trade' has no single definition. It is often used when buyers are in direct contact with the source of their product. It is a trade model and concept central to the third-wave movement. However, it has been far less successful in implementation at scale than initially predicted.

The direct trade model has developed slowly because, to work smoothly, it requires a great deal of input, a solid infrastructure and a high level of know-how and business skills – all of which are often lacking, as farmers and roasters are typically unfamiliar with the requirements and realities of international trading and logistics. Direct trade is often unnecessarily expensive and inefficient because many small producers and roasters do not have the resources or knowledge to manage international requirements.

From an economy-of-scale perspective, the small volumes involved per farmer/farmer group or roaster often necessitate some involvement of exporters and importers at both ends of the chain.

Source: International Trade Centre.

Online auctions (see Chapter 4) are gradually becoming more popular. The typical format involves a competition in a producing country. Farmers submit small lots of their best coffee that are graded and ranked by juries of coffee tasters – both local and international. The very best coffees are sold at auction and generally attract very high prices, especially the winning lot. Most auctions display the price paid for the coffee online, allowing full traceability behind the whole process.

The most famous online auction is the Cup of Excellence. It brings together buyers from all over the world and connects them with coffee farmers who have qualified with their superb coffees to compete in a national competition. The top lots of the national competition are offered in the Cup of Excellence auction. Lots that fail to qualify for the Cup of Excellence are still up for auction on the National Winners programme.

South-South trade

Partners in the Global South are trading with one another more than at any other time in history.¹²⁶ South-South trade grew from \$2.6 trillion in 2007 to about \$4 trillion in 2018,¹²⁷ representing roughly 52% of developing country exports in 2018 and 28% of total world trade in 2017.¹²⁸

Foreign direct investment flows into Southern economies have grown steadily over the last three decades. In 2018, China, India, Singapore, Kenya and South Africa were among the top 10 foreign investors in Africa by number of new projects.¹²⁹ Investment flows to Africa rose to \$46 billion in 2018, an increase of 11% compared to the previous year.

By 2025, firms from the South will generate a third of global foreign direct investment outflows – particularly those to the manufacturing and service sectors of other Southern countries. Southern value chains provide opportunities with lower barriers for market entry. Whether South-South trade presents higher income elasticities than South-North trade is still to be determined. South-South value chains certainly make it easier for enterprises to move up the value chain, increasing their competitiveness.

DRIVING SOUTH-SOUTH COFFEE TRADE RELATIONSHIPS

South-South trade can be an alternative source of growth, especially if South-North income and import growth differentials persist.

As coffee consumption rises in coffee-producing countries, so does demand. When demand (both external and internal) outweighs production, countries have no choice but to start importing what they lack. Typically, producer countries export their higher-quality (or higher-value) coffees and to import standard grade coffees when necessary. They are often, but not always, value-added and soluble.

This is either due to rising incomes and coffee demand, or production issues. In Mexico, for example, coffee rust disease decimated production in 2015–2016. Federal and state governments and the private sector made significant efforts to recover production, but the country still relies heavily on imports, with 1.9 million 60kg bags forecast for 2020–2021, as domestic production alone cannot satisfy increased demand.¹³⁰

Colombia, Indonesia, Mexico, the Philippines and Thailand are among producer countries that import fairly large volumes of coffee. Until recently, a growing number of coffee outlets in urban areas of Indonesia that catered to an expanding cafe lifestyle drove coffee consumption. This growing demand, combined with production issues, led the country to import usually standard grade (Robusta) coffee from other countries.

However, the severe impact of the COVID-19 pandemic on the Indonesian economy is expected to shrink coffee consumption. The US Department of Agriculture predicts that consumption in Indonesia will decline by 600,000 bags to 4.3 million bags in 2020/21.¹³¹

126. Horner, Rory (2016). 'A New Economic Geography of Trade and Development? Governing South-South Trade, Value Chains and Production Networks.' *Territory, Politics, Governance*, vol. 4, No. 4, pp. 400–420. Available at <https://doi.org/10.1080/21622671.2015.1073614>.

127. World Trade Organization (2019). *World Trade Statistical Review 2019*. Available at https://www.wto.org/english/res_e/status_e/wts2019_e/wts2019_e.pdf.

128. United Nations Conference on Trade and Development (2018). *World Investment Report 2018: Investment and New Industrial Policies*. Geneva: United Nations.

129. United Nations Conference on Trade and Development (2018). *Forging a Path Beyond Borders: The Global South*. UNCTAD/OSG/2018/1. Geneva: United Nations.

130. US Department of Agriculture, 2020, *Coffee Annual Report (Mexico)*.

131. US Department of Agriculture, 2020, *Coffee Annual Report (Indonesia)*.

More South-South trade will bring more balance to global coffee trade dynamics. This will be achieved primarily by promoting consumption in producing countries, supported by enabling government policies and initiatives.

Table 15: Viet Nam, Brazil, Peru ship coffee to nearby countries (2019)

FROM - TO	Volume (60 kg bags)	Type of coffee
Viet Nam to India	719 081	Green Robusta
Viet Nam to Indonesia	13 815	Soluble
Viet Nam to Philippines	559 850	Soluble
Brazil to Mexico	796 500	Green Robusta
Peru to Colombia	181 000	Green Arabica
Brazil to Colombia	274 620	Green Arabica

Source: International Coffee Organization (2019).

THE AFRICAN CONTINENTAL FREE TRADE AREA

While still in its infancy, the African Continental Free Trade Area (AfCFTA) could advance intra-African coffee trade in coming years.

The AfCFTA can facilitate the development of Made in Africa coffee that can be used to meet domestic and continental demand, as well as to be traded across global markets.

The start of trade under the AfCFTA on 1 January 2021 marked a milestone shift for African and global trade dynamics. The agreement will eliminate tariffs on 90% of goods traded on the continent and address non-tariff barriers.

Its single market of more than 1.3 billion people is expected to boost intra-African trade, spur economic diversification and reduce poverty, while increasing the appeal of direct investment in Africa.

Intra-African trade historically has been low. In 2019, only 12% of Africa's \$560 billion worth of imports came from the continent. African countries have been trapped in the lower levels of the global economy by selling low-value raw materials and buying higher-value manufactured goods, including coffee.

The AfCFTA addresses this issue by stimulating 'production through the development of regional value chains, to ensure that manufacturing, agroprocessing and other activities across the continent are stimulated to supply the market'.¹³² Doing so is expected to boost industrialization and productive capacity, allowing greater value addition in the continent and the development of 'Made in Africa' goods.

This offers an opportunity to stimulate intra-African trade, by reducing dependence on foreign products, improving competitiveness and better positioning African countries in global value chains.

By creating a framework to support agribusinesses, the AfCFTA offers benefits for the coffee sector. The agreement's focus on regional agricultural value chains provides pathways to enhance agroprocessing, thereby fostering opportunities to add value to agrifood exports such as coffee.

To achieve this, African countries should provide complementary policies to enhance productive capacities, promote investment, and develop policies to address challenges such as infrastructure deficits.

132. <https://au.int/sw/articles/operational-phase-african-continental-free-trade-area-launched>

New trends in coffee products

Eco-friendly single-use pods

There are three main types of 'eco' pods: those of aluminium that need emptying before recycling; reusable stainless steel, which people fill with freshly ground fine coffee themselves; or compostable.

Most compostable pods need to be commercially composted rather than directly thrown into nature before they break down into nutrient-rich soil. Some brands offer that service as part of their after-sales strategy.

Large businesses including Bosch Tassimo, Illy, Keurig, Lavazza, Nespresso and Nestlé and a bevy of smaller companies such as Halo Coffee and Origin Coffee offer this product.

A 'specialty' makeover for instant coffee

Instant coffee is making a comeback. Traditionally perceived as a money-saving solution, common grocery store-type instant coffees are often made from cheap coffee beans using highly industrialized processes.

Specialty roasters and coffee brands are now making instant coffees from high-quality Arabica beans that are carefully processed, stylishly packaged and truly taste good. This has enormous appeal for the new generation of specialty coffee drinkers as it combines convenience, quality and a trendy look.

Specialty soluble coffee is enjoying particular success in China, where its popularity is set to soar.

Examples of successful brands offering this product include start-ups Sudden Coffee, Voila Coffee and Swift Cup Coffee. Even Starbucks offers a better-than-usual quality instant coffee.

Ready-to-drink sees steady growth

■ **Nitro coffee**

Nitro coffee has become quite popular lately. It can be found in supermarkets and gas stations and on the menu boards at local cafes and major chains. This trend shows no sign of slowing down.

Nitro coffee is cold-brew coffee infused with nitrogen gas through a pressurized valve. It became popular in third-wave coffee shops before appearing in Starbucks' Seattle Reserve Roastery in 2016, where it enjoyed solid success.

Cold brewing increases sweetness while reducing acidity, and adding nitrogen gives nitro coffee its signature velvety texture.

Nitro coffee is expensive. It is cold, thick and slightly sweet, yet contains no dairy or sugar. This is the winning combination that convinces so many coffee drinkers to spend more than usual for a cup.

Brands that offer popular nitro coffee choices include La Colombe, Chameleon Cold Brew, Rise Brewing and High Brew.

■ **Sparkling coffee or 'espressoda'**

Similar to nitro cold-brew coffee, sparkling coffee is frothy and refreshing, with the advantage that it can be made easily at home without a fancy nitrogen infusion machine. It is a version of iced coffee, made with carbonated water instead of plain water, a drizzle of vanilla for sweetness, and no milk or creamer.

While sparkling coffee is not a new trend and has been fashionable for a few years already, its popularity is expected to continue growing in coming years.

Illy, Stumptown and Vivic are among the brands that successfully sell this product.

■ **Vegan, plant-based milk options**

Lactose intolerance – a common condition – makes dairy alternatives appealing even beyond the ethical consumption and special diet niches. Brands are increasingly offering vegan, plant-based options to cater to this demand.

In an effort to keep up with growing consumer demand and to boost its sustainability efforts, Starbucks has been steadily adding vegan options to its menus, including its ready-to-drink products. It now offers bottled Frappuccinos made with almond milk.

While almond, soy and coconut milks have been popular alternatives so far, they taste and behave differently than dairy. Brands are stepping in to offer new innovations in the way of premade lattes, coffee creamers and other vegan-friendly caffeine vehicles.

Oatly is one such a brand; it rapidly rose to prominence thanks to its popularity with baristas and their customers. Modern Times has a line of canned cold brew sold in grocery stores and elsewhere. La Colombe sells its famous canned draft lattes, including options made with coconut or oat milk. RISE Brewing, too, sells canned oat milk lattes in a variety of flavors, as does Austin brand Chameleon Cold Brew.

■ **Coffee-cola drinks**

With Coca-Cola's recent acquisition of Costa Coffee, coffee-cola drinks are set to take the ready-to-drink market by storm. Coca-Cola® With Coffee hit ready-to-drink coffee aisles nationwide in January 2021.

■ **'Hard' coffee (with alcohol)**

The global ready-to-drink coffee categories are expanding, and within that, brands are launching alcoholic takes on cold brew, lattes and more. Malt-based cocktails are having a resurgence and spirits-based ready-to-drink beverages are bringing a craft edge to the space.

Many brands are tapping into the popularity of cold-brew coffee with an alcohol-infused twist. Hard coffee falls into two camps: cold-brew hard coffee and creamy hard coffee. These ready-to-drink beverages offer caffeine plus alcohol, a popular combination that attracts significant demand.

Coffee tries its hand at tea

■ **Cascara**

Cascara, also known as coffee cherry tea, has been around for a few years and is still steadily growing in popularity. From Starbucks to Shake Shack, cascara has been popping up on menus everywhere, including at specialty coffee shops and teahouses.

For generations, farmers traditionally discarded cascara for compost or dumped it in waterways after a collection process called strip picking, when coffee cherries – ripe, overripe and underripe – are taken off all at once.

Today, cascara is dried before being packed up and shipped to other countries, where it is transformed into other products. Businesses have begun to see cascara as a way to reduce waste and contribute to a more sustainable industry in a profitable way.

The Coffee Cherry Co. is known for its coffee flour, created by taking the coffee fruit and making it into a powder that can be stirred into beverages. It offers chopped cascara, as well as course and fine grinds. Caskai is known for its sparkling cascara drink and Slingshot Coffee Co. began bottling cascara tea in 2013, before many companies even knew that the coffee cherry could be used at a commercial level.

■ **Coffee leaves**

When a coffee plant is trimmed or pruned, its leaves often go to waste. In some parts of the world, however, they are picked and brewed to prepare coffee leaf tea.

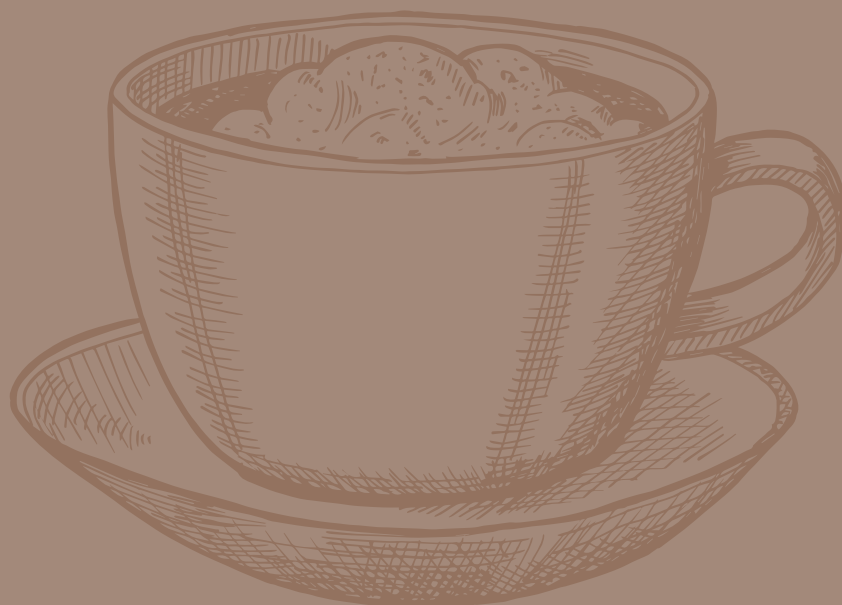
This offers producers a way to diversify their farming income. For coffee shops, it could be a way to 'bridge the gap' between the worlds of coffee and tea.

Wize Monkey is the only branded coffee leaf tea in the Western market, apart from a few Ethiopian imports. Market success seems to rest on building customer awareness and expanding distribution.

CHAPTER 4

DIGITAL TRANSFORMATION

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DIGITAL TRANSFORMATION

Coffee played an important role in the development of the modern information age by fuelling the late-night sessions of programmers and software developers. Tributes to the influence of coffee are paid in such tech names as Java, JavaScript and CoffeeScript.

Now, tech is repaying the favour by helping farmers, producers, traders and coffee drinkers to create better coffee, from seed to cup. Digital technology also enables players across the coffee supply chain to work more efficiently, reach new markets and function more equitably and sustainably.

Digital technology bolsters the competitiveness of the coffee sector as a whole. Digitalization enhances the three Ts of transparency, traceability and trust across the supply chain. It opens up new funding opportunities, such as impact investment, which seeks social or environmental gains as well as profits. Moreover, sustainable digitalization has become a priority of public policy as reflected, for example, in the European Green Deal.

The large volumes of data being generated by the agricultural sector, including coffee, present opportunities for Big Data. This is causing a shift in the sector. The insights acquired from mining the mountains of available data make it easier to tackle even the inherent uncertainties in the coffee sector.

Opportunities bring risks, however. While digitalization offers the promise of greater accessibility, it also widens inequalities. This risk is especially high in the coffee sector, where inequalities along the supply chain are already substantial and the poorer players often lack the resources to take full advantage of the opportunities on offer.

That said, digitalization also presents a promising pathway to greater fairness, sustainability and durability. For that to happen, policymakers, donors and investors must be aware of opportunities and risks. They must invest in structural reforms, infrastructure and capacity building.

DIGITILIZATION ACROSS THE COFFEE SECTOR



SOLUTIONS

- Agronomy: Soil analysis
- Satellite technology for 'precision agriculture'
- Tools for harvesting & growing
- Software gathering key data for better group management and bargaining power

Farm & Farmer Group Management

Logistics



SOLUTIONS

- Digital platforms for shipping and paperwork
- Digital platforms for shipping
- Radio frequency identification for warehouse management



Market Information



SOLUTIONS

- Blockchain technology for transparency and traceability

Online Marketplace



SOLUTIONS

- Direct sales
- Online market places
- Online auctions

Roasting, brewing and cupping

Financial Services



SOLUTIONS

- Digital banking
- Mobile banking

SOLUTIONS



- Roasting, brewing and cupping technologies and apps

Source: ITC.

The promise of high-tech farming

Even in the twenty-first century, agriculture enjoys a rustic image. People associate farming with age-old, ageless tradition and with being close to nature.

However, science and technology have changed the face of modern farming, boosting yields and reducing waste – and the coffee sector is no exception.

New technologies help farmers to grow better coffee, and to adapt to global warming challenges and other environmental problems. They provide farmers with tools to make a sustainable living, on the environmental, social, economic and generational levels. They help farmers forge a more direct connection with buyers and consumers.

A growing spectrum of tools, technologies and platforms is available to farmers today. However, many remain too costly for smallholder farmers or those operating in poorer countries.

Cooperative mechanisms to share technology costs help address this challenge. In addition, some corporations offer tech services free to farmers with whom they work as an incentive or a way of collaborating to improve coffee quality and reliability. Technology providers also realize that inclusive development promotes farmer uptake and adoption. This means that while smallholders may not be key revenue drivers, they are still important stakeholders and beneficiaries.

Even when cost is not a barrier, infrastructure can hinder the spread of new technologies. Tech solutions require a reliable electricity supply. They also need broadband connectivity and access to computers or smartphones.

The digital divide can sometimes resemble a chasm. This divide is most visible between urban and rural areas, according to the International Telecommunication Union.¹³³ Almost three-quarters of the world's urban population enjoy access to the internet and almost two-thirds have access to a computer; in rural areas, less than two-fifths can connect to the internet and only a quarter have a computer at their disposal. The situation is especially stark in Africa, where just 6% of the rural population can connect to the internet and a miniscule 2% have access to a computer.

The situation is better for mobile technology. Although about 90% of the world's population has access to mobile broadband, persistent gaps in access remain between rich and poor countries and between urban and rural areas within countries. This is reflected in the fact that a quarter of the population of least developed countries does not enjoy access to mobile broadband.

More alarmingly, while some 70% of rural populations globally have access to 4G (compared with 95% for urban areas), penetration in some regions is much lower. For example, only a fifth of rural populations in Africa receive 4G connectivity.

Some farming communities can leapfrog or overcome technological barriers, such as by using small solar panels to charge their devices, taking advantage of texting-based money payments or accessing solutions through text messages instead of apps.

Technical literacy also poses a major problem. Many farmers lack the education and training to make the most of new tech solutions. Awareness also remains a challenge. Although knowledge about novel solutions and technologies among farmers has improved, many are still not up to speed on alternatives to their conventional practices. In addition, some resist change, preferring the tried and tested.



133. <https://www.itu.int/en/ITU-D/Statistics/Documents/facts/FactsFigures2020.pdf>



Coffee producers in Cameroon.

Agronomy: Down-to-earth solutions

Like with all farming, soil quality is essential to grow good coffee beans on robust and healthy coffee trees.

Coffee plants draw water and macronutrients such as nitrogen, potassium, phosphorus, calcium, magnesium and sulphur from the soil. They need micronutrients including iron, zinc, manganese, chlorine, boron and copper.

The right level of acidity is vital for plant health, its ability to absorb nutrients, its yield and its resilience to disease. The optimal acidity level is in the region of 4.9–5.6 pH.

Fertile, nutritious soil has required experience, expertise and guesswork. While expertise and experience remain essential, modern science and technology can take away much of the guesswork.

Fertile ground for science

Given the importance of soil for coffee cultivation, science and technology play a significant role in helping farmers turn their soil into fertile ground. In Brazil, for instance, the government believes the country's success as a coffee-producing nation is largely down to effective soil analysis, particle physics, chemistry and biology.¹³⁴

Accurate, timely soil analysis helps farmers maximize yields and minimize fertilizers. Such analysis has been out of reach or too expensive for most smaller farmers or farmers in developing countries. Some specialists estimate that as few as 10% the world's farmers enjoy access to laboratories, which are usually too far away and/or too costly to use.¹³⁵

AgroCares,¹³⁶ a Dutch company that focuses on farmers in developing countries, has developed a compact infrared scanner that screens samples and sends them via mobile phone for comparison with a shared calibration database. Results are returned to farmers on their mobile phones (there is an app called Kahawa Soil Test for coffee farmers). Umbrella organizations often buy the device and subscription to the database.

134. <https://perfectdailygrind.com/2019/10/coffee-farming-guide-how-to-improve-soil-quality/>

135. <https://innovationorigins.com/christy-van-beek-agrocares-25-higher-harvest-yield-thanks-to-better-soil-composition/>

136. <https://www.agrocares.com/en>

By deepening farmers' knowledge of just what the soil needs and when, the AgroCares solution saves growers large amounts of fertilizer and can boost yields by an average of 25%, the company says. Although AgroCare has served some 30,000 farmers, the company acknowledges that uptake remains challenging.

The acceptance and use of agronomic digital technology needs to improve in the coming years. Global warming, soil degeneration, stressed water supplies and the growing frequency of extreme weather events mean the future sustainability of coffee farming increasingly depends on digital technology.

Boosting uptake requires addressing socioeconomic challenges of access to technology, infrastructure and training.

The genetics of coffee plants are also a precursor to success. The genetic conformity of coffee plants has been compromised because of certain practices in the coffee seed sector and the informal seed exchange among farmers. This can make it difficult to ascertain the true nature of cultivated varieties.

This has created a major barrier to getting seeds of optimal quality into the hands of farmers. World Coffee Research, a non-profit R&D organization, has developed a DNA fingerprinting technique to identify the varieties being grown in farmers' fields.¹³⁷

Field mapping: Eye in the sky

The thousands of satellites that orbit the earth are normally associated with telecommunications, global positioning for vehicles and weather monitoring.

Land-use monitoring is a new trend in satellite use. Observation data, maps and imagery are being used in an emerging field known as 'precision agriculture', 'satellite farming' or 'site-specific crop management'.

Precision agriculture complements the ground-level technologies to analyse and monitor soil and crop yields. It uses information gleaned from space or from unmanned drones in the sky to support decisions made at the level of the farm and region.

Because earth observation technologies and geographical information systems are expensive, initial forays into precision agriculture focused on crops with faster cycles.

That said, satellite technologies are making inroads into the coffee sector, as growers increasingly become aware of the medium- to long-term benefits. One company in Brazil that has been a trailblazer is O'Coffee, which has used satellite technology to monitor hundreds of acres of coffee farms for the better part of a decade.¹³⁸

Box 1: Farmer group internal management systems

Internal management system software enables small farmer groups (farmer cooperatives and other associations) to effectively gather data and information in one place. This helps them better meet certification and buyer requirements and empowers them in the negotiation process.

Such a system would cover, indicatively:

- Number of farmers belonging to the group
- Male/female/household information
- Exact location of the farm(s)
- Number of coffee trees and other agricultural plants
- Number and type of shade trees
- Alternative sources of income
- Basic data on production and yields
- Basic data on trainings
- Basic requirements for certifications such as RFA, UTZ, Fairtrade and/or organic

Source: International Trade Centre.

¹³⁷<https://worldcoffeeresearch.org/news/study-widespread-lack-genetic-conformity-arabica-coffee/>

¹³⁸<https://stir-tea-coffee.com/features/unprecedented-precision/>

Location, location, location

Geospatial satellite data can be integrated with other analytical and modelling technologies to adapt to the climate crisis; monitor and manage pests; protect biodiversity and forests; and tackle water shortages which have hit many coffee-producing nations. For example, rainfall in Mexico, Guatemala and Honduras has fallen 15% since 1980. If worse comes to worst, global warming may halve the supply of land available for coffee farming by 2050, according to the Climate Institute.¹³⁹

Earth-i delivers geospatial information to farmers and agri-companies that can help them improve crop yields, plant health and farm productivity. One service that Earth-i offers is to identify optimal locations and times for coffee growing, based on local weather patterns. This precision geolocation has the additional benefit of enabling farmers to minimize fertilizer and water use, which is invaluable during the more frequent droughts that coffee-producing nations are experiencing.

Similarly, Cropio, which describes itself as a productivity management system, uses satellite technology to help farmers monitor their land remotely – in nearly real time and up to 10 years in the past – including the vegetation patterns of individual fields. The system also enables weather and harvest forecasts on a field-by-field basis.¹⁴⁰

Weather-related diseases can sometimes be managed using geospatial data. One example is the longstanding enemy of the coffee farmer, coffee rust (known scientifically as *Hemileia vastatrix*), a mysterious fungus that kills healthy coffee leaves and chokes off plant nutrients. Coffee rust hit around 70% of Arabica farms in Latin America in 2018, costing them billions in damage and destroying 1.7 million jobs.¹⁴¹ Although there is no known cure, the disease can be contained using precision agriculture, according to Earth-i.

Helping small farmers

The high cost of access hinders the spread of precision agriculture in many coffee-producing countries. In some countries, coffee farmer cooperatives have stepped in to fill the gap – either by purchasing collective access to platforms or by developing their own software. These cooperatives use the data to improve services to farmers and to enhance their bargaining power and agricultural practices. More broadly, digital technologies are equipping cooperatives in producing countries with the tools and intelligence to operate more efficiently and to represent farmers better.

One example is an app developed by the National Federation of Coffee Growers in Colombia. With the aid of a tablet, smallholders tap into invaluable information about local weather conditions, share intelligence on fighting coffee rust and even check coffee bean market prices.¹⁴²

Similarly, WeatherSafe, an app developed by a British start-up, provides precision weather data to Rwandan coffee farmers. WeatherSafe joined a consortium led by Earth-i to provide satellite analytics to smallholder farmers in Rwanda and Kenya. Known as Advanced Coffee Crop Optimization for Rural Development, it sends out weather alerts and agronomic advice direct to farmers' phones via text messages. The messages are drawn from Global Positioning System-based field mapping and satellite imagery with localized weather data.¹⁴³

Earth observation can help smallholders to gain a foothold in the sustainable coffee market. Enveritas, a non-profit with the ambitious goal of helping to end poverty in the coffee sector by 2030, offers the normally costly process of sustainable coffee certification to the smallest scale coffee farmers who are not part of cooperatives. (Those farmers have less than two hectares of land and earn as little as \$2 a day.¹⁴⁴

Enveritas uses geospatial analysis and machine learning to monitor coffee farms and their surroundings. The system checks for 30 sustainability standards, divided into social, environmental and economic criteria. These include no deforestation, biodiversity protection, no child labour or forced labour, as well as sustainable production and traceability.¹⁴⁵

Geospatial data can also be used further down the value chain. Coffee importers and even consumers can trace coffee right back to source, from the very fields where the coffee is grown to the farmers who grew it.

139. <https://gcrmag.com/climate-change-to-halve-coffee-growing-land-by-2050-report/>

140. <https://www.farmmanagement.pro/farm-management-system-focused-on-performance/>

141. <https://www.panoramas.pitt.edu/health-and-society/coffee-rust-disease-posed-destroy-latin-american-market-and-your-daily-coffee-fix>

142. <https://www.fastcompany.com/3030637/how-mobile-apps-for-farmers-could-help-fight-rising-coffee-prices>

143. <https://earthi.space/wp-content/uploads/2020/10/ACCORD-Case-Study-Progress-Review-02OCT20.pdf>

144. <https://techcrunch.com/2018/08/30/enveritas-technology-lets-small-growers-tap-into-the-market-for-sustainable-coffee/?guccounter=2>

145. <https://www.enveritas.org/library/standards/#/coffee>



Green bean sampling at a coffee farmers' cooperative in Brazil.

'Thank My Farmer', developed by farmer connect in collaboration with leading coffee companies, is one example. This web app allows drinkers to trace their coffee back to its origin and to raise consumer awareness of coffee quality. It includes the option for consumers to support projects that empower producers in the countries of coffee origin.¹⁴⁶

Farm management tools: Digital bean counting

Technology also helps to manage farms. Available solutions enable farmers and plantations to monitor fields, arrange harvests, store crops, manage suppliers and customers, buy supplies, sell produce, carry out quality control and optimize bean storage. They also help farmers with day-to-day business functions such as accounting and payroll.

Among the proliferation of market solutions, many are prohibitively expensive for small coffee farmers. In addition, as with agronomical technologies, many farmers are unaware of their existence or lack the skills and know-how to use them effectively.

Some software offers what is marketed as complete and integrated farm management solutions. An example is Amity Software's agriculture management software system. This software targets agribusinesses with modules on land acquisition and preparation, crop management, dispatch and delivery, and post-delivery operations.¹⁴⁷

Harvesting coffee data

Other solutions are designed specifically for coffee farmers. Innovakit, a Colombian start-up, collaborates with coffee farmers to introduce and use technologies that improve their production processes. It offers tools for harvesting and growing, such as refractometers, which measure the amount of dissolved solids; solar dryers; fermentation systems; pH meters; temperature and humidity sensors; and waste treatment systems.¹⁴⁸

ECropOrigin allows coffee farmers to schedule and log work on the farm, track inventory, harvests and processing, connect with buyers, manage shipping and trace origins.¹⁴⁹ Cropster Origin, part of a software suite covering the entire process from production to cup, targets specialty coffee growers. It enables, among other things, the recording and tracking of coffee bean lots, the monitoring of the processing and storage environment, comparing the quality of different batches and samples, and sharing data with customers.¹⁵⁰

146. <https://www.thankmyfarmer.com>

147. <https://amitysoftware.com/solutions/agriculture-management-system/>

148. <https://innovakit.co/>

149. <https://ecroporigin.com/app-functionalities-1>

150. <https://www.cropster.com/products/origin/>



Coffee producers looking at farm management technology in Ethiopia.

For post-harvesting, most available platforms enable the comparison of yield estimates against actual outcomes; quality assurance using sensors; and quality control, to allow for different blending techniques. However, their shortcomings include a lack of integration with post-harvesting hardware, such as pulping, drying and hulling equipment. Some platforms do not permit offline accessibility, which is problematic for remote areas, and have a one-size-fits-all approach to workflows that fails to capture the nuances of different processing methodologies.¹⁵¹

Digital banking: Credit where it's due

Though digital banking is fact of daily life for people in wealthy coffee-drinking countries, the reality is very different for small coffee growers. Until recently, smallholder farmers and those in remote locations were largely excluded from the banking system, including e-banking. In addition, many small farmers do not trust banks or fully comprehend the benefits of banking services.

However, digital and telecommunications technologies enable a growing number of coffee farmers to benefit from modern banking system services, including digital wallets, digital bank accounts, credit and financial support.

Among the first banking services for poorer farmers, especially in Africa, were simple e-wallets on mobile phones. These were usually established and run by telecom companies rather than traditional banks. The service allowed them to pay for goods and services and receive payment for their produce. This was especially the case in sub-Saharan Africa, where the penetration of conventional banking – not just for farmers, but also for the population as a whole – was low. Mobile phone-based money transfer services entered to fill the void.

For example, using core technology developed by a Kenyan student and rolled out by Vodafone's Safaricom subsidiary, M-Pesa was launched in Kenya in 2007 to enable people without a bank account to transfer money. The technology was quickly adopted in the rest of East Africa before spreading rapidly to other parts of the continent, reaching some 30 million users in 10 countries.¹⁵²

Despite the convenience of mobile phone systems such as M-Pesa, the charges that users pay to send or withdraw money add to the cost of doing business.

151. <http://www.postharvestcoffee.com/>

152. <https://edition.cnn.com/2017/02/21/africa/mpesa-10th-anniversary/index.html>

Banking on success

Digital banking services targeting smaller farmers, including coffee growers, have emerged in recent years. One of these is Kenyan start-up FarmDrive, which was developed by two young computer science graduates from the University of Nairobi.

FarmDrive seeks to bridge the chasm between smallholders and financial institutions. The platform allows African farmers to keep financial records, and integrates its own proprietary lending engine to enable them to access credit and apply for loans. Through its software, FarmDrive believes it can do its bit to serve some of the SDGs, including eradicating poverty, ending hunger, promoting gender equality, creating decent work and reducing inequalities.¹⁵³

Colombia has gone a step further. In 2007, the Colombian Coffee Growers Federation introduced its Smart Coffee ID Card, which acts as both a federation membership card and Bank of Bogotá banking card. By 2014, 5.4 million transactions worth nearly \$750 million had been carried out using it. Although the Smart Coffee ID Card was designed as a safe and simple method to pay farmers for their coffee harvests, it rapidly evolved to become a channel for the distribution of incentives, government subsidies, credits and resources, the federation says.¹⁵⁴

In addition, coffee growers can use the smart card to access automated teller machines and pay for purchases from provision warehouses, cooperatives and selected commercial outlets. This made transactions safer for farmers by reducing the need to carry cash.¹⁵⁵

The pandemic has brought unique challenges that can be addressed through digitization. This has led to a redoubled drive to expand digital banking access to coffee farmers. In the Philippines, for instance, Rizal Bank has been working to sign up 50,000 coffee farmers to its financial inclusion app, DiskarTech. The application provides each farmer with a unique QR code to accept direct cashless payments. These are then deposited into a savings account that, as of August 2020, earned 3.25% interest.¹⁵⁶

Reaping the rewards of virtual markets

A great geographical distance separates coffee growers from coffee consumers. Traditionally, this required a long chain of go-betweens, sellers, buyers and intermediate markets. Digital technologies are helping to shrink that distance.

They offer coffee farmers, roasters and traders new opportunities to link up directly with coffee buyers, such as green bean marketplaces, and blockchain. During the pandemic the trend towards distributing coffee through e-commerce channels picked up speed to offset falling sales in coffee shops and cafes.¹⁵⁷

Electronic marketplaces for green beans

Virtual marketplaces have blossomed in recent years, especially for the specialized segment. They reduce distribution costs, increase growers' profit margins, provide buyers with a wider selection of beans and cut delivery times.

These platforms also have disadvantages. One drawback is that they remove personal relationships – often built up over years of direct contact – between coffee growers and distributors.

Another challenge with e-markets is that they require digital literacy on the part of farmers, as well as extra work to set up and manage online presence.

153. <https://farmdrive.co.ke/>

154. <https://www.comunicaffe.com/colombian-coffee-farmers-warm-up-to-new-digital-wallets/>

155. <https://federaciondecafeteros.org/wp/coffee-grower-services/?lang=en>

156. <https://businessmirror.com.ph/2020/08/31/rcbc-helps-coffee-farmers-go-digital-during-pandemic/>

157. <https://www.bbc.com/future/ bespoke/made-on-earth/how-the-coffee-trade-survived-Covid-19.html>



Concept of online coffee auction.

Direct sales

Algrano, a Swiss start-up established in 2015, runs a virtual marketplace linking coffee growers directly with roasters. The platform provides coffee farmers with direct access to new markets in Europe and enables European roasters to contact growers directly and easily. More than 600 registered growers and 700 registered roasters use Algrano.

Vollers Group runs the V-Hub green coffee marketplace, which hosts electronic 'shops' for sellers and buyers of green coffee beans.¹⁵⁸ Vetted traders can set up a public profile for their company and provide real-time information on the beans they have on offer.

Thanks to the detailed data available, buyers who join the system can search for coffee beans by flavour, region of origin, coffee varietal, processing method and certification. The system also includes maps and real-time location information.

Under the hammer

Online auctions offer coffee farmers and traders a way to sell their produce to the highest bidder, potentially generating greater revenue and increasing their profit margins.

One successful initiative is the Alliance for Coffee Excellence's Cup of Excellence auctions. Launched in 1999, the Cup of Excellence not only allows coffee growers to receive top dollar for their beans, but its exacting standards ensure the highest standards for coffee buyers.

The Cup of Excellence helps farmers develop cutting-edge skills and organizes competitions and competitive auctions that recognize and reward the excellence achieved by individual farmers. Thousands of growers submit their coffee to the Cup of Excellence each year. The winning entries are placed under the hammer at a global online auction at premium prices.

As an indication of just how well Cup of Excellence auctions serve farmers, auction prices in 2020 hit record highs, despite the economic downturn caused by the COVID-19 pandemic.¹⁵⁹ This helps create a clear link between the quality of a coffee and its price, while making it possible for even the smallest farmers in the most remote locations to be recognized for their excellence and to access the quality coffee market.

¹⁵⁸. <https://hub.cropster.com/store/shops>

¹⁵⁹. <https://dailycoffeenews.com/2020/08/11/costa-rica-cup-of-excellence-auction-continues-streak-of-high-average-prices/>

Table 1: Cup of Excellence online auctions in 2020

COUNTRY OF AUCTION	Weight (lbs.)	Maximum price per pound (\$)
Brazil	396.83	40
Colombia	595.25	69
Costa Rica	396.83	66.90
El Salvador	637.7	80.10
Ethiopia	595.25	185.10
Guatemala	233.22	180.20
Nicaragua	463.05	36.90
Peru	442.85	51.10

Source: www.allianceforcoffeexcellence.org

Transparent and trusted transactions

The coffee supply chain is, by its very nature, very long and very complex, involving multiple players, from coffee growers and millers all the way down to distributors and retailers.

Conventional techniques for tracking movements along the supply chain have relied on each link keeping its own separate records, which increases both the margin for error and reduces transparency. For example, farmers and cooperatives maintain their own records, while washing stations, roasters and shippers keep separate records. This can sometimes be a recipe for discrepancies and, consequently, disputes.

However, transparency is essential to guarantee that the coffee has been grown and traded to the required quality, environmental, economic and social standards. Traceability is also vital for the various certification initiatives, such as those guaranteeing fair trade, organic farming, rainforest protection and bird-friendly agriculture.

Digital technologies can and do offer powerful solutions that better integrate the coffee supply chain and enhance traceability along it. However, here again, farmers and other players in producing countries face certain visible and invisible obstacles that influence their ability to access or fully use these technologies.

These include inadequate access to finance, the digital divide, relative lack of know-how and training, as well as deficiencies in the physical infrastructure. To ensure that this digital divide does not widen and that everyone along the supply chain benefits fully from the promise of digital technology, these issues must be tackled robustly.

Unbreakable chain

Blockchain technology offers a versatile, powerful, reliable and unhackable method for tracing and tracking coffee along the entire supply chain. Rather than a string of unconnected records kept by each player in the supply chain, blockchain enables a single unique, unmodifiable ledger to be created for each batch of coffee that starts with the farmer and ends with the consumer.

Blockchain systems can also complement the virtual marketplace platforms outlined in the previous section. Although blockchain-distributed ledgers empower farmers, they also greatly increase their administrative burden.

To make the coffee supply chain more transparent and democratic and provide farmers with a fairer share of profits, Colombia-based iFinsa employs what it defines as blockchain in its app to enable validation and verification of every transaction, from bean to cup.¹⁶⁰ Farmer connect has developed a traceability platform using IBM blockchain technology to aggregate supply chain data across different actors in the supply chain in an easy-to-use interface, and to enable consumers to trace the coffee they purchase back to its source.¹⁶¹

¹⁶⁰ <https://www.prnewswire.com/news-releases/democratizing-the-coffee-supply-chain-with-ifinsa-300939497.html>

¹⁶¹ <https://www.farmerconnect.com/>



DEFINITION

Blockchain is essentially an electronic ledger.

It is distributed between multiple players, encrypted and unalterable. This makes it more transparent and reliable than a traditional paper ledger.



Coffee bags with information tag in Oromia Coffee Farmers Cooperative Union in Addis Ababa, Ethiopia.

Similarly, Beyond Coffee (Beyco) has developed a coffee connection and trading platform based on blockchain technology. Beyco links sellers with buyers in different countries and seeks to create greater transparency in the coffee supply chain. The platform enables sellers and buyers to browse different profiles, start conversations online, negotiate terms and sign online contracts.¹⁶²

Socially conscious coffee brands believe blockchain is affordable and more accessible than some certification schemes. They are also convinced that the technology can help overcome the risks of greenwashing.

For example, Moyee Coffee, a greentech coffee company, uses blockchain technology to trace coffee transactions from farms in Ethiopia to supermarkets in Europe. In this way, the firm intends to help end exploitative practices that keep farmers poor and better inform customers about the history of the coffee they buy and drink.¹⁶³

Sea change in shipping and logistics

Digital technologies and platforms are revolutionizing the relationship between the different players along the supply chain, enabling producers to build up more direct and mutually beneficial relationships.

These newfound relationships can capsizes in the rough seas of shipping bureaucracy or smash up against the rocks of logistics. Fortunately, digital technologies can help producers navigate these complicated waters – but it's not always plain sailing.

Platforms exist that enable coffee farmers and roasters to organize produce transport and manage export and import paperwork, lightening the bureaucratic burden on both producers and buyers, especially small coffee farmers without export experience.

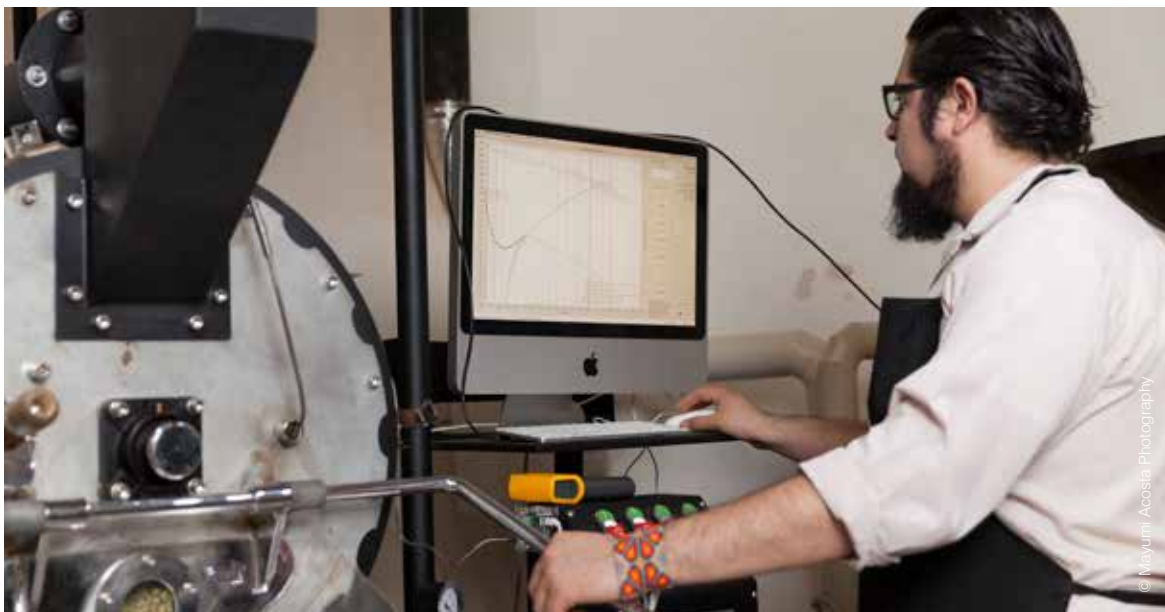
However, available solutions have drawbacks. Platforms may discourage farmers by stipulating that they must be registered users of the platform before their coffee can be transported. In addition, these services can be expensive when small shipment sizes are involved, leading to an increase in the final coffee price.

Algrano offers just such a service. This platform allows coffee exporters to find either shared or dedicated shipping solutions, depending on the size of their shipment. Exporters can calculate shipping costs and order the shipping from the comfort of their desks.¹⁶⁴

162. <https://www.beyco.nl/>

163. <https://www.forbes.com/sites/mariannelehnis/2020/08/31/moyee-coffee-has-harnessed-blockchain-to-disrupt-a-conglomerate-controlled-industry/?sh=18c7d0975670>

164. https://www.algrano.com/en/shipping-services?utm_campaign=Shipping%20services%20May%20-%20June%202020&utm_source=PDG&utm_medium=article&utm_content=shipping



Coffee roaster using Cropster roasting technology at Buna Café Rico in Mexico City.

Smelling the coffee: Precision roasting technologies

New technologies are transforming the roasting of coffee beans from an art form into a science. Whereas coffee roasters previously relied on guesswork and crude measurements, new integrated systems allow for the monitoring and adjusting of every tiny detail of the roasting process.

Coffee roasting machines have become smaller, cheaper, more consistent, programmable and versatile. For example, the Behmor 2000AB Plus is about the size of a kitchen oven and can be used by producers to develop and taste their own samples.¹⁶⁵ Though coffee roasters like this are cheaper than their industrial rivals, they are still beyond the means of many coffee growers, especially small-scale farmers. Also, few growers see the advantage of roasting their own coffee.

Ikawa has gone even smaller. It has developed a micro coffee roaster, for both professional and home use, that can be programmed and fine-tuned.¹⁶⁶ London-based Ikawa has also created an online community where roasters can share their recipes and roasting curves.

Some smaller farmers have invested in this type of small-scale roasting technology to enable them to experiment with the flavours of coffee beans that are more resilient to global warming and pests.

Box 2: What is sample roasting?

Sample roasting consists in roasting a very small sample of green coffee to:

1. Evaluate green coffee quality and uniformity, something that benefits everyone along the supply chain.
2. Select and ideal roast profile for product development purposes. Accentuating a coffee's best features helps craft a product that consumers will enjoy.
3. Host cuppings for sales and education, for end-consumers or wholesale customers.

For green coffee exporters, importers and roasteries, sample roasting is a crucial part of the sale and purchase of green coffee, as it determines the baseline quality of a certain coffee.

Consistency is the primary goal of the process.

Source: ITC.

¹⁶⁵ <https://behmor.com/behmor-2000ab-plus/>

¹⁶⁶ <https://www.ikawacoffee.com/>

Blending software with hardware

A major innovation in roasting technology has been platforms that use sensors in roasting machines to monitor, control and automate roasting.

The Cropster platform now counts thousands of users, from professional roasting businesses, from garage roasters to suppliers of major brands. Cropster's tools are connectable to roasting machines and provide roasters with split-second control over the roasting process. Roasting results are automatically tied to samples and lots, as well as to sensorial and physical quality characteristics, thereby providing traceability regarding coffee origins and quality.

Cropster's longer-term vision involves encouraging farmers to gather quality-relevant coffee bean information, and access better markets and partners in the coffee value chain. This includes tools such as Cropster Roast and Cropster Lab, which collect and share data about coffee samples, including origin, grading, sensorial and roasting information. Additionally, Cropster Origin helps farmers who sell green coffee to connect directly with roasters.¹⁶⁷

While Cropster charges coffee roasters a fee for its software and professional support, some free, open-source alternatives exist for those unable to pay for these services.

One example is Artisan, installed by thousands of users around the world, including new and experienced roasters as well as home hobbyists. Being open source, the app has evolved with the active input of its community of users and developers. Available in 20 languages, Artisan can work with more than 30 types of roasting machines and over 50 associated devices. In addition to helping manage and control the roasting process, Artisan also provides a roast simulator that enables roasters to test out ideas without wasting too many beans.¹⁶⁸



Source: This cupping chart by Tastify enables cuppers to describe their taste experience. Other tastery wheels exist in the coffee trade.

167. <https://www.bloomberg.com/news/features/2020-02-20/crop-app-cropster-wants-to-save-coffee-and-the-global-food-supply>

168. <https://dailycoffeenews.com/2020/08/31/major-new-features-for-open-source-roasting-software-artisan/>



Coffee cupping in Brazil.

The holy grail of cupping

The entire coffee process will have essentially been for naught if the final product does not end up tasting just right, all the time, every time. A wide array of digital solutions have emerged in recent years to enable the empirical evaluation and comparison of different coffee samples, lots and roasts. Some collect data on tasting parameters, rate and contrast different coffee blends and roasts, and compare scores across time.

While these solutions are useful, especially at the end of the pipeline, they can add to the burden on farmers when introduced early in the process.

Cup-fuls of expertise

Cropster Cup is a cupping app integrated into the Cropster solutions environment. It ties cupping results directly to lots, samples and roasts, and provides comparative visual reporting. Built-in sharing mechanisms facilitate communication between coffee buyers and sellers, including international coffee auctions, import and export businesses, and producer organizations.

The app Tastify attempts to standardize cupping protocols to ease comparisons and rankings. It allows cuppers to record and document their cupping experience and share it with others around the world.

The resulting database is useful to both roasters and buyers on the lookout for a particular flavour profile. Exporters can use their comparative score as a selling point to attract importers, while importers can use the app to inform their buyers about the cupping scores of a particular source.¹⁶⁹

Similarly, Open Cup is an app that lets the user create customized profiles of each cupping experience and compare them with other evaluations.



DEFINITION

What is cupping?

Cupping is the coffee world's equivalent of wine tasting.

Tasters, known as cuppers, observe aromas and tastes of brewed coffee blends. They sniff the coffee and then slurp it to gauge sweetness, acidity and flavour.

¹⁶⁹ <https://sprudge.com/tastify-a-coffee-cupping-app-looks-to-the-future-of-flavor-75674.html>

Angels' Cup is similar to Tastify and Open Cup, but aims more at hobbyists and 'coffee geekdom'. It enables consumers to record and share coffee-tasting notes, and find their ideal coffee blend.¹⁷⁰

Although these apps provide powerful tools for sharing and standardising quality evaluations, they cannot and do not replace the skill of roasters, who are the ultimate determiners of coffee quality.

Quest for the perfect brew

Creating the perfect coffee brew involves knowledge, skill, artwork and a sprinkling of magic. Digital tech can provide a helping hand. Modern brewing technologies provide tools to aid in the design of coffee preparation processes that extract the desired aromas, tastes and solubles from the coffee beans. They are used to develop recipes, manage the brewing process and evaluate the quality of the produced beverage.

These technologies help standardize desired parameters and ensure consistent quality across cups. Most platforms on the market focus on recipe creation, sensorial analysis and quantitative measurements, as well as quality and consistency management.

As useful as these technologies are, few are designed for scalability and the hectic pace of busy modern cafes. The processes consume too much time or are not easily repeatable across batches. Moreover, they are often not integrated back into the coffee supply chain. Consequently, they do not yet deliver the valuable insights that can be achieved through the sharing of information on quality and charting the correlation between roast and origin parameters.



Coffee cupper performing quality control with Cropster cupping technology at Royal Coffee.

Know with the flow

Brewing technologies are becoming more important in the highly competitive coffee retail sector. By helping coffee shops develop their own signature brews and produce them to a consistently high quality, these technologies can lead to greater customer satisfaction and return business. They can also enhance the skills of baristas and reduce waste.

¹⁷⁰. <https://angelscup.com/>

To achieve these outcomes, most platforms rely on telemetry solutions that combine measurement instruments attached to equipment with analytical applications. One example is the Flow telemetry system, which combines real-time gauges to monitor the quality and consistency of recipe application with a proprietary WiFi-enabled portable device that can be connected to coffee machines and an analytics dashboard.¹⁷¹

Targeting not only coffee shops, but also brewing equipment designers and coffee enthusiasts, the VST Coffee Tools app can be used to design recipes and control the brewing process. It can be used with or without a refractometer.¹⁷²

Cropster Cafe, which is part of the Cropster suite, also offers a platform that enables the creation of recipes, the training of coffee shop staff, the tracking of product usage and the monitoring of tasks.¹⁷³

In addition, Vendon offers a telemetry system that is focused on automatic coffee vending machines. It collects, uses and analyses real-time data on the state and output of the machine. Available information and data include water temperature, shot time, bean use and sales logs.¹⁷⁴

The Acaia Pearl S app is designed to work with the popular Acacia Pearl scale. It measures and records coffee and water weight, with an accuracy up to a tenth of a gram, brewing ratios, temperatures and times, as well as recording the grind size used. It also enables the creation and sharing of recipes.¹⁷⁵

Managing success

With fierce competition and discerning customers, effective management is a key to success for coffee shops and cafes. Digital tools can help manage operations and processes for ordering, production, sales, inventory and waste management.

Many solutions are available on the market. Most focus on digitizing workflows and processes, and generating useful reports and analytics. Few platforms are available off the shelf that cover everything involved in managing a modern coffee shop. This leaves managers juggling with the complexity of using different solutions or the additional cost of customization.

Given how diverse coffee shops are, there exists no one-size-fits-all solution. Which applications or platforms a coffee shop owner or manager decides to use depends on individual needs and circumstances. Therefore, it makes sense to study the available options carefully and to seek knowledgeable and independent advice before deciding to invest in one system or another.

171. <https://flowcoffee.co.nz/>

172. <https://store.vstapps.com/products/vst-coffeetools-pro-for-iphone>

173. <https://www.cropster.com/products/cafe/>

174. <https://vendon.net>

175. <https://acaia.co/pages/apps>

CHAPTER 5

COFFEE QUALITY FROM SEED TO CUP

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The different stages of coffee beans.

COFFEE QUALITY FROM SEED TO CUP

Quality is central to the coffee industry. Before addressing quality, it is important to differentiate the raw material (green coffee) from the finished product (roasted coffee). Coffee quality actually emerges in the cup of the final product.

Green coffee: Quality parameters

When assessing green coffee, consider the correlation between input parameters in the raw material and output variables in the final product. Input parameters include bean density and moisture content. Output variables include acidity, flavour and body, to name a few. Both contribute to the final quality assessment.

Various grading systems exist to measure coffee quality as objectively as possible. Yet quality remains a relative and complex term. Cuppers are affected by external factors, such as location, light and sounds in the cupping environment. These alter the senses, and ultimately the sensory evaluation of the coffee. Quality assessment combines evaluation of attributes in the cup and out of the cup.

Social and environmental dimensions play a role in coffee quality. Today, most coffee evaluators would agree that quality in the cup also depends on quality in the environment and the lives of the people who produce that coffee. Simply put, sustainability has become an intrinsic component of quality.

Chapter 2 of this guide explores this link between quality and sustainability of coffee production. Chapter 5 focuses on quality attributes in the cup.

This chapter targets coffee sector operators, growers and exporters, and focuses on green coffee quality. Roasting, grinding and brewing are touched upon briefly. These vast topics are better addressed by more targeted resources.

Defining quality

There are many views about what constitutes quality, just as there are about beauty. Its meaning is relative.

The Oxford Dictionary defines quality as 'the standard of something when it is compared to other things like it; how good or bad something is'. According to ISO, quality is 'the totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs'. In simpler words, one can say a product has good quality when it meets 'the requirements specified by the client'.¹⁷⁶

This idea of quality as adherence to specifications is largely what guides the concept of quality in coffee. The specifications or client requirements are the variable. Thus definitions of quality vary depending on the context and priorities.

Certification schemes, marketing and price all play a defining role, but quality ultimately dictates the worth or price of a given coffee. It is the attribute that positions coffees within a certain market segment. In specialty coffee circles, quality combined with rarity is the holy grail.

Coffee quality assessment tools and methodologies are about finding a common language and set of indicators to evaluate coffee. These methodologies are informed by research and science. However, the descriptive sensory analysis stage remains a qualitative assessment that is difficult to measure. There is no perfect system, and coffee quality assessment methodologies are constantly evolving as new research and technologies become available – and as the coffee industry itself evolves.

What is quality in coffee?

Coffee quality combines specific variety, topography, soil conditions, climate, agronomic management and harvesting practices. Market preferences influence how coffee is processed, stored, prepared for export and transported.

Specific varieties, topography and soil conditions are constants and therefore dominate the basic or inherent character of a designated coffee. Climate is variable and cannot be influenced, resulting in fluctuating quality from one season to another.

Growing, harvesting, processing, storage, export preparation and transport are variables that can be influenced. They involve intervention by human beings, whose motivation is a key factor in determining the end quality of green coffee. Depending on marketing priorities, the efforts deployed range from intense – regardless of cost – to the bare minimum, to reduce costs and optimize revenues and margins.

World market prices hamper efforts to promote quality. So does the degree to which buyers are willing to reward safeguarding quality with adequate premiums for better-than-average quality.¹⁷⁷

In general, coffee quality can be divided into quantitative and qualitative (sensory) considerations. Green coffee input parameters have a direct correlation with output variables in the cup. These include:

- Density
- Moisture content
- Water activity
- Colour and smell
- Bean size
- Uniformity
- Presence of defects

Quality assessment evaluates factors that influence the taste of a coffee beverage. This is done to determine their impact on a buyer's decision-making process. It is crucial that qualities meet agreed specifications between the buyer and the seller.

Quality assessment: A subjective process

Coffee quality assessment is a system to determine the relative value of a coffee in the marketplace, assuming that higher-quality coffees are more readily embraced by the market and command a higher price than those with lower quality.

¹⁷⁶. <http://www.fao.org/3/W7295E/w7295e03.htm>

¹⁷⁷. <https://www.intracen.org/coffee-guide/coffee-quality/the-definition-of-quality/>

This system of evaluating coffee quality means the assessor must rely on an array of challenging assessments for the subjective measurements of flavour. It becomes extremely important to understand how and by whom these subjective assessments are made.

The first stage of assessment is to determine the presence of defects and their magnitude – that is, the likely degree of negative impact on flavour. Various groups have classified defects, from the Intercontinental Exchange Futures Exchanges' grading standards to commercial actors' internal standards, to the specialty-focused standards of the Specialty Coffee Association and the Coffee Quality Institute. These associations with quality are based on coffee buyers' collective experience.

Coffee quality is assessed through cupping, to confirm the predictive indicators of the empirical testing and to screen for flavour defects or attributes.

Professional cupping has been the quality-control practice that has determined both market access and market value for at least 100 years. An activity that relies on an individual's senses has been made as objective as possible, thanks to sensory and food science, training and screening sensory panels, and alignment with and calibration to standards.

Who assesses coffee quality?

Accepted parameters for flavour quality assessment today are based on the culturally preferred flavours of Western Europe, North America and Japan – the three biggest global coffee markets.

When considering the acceptability of coffee to consumers, the question is almost never posed to those consumers. Instead, coffee professionals perform coffee rating and evaluation. They have learned, through on-the-job training or a certification course, to follow a grading and tasting protocol. It results in a pass/fail assessment or a comparative rating on a qualitative scale.

These systems are more rooted in the industry's habit and practice than in a clear body of research. It is based on the preferences of coffee tasters, which may or may not be relevant to a given set of consumers.

While emerging coffee consumer markets have widely adopted the cultural preferences of traditional coffee markets, this is changing. Traders are looking at marketing specific coffees to defined groups.

Thus quality evolves with changing consumer preferences, demographic shifts in buying power and greater knowledge of how flavours and aromas interact with human physiology and psychology.

It is important to keep an open mind, an open heart and an open palate when considering the implications of quality.



Drip brewing, filtered coffee or reverse brewing is a method of pouring water over roasted and ground coffee beans contained in a filter.

Quality segmentation: Three categories

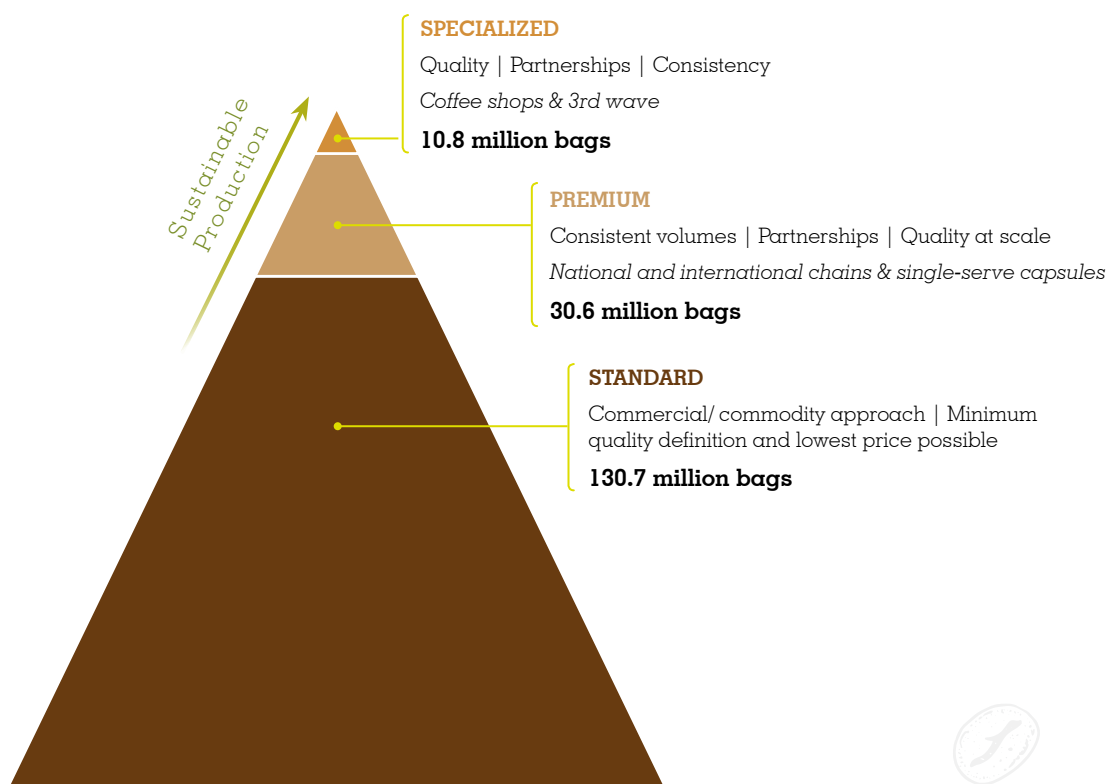
The Specialty Coffee Association tagline 'Because great coffee doesn't just happen' clearly highlights the importance of all the processes 'behind the cup'. It gives the message that specialty coffee is a matter of choice, not a beverage of chance.

This guide considers three quality segments across the entire coffee sector: standard, premium and specialized. These terms do not have globally recognized and quantifiable definitions and specifications.

This new quality segmentation model splits the Arabica and Robusta species into three groups along the post-harvest production process: washed, pulped natural/honey and natural.

The figure places the three segments in the context of the global coffee market, with an illustration of indicative volumes traded per segment.

Figure 1: Standard coffee dominates the market



Crop year: 2018/2019

Source: Carlos Brando, adapted by ITC (2021).



Table 1: Three coffee categories, segmented by quality

Indicative parameters
<p>Standard coffee</p> <ul style="list-style-type: none"> ▪ Standard quality denomination (commercial qualities) ▪ Minimum quality definition, lowest price possible ▪ Clear defect counts, but few quality attributes ▪ Price is the main driver ▪ Qualities are often interchangeable and traded in baskets ▪ Often traded in large volumes (multiple container loads in forward spreads) ▪ Quality parameters defined by ICE for Arabica and Robusta tendering ▪ Volatile pricing logic; mainly traded on a differential basis, price-to-be-fixed logic ▪ Little to no traceability (focus on food safety), no major focus on certifications, verifications as a viable alternative ▪ Final buyers are usually large roasters, soluble manufacturers, industrial sector ▪ Commonly used in blends ▪ Commercial/commodity approach ▪ Easily substitutable ▪ Category includes triage, low grades, stock-lots, etc.
<p>Premium coffee</p> <ul style="list-style-type: none"> ▪ Regional approach (e.g. Mogiana, Caldas, Yirgacheffe) ▪ Balances quality with price/value ▪ Traded on differential basis or outright basis ▪ Price premium for higher quality definition (e.g. strictly soft, fine cups, fancy) ▪ Combines factors of traceability and voluntary standards such as Fairtrade, organic, RFA/UTZ, or company sustainability programmes such as Nescafé PLAN, Starbucks CAFE Practices, Nespresso AAA, Lavazza Terra and Tchibo Joint Forces! ▪ Final buyers are usually midsize to big roasters and national or large coffee shop chains. Small buyers gain access through importers ▪ Usually one quality per container, but multiple containers with same quality ▪ Market access through additional quality components: traceability, sustainability projects, co-investments, etc. ▪ Frequently used as 'single origin' ▪ Sometimes used for blending and obtaining a specific cup profile
<p>Specialized coffee</p> <ul style="list-style-type: none"> ▪ Highest quality definition: main focus is quality, price is of secondary importance. ▪ Mainly traded on an outright basis ▪ Quality is the main driver, with presence of desirable flavours and other attributes such as variety, post-harvest-processing and certifications ▪ Sensoric cup profile: SCA-grading, Q cupping, etc. ▪ Explicit quality denomination: specific region, farm, variety, altitude, farmer/producer ▪ Innovative and traditional production process (e.g. pulped natural/honey, barrel-aged, anaerobic and yeast fermentation) ▪ Micro-lots with difficult replicability, championship coffees, Cup of Excellence, etc. ▪ Multiple qualities per contract/container, high coffee value ▪ Coffee farms with enough know-how, finance and international market access become 'producing exporters' ▪ Full traceability (farm-plot) and if certifications, then mainly organic and Fairtrade ▪ Final buyers: Small/midsize roasters, single shops, small/midsize coffee-shop chains. Growing presence in retail and digital marketplaces. ▪ Partnership/direct trade/stability of supply (long-term contracts of at least a year) ▪ Artisan roasteries, freshly roasted ▪ Rarer (e.g. high cup scores, high differentials, zero defects, unique stories)

Coffee species and varieties

There are more than 124 identified species under the *Coffea* genus. Producers, traders, roasters, baristas and consumers are familiar with *Coffea arabica* and *Coffea canephora*, known as Arabica and Robusta. A third commercial species originates in Liberia: *Coffea liberica*. Today, it grows mostly in Asia, with the Philippines the largest producer. Liberica has been reintroduced only recently for commercialization and is produced on a much smaller scale.

Most species have not been commercialized. Scientists are interested in them because of the lack of genetic diversity of plants now in cultivation – a major concern for the coffee industry. These species can also provide breeding material to help improve the resilience of Arabica.

Within the Arabica species, many varieties exist. Some are natural mutations and others are the result of crossbreeding for productivity, quality and/or resilience.

Box 1: Species, varieties and varieties

The terms 'species', 'variety', 'cultivar' and 'varietal' can be confusing.

What is a coffee species?

The species is the lowest level of hierarchy within taxonomic classification, where a group of species with similarities make up a 'genus'.

Coffea is a genus of flowering plants in the family Rubiaceae. *Coffea* species are shrubs or small trees native to Africa, Madagascar, Indian Ocean islands and Australasia.

What is a coffee variety?

Varieties are genetically distinct variations of a single species, in this case *Coffea arabica*, that may show different characteristics in the tree structure, leaves or fruit. They can be defined as distinct one from another group, homogeneous and stable (when reproducing).

'Cultivar,' a truncation of 'cultivated variety', is often used as an equivalent of 'variety'. However, it differs in that the cultivar is the result of genetic improvement techniques, while varieties are generated spontaneously from the reproductive process of two parent plants.

'Varietal' should be used when referring to a specific instance of a variety. When referring to the production of one farm, for example, it would be correct to say that it was 100% Bourbon varietal.

Source: The World Atlas of Coffee (2018) and Coffee Sapiens (2019).

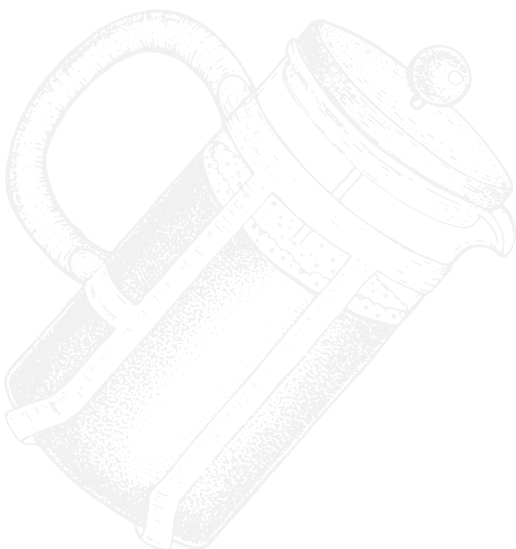


Table 2: Twenty-six differences between Arabica and Robusta

	Arabica	Robusta
Botanic name in Latin (species)	<i>Coffea arabica</i>	<i>Coffea canephora</i>
Origin	Ethiopia in East Africa and then disseminated via Mokka (in today's Yemen) on the Arabian Peninsula.	West and Central Africa – Guinea, Côte d'Ivoire and between the Atlantic Ocean and Lake Victoria, in and around the Congo Basin and Uganda.
Regions with the largest production today	Central America, South America and East Africa.	Viet Nam and other parts of South-East Asia, Brazil and West/Central Africa.
Annual production	Around 90 million bags (60kg) = 5.4 million tons.	Around 60 million bags (60kg) = 3.6 million tons.
Portion of world production	60% – dropped from 75% in 1965.	40% – up from 25% in 1965.
Ideal elevation	700m–2,200m (2,300–7,200 feet).	0–900m (0–3,000 feet); up to 1,600m is possible.
Ideal temperature (yearly average)	16°C –24°C (61°F –75°F).	21°C–30°C (70°F–86°F).
Ideal rainfall	1,200mm–2,200 mm (50–85 inches).	1,200mm–3,300mm (70–125 inches).
Resistance to diseases and pests	Sensitive – and global climate change is a challenge.	Generally high tolerance.
Height if not pruned	Up to 7m (22 feet).	Up to 15m (50 feet).
Trunk and branches	One solid trunk and many horizontal branches.	Often pruned to have around three stems with many branches – overall like a large bush.
Duration from flowering to harvest	7–9 months.	9–11 months.
Pollination	Self-pollinating (self-fertile), so the plant's own pollen can produce fruit. It is also able to cross pollinate at a rate of up to 50%.	Cross-pollinating (self-sterile), so the plant requires pollen from another plant to produce fruit.
Chromosomes	44 (genetically complex; tetraploid).	22 (genetically simpler; diploid).
Shape and size of the bean	Oval, 7mm–12mm.	Round, 5mm–8mm.
Colour	Light green, almost grey.	Brownish yellow.
Shape of the centre cut (slit, groove, furrow) on the bean	Zig-zagged or curved like a long S.	Almost straight.
Caffeine content	0.8%–1.6%.	1.5%–2.5% – can be higher.
Sugar content	6%–9%.	3%–7%.
Oil content	15%–17%.	10%–12%.
Sensory and other attributes	Sweet and aromatic with a range of fine flavours and some desirable acidity.	Strong and intense, sometimes even harsh. Smooth, wholesome mouthfeel to the cup. Forms an elegant crema on espressos, preserving aromas and temperature.
Main commodity exchange where traded	ICE Futures United States, New York	ICE Futures Europe, London
Units used at the commodity exchange	\$ per 37,500lb (17.01 tons = one container).	\$ per 10 tons (22,046lb).
Price at the commodity exchange (examples)	\$1.53 per lb, referring to the export price (FOB) from producing countries.	\$2,023 per ton = \$0.91 per lb, FOB. The price is typically around two-thirds of the price of Arabica.

Note: Altitudes, temperatures and yields in the table are based on the author's assessments of data from many sources that sometimes differ.

Source: Morten Scholer (2018), *Coffee and Wine* – adapted.

Arabica and Robusta: The two main traded coffee species

The coffee industry treated Robusta as if it were inferior to Arabica until an interesting genetic discovery was made. It appears that Robusta is not a cousin or sibling of Arabica, but in fact a parent of Arabica. Robusta crossed with another species called *Coffea eugenioides* and produced Arabica. This new species spread and began to flourish in Ethiopia, long established as the birthplace of coffee.¹⁷⁸

The main focus in Arabica genetics in the last 20 years has been on:

- Aromatic quality (notably with the discovery of Geisha)
- Rust and disease resistance
- Climate change
- Yield increase

Meanwhile, there has been a wake-up call in the coffee sector, reviving interest in Robusta genetics with a special focus on:

- Quality
- Climate change
- Yield

The development of Robusta could be a milestone for the coffee industry. Robusta represents an ocean of opportunities, with huge potential for return on investment because of its genetic diversity. The combination of resilience, cup quality and productivity is a powerful one.

R&D is giving rise to new hybrid varieties named 'Arabusta' – a cross between Arabica and Robusta that is the first generation (F1) of its kind. The idea is that this F1 hybrid retains the good genes of Arabica – and the cup quality – while tapping into the resilience and productivity of Robusta. These hybrids can be further combined with pure Arabica to introgress, or bring in, the important resilience genes from Robusta into Arabica. This is often done over multiple generations, which generates new resilient lines of Arabica with the key genes that offer resilience.

Coffee varieties

Varieties refers to the genetic differentiation of the plants. They must be distinct, uniform and stable. The exact number of distinct coffee accessions in the world remains unknown. According to estimates, in Ethiopia alone there are as many as 6,000–10,000 unique accessions. The best known coffee varieties are Typica and Bourbon, varieties of *C. arabica* that are considered to be the first to have been developed.

Arabica varieties have evolved over time, starting with wild accessions and going through phases of domestication. Yemen was a major place of coffee domestication. Coffee farmers selected what they considered to be the best types or varieties, including Bourbons and Typica. In the 1940s and 1950s, the first man-made crossings were performed in Brazil to develop new varieties Catuai and Mondo Novo. From then on, crosses have involved many different parents, including some with Robusta genes for resistance to rust (this eventually led to large groups of Catimors and Sarchimors).

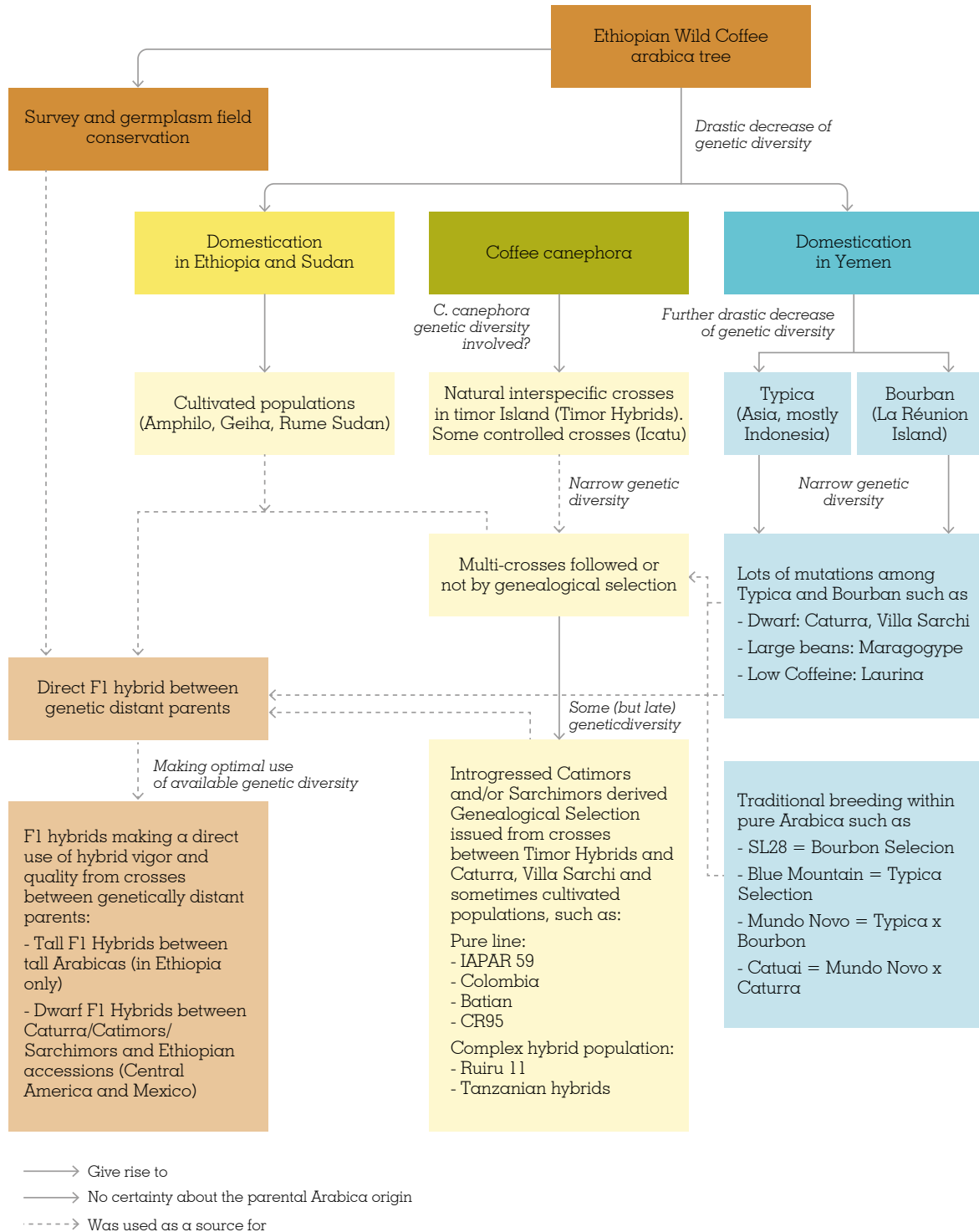
More recently, new crosses have been made between original Ethiopian varieties and cultivated varieties in Central America – these are the F1 hybrids.

The importance of coffee varieties affects all players along the coffee supply chain, the consumer included. Different varieties can have different sensory characteristics that influence the taste and aroma of the final elaboration. These characteristics are, in turn, linked to the cultivation conditions and elaboration along the supply chain. Each variety corresponds to certain physical/chemical characteristics and, consequently, different types of recommended good practices.

178. Scalabrin, S., Toniutti, L., Di Gaspero, G., et al. (2020). 'A single polyploidization event at the origin of the tetraploid genome of *Coffea arabica* is responsible for the extremely low genetic variation in wild and cultivated germplasm.' *Scientific Reports*, 10, 4642 pp. 1–13. <https://doi.org/10.1038/s41598-020-61216-7>

The figure below illustrates how the main species, varieties, hybrids and crosses of coffee interplay.

Figure 2: The genealogy of the main varieties of *Coffea arabica*



Source: Christophe Montagnon in Cropster's Specialty Coffee Managing Quality, fully revised 2nd edition (2019).

COFFEE VARIETIES AND OPPORTUNITIES FOR INNOVATION

There has been a loud wake-up call of late on the importance of varieties in Arabica. Genetic conformity is a key component to ensure that varieties perform as expected.

Although diversity within Arabica coffee is low, there is still enough for coffee breeders to develop new varieties, such as pest- and disease-resistant varieties that also have high cup quality. In addition, coffee breeding programmes have successfully increased yields, which is very important for farmers.

A major challenge in tree crop variety development is that new varieties may take up to 25 years to develop – and even then, may not have all the traits farmers and consumers want (a pest-resistant, high-yielding variety with high cup quality).

The good news is that modern breeding methods, such as genomic selection, can accelerate progress. This reduces the time it takes to generate new varieties – which is critical, given climate change challenges.

Variety has become central to discussions in the last decade because of climate change threats. Improved genetics through improved varieties can build resilience to a changing climate and diseases such as rust.

Selecting varieties based on disease-resistance was a major trend in the 1980s and 1990s. However, the market soon grew disappointed by the quality. This triggered research and development of varieties that are both resistant and offer good cup quality.

A healthy, organized coffee seed and nursery sector is important to ensure that farmers can obtain genetically pure coffee varieties. Today, this sector is unreliable and disorganized. There is no guarantee that farmers who want seeds or seedlings of a given variety will be able to get them, or that the variety they obtain is 'true-to-type'.

For example, if a farmer wants a rust-resistant variety, the purchased seeds must be from a pure line to ensure that they are truly resistant. More often than not, seeds are not maintained in a way that preserves the genetic purity of the line. This remains a major challenge in coffee production.

Box 2: Geisha: A story of serendipity

The perfect example of the use of genetic resources in coffee is the story of Geisha.

During an expedition to Ethiopia to collect coffee seedlings in the 1930s, Geisha was a variety that was collected and sent to Kenya and Tanganyika (now the United Republic of Tanzania). One seed was planted in Tanganyika and given the name VC496.

In the 1950s, the FAO collected VC496 seeds and sent them to the CATIE genebank in Costa Rica. In the 1960s, the Panamanian government brought back new coffee varieties from CATIE to Panama. Of the three or four varieties collected, one was Geisha. These plants were distributed to farms in Boquete, a small mountain town in Panama. One of the lucky recipients was Hacienda La Esmeralda, the Panamanian farm that made it famous.

For Boquete harvest of 2004, Daniel Peterson took the then-unusual step of separating the pickings of a small group of coffee trees, known as Geisha, from a hill that had been planted with this, until then, unknown variety on the Peterson-owned Esmeralda farm. These uniquely large cherries were processed separately and after cupping the results, Peterson opted to enter the lot into the Best of Panama competition.

Those beans shocked and delighted the international jury, swept the competition and went on to sell at auction for more than \$20 per pound, a world record price for the time. Panama Geisha has continued to please cuppers and consumers around the world, and expand the possibilities for extraordinary coffee everywhere.

The story of Geisha illustrates the importance of conserving coffee genetic resources in genebanks. The plant was hiding in plain sight for 80 years before its unique flavour met just the right moment in history. At the time that Geisha was collected in an Ethiopian forest, the super-specialty coffee market didn't exist. It was fortunately preserved until the world was ready to recognize and embrace its unique traits.

Source: International Women's Coffee Alliance (2021) and Rachel Peterson, Hacienda La Esmeralda, Panama (2021).

World Coffee Research is addressing this by supporting low-cost, broadly available tools to improve confirmation of genetic purity. It also focuses on increasing use of these tools to improve farmers' certainty on what planting material they can access. World Coffee Research has technical manuals with best practices for nurseries to maintain genetic purity and healthy planting material, in order to improve conformity and organization in the seed and nursery sector.

Genetic progress in coffee varieties

Traditional Arabica varieties are a product of fortunate and naturally occurring mutations, or are orchestrated by humans in agricultural settings.

Breeding of Arabica started with a strong domestication process in Yemen that gave rise to the traditional Arabica varieties, on top of the existing 'wild' varieties in Ethiopia. Genetic progress in coffee did not take place until the mid-twentieth century, when the Bourbon, Typica and SL28 varieties appeared as children of the domestication process.

In the mid-1950s, the first controlled pollination took place, as a result of a strong domestication work in Brazil. This gave rise to the Mundo Nuovo and Catuai varieties.

This was followed by the period of introgressed varieties, such as Catimor and Sarchimor. Breeders call introgression the process taking selected genes from one species to another. The resulting varieties are called introgressed varieties. In the 1960s–1980s, Brazil, Colombia, India and Indonesia and regions such as Central America and East Africa all experimented with their own introgressed varieties.

The table indicates the origin of some renowned varieties. Varieties within a cell originate from a cross between the interspecific parent in the column and the traditional variety/varieties in the row.

Table 3: Introgressed varieties and their origins

	TH 832/1	TH 832/2	TH 1343	Various TH	Icatu
Caturra	Mostly Central American Catimors: CR95, Lempira...		Mostly Colombian Catimors: Variedad Colombia, Castillo...		
Villa Sarchi		Sarchimors: Obata, Marsellesa, Parainema...			
Catuai				Mostly Brazilian varieties (sometimes called Cavimors): Catigua, Paraiso...	Catuai
Mundo Novo					Various generations of Icatu
Indian and East/Central African varieties				Kenya: Batian India: Various Sln populations such as Sln5, Sln6 Rwanda: Rabc15	

Source: Christophe Montagnon, RD2 Vision, 2020.

New hybrids

The late 1990s and early 2000s marked a period of F1 hybrid development in countries and regions that chose this strategy (Central America, Kenya and United Republic of Tanzania). Brazil and Colombia followed different breeding strategies.

Brazil went for multiresistance combined with improved cup quality interspecific hybrids. This means a single variety combined resistance to rust, nematodes and bacterial blights. The result of this strategy are the following recent varieties:

- **IAC 125 RN**: In Brazil, derived from a cross between the coffee cultivar Villa Sarchí and the Hibrido de Timor CIFC 832/2;
- **IAC Obatã 4739**: Derived from a cross between coffee tree IAC 1669-20-1 and cultivar Catuaí Amarelo IAC 62;
- **IAC Catuaí SH3**: Developed through the pedigree method, from the recombination of the coffee tree H 2077-2-5-46, of the Catuaí Vermelho germplasm, with accession IAC 1110-8, from the exotic cultivar BA10.¹⁷⁹

Colombia pursued a multiline strategy for resistance to diseases, together with improved cup quality. A multiline strategy leads to means a new variety by combining several different varieties. It can only be applied in a country with an outstandingly organized and centralized coffee seed sector. The famous Castillo and Colombia varieties are the result of this strategy.

Brazil brought different genes into the same variety, while Colombia mixed different lines with different genes as a multiplying variety.

Meanwhile, F1 hybrid development was actively pursued elsewhere. An F1 hybrid – a cross between genetically distant parents – performs better than either parent. Breeders call this hybrid vigour or heterosis. Thus F1 hybrids can be stronger and more resilient than pure-line materials.

In coffee, the genetic distance is found between Ethiopian landraces and traditional or introgressed varieties. Given that pure-line development may not generate new varieties for 25 years, and more varieties are susceptible to rust as resistance breaks down, attention has turned to F1 hybrids. These require mass-propagation in laboratories. Laboratory researchers can engineer hybrids in laboratories more quickly than replanting pure-line varieties.

Hybrid varieties can yield superior coffees with disease resistance and sometimes extraordinary cup quality. In Costa Rica, some F1 hybrids have increased productivity of the widely planted Caturra and Catuaí by up to 30%–40%. In East Africa, the presence of both rust and coffee berry disease means that F1 hybrids such as Ruiru 11 (Kenya) and Tanzanian hybrids have a slightly more complex genetic makeup.

Hybrid vigour can lead to better quality, higher productivity and greater resilience and climatic adaptivity. However, a coffee's quality depends on many factors. Elevation, distance from the equator and temperature all affect how fast the cherries ripen – and the slower they ripen, typically, the better the flavour. The soil can provide nutrients that lead to healthier coffee trees, and therefore better coffee beans.

Different coffee plants are suited to different environments. Planting, harvesting and processing methods also ensure quality.

179.lasm, with accession IAC 1110-8, from the exotic cultivar BA10



Researcher taking notes on coffee plants in Guatemala.

Research centres

The Tropical Agricultural Research and Higher Education Centre (CATIE), in collaboration with the French Agricultural Research Centre for International Development, developed a hybrid programme in Central America. Their method involved crossing commercial varieties such as Caturra, Catuai and CR95 with materials from wild coffee in CATIE's collection.

This collaboration resulted in the development of 100 F1 hybrids. Of these, 20 were selected and reproduced via biotechnology. The next stage was 6–7 years of field research to further narrow down which of those hybrids should be made commercially available. The CATIE team looked for high productivity, good rust resistance and high cup quality.

Under the auspices of research and cooperation network PROMECAFE, at least three of these 20 hybrids were released in Central America: Centroamericano, Milenio and Casiopea. There are plans to test them soon in parts of South America, Africa and Asia.¹⁸⁰

So far, the hybrids have proven successful. Centroamericano, the result of a hybrid developed through a collaboration between the French Agricultural Research Centre for International Development and PROMECAFE, made headlines a few years back for scoring 90.5 points in the Nicaraguan Cup of Excellence – an exceptional result, and one that is promising for the future of F1 hybrids. Centroamericano is a cross between the Sudanese landrace Rume Sudan and a rust-resistant variety called T5296. Along with the potential for high-quality coffee, it is high yielding and was rust resistant, until some new races appeared in Central America.

For decades, national coffee research institutes, such as the Instituto Agronômico de Campinas in Brazil and Cenicafé in Colombia, generated genetic gains in coffee breeding. Since 2012, research centres such as CATIE and, more recently, World Coffee Research have collaborated on a genetic improvement programme through partnerships with national coffee research institutes.

Coffee breeding programmes recombine Arabica germplasm in new combinations to combine productive trees with additional traits to improve production value for farmers and cup quality. Most programmes to date have focused on pure-line varieties, though others have been known to explore and develop hybrid programmes.

180. <https://perfectdailygrind.com/2017/06/coffee-varieties-what-are-f1-hybrids-why-are-they-good-news/>

Quality and coffee cultivation

Production and processing systems influence quality. Exporters can never be certain of all the components and inputs that make up consistent quality. They should know the basic norms in climate, soil and other agricultural factors in the growing areas. Exporters can then adjust processing techniques to get the best result. Even annual weather variations can often be partly offset by processing adjustments.

The best quality is obtained from selective picking in which only red, ripe cherries are gathered by hand in successive picking rounds until most of the crop has been harvested. When coffee prices are low, this time- and labour-consuming method is expensive. Stripping allows individual pickers to harvest between three and four times more per day, considerably reducing the number of picking rounds.

Mechanical harvesting uses hand-held machines or large-wheeled mechanical harvesters, often self-propelled. This further reduces the number of picking rounds. However, bulk mechanical harvesting is not feasible where coffee trees carry ripe cherries and flowers or pinheads at the same time – where the year's harvest is split between early crop and main crop, for example. Mechanical harvesting is also not possible in steep terrain, common in many coffee-growing regions.

Modern technology allows for fairly effective separation of ripe, unripe and overripe cherries that can then be processed separately.



Pruning coffee trees.

Soil and plant health

Growing strong, healthy coffee trees involves balancing sun, water, wind and soil nutrients. When it comes to soil quality, however, there is no one-size-fits-all solution. Many factors influence the outcome.

Soil composition plays a fundamental role, supplying the water and nutrients essential for the coffee plant's growth, development and fruit production.

The coffee plant does not favour a single type of soil, as it can adapt to various types of terrain. In general, however, it prefers moist, deep, porous, well-drained and well-balanced soils that are rich in organic material and have a granular structure able to absorb water rapidly and drain away the excess. One of the most common and widespread factors that limits coffee growing is the soil's acidity.

Soil testing is crucial for producers to determine where specific varieties best grow. However, access to soil testing varies, depending on the country. Producers in Brazil, Colombia, India, Viet Nam and countries in

Central America generally have good access. Producers in other countries have poor access to these services, which puts them at a disadvantage.

Healthy soil is also essential for coffee plants. It ensures the health of the plant, without which quality cannot be achieved. Soil conservation and plant nutrition are both crucial for successful plant cultivation.

Soil conservation is a common problem in many tropical regions where coffee is produced at higher altitudes. The soil must be protected from erosive effects of tropical and torrential rains, particularly in mountainous regions and on steep slopes.

Awareness about the importance of good soil for sustainable, quality production has grown over the last decade. If soil does not have healthy organic matter, then fertilizers will not be effective. Organic matter acts like a sponge that retains good elements. Even production systems that depend heavily on synthetic chemical fertilizers, common in nearly every coffee-producing country, benefit from conserving organic matter in the soil.

Agroforestry is another major development in the last decade. While it is not the dominant model of production, it is a growing trend. Agroforestry is good for soil conservation, organic matter, biodiversity and environmental services such as improving carbon capture. Shade-grown coffee and agroforestry are strongly recommended production models.

Agroforestry and cover crops improve soil health, which in turn increases the effectiveness of fertilizers.

To achieve soil health, both a plant nutrition strategy and an effective coffee ecosystem must be in place. A coffee ecosystem offers farmers the data and services they need to inform their plant nutrition strategy.

Box 3: What is a coffee ecosystem?

A coffee ecosystem is crucial to coffee producers and plays a major role in the success of their activities. Some countries, such as Brazil and Colombia, have strong coffee ecosystems and production that matches. Others, including Papua New Guinea and Burundi, have much weaker coffee ecosystems and face more obstacles in producing at scale.

A coffee ecosystem comprises a community of providers, namely:

- Nurseries
- Fertilizer providers
- Pesticide providers
- Soil analysis services
- Advice bodies: government extension services, cooperatives and unions, private extension services, traders and technical assistance, coffee quality training facilities
- Agricultural research and development services
- Efficient markets for inputs, equipment and coffee trade
- Efficient logistics
- Financial services
- Strong institutional sector
- Low and competitive taxes and fees

Source: ITC.

Links between elevation, climate and quality

Location (latitude, altitude and soil) has a decisive effect on coffee production and quality.

Latitude influences bean size and affects coffee production. Coffee grows in the zones between the Tropic of Cancer and the Tropic of Capricorn (intertropical zone), 23° to the north and south of the equator, in the so-called coffee belt.

The Crop Calendar is a useful tool to assess harvest times and associated export times per country.

Elevation influences production in several ways:

- It can offer a consistent range of ideal temperatures. Drastic temperature changes are detrimental to plant and fruit health.
- Cooler temperatures slow, yet improve, the fruit's aroma.
- High elevation increases acidity.

Altitude strongly influences the development of both the plant and its fruit. It can affect characteristics of the final product and its body, acidity, aroma and fineness.

High altitude improves quality but complicates production. Acidity, density and aromatic intensity increase at higher altitudes, but yield is lower. The higher the altitude, the lower the temperature. Lower temperatures decrease productivity and slow the maturation rate of the coffee cherries. This slow maturation process is what increases the quality and cup profile.

Higher altitude increases lipid content as a reaction to low temperatures. Lipids are the containers of aromas and have a sponge effect. That is why coffees at higher altitudes typically have more delicate and complex aromas. The extreme temperature variation from day to night plays a role, as plant stress increases lipids and sugars, the two precursors of aroma. Some 200–250 chemical compounds in green coffee become more than 1,000 chemical aroma compounds during roasting.

Farmers who grow coffee at high altitudes should capitalize on this by selecting high-quality plant varieties.

The optimal altitude for quality and agronomic performance potential takes into account the variety's expected cup quality and tolerance to coffee leaf rust and coffee berry disease. Optimal altitude depends on a farm's latitude. Farms located near the equator have higher optimal altitudes than those farther north or south of the equator.

Table 4: Optimal altitude in relation to latitude

Latitude	Low	Medium	High
5°N to 5°S	1 000–1 200m	1 200–1 600m	> 1 600m
15°N to 5°N and 5°S to 15°S	700–900m	900–1 300m	> 1 300m
> 15°N and > 15°S	400–700m	700–1 000m	> 1 000m

Source: WCR and Christophe Montagnon, RD2 Vision (2021).



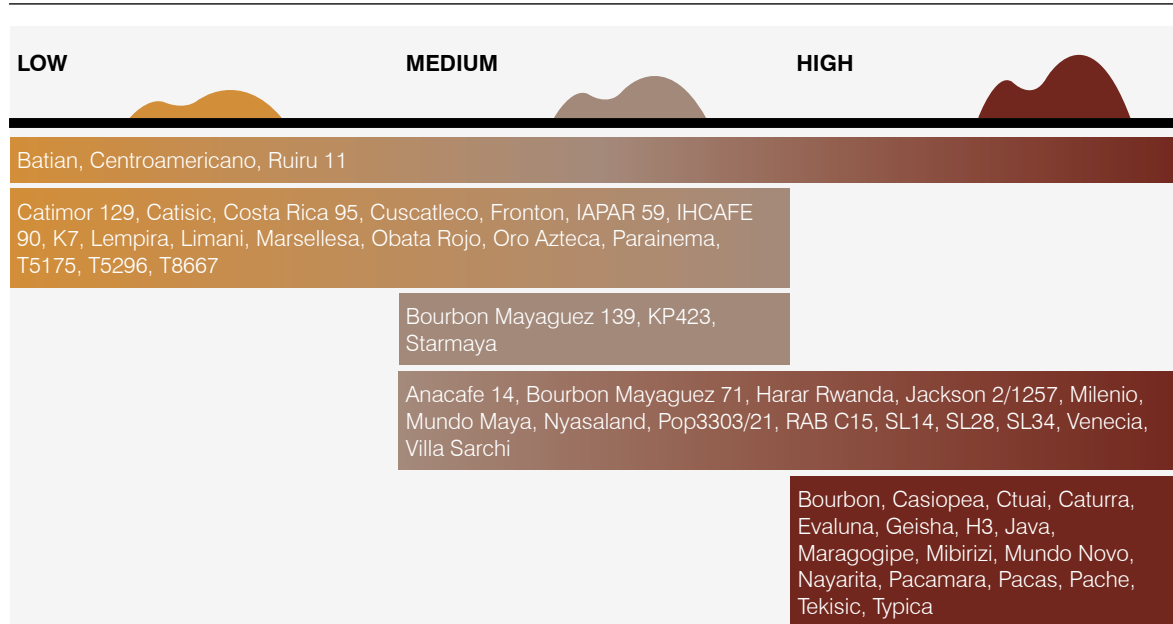
IMPORTANT INFO

Coffee grows from sea level to 2,000 metres. Arabica varieties develop best between 600 and 2,000 metres and occasionally even at higher altitudes.

Coffee Sapiens (2019)



Figure 3: Choosing the right variety based on altitude



Source: World Coffee Research (2021), adapted by ITC (2021).

This table is for Central America and East Africa, where there can be a huge variation in altitude. Brazilian varieties are primarily low altitude while Colombian varieties are largely high altitude.

Box 4: Climate affects the coffee life cycle

Coffee responds to the stimulus of different weather conditions. Temperature, rainfall, sunlight and relative humidity affect commercial organic production.

Temperature

Temperature regulates all the biological processes of the plant – its nutrition, metabolism and the growth and development of fruit. Generally speaking, fruit production falls within certain annual temperature limits.

Rainfall

Any water deficit or prolonged drought influences the development of the coffee plant. Water makes up 80% of the live weight of the plant, in either liquid or metabolic form. The plant requires 1,500–3,000mm of water per year and should not be exposed to dry periods of longer than four months.

Sunlight

Light regulates a plant's behaviour according to the duration (number of light hours), intensity (radiant energy) and quality of its rays. The length of exposure to the sun affects both growth and flowering.

Relative humidity

This is the quantity of water in vapour at a given temperature. The evaporation of water from the plant and soil due to a certain temperature leads to an increase in the relative humidity. In contrast, relative humidity decreases during prolonged dry periods with high temperatures. The coffee plant generally needs relative humidity of 60%–70%; anything beyond this facilitates the development of fungal diseases.

Source: Coffee Sapiens (2019).

Rain-fed vs irrigated

Rainfall drives proper coffee cherry development, from flowering to maturation. Abundant and timely watering is crucial to production. Arabica and Robusta coffee trees have different water requirements based on altitude, latitude, soil composition, shade and microclimate.

Climate change brings a new wave of challenges to coffee trees, exposing them to prolonged stress periods of drought or extreme rainfalls, storms, hail or humidity.

At the time of drafting this publication, no extensive research studies were found on the positive correlation between coffee cup quality and irrigation. However, it is widely accepted that stressed coffee trees do not produce optimal, well-formed cherries. Malnourished coffee trees produce smaller beans with more defects – which has a negative impact on the cup profile. The coffee plant is drought resistant, but not drought proof; it needs water to live and thrive, as do all living species.

This means some coffee farmers must use alternative watering systems such as artificial irrigation or wetting. Adequate soil moisture also boosts productivity.

Today, irrigation is often used in coffee-producing countries. The methods and technologies vary in each country and from farm to farm.

Large farms invest in irrigation systems such as ‘centre-pivots’ (automated overhead sprinkler irrigation) or ‘drip-irrigation’, a smart irrigation technology. Small farms typically use the more affordable wetting method, where water is pumped onto the fields to flood them. Irrigation systems calculate and monitor the right amount of water needed. Wetting systems can be quite inaccurate in their water-efficiency ratios.

Technology is a huge asset for irrigation systems. Drip-irrigation, for example, saves 35% more water compared to the centre-pivot method. As water becomes scarce in certain regions because of climate change, this needs to be taken into account when considering irrigation systems.

In Brazil, up to 8% of the Arabica production area of 1.5 million hectares is irrigated. Most of the Cerrado region uses drip-irrigation systems, and combinations of centre-pivots and drip-irrigation are also common. The Robusta-producing area (better known as Conilon in Brazil) of 520,000 hectares is fully irrigated.

Box 5: Drought: Its effect on quality

Phenolic compounds help plants adapt to environmental stress. Chlorogenic acids and related compounds are the main components of the phenolic component of green coffee beans, reaching levels up to 14% (dry matter basis).

These compounds have health benefits related to their potent antioxidant activity as well as hepatoprotective, hypoglycemic and antiviral activities. Chlorogenic acids are important determinants of coffee flavour. They contribute to the final acidity and confer astringency and bitterness.

Drought- and heat-affected trees are likely to produce coffee beans with higher amounts of phenolic compounds. The bean's chemical composition changes as a result of extreme growing conditions, and so does the cup profile.

This is a logical phenomenon because healthy, vigorous trees always produce better quality than stressed trees.

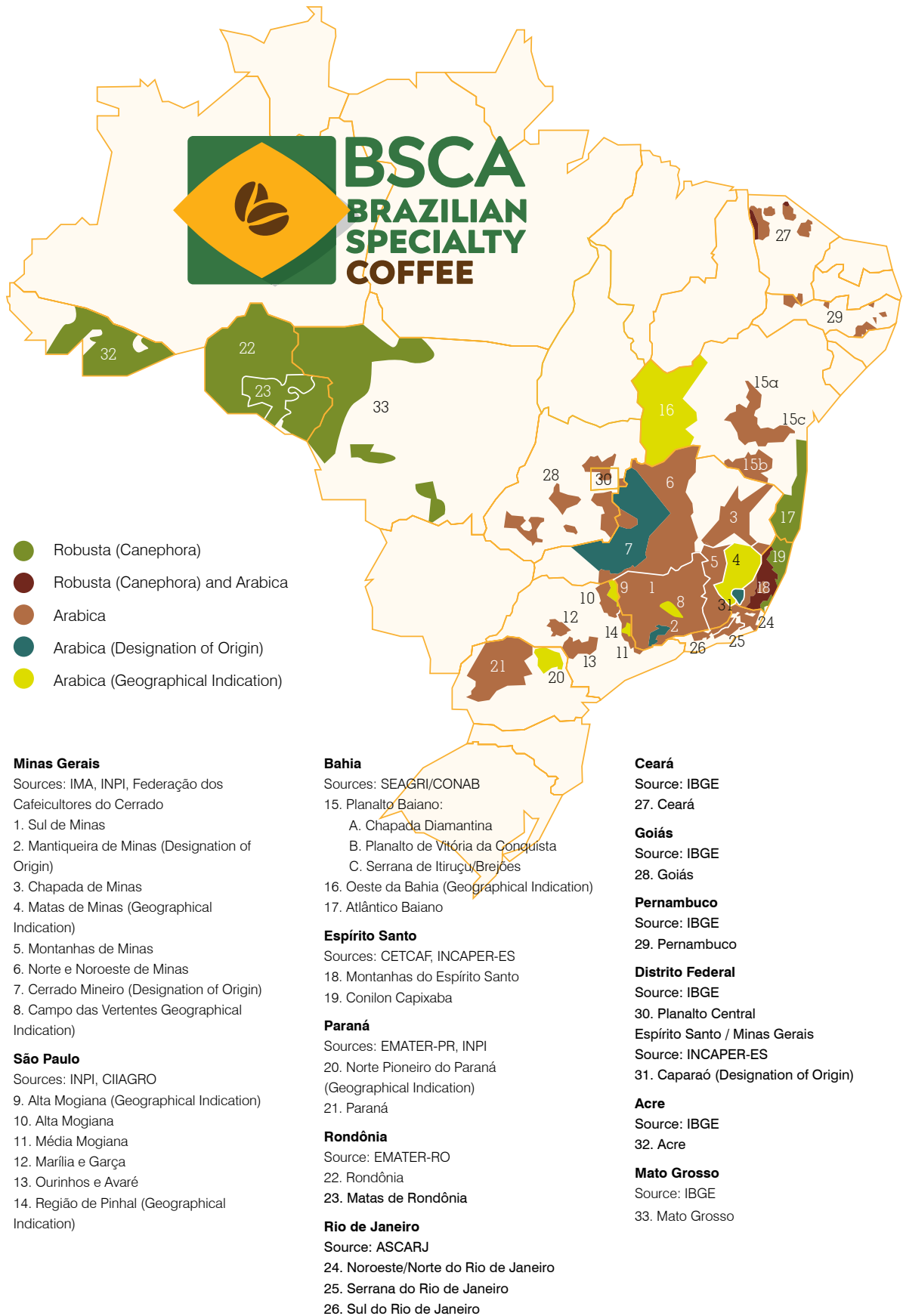
Non-irrigated coffee in marginal rainfall areas usually shows the greatest seasonal quality variation. The most likely remedy would be at least a minimal level of irrigation.

Source: ITC (2021) and Brazilian Journal of Plant Physiology (2006).

Irrigation is seemingly a prerequisite for Viet Nam's high Robusta production. The wetting of coffee fields is a common practice and has taken a toll on declining ground water levels. This method is also used in some Robusta production areas in Espirito Santo, Brazil.

Some – usually larger – farms build water reservoirs or use irrigation for emergencies only, i.e. droughts, instead of supplementing insufficient or poorly distributed average rainfall. In India, irrigation is mainly used to trigger the flowering process, while some large farms in the southern regions of the United Republic of Tanzania use drip-irrigation to nurture the trees during droughts.

Figure 4: Brazilian coffee origins



Source: Brazil Specialty Coffee Association and Eduardo Sampaio, adapted by ITC.

Links between farming systems and quality segments

There are many farm sizes and farming systems. These have generally been categorized into three models described in Chapter 3 of this guide: small, medium-sized and large.

To keep quality and productivity stable in a way that is profitable, each model must find a balance between input, output and yields that works. The goal is to manage risk by lowering inputs, without affecting quality and productivity too much.

Table 5: The different worlds of coffee production systems

Capital	Labour	Decision-making	Production costs	Practical steps
Typology: Small farms				
Family	Family	Family	<ul style="list-style-type: none"> Low inputs Low productivity Low yields Low investment risk High return on investment 	<ul style="list-style-type: none"> Keep production costs low to increase return on investment Diversify income streams Engage with farmer associations to leverage technical and economic benefits
Typology: Medium-sized farms				
Often family	Family + hired	Family	<ul style="list-style-type: none"> Low-medium inputs Low-medium productivity Low-medium yields Low-medium investment risk Uncertain return on investment 	<ul style="list-style-type: none"> Increasing yields with reasonable costs and investments in a stepwise approach help stabilize return on investment Diversify income streams Engage with farmer associations to leverage technical and economic benefits
Typology: Large farms				
Company	Hired	<ul style="list-style-type: none"> Farm manager Technical staff 	<ul style="list-style-type: none"> High input High productivity High yields High investment risk Uncertain return on investment 	<ul style="list-style-type: none"> Control risk of dependence on fertilizers Control risk of dependence on high yields to cover production costs

Source: Christophe Montagnon, RD2 Vision (2021).

Table 6: Farm management based on quality segment

Capital	Production costs	Practical steps
Farm size: Small, medium-sized and large		
<ul style="list-style-type: none"> Avoid defects Focus on the quality of the harvest and post-harvest Variety is of little importance Plan exact harvesting practices: either multiple pickings of ripe cherries, or one stripping process Good harvest and post-harvest practices 	<ul style="list-style-type: none"> Find a balance between yield and quality Select the suitable variety for farm size, agroecological conditions and sales market 	<ul style="list-style-type: none"> Outstanding cup quality can only be achieved through outstanding varieties Variety is of paramount importance Choose quality over yield potential Good harvesting and post-harvesting practices are paramount, as mistakes at any stage cannot be corrected Access to buyers who can pay high prices to cover high costs of production Producing specialized coffee in the long term requires high dedication and knowledge, ranging from agriculture to production to finance, marketing and management skills

Source: Christophe Montagnon, RD2 Vision (2021).

Common pests and diseases

Pests and diseases can ruin a coffee crop. A badly handled infestation or outbreak can mean financial hardship or even devastation.

Coffee crops are vulnerable to infestation or outbreak due to:

- **Genetics.** Some coffee varieties are more resistant. For example, Bourbon Pointu/Laurina is very susceptible to leaf rust.
- **Environmental conditions.** Specific pests and diseases depend on environmental conditions. For example, the coffee borer beetle thrives in humid conditions. Some diseases, on the other hand, are almost universal. Coffee leaf rust is a fungus that is one of the biggest threats to coffee. It is present in almost every coffee-producing country, regardless of local environmental conditions.
- **Crop management.** Poorly managed crops have a serious impact on yield and profit. Damaged coffee plants are susceptible to fungal infection and improper fertilization can cause structural weakness.
- **Economics.** Insufficient cash flow for investment in fertilizers, new plants or pesticides make crops more vulnerable to pests and diseases.

There are more than 900 species of insects, various other pests (including microscopic parasites, molluscs, birds and mammals) and a large number of diseases that attack coffee crops.

Most pests and diseases are restricted to just one continent. Only a few pests are widespread throughout the tropics. Most of these pests have been accidentally spread through infested coffee shipments.

A series of diseases and pests can put the whole coffee plant or its individual parts under stress. These can be categorized into five groups of pests and diseases: Fungi, viruses, bacteria, insects and nematodes.

- **A fungus** can be a unicellular organism like yeast, or a multicellular organism, for example, in the form of mushrooms.
- **A virus** has no cell structure and requires a living host to survive. For humans, it is possible to vaccinate against many viruses. For coffee plants, various forms of prevention can reduce the transmission by insects or otherwise.
- **A bacterium** is a single-celled microorganism. It exists in living hosts like human beings and animals as well as in water and soil. A bacterium can be beneficial or harmful and is up to 100 times bigger than a virus.
- **Insects** can damage in two ways that are independent of each other: either as parasites that destroy by feeding on the fruit, or by leaving eggs that hatch into larvae, or as vectors that are harmless but transmit fungi, viruses and bacteria to plants and fruits.
- **Nematodes** are a diverse animal phylum inhabiting a broad range of environments. They represent a major threat to Arabica coffee-growing regions.

The best way to prevent pests and diseases is through good farm management. Variety choice, shade management, selective pesticide use and plant nutrition are important considerations. Disease and pest control measures fall into six main categories:

- Cultural practices such as pruning, sanitation, mulching and fertilizing
- Mechanical control – e.g. traps
- Chemical control with fungicides, insecticides and herbicides
- Biological control
- Shifting to resistant varieties
- Integrated pest management would include a combination of these strategies

The term 'pesticides' for substances used to counter pests is not always used consistently. The term sometimes refers to the entire group of chemicals, like insecticides against insects, fungicides against fungus and herbicides against weeds. In other contexts, the word is used for insecticides only.

Table 7: Common diseases and pests in coffee trees and cherries

Name of disease or pest	Distribution range	Symptoms and damage	Pest management and remedies
PREHARVEST PROBLEMS			
Pest problem: Fungi			
Coffee leaf rust <i>Hemileia vastatrix</i> Often just called rust or <i>roya</i> in Spanish.	Worldwide	<ul style="list-style-type: none"> Affects Arabica coffee. Yellow and orange powdery spots develop on the leaves, which then fall off. The fungus moved from East Africa to Ceylon (Sri Lanka) in the late nineteenth century and to West Africa in the 1950s. The first outbreak in Colombia was in the 1980s. Further damaging outbreaks greatly affected Colombia during the 2008/09 season and then all of Central America in 2012. Spreads through the wind disseminating the spores. 	<ul style="list-style-type: none"> The first step is monitoring disease development in plantations for preventive control. Several fungicides, including some copper-based and organic, can be used. Breeding of resistant varieties such as Catimor has been fairly successful, but replanting is costly and cumbersome and new varieties may be resistant to only some of the many leaf rust types. Careful pruning, weed management and mixed shade can be useful.
Coffee wilt disease or acheomycosis <i>Gibberella xylarioides</i> (<i>Fusarium xylarioides</i>)	Africa	<ul style="list-style-type: none"> Different variants affect Arabica and Robusta. Leaves turn yellow, curl up and drop off. The tree dries out and the bark swells and cracks. 	<ul style="list-style-type: none"> Strict quarantine with no movement of any coffee materials to prevent coffee wilt disease in disease-free areas. Uprooting and burning; replanting with resistant cultivars. Balanced nutrition helps.
Coffee berry disease <i>Colletotrichum kahawae</i>	Africa	<ul style="list-style-type: none"> Dark, sunken marks on green cherries. The cherries dry out and may drop off. Yield loss can be huge. 	<ul style="list-style-type: none"> Diseased material must be removed. Copper-based fungicides work. Resistant varieties exist, but their cup quality can be mediocre.
Brown eye spot, coffee leaf spot, coffee eye spot, berry blotch or berry spot disease <i>Cercospora coffeicola</i>	Worldwide	<ul style="list-style-type: none"> Brown spots on the leaves, which sometimes drop. Red cherries may have dark spots. The disease spreads by wind and water. 	<ul style="list-style-type: none"> Nurseries to be given special attention. Good fertilizers and intensive pruning reduce the risks. Exposed material to be removed and destroyed. Copper-holding fungicides are sometimes used.
American Leaf Spot <i>Mycena citricolor</i>	Mainly Latin America and the Caribbean	<ul style="list-style-type: none"> Affects all plant parts – stems, branches, leaves and fruits. Subcircular brown spots are formed on leaves, which turn pale brown to straw-coloured, eventually causing leaf fall. 	<ul style="list-style-type: none"> Copper-based fungicides alternated with modern triazoles with systemic effect. Good cultural practices such as weed control, pruning and shade control can reduce disease intensity.
Pest problem: Viruses			
Coffee ringspot virus	The Americas and Philippines	<ul style="list-style-type: none"> Characterized by clear ringspot symptoms on leaves and cherries that may be deformed. Transmitted by a mite. Damage can result in subsequent fungal diseases. 	<ul style="list-style-type: none"> No obvious treatment. Destruction and replanting with proper seed selection can be necessary. Seen mainly in Brazil in the early 2000s.
Emaravirus	Hawaii	<ul style="list-style-type: none"> Carried by mites on leaves, which get spots. 	<ul style="list-style-type: none"> Infected trees have to be destroyed. The disease is not treatable like fungal infections.

Name of disease or pest	Distribution range	Symptoms and damage	Pest management and remedies
Pest problem: Bacteria			
Bacterial blight <i>Pseudomonas syringae</i>	East Africa and South America	<ul style="list-style-type: none"> Yellow spots on leaves that dry out but do not drop. Spreads easily and quickly to other trees. 	<ul style="list-style-type: none"> Copper-based sprays to be applied several times.
Coffee leaf scorch or crespersa disease <i>Xylella fastidiosa</i>		<ul style="list-style-type: none"> Shortened internodes, premature loss of older leaves, terminal clusters of small pale green to yellow deformed leaves, apical and marginal leaf scorch, lateral shoot dieback, reduction of fruit size and quantity, and overall stunting. 	
Pest problem: Insects			
Two categories of insects damage coffee trees: Parasites that destroy, for example, by feeding on the fruit or by leaving their eggs, and Vectors that are harmless, but transport and spread fungi, viruses and bacteria.			
Coffee berry borer or broca del café <i>Hypothenemus hampei</i>	Worldwide	<ul style="list-style-type: none"> Attacks Robusta and Arabica. The 2mm black beetle bores galleries in yellow and red berries where it lays eggs. Larvae feed on the coffee seeds. Survives between crops. One of the most damaging pests on all continents. 	<ul style="list-style-type: none"> Removal of dropped cherries and cherries from the trees in areas where rainfall patterns allow for continuous flowering and fruiting. Application of <i>Beauveria bassiana</i>. Spraying works only if done before the beetle reaches the beans. The use of endosulfan is generally banned. Monitoring and control of the insect, placement of drill traps with special preparation of ethyl and methyl alcohol, plus soap.
Black twig borer <i>Xylosandrus compactus</i> Also called short-hole borer.	Worldwide	<ul style="list-style-type: none"> Yellowing and wilting of leaves at the end of the branches. Twigs and stems are hollowed by the 2mm black beetle. 	<ul style="list-style-type: none"> Insecticides can be economic on small and young trees. A chlorine-based product can be applied with some effect. Infested branches and stems to be pruned and destroyed. Cultural control practices also work well
Coffee mealybug <i>Planococcus kenyae</i>	Africa	<ul style="list-style-type: none"> Female insect sucking sap from leaves and tree, sometimes also from roots. Leaves turn yellow, wilt and drop. 	<ul style="list-style-type: none"> Resistant as it also feeds on roots. Pruned material attracts useful parasites such as wasps, caterpillars and ladybirds.
Coffee stem borers <i>Xylotrichus quadripes</i> The white coffee stem borer <i>Monochamus leuconotus</i> <i>Acalolepta cervinus</i> (Hope) (Asia)	<i>Xylotrichus quadripes</i> [JJ7] [PvdG8] in Asia White coffee stem borer in Arabica coffee in Africa <i>Acalolepta cervinus</i> China and South-East Asia	<ul style="list-style-type: none"> A caterpillar-turned-beetle that drills tiny tunnels through the main stem (trunk) and can kill the plant. Early instars of white coffee stem borer ring bark the plants, affecting the vascular transport system so that heavily affected young trees may die. Arabica is most exposed, especially in Asia and Africa. 	<ul style="list-style-type: none"> Shaded trees are best protected. The beetle can be hand-picked and killed. Spraying reduces the impact. Affected shoots and roots to be burned. Because the pest develops inside the trunk, it is difficult to control.

Name of disease or pest	Distribution range	Symptoms and damage	Pest management and remedies
Coffee leaf miner <i>Leucoptera</i> spp. <i>L. coffeella</i> , <i>L. meyricki</i> , <i>L. coma</i> , and <i>L. coffeina</i>	Worldwide	<ul style="list-style-type: none"> The leaf miner is a moth whose larvae feed inside the leaf tissue and consume the palisade parenchyma. Infested coffee has large, irregular brown spots on the upper surface of the leaf caused by larvae that bore through the epidermis and feed in the palisade tissue, reducing photosynthetic area. 	<ul style="list-style-type: none"> Chemical control of the pest is effective, but increases cost of production and has associated environmental risks. Breeding cultivars resistant to the pest.
Pest problem: Nematodes			
Root-knot nematodes <i>Meloidogyne exigua</i> <i>M. incognita</i>	A major threat in all Arabica coffee-growing regions of the world	<ul style="list-style-type: none"> The females settle into the rootlets of the coffee trees causing distorted knots known as galls. More than 15 species of <i>Meloidogyne</i> have been reported to infest coffee. Significant impact in Latin America. 	<ul style="list-style-type: none"> Soil disinfection as a preventive measure. Control of weedy hosts, pruning to strengthen root systems, removal of dead plants, grafting on resistant root stocks, organic fertilizers to strengthen root growth and improve nutrition.
POST-HARVEST PROBLEMS			
Ochratoxin A (OTA) <i>Aspergillus ochraceus</i>		<ul style="list-style-type: none"> OTA is not a disease in the tree, but a mould on the harvested green beans. It can develop during processing from cherry to bean and during transportation. EU regulations on mycotoxins in foodstuff have set the maximum limits for OTA at 3 parts per billion (ppb) in roasted and ground coffee, and 5ppb in instant coffee. 	<ul style="list-style-type: none"> OTA is best avoided through the application of good hygienic practices, including (i) not drying coffee cherries on the ground, (ii) separating beans with defects and (iii) controlling the temperature and moisture level at all times, including transportation in containers.
Coffee bean weevil or gorgojo del café in Latin America <i>Araecerus fasciculatus</i>	Worldwide	<ul style="list-style-type: none"> The beetle (2–4 mm) lays eggs in stored food products including coffee in parchment. The larvae bore into coffee beans where they pupate. Common in Asia and in Central and South America. 	<ul style="list-style-type: none"> Control is possible with methyl bromide – possibly in a mixture with ethylene dibromide. Irradiation is also used.

Note: *5ppb = 5 parts per billion = 5 parts per thousand million = 5:1,000,000,000.

Source: Morten Scholer (2018), *Coffee and Wine*, Rainforest Alliance (2021) International Women's Coffee Alliance (2021).

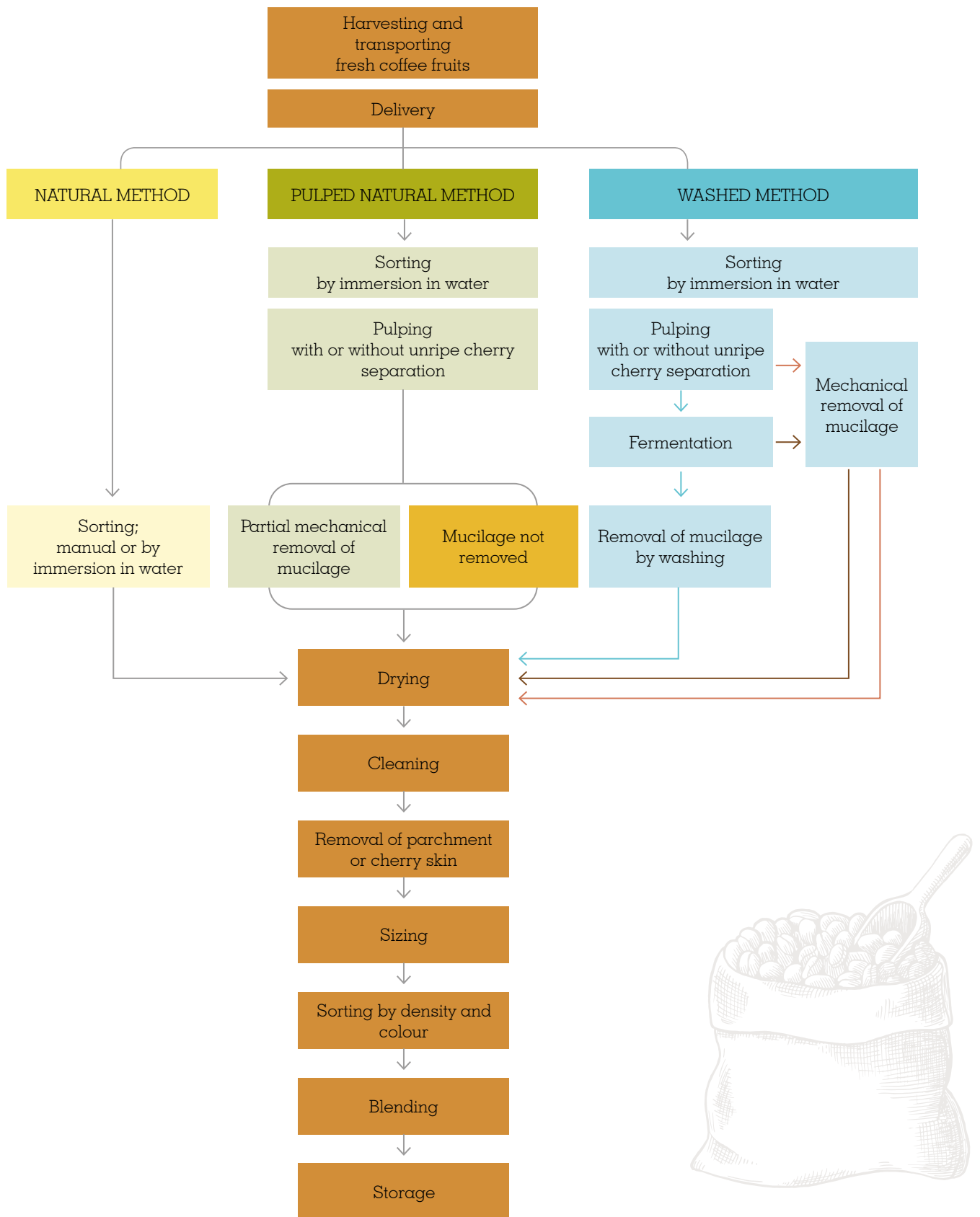
Post-harvest processing

Once the harvest is completed, the coffee cherries are transported to a processing facility. The size and mechanization degree of these facilities varies from country to country and from farm to farm. The post-harvest process transforms the unprocessed cherries into green coffee beans ready to be shipped to a roaster.

Although this happens before the 'green bean' stage, it is nevertheless a sophisticated process that carries its share of opportunities and threats to the final quality of the green bean. Understanding potential post-harvesting processing errors allows for better quality management.

On one hand, proper post-harvest processing avoids unnecessary mistakes resulting in potential quality claims and price penalties. On the other, it secures consistent quality as well as the production of coffees with good cup profiles, capable of logging attractive prices.

Figure 5: An overview of coffee processing



Source: ITC (2021), *Coffee Sapiens: Innovation through understanding* (2019), Carlos Brando, P&A International Marketing (2021).

Countries use different methods to process coffee. Terminology may vary. Towards the end of the production process especially, buyer specifications such as cup profile, bean size, density, moisture content, colour and number of defects need to be taken into consideration.

Table 8: Three primary coffee processing methods

Natural method (dry)	Washed method (wet)	Pulped natural method (honey)	Impact and risks
State of the coffee beans: In the fruit or parchment			
Harvesting: Selective versus strip-picking. Different types of mechanization (manual, semi-mechanized, fully mechanized).			Can cause defects such as bruising.
Reception of cherries at the processing facilities – ideally within eight hours after harvesting, the shorter, the better. Sorting by hand in some countries when manually harvested.			Can cause defects such as bruising.
Precleaning, sorting and separation of stones and impurities and grading of cherries according to density in siphon tanks or mechanical siphons. Hydraulic separation or floatation. Further precleaning measures such as size grading of fruit, winnowing and sieving are possible.			Removal of defects such as light beans.
Drying cherries on raised beds or on patios by raking and turning for 14–21 days or mechanically. The final moisture level is 11%–12%. The skin turns black.			Can cause defects if the cherries are not turned regularly to prevent fermentation and to allow uniform drying, if the drying rate is too low due to high relative humidity or other factors, and if temperatures exceed the recommended limit. A critical stage in the process where undesirable aromas may develop.
	Mechanical pulping , with or without unripe cherry separation. Skin and fruit flesh are removed, leaving the beans in the sticky mucilage.	Mechanical pulping , with or without unripe cherry separation. Skin and fruit flesh are removed, leaving the beans in the sticky mucilage.	High-quality pulpers reduce the percentage of waste. Can cause defects such as pulper cuts.
		Mucilage removal. The sticky mucilage may be left or partly removed by a mucilage remover.	Can cause defects.
	Fermentation in tanks for 10 to 48 hours; can be shorter or longer. The sticky mucilage is broken down by microbes. Mechanical mucilage removal can follow or even replace fermentation (saving water).		Note: It is not the coffee bean itself, but the mucilage on the parchment that is removed through fermentation.
	Washing off any remaining mucilage particles. Can be combined with sorting.		Can cause defects.
	Drying of parchment for 8–15 days on patios or on mesh tables, or mechanically at around 40°C (105°F). The final moisture level should be 11%– 12%.	Drying of parchment for 8–15 days on patios or on mesh tables, or mechanically at around 40°C (105°F). The final moisture level should be 11%– 12%.	Can cause defects if drying is done too fast or too slow and if temperature exceeds the recommended upper limit. Parchment must be turned regularly to prevent fermentation. One of the most critical phases in the preservation of quality.

Natural method (dry)	Washed method (wet)	Pulped natural method (honey)	Impact and risks
Resting (also called curing, conditioning, storage) in silos for 15–60 days to homogenize moisture, enhance quality attributes and ensure better ageing. The resting can be longer for naturals than for coffee in parchment.			Can cause defects and greenish flavours if moisture content is not controlled. Failure to control moisture content may result in loss of quality and possible mould contamination.
Precleaning and destoning. Removal of foreign matter, sometimes also with magnets for iron pieces.			Removal of impurities and defects.
State of the coffee beans: Green beans Processes are adapted to roasters' specifications			
Hulling or milling. Removal of dried cherry skin with the help of a cross-beater or a friction huller. Equipment must be accurately calibrated for bean size. Polishing in friction machines is optional, but not recommended for Arabica.	Hulling or milling to Removal of parchment and silver skin by friction equipment. Polishing in friction machines is optional, but not recommended for Arabica.	Hulling or milling. Removal of parchment and silver skin by friction equipment. Equipment must be accurately calibrated for bean size.	Can cause defects such as breakage.
Air cleaning in airflow, removing dust.			Can discard light beans and impurities/ hull remnants.
Sorting by bean size via screening (same size enables uniform roasting at a later stage).			Can cause defects.
Sorting by bean density on shaking densimetric tables. Dense (and best) beans climb to the top (same density secures uniform roasting at a later stage).			Removal of defects.
Sorting by colour – manually or optically.			Removal of defects.
Quality evaluation and classification – visually and by cupping.			–
Blending of different sizes and qualities to meet client requirements.			–
Bagging off or sending to bulk silos.			Can be contaminated by foreign odours.
Shipping in container. On trucks and vessels, either in bags or in bulk.			Fungus risk from temperature and humidity fluctuations.
Storage in bags or in silos – often by a trading house and later at the roaster's premises.			Can be contaminated by foreign odours.
Blending: Performed to meet client quality and bean size requirements. For optimal roasting, the beans must have the same size, density and moisture content. (Blending <i>after</i> roasting (split-roasting) is also possible but less common and primarily used for high quality coffees.)			Causes defects at roasting if beans are not homogeneous.

Source: Morten Scholer (2018), *Coffee and Wine*, and Carlos Brando, P&A International Marketing (2021).

Critical steps in the coffee production process

Once the cherries have been harvested, their natural biological development is interrupted and the 'quality time clock' starts ticking. Attention to detail is crucial at this stage – a mismanaged step can have negative effects on quality and affect its full potential. Correct and timely handling during the production process is vital for consistent quality development.

The most important steps include:

Precleaning

Precleaning removes coffee impurities and separates it into more homogeneous lots for processing. Impurities compromise coffee quality and increase wear and tear on processing equipment.

A pre-cleaned lot of cherries produces more uniform quality. This entails separating the fruit into homogenous lots.

- **Winnowing.** Airflow to remove dust, leaves and stems.
- **Sifting.** Perforated screens to remove impurities that are larger or smaller than the coffee fruit.
- **Hydraulic separation.** Water to remove impurities and separate the coffee fruit. This can be done using static water containers (buckets or larger tanks), grading channels, siphon tanks or mechanical washer-separators that recycle and save water. Hydraulic separation traditionally provides a separation into floaters and sinkers.

Floaters:

- Less-dense impurities such as leaves and twigs
- Dried-on-tree coffee and some overripe fruit
- Ripe, semi-ripe and unripe coffee fruit that is less dense because of pest or disease attacks or lack of bean development.

Sinkers

- Unripe, semi-ripe and some overripe coffee fruit.
 - Stones (some hydraulic separation equipment has internal divisions that allow for stone separation)
- **Size separation.** Perforated screens to separate coffee fruit by size.
 - **Colour sorting.** Manual separation of coffee fruit by colour – though mechanized colour selection has recently been developed.

Pulping

Pulping separates the pulp (exocarp and part of the mesocarp) from the parchment coffee (part of the mesocarp, endocarp and seed). Several pulping technologies are available, principally disc pulpers, horizontal drum pulpers, vertical drum pulpers and screen pulpers – with or without unripe cherry separation.

Cleaning operations may follow the initial pulping to further separate the pulp from the parchment coffee and to separate unpulped fruit (typically underripe/unripe or overripe/dried-on-tree coffee that was too hard to be pulped). This unpulped fruit may either be dried as a natural or put through a more tightly calibrated re-pass pulper. Recent pulper models allow for minimal water usage and more control of the range of maturation levels that are pulped.

Fermentation

The fermentation unit operation provides the necessary growth conditions for microorganisms that depolymerize and hydrolyze the pectin present in the mucilage. In this way, it becomes soluble and can be removed with water.

Fermentation has been performed either dry (residual water is drained from the pulped coffee mass before fermentation) or wet (fresh water is added after the residual water is removed so the coffee mass is completely submerged). Fermentation times vary based on ambient temperature, coffee mass composition, initial microbial load and the use of pectinolytic enzymes or other inoculants.

Fermentation has aimed to remove the mucilage, to increase drying efficiency and contribute to a clean, consistent and defect-free product.

More recently, fermentation has become a way to add value by developing unique flavours. Methods include:

- In-fruit fermentation: Fermentation of the coffee fruit before processing or drying;
- Enhanced microbial activity and microorganism selection: Using different oxygen levels, temperatures or acidity levels (pH) and extending fermentation times past the traditional washing point;
- Inoculation: Injecting fruit or parchment with microorganisms to achieve more consistent flavour profiles and/or to accelerate fermentation.

Fermentation is a water-intensive method. Even dry fermentation consumes a large amount of water to fill and empty the tanks.

Washing

Once the fermenting coffee has reached its washing point – the point in which the remaining mucilage may be completely removed using water – it is washed using fresh water. This is traditionally done in fermentation tanks or grading channels. More recently, mechanical washers or mechanical demucilators have been introduced to perform this function as they require less labour and water.

Mechanical demucilation

Mechanical demucilation uses friction to remove mucilage from the parchment coffee. Mechanical demucilators generate this friction between the parchment and between the parchment and metal parts of the machine, generally an external perforated metal cylinder and internal rotating metal agitators. Small amounts of water are added to lubricate and wash away the mucilage. The amount of mucilage removed depends largely on how long the coffee mass remains in the machine.

Drying

Drying entails removing moisture from the coffee so it can be safely stored. Moisture content is expressed on a wet basis – that is, as the water mass in grams per 100g of the total mass, which includes the water. Coffee fruit is harvested with a high moisture content, typically around 60%–65% (wet basis) for ripe fruit.

Drying at high temperatures (coffee mass temperature above 40°C for parchment and 45°C for cherry coffee) and drying too quickly (regardless of temperatures) compromise final coffee quality and affect the shelf-life of the green coffee. Drying too slowly may result in mould formation and other microbial activity that may reduce quality. Drying can be done through sun drying, mechanical drying or a combination of both. Both methods result in high-quality coffee, provided the drying is done properly.

- **Sun drying.** The wet coffee is exposed to the sun on flat surfaces and rotated to ensure homogenous drying. This can be done on patios or raised beds, in the open air or in closed structures such as greenhouses or parabolic dryers. Drying on patios requires a lot of space and working hours – sometimes weeks.
- **Mechanical drying.** The wet coffee is placed in a mechanical dryer where heated air is passed through the coffee. There are many types of mechanical dryers, including static (fixed-bed) dryers, vertical dryers and horizontal rotary (Guardiola) dryers.

Resting or conditioning after drying gives the green beans a longer shelf life and sometimes reduces the greenish taste. Resting is becoming less common, as the beans today are usually better preserved during transportation and storage, and because value chain players are eager to be paid sooner rather than later.

Storage

Green coffee is stored to preserve quality until the beans are roasted. The beans can be stored at various locations and at different points along the supply chain, from on-farm storage of parchment or pods immediately after drying to storage of milled, sorted and graded green coffee at the roasting facility immediately before roasting.

Coffee should be stored at a moisture content of 11% (wet basis) at cool temperatures. If the moisture level is too high, the coffee is more susceptible to microbial activity, mainly moulds, as well as increased metabolic activity, which degrades coffee quality. On the other hand, coffee that is stored below 11% moisture content degrades in quality more rapidly and is more susceptible to breakage at the dry mill. Higher temperatures may accelerate both microbial activity and coffee metabolism.

Coffee is hygroscopic and exchanges moisture with its surrounding environment until reaching its equilibrium moisture content. If stored in a place with high relative humidity, the coffee takes on moisture from the surrounding air. If stored in a very dry place, it gives off moisture to the surrounding air. It is generally recommended that coffee be stored at a relative humidity of 60%–65%.

Jute bags are traditionally used for coffee storage as they allow moisture to escape, mitigating the risk of mold. In some countries today, coffee is also stored in big bags. However, given coffee's hygroscopicity, this leads to variability in moisture content and absorption of odours. A recent trend, especially for higher quality coffee, is to use high-barrier packaging.

Regardless of packaging, coffee should be stored to allow adequate airflow between the beans and the walls and ceiling, and on pallets or with a moisture barrier between the coffee and the ground. Even if high-barrier packaging inhibits direct moisture migration, temperature fluctuations caused by contact may lead to moisture migration in the bag.

New developments

Post-harvest processes traditionally targeted the preservation of a coffee's quality potential, not its development. Today, the post-harvest can be used to generate new flavours and introduce new qualities.

Many new processing techniques, starting at the moment the coffee fruit is harvested, seek to achieve this by stimulating microbial activity. These techniques include optical colour sorting of cherries and fermentation with yeast. The compounds subsequently generated serve as precursors in the roasting process. The pathways of these compounds to the final cup are complex. Understanding the impact of specific microbial communities is an area of active investigation.

Barrel-aging coffee beans is another technique. It infuses volatile flavour compounds from the oak or from the liqueur previously sitting in the barrel.

Note the potential impact for coffee producers in the supply chain. Rather than just following traditional processing methods to produce a clean raw material, producers or processors are now making decisions to arrive at a preconceived product and flavour profile.

This new reality is still in its infancy and is used only for small volumes of specialty coffee. However, it represents a paradigm shift – one that will hopefully bring greater respect and profitability to the profession and encourage future generations to remain in the business.

Decreasing water usage is another post-harvesting trend. Eco-pulpers, minimizing water use in transport and using mechanical demucilage instead of fermentation are ways to do this.

Coffee quality assessment

Coffee quality is generally evaluated in two ways: a physical evaluation of the green and roasted coffee, and sensory evaluation of the roasted beverage. This assessment detects potential physical, chemical, anatomical or functional defects. The goal is to avoid defects in the final beverage and to discover the attributes in the coffee cup.

The long journey from the farmer's coffee trees to the consumer's cup needs to be protected from hazardous off-tastes. The logic behind this is quite simple. The fewer defects, the better the final product. Zero defects combined with attributes make the consumer's coffee experience satisfying.

Over the years, green coffee quality classification systems have evolved, due to buyer demand for higher-quality coffees. This has catalysed a new experimental sensory journey and new food safety considerations. Certain defects carry a contamination risk that modern quality classification systems need to address.

Before the green coffee is commercialized, it must be classified on the basis of its green and roasted physical appearance as well as its sensory assessment. No universal quality classification system is in place. Every coffee-producing country has its own classification logic, which may be used to establish an internationally recognized standard for export. These systems include:

- COB — Classificação Oficial Brasileira or Brazil Official Classification
- New York
- Le Havre
- FNC — Federación Nacional de Cafeteros de Colombia

Classification systems have criteria such as:

- Processing method
- Screen size
- Number of defects
- Altitude
- Density
- Region
- Variety
- Cup quality

Examples are:

BRAZIL NATURAL ARABICA SANTOS NY 2/3, MTGB SSFC

This quality description denotes that the coffee is a natural processed Arabica from Brazil. Santos is the port from which the coffee was shipped. NY 2/3 is a specification for a maximum of nine secondary defects and no primary defects in a 300g representative sample. This quality can also be called 'extra prime'. MTGB stands for 'medium to good bean' and refers to the screen sizes 15 (medium) to 16 (good). SSFC stands for 'strictly soft, fine cup', a high-quality, clean cup with mild flavours. Soft cup means no hard/phenolic off-cups are allowed.

COLOMBIA WASHED ARABICA SUPREMO 17/18 HUILA

This quality description reveals that this specific washed Arabica coffee comes from Colombia's Huila region. Further, it tolerates only a maximum of 5% below screen size 17.

CÔTE D'IVOIRE NATURAL ROBUSTA GRADE 2

This coffee is a natural Robusta from Ivory Coast. The grade scale is from 0 (best) to 4, based on a combination of screen size and defects.

EL SALVADOR WASHED ARABICA SHG EP

This coffee from El Salvador is a washed Arabica. Qualities are sorted by their altitude. SHG stands for 'strictly high grown', meaning above 1,200m. Other grades are known as high grown, from 900–1,200m, and central standard, from 500–900m. Commonly used quality descriptions are European Preparation, with a maximum six defects per 300g, and American Preparation, with a maximum 12 defects per 300g.

ETHIOPIA NATURAL ARABICA JIMMA 5

This coffee is a natural Arabica from Ethiopia's Jimma region. Type 5 refers to a grading scale based on defect count and cup quality.

GUATEMALA WASHED ARABICA SHB EP HUEHUETENANGO

This coffee is a washed Arabica from Guatemala's Huehuetenango region. SHB stands for 'strictly hard bean' and means it comes from higher than 1,400m. Other common descriptors in Guatemala are based on five altitude levels: 'prime washed', below 900m, through 'high grown' to 'strictly high grown', above 1,400m. EP stands for European Preparation, with beans sizes above screen 15 and a maximum eight defects per 300g, American Preparation needs to be above screen 14, allowing a maximum of 23 defects.

INDIA WASHED ARABICA PLANTATION A

This description is used for a washed Arabica coffee from India. The screen size is above 17. Other classifications might be Peaberry (PB), AA (a coffee grading term that refers to a specific, larger-than-normal bean size), B, C and some combinations. Further, Indian coffees might be naturals (in India called 'cherry') and of course Robustas (also washed parchment or natural/cherry).

KENYA WASHED ARABICA AB FAQ

This coffee is a washed Arabica from Kenya. AB stands for a screen size above 16. Kenya uses an internal grading system (E, AA, AB, PB, C, TT and T) based on bean size and density, further detailed by the cup profile (called 'liquor') quality into 10 classifications. FAQ stands for 'fair average quality'. Top cupping coffees are mostly sold on actual sample basis.

PAPUA NEW GUINEA (PNG) WASHED ARABICA Y1

In 2016, Papua New Guinea simplified its grading system for exportable Arabica from 12 grades to five grades: A (best), B, Y (a grade that can also be distinguished by bean size), Y2 and Y3. There are three applicable grades for Robusta: R1 (best), R2 (corresponding to the common fair average quality) and RT for triage.

VIET NAM ROBUSTA GRADE 2 MAXIMUM 5% BLACKS AND BROKEN

This is a natural Robusta from Viet Nam. There are six different grades: Special Grade and Grades 1 through 5, all of which are based on defects and screen size. In this case, it's a grade 2. Additional details on moisture content, acceptable mix of bean types, bean size, etc., often supplement descriptions.

Green coffee assessment

The aspect of the green coffee is paramount, as it is the first impression a buyer gets. Depending on the impression, a buyer may decide to assess the coffee quality further or skip the sample and buy elsewhere.

The green coffee assessment has several steps. The beans' colour and appearance are evaluated, along with an olfactory check. This is followed by a humidity and water activity analysis. Screen-size analysis and defect counting are paramount in any coffee quality assurance lab today.



Sorting the beans at Y Coffee Roasters in Addis Ababa.



Screens for grading bean size.

Defect count. Green coffee defects directly affect the roasted coffee's quality and appearance and, hence, the final product.

Defects are usually categorized as follows:

- **Primary (or type 1) defects:** significant impact on the cup
- **Secondary (or type 2) defects:** minor impact on the cup

Box 6: Screen sizes

Coffee is graded by size using rotating or shaking screens, replaceable metal sheets that have holes that retain beans over a certain size and allow smaller beans to pass. Screen sizes are expressed as numbers (e.g. Robusta grade one screen 16), by letters (e.g. Arabica grade AA – indicating a bold bean) or by descriptions (e.g. bold, medium or small bean).

Intermediate screen sizes (e.g. 16.5) are important in some producing countries, but disregarded in others. However, nearly all coffee for export is graded to exclude the largest and smallest beans, as well as broken beans and other particles.

It is not always easy or possible to achieve a 100% accurate screen (e.g. nil passing through screen 16). Where a 100% accurate screen is required, then marginally increasing the hole size to give a small tolerance in the screen may provide the required result.

Slotted screens with oblong slits (usually 4mm or 4.5mm wide) are used in some countries to remove peaberries (single oblong beans in a cherry, the result of a genetic aberration because normally there are two beans in a cherry), which are sought after in some consuming countries.

Standard coffee round screen dimensions

Screen number	10	12	13	14	15	16	17	18	19	20
ISO dimensions (mm)	4.00	4.75	5.00	5.60	6.00	6.30	6.70	7.10	7.50	8.00

Source: ITC.

Table 9: Examples of primary defects

	Possible impact on roasting	Possible effect on beverage taste
Fully black	Slow, with light beans	Highly bitter, dirty, phenolic
Fully sour	Slow and irregular	Acrid, pungent, fermented, sour
Fermented sour	Irregular	Fermented, sour, unpleasant smell
Presence of foreign matter (stones, wood)	Irregular	Abnormal, unpleasant tastes
Presence of dried cherries	Irregular	Phenolic, fermented, mouldy

Figure 6: What do coffee bean defects look like?



Source: *Coffee Sapiens*, Adrià, elBullifoundation and Lavazza (2019).

Roasted coffee assessment

Sample roasting is an essential component of the quality-control process at all points along the supply chain, starting from origin. This is helpful for buyers, producers, importers and roasters.

Sample roasting is an opportunity to evaluate the green coffee's quality and uniformity. It can provide valuable feedback to producers, showcase coffee to potential buyers and aid in production development processes. Sample roasting also provides quality assurance on inventory checks, age and any profile changes that need to be made.

When evaluating coffee for quality purposes, it is important to have a consistent, non-biased and uniform roast to concentrate on the coffee attributes versus the roast profile. The main goal of this process is to uncover any defects that were not revealed in the previous green bean evaluation. Roasting brings out the aroma and flavour that is locked inside the green coffee beans. It causes chemical changes to take place as the beans are rapidly brought to very high temperatures.

Internationally accepted digital colorimeter tools and scales are available. Agrtron, Probat and others sell this kind of laboratory equipment, which ensures a consistent measurement of the roasted coffee grind's colour.

Coffee roasts are identified by their colour: light, medium and dark. Although these are not the most accurate terms for describing different roasts, as some coffees are naturally darker or lighter than others, they are convenient ways to categorize roasts.

- **Light roasts** retain most of the original coffee characteristics. They have a light brown or tan colour and the roasted beans lack oil. They have the highest acidity and are the brightest of the three roast levels. The characteristics of different origins are most pronounced in light roasts, as are the qualities of the individual coffees.

A light roast also makes it easier to spot immature and green beans, which are pale yellow in colour rather than brown when roasted. Much of the taste comes from the original coffee, which is why light roasts are often used for cuppings. Light roasts are sometimes called Half City, Light City, New England or Cinnamon roasts.

- **Medium roasts** balance acidity and body. A medium roast has a darker brown colour than a light roast and looks richer. Some of the coffee's oils may be visible on the beans, as well. At this roast level, the coffee's qualities begin to give way to the roast's flavours and aromas, creating a balance between acidity and body. The original coffee taste is still discernable, but the brightness of the beans is complemented by the fuller body that is introduced by the roasting process. Medium roasts go by City, Breakfast, Regular and American roasts.
- **Dark roasts** showcase bold bodies and a richer taste. They are dark brown, sometimes almost black. Oils can be seen on the beans at this point. Dark roasts obscure the finer aspects and are often used to cover up defects. When roasting beans of the same quality, a light roast brings out more brightness in the cup, while a dark roast accentuates body. Because the original coffee's qualities are mostly lost at this roast level, it's difficult to pick out the characteristics of a specific coffee's origin or lot.



Sample of roasted F1 hybrid coffee beans.

The roasting process greatly influences coffee quality. 'Quakers', 'pales' and 'semi-pales' can affect the cup quality. These are beans that are yellow in colour. They come from immature or drought-affected coffee and are beans with little or no grain. These can largely be eliminated in the washing channel. Amber beans and green parchment beans also frequently cause pales in the roast.

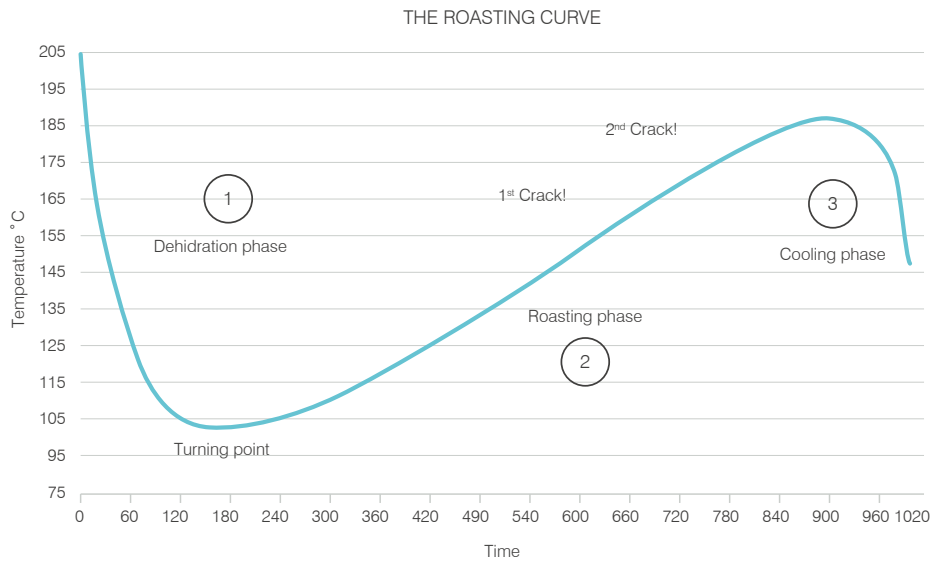
The following descriptions are commonly used in roasted coffee assessments:

- **Fine roast.** Bright, brilliant, uniform and even, no pales.
- **Good to fine.** Bright, uniform, even, no pales.
- **Good roast.** Bright to dullish, reasonably even, occasional pale, no other defects such as ears or broken.
- **Good to fair.** Dullish, slightly uneven, mottled, a few pales and other defects, can be soft and open.

- **Fair to poor.** Dull and uneven, a number of pales and other defects, generally soft and open, often containing many broken.
- **Poor.** Anything below fair to poor. Uneven bean size produces uneven roasts because small, broken and light beans roast faster than whole, solid beans. Very small pieces or chips may even burn up.

Roasting is vitally important to determine the quality that is perceived in the cup. Each coffee type should be roasted according to specifically tailored methodologies that bring out its inherent potential and the desired roast profile. Analysis of the result and cupping are interlinked and become useful tools for coffee producers to learn more about the coffee, the market and product opportunities available to them.

Figure 7: The roasting curve covers three phases



Source: *Coffee Sapiens*, Adrià, elBullifoundation and Lavazza (2019).

Figure 8: Duration of roast affects sensory characteristics



Source: *Coffee Sapiens*, Adrià, elBullifoundation and Lavazza (2019).

Sensory assessment: Coffee cupping

Coffee is assessed and scored by a method known as cupping, or the sensory analysis of coffee. Various protocols and standards are used for this evaluation at the private enterprise, national and international levels.

Cupping helps green coffee buyers decide what coffees to purchase and how they will be featured. For roasters, cupping means dialling in a roast profile to ensure the coffee development is just right. For quality-control specialists, it is a tool to guarantee that every coffee makes it out of the roastery and into coffee shops and online marketplaces without defects, with consistent quality and with excellent flavour.

Cupping methods and assessment standards vary across companies and individuals. Typically, these standards note (and discount for) defects and grade the coffee quality based on flavour aspects.

Overall, cupping should be a systematic evaluation to assess the coffee beans' aroma and taste, with a clearly defined roasting curve, proper resting period (e.g. minimum of eight hours), grinding and brewing. Within this structured process, selected indicators are assessed to achieve a full sensory evaluation of the coffee. All senses are engaged: sight (colour of beans and grind), smell (dry and wet coffee) and finally taste and mouthfeel sensations when slurping the coffee liquid.

Cuppers look for fragrance/aroma, body, acidity and flavour when cupping coffee.

Cupping is about experiencing the coffee, sharing and describing perceptions. This entails the need for shared descriptors and taste references to enable assessment. Over the years, multiple systems and terms have been developed to support this exercise.

The biggest, most widely used cupping tool is probably the Specialty Coffee Association's Coffee Taster's Flavor Wheel. This practical tool describes coffee flavour. Developed in 2016 by the association in collaboration with World Coffee Research, this is the largest and most collaborative piece of coffee flavour research ever completed. It is much more accurate than the 1995 original version.

That said, some critics say the Specialty Coffee Association descriptors are not regionally inclusive or objective enough – giving rise to alternative flavour wheels and cupping standards. Nevertheless, it remains a useful tool used by most in the coffee industry. It is the closest to a common language among cuppers.

The terminology to design the wheel is defined in the World Coffee Research Sensory Lexicon. As the biggest piece of research into coffee aromas ever undertaken, it has given rise to a whole new vocabulary for the coffee taster.

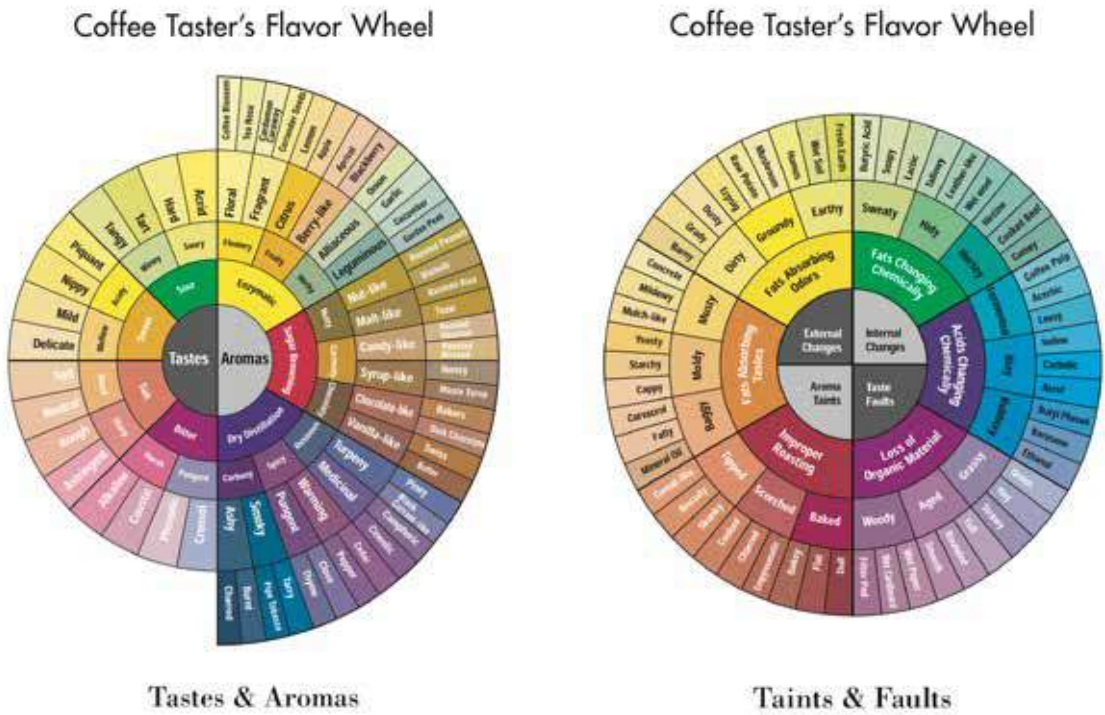


Cupping session in Brazil by the Brazil Specialty Coffee Association at the CLAC-Fairtrade 'Taza Dorada' Competition.



Coffee samples ready for cupping.

Figure 9: First versions of the Coffee Taster's Flavor Wheel



Source: Specialty Coffee Association (2021).

Figure 10: The Coffee Taster's Flavor Wheel today



Source: Specialty Coffee Association (2021).

Arabica cupping protocol and the 'Q' Coffee System

Historically, sensory analysis protocols focused on commercial-quality coffee, with an emphasis on discounting for defects and a very limited description of positive flavour attributes. With the rise of the specialty coffee industry and a new focus on flavour diversity and uniqueness, a new protocol to describe and evaluate them became necessary.

The Specialty Coffee Association of America's Arabica Cupping Form and Protocol was established in the early 2000s. It is based largely on the seminal Coffee Cupper's Handbook written by Ted Lingle, with several modifications. The form uses a 100-point scale that covers 10 quality attributes, each worth 10 points.

1. **Fragrance/Aroma:** Fragrance/Aroma includes two aromatic aspects of the Arabica coffee sample. Fragrance is the smell of the freshly ground coffee as it sits in the sample cup when still dry. Aroma is the smell of the coffee when it is infused with hot water and vapours are released as the wet coffee grounds are stirred.
2. **Flavour:** Flavour is a combined impression of all the gustatory (taste bud) sensations and retro nasal aromas that go from mouth to nose. It represents the coffee's principle character, the 'mid-range' notes recognized in between the first impressions given by the coffee's aroma and acidity, and the final impressions given by the coffee's aftertaste.
3. **Aftertaste:** Aftertaste is defined as the length of positive flavour (taste and aroma) qualities emanating from the back of the palate and remaining after the coffee is expectorated or swallowed.
4. **Acidity:** Acidity is often described as 'brightness' when favourable or 'sour' when unfavourable. At its best, acidity contributes to a coffee's liveliness, sweetness and fresh-fruit character, and is almost immediately experienced and evaluated when the coffee is first slurped into the mouth.
5. **Body:** Body is the tactile feeling of the liquid in the mouth, especially perceived between the tongue and roof of the mouth as the result of the formation of brew colloids from the undissolved solids and oils suspended in the liquid.
6. **Uniformity:** Uniformity refers to consistency of flavour of the different cups of the sample tasted. Nonuniformity is the result of defective beans isolated in individual cups.
7. **Balance:** Balance is the cupper's assessment of how well all the aspects of flavour, aftertaste, acidity and body of the coffee sample work together to complement or contrast with each other.
8. **Clean cup:** Clean cup refers to a lack of any interfering or negative taste or odour sensations from the first sip to the final aftertaste that are usually the result of defective beans, improper storage conditions or poor processing methods
9. **Sweetness:** Sweetness refers to a pleasing fullness of flavour as well as any obvious sweetness. Its perception results from the presence of certain carbohydrates. Low-level concentrations of sugars, salts and acids can create the impression of sweetness in the coffee sample.
10. **Overall:** The overall rating is meant to reflect the holistically integrated rating of the sample as perceived by the individual cupper. This is the point in the assessment process where the cupper makes a personal appraisal.

This new protocol clearly established the need for a new generation of formally trained and certified coffee professionals. The Coffee Quality Institute established the Q Coffee System, a formalized method of cupping and grading Arabica coffee based on the Specialty Coffee Association cupping and grading protocol.

To become a Q grader, students must pass 22 individual tests that evaluate their sensory acuity and their knowledge of the Specialty Coffee Association Cupping and Grading protocol, as well as ensure a sensory calibration with other Q-graders.

Fine Robusta standards and protocols

Based on the success of its Q Coffee System for Arabica coffee, the Coffee Quality Institute developed the Fine Robusta Cupping form in collaboration with the Uganda Coffee Development Authority. The word 'fine' is used to distinguish these coffees from specialty Arabicas. The method also uses a 100-point scale that covers 10 quality attributes, each worth 10 points.

1. **Fragrance/Aroma:** The aromatic aspects include dry fragrance (the smell of the ground coffee when still dry) and wet aroma (the smell of the coffee when infused with hot water). These can be evaluated at three distinct steps in the cupping process: (1) sniffing the grounds placed in the cup before pouring water onto the coffee, (2) sniffing the aromas released as the coffee steeps and (3) sniffing the aromas released while breaking the crust.

Specific aromas can be noted under qualities and the intensity of the dry fragrance, break and wet aroma aspects. The score is a personal determination considering all the intensities and qualities at each of the three evaluation stages.

2. **Flavour:** Flavour represents the coffee's principal character, the mid-range elements, in between the first impressions given by the coffee's first aroma and taste to its final aftertaste. It is a combined impression of all the gustatory sensations and retronasal aromas that go from the mouth to nose. The score given for flavour should account for the intensity, quality and complexity of its combined taste and aroma, experienced when the coffee is slurped into the mouth vigorously to involve the entire palate in the evaluation.
3. **Aftertaste:** Aftertaste is the length of positive flavour (combined taste and aroma) qualities emanating from the back of the palate and remaining after the coffee is ejected or swallowed. When an aftertaste is short or unpleasant, a lower score is appropriate. In Robusta coffees, aftertaste is often underscored by the potassium level found in the coffee, with high levels resulting in brackish (high saltiness and displeasing aromas) aftertastes and with low levels resulting in savoury (low saltiness and pleasing aromas) aftertastes.
4. **Salt/acid aspect ratio:** The salt/acid aspect ratio is responsible for the pleasing and delicate taste derived from distinguishable acidity in Robusta coffees, stemming from the presence of fruit acids and sugars. Lower potassium levels or salty compounds that make Robusta coffee taste coarse or harsh are absent from Fine Robusta coffees. This attribute is comparable to the strictly soft or strictly hard categorization of Brazilian coffees. The noticeable perception of acidity is one of the striking taste differences between Fine Robusta and off-grade Robusta coffees.
5. **Bitter/sweet aspect ratio:** Both bitter and sweet taste sensations are present in Robusta coffees. The bitter component stems principally from the caffeine and potassium in the coffee, while the sweet component is derived from the fruit acids, chlorogenic acid and sweet-tasting compound levels in the coffee. Fine Robusta coffees have a low bitter and high sweet aspect in their taste, while commercial Robusta coffees have a high bitter and low sweet aspect in their taste.

In determining the bitter/sweet aspect ratio score, the cupper rates the relative bitterness on a scale of 1 to 6, giving the higher score to the lower perceived bitterness. At the same time, the cupper rates the relative sweetness on a scale of 1 to 6, giving the higher score to the higher perceived sweetness. The two scores are then considered to assess the bitter/sweet score.

6. **Mouthfeel:** The quality of mouthfeel is based on the tactile feeling of the liquid in the mouth, especially as perceived between the tongue and roof of the mouth. Most samples with heavy mouthfeel may also receive a high score in terms of quality due to the presence of brew colloids. Brew colloids form as the oils extracted from the ground coffee coagulate around the micro-fine bean fibres suspended in the brew. Mouthfeel has two distinct aspects: weight and texture.
7. **Balance:** The way all the qualities of flavour, aftertaste, salt/acid aspect ratio, bitter/sweet aspect ratio and mouthfeel of the sample work together and complement or contrast each other is 'balance'. As the intensity of each of these attributes increases, it is more difficult for all the attributes to remain in balance. If each attribute increases equally in intensity, then the balance score is high. If the sample lacks one or more attributes or if some attributes are overpowering, the balance score would be reduced.
8. **Uniform cups:** Uniform cups refers to flavour consistency among the different cups of the sample tasted. If a single sour, fermented, phenolic or other off-tasting bean is present in any of the cups, one or more of the cups will produce a different taste. This inconsistency in the coffee flavour is a very negative attribute. This type of inconsistency should be so distinct that the cupper could easily identify the off-cup in a triangulation with the other cups in the sample set.

The rating of this attribute is calculated on a cup-by-cup basis. Two points are awarded for each cup in the sample that is uniform (tastes like the other cups), with a maximum of 10 points if all five cups are the same.

9. **Clean cups:** Clean cups refers to a lack of interfering negative impressions from first ingestion to final aftertaste, a 'transparency' of cup. In evaluating this attribute, notice the total flavour experience from the time of initial ingestion to final swallowing or ejection. If a single mouldy, dirty and baggy or other off-tasting bean is present in any of the cups, one or more of the cups will produce a non-coffee taste. Any non-coffee-like tastes or aromas disqualify an individual cup.

Two points are awarded for each cup in the sample that is free of a non-coffee-like taste or aroma. All defects (ferment, sour, phenolic, etc.) are also considered an unclean cup and should be marked down.

10. **Overall:** The 'overall' score attribute reflects the holistically integrated rating of the sample as perceived by the individual cupper. Uniqueness and complexity are two desirable traits that should merit a high overall score, regardless of the cupper's preferences. This is also the only step where cuppers can make their personal appraisal of the coffee. Good cuppers do not allow their personal preference for a coffee to interfere with the rating of the other flavour attributes of the sample.

The Coffee Quality Institute incorporated the Fine Robusta Standards and Protocols into the Q Coffee System, providing a means to train and certify cuppers worldwide.

Box 7: Other ratings with score cards and points

- SCA Arabica Cupping Protocol (Specialty Coffee Association)
- SCA Robusta Cupping Protocol (Specialty Coffee Association)
- Cup of Excellence (Alliances for Coffee Excellence)
- Taza Dorada (Latin American and Caribbean Network of Fair Trade Small Producers and Workers, co-owner of the Fairtrade International system)

Note: This is a non-exhaustive list.

Source: ITC.

Coffee quality control

Food safety has become a central issue in the coffee industry in recent years, with most countries regulating and inspecting importers and roasters.

Quality control is essential, not only because of pricing considerations (better quality equals better price), but also to ensure that exports comply with food safety legislation in major import markets. It also helps to reduce waste and loss when coffee is harvested, processed and dried, and plays a role in the general move towards more sustainability in the industry.

Approaches to food safety

Coffee is defined as a food product, and countries around the world take different approaches to their food safety regulations. Generally, all follow similar standards and a food business operator should take the following steps:

- **Registration** as a company in the food supply chain. Some regulations require enterprises to register with the local regulatory body before starting their business.
- **Establish quality systems** such as Good Agricultural Practices, prerequisite programmes or Good Manufacturing Practices, ISO 9001 or hazard identification and analysis within a Hazard Analysis Critical Control Points (HACCP) programme.
- **Have preventive controls in place** to limit high-risk hazards. These may include supply chain approval programmes, sanitation standard operating procedures, allergen control standard operating procedures, and traceability and recall standard operating procedures.

- **Verify** declared measures are being implemented and validate that they are sufficient.
- **Have a written plan:** All of the above in a written plan, reviewed and updated every few years or when any changes occur.
- **Training:** Some regulations require having a trained individual who writes and oversees the food safety plan.

International food regulation laws and regulations vary per country.

Quality control in the supply chain: Where it begins

Quality control starts at the farm where the coffee fruits are produced and extends through each supply chain actor's respective steps until reaching the final consumer.

Quality control at the primary (farm-gate) level can assume different forms:

- Government or coffee authorities attempt to police harvesting, on-farm processing and drying. This is costly in terms of qualified staff and does not have a good track record.
- Penalties are imposed for lower-than-average quality. This is passive quality control – it does nothing to encourage better than minimal or average quality.
- Premiums are offered for better-than-average quality. This is active quality control: it rewards and encourages the production of better quality. Premiums can be combined with a refusal to purchase lower quality, but this does leave open the question of what then happens to such coffees.

Different producing countries have different quality-control systems and attach different values to certain quality aspects. General information on coffee quality standards can be found at www.iso.org (for instance, ISO 10470, a draft defect chart, but there are also many other ISO standards of interest to coffee exporters, including one detailing correct sampling procedures – under ICS 67.140.20 Coffee and coffee substitutes). Information is also available from coffee authorities in producing countries.

When setting quality limits, one should recognize that without active quality control, such as paying premiums for better quality, the maximum permissible limit (of defects, for instance) quickly becomes the new standard. And when setting export taxes, care should be taken not to penalize producers of better quality who manage to obtain premium prices as a result of their effort.

Quality systems

Good Agricultural Practices (GAPs) set the tone – or quality – for coffee's journey across the supply chain. Good Manufacturing Practices (GMPs) are also vital to coffee quality, before ending with ISO and HACCP standards at the end of the supply chain.

Good Agricultural Practices

GAPs are voluntary guidelines for farmers to reduce the risk of microbial contamination related to food-borne illnesses or other contaminations, e.g. with polluted water on their farms. They should be perceived as the foundation of food safety. Following these best practices minimizes the risk that the food sold to the public will cause harm or illness to consumers.

GAPs are not intended to eliminate the risk of contamination – this is impossible. Rather, they seek to guide growers to reduce the risk of contamination where possible. However, they are not specifically focused on preventing any particular hazard.

Good Manufacturing Practices or prerequisite programmes

GMP guidelines are general principles that must be observed during manufacturing. They provide guidance on post-harvest processes such as washed or natural processing, manufacturing, testing and quality assurance to ensure that a manufactured product is safe for human consumption or use. Many countries have legislated that producers follow GMP procedures and/or created their own GMP guidelines that correspond with their legislation.

GMP guidelines are not prescriptive instructions on how to manufacture products. When a firm sets up its quality programme and manufacturing process, there may be many ways for it to fulfil GMP requirements. The company itself must determine the most effective and efficient quality process that meets both business and regulatory needs.

All GMP guidelines should follow these basic principles:

- **Employees:** This includes personal hygiene, hand washing, hair restraints, no personal items near open food, no food or drink.
- **Processing facility:** Good condition of building, no leaks, cracks, smooth cleanable walls, surfaces and floors, cleaning of all facilities and surfaces on a regular basis, pest control programme, grounds maintained, proper plumbing, bathrooms, sinks and maintenance of everything.
- **Processing equipment:** Approved for food use, cleaned and sanitized, maintenance programme, proper equipment and trained employees.
- **Warehouse and distribution:** Storage and transportation shall be under conditions that protect food against physical, chemical and microbial contamination as well as against deterioration of the food and food containers.

GMPs are recommended to safeguard consumer health and to produce quality items. All food business operators should follow them.

GMPs are the foundation of a food safety plan and are, in theory, in effect at all times. They are not specific to one hazard. They are also the minimum policies and procedures one should have in place.

The ISO quality system

ISO 9001 is suitable for food-processing companies, which can use the process-based quality-management system to demonstrate the consistent quality of their goods to customers and concerned regulatory institutions. The company further enhances customer satisfaction by continually improving its system. As an example, it would be impossible to inspect every single pencil manufactured in a pencil factory – instead, one monitors the process used to make them. Similarly, one can describe in documented procedures, such as production manuals, the process of converting coffee fruit into exportable green beans.

When a firm's quality-management system complies with ISO 9001 and when the coffee is processed in accordance with these procedures, the system (not the product) can be ISO 9001 certified. During cultivation, too many variables (weather, diseases and pests, for example) are beyond the producer's control. This is why, in the case of green coffee, the process in the ISO system starts when the cherry is picked and ends when the container is delivered to the ship's side.

This can work for estate coffee that is exported under its own name. However, it is harder to apply to smallholder coffee, because numerous small deliveries to collection points or washing stations automatically lose their identity. And blended coffee shipped in bulk gains an identity only upon loading.

Nevertheless, good harvesting and processing standards are essential to maintain quality. ISO 9001 provides those who process their own coffee for export with identification and traceability for all the coffee produced. The batch number can lead back to the day of picking, showing where on the farm, what the weather was at the time, how long it took to dry the coffee, how well it was dried and many other variables – all useful information to determine the cause of any quality problems that may subsequently arise.

Although none of this may offer any immediate or direct economic advantage, estate growers using the system say they have become better processors and are more capable of providing the sort of quality guarantees that larger commercial roasters demand. For details, see www.iso.org and look for ISO 9001.

Individually, ICO and ISO objectives do not provide answers to the increasingly stringent food safety legislation being introduced at the consumer end, and the potential impact this has on coffee exporters. However, ISO 22000, which deals with food standards, incorporates the requirements of the HACCP system developed by the Codex Alimentarius Commission.

HACCP has become mandatory in many countries since the 1990s, most notably for non-farm food businesses in the European Union since January 2006. As ISO 22000 is an auditable standard, certified companies can demonstrate their compliance to HACCP. Certification to ISO 22000 could facilitate acceptance by global food retailers, as it also covers the requirements of key standards developed by various global food retailer systems.

Hazard Analysis Critical Control Points

HACCP is a management system that addresses food safety through the analysis and control of biological, chemical and physical hazards from raw food material production to manufacturing and consumption. While GAPs and GMPs are general in nature and not focused on a specific hazard, HACCP concentrates on a food manufacturer's product hazards, and its intended use of these products. Food-processing companies such as coffee roasters typically use HACCP systems.

It is possible, and common, to have more than one HACCP plan depending on the mix of products and their intended use. The usual intended use of coffee is to pour hot water over ground coffee and (in some cases run it through a filter). New industry uses of coffee – such as cold brew, food ingredients and cascara – may pose different hazards. It is the manufacturer's responsibility to assess and address all known and foreseeable hazards.

HACCP revolves around seven principles:

1. Conduct a hazard analysis

This is a two-step process (hazard identification and hazard evaluation). Identify potential hazards then rate them based on severity and likelihood of occurrence.

2. Determine critical control points

Critical control points are based on the hazard analysis and are defined as a step at which a control measure can be applied. They are essential to prevent, eliminate or reduce a food safety hazard to an acceptable level. There are many control points in a process, but only those points essential to the production of safe food are critical control points.

3. Establish critical limits

A critical limit is defined as a maximum or minimum value to which a biological, chemical or physical parameter must be controlled at a critical control point to prevent, eliminate or reduce to an acceptable level the occurrence of a food safety hazard. Regulatory standards and guidelines must establish critical limits.

4. Establish monitoring procedures of CCPs

What is monitored, how is it monitored, when is it monitored and who monitors it. There is a planned sequence of observations or measurements to determine if a critical control point is under control.

5. Establish corrective actions

Actions must be taken when a critical limit is exceeded. Determine and correct the cause of noncompliance. Adjust the process as necessary. Corrective actions describe the steps to be taken and assign responsibility.

6. Establish verification procedures

To validate is to ensure the plan is adequate to control hazards. To verify is to ensure the plan is being implemented properly. This is done by onsite observations, records review, auditing, calibration and review of customer complaints.

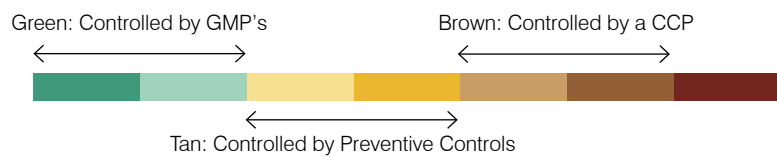
7. Establish recordkeeping

Recordkeeping provides evidence to demonstrate that the HACCP plan is applied effectively. Records must be maintained to document control methods, monitoring and verification results, and all action taken in response to any deviations.



Figure 11: Risk matrix

		SEVERITY				
		1 Near Impossible	2 Unlikely	3 Substantial Chance	4 Likely	5 Almost Certain
LIKELIHOOD	1 Insignificant	1	2	3	4	5
	2 Minor injuries or illnesses	2	4	6	8	10
	3 Substantial injuries or illnesses	3	6	9	12	15
	4 Major injuries or illnesses	4	8	12	16	20
	5 Death	5	10	15	20	25



Source: Food safety expert Mike Ebert (2021), adapted by ITC.

WHAT IS THE DIFFERENCE BETWEEN HACCP AND HARPC?

With the food supply chain's globalization and emerging new food safety risks, quality control and food safety measures have shifted from a focus on 'what would you do if' to 'what will you do when'. The goal is to proactively reduce and/or prevent potential for food contamination and to minimize food recalls across the food supply chain.

The US Congress signed the Food Safety Modernization Act (FSMA) into law in 2011. The Food and Drug Administration (FDA) is mandated to implement the FSMA new food safety regulations. The essence of FSMA-proposed rules is prevention – that is, a shift from a reactive to a protective and preventive approach. While this is a US-based regulation, the rest of the world and third-party food safety certification bodies are following a similar path of focusing more on prevention.

Under the FSMA, the FDA has a legislative mandate to require comprehensive, science-based preventive controls across the food supply chain. This means all food facilities that fall under the act must conduct Hazard Analysis and Risk-Based Preventive Controls (HARPC) and establish science-based preventive control measures to reduce the risk of food contamination.

The primary focus for all food processors should be:

- To understand how the risk-based preventive control rules compare to HACCP principles;
- To establish process controls to achieve and maintain compliance with the FSMA law for preventing risk of food contamination.

HACCP and GMPs are essentially designed to ensure that food is manufactured, processed, packaged and stored in sanitary conditions to prevent post-process contamination and to make sure it is safe, wholesome and without visible quality deterioration.

The HARPC plan has a similar concept and goal, but the approach is different from GMP and HACCP. HARPC enforces preventive controls to identify potential risks or threats to the food supply and to implement appropriate corrective actions proactively to prevent contamination. The FDA will establish science-based standards for conducting a hazard analysis and implementing and documenting preventive controls.

A qualified individual or a team of qualified individuals must understand the significant food safety hazards and put in place preventive controls to minimize the risk of hazards. Although the proposed HARPC aligns well with the HACCP plan, it differs in that science- or risk-based preventive controls, rather than critical control points, are required. Therefore, the establishment of critical limits would not be required under the HARPC.

However, the validity of preventive controls to minimize significant food risks should be backed up by demonstrated or tried-and-true scientific data or authentic scientific literature. A HACCP plan is not mandatory, but the FSMA HARPC is mandated by law under the FSMA.

WHAT HAZARDS SHOULD BE IDENTIFIED FOR HARPC?

- Biological, chemical, physical and radiological hazards
- Natural toxins, pesticides, drug residues, decomposition, parasites, allergens, and unapproved food and colour additives
- Naturally occurring hazards or unintentionally introduced hazards
- Intentionally introduced hazards (including acts of terrorism)
- Sanitation procedures at food surface contact points
- Sanitation of utensils and equipment
- Staff hygiene training
- Environmental monitoring programme (for pathogen controls)
- Food allergen control programme
- Recall plan
- Current Good Manufacturing Practices
- Supplier verification activities

A hazard analysis may reveal the need for stronger controls than just GAP or GMPs. These preventive controls can be broken into five main areas:

1. **Process controls:** Procedures, practices and processes to control parameters during operations. Examples: Cooking, refrigeration and product formulation.
2. **Allergen controls:** Procedures, practices and process to control food allergen cross-contact within a facility and ensure proper labelling.
3. **Sanitation controls:** Procedures, practices and processes to ensure that the facility is maintained in a sanitary condition that significantly minimizes or prevents hazards such as environmental pathogens or biological hazards due to employee handling. GMPs already include some of these, but sanitation standard operating procedures are more robust.
4. **Supplier approval programme:** Methodology for approving suppliers before buying a product from them, knowing what hazards they check and verifying that they are acting in line with declared implementation measures.
5. **Critical control point:** A step in which a control measure can be applied and is essential to prevent or eliminate a food safety hazard or reduce it to an acceptable level.

Potential hazards

Potential hazards across the coffee supply chain are plentiful. They must be managed carefully and proactively – regardless of the management system used by the food business operator.

Mineral oils – hydrocarbon contamination

Mineral oils (mineral oil saturated hydrocarbons/mineral oil aromatic hydrocarbons) are not identified as naturally occurring in coffee. Hydrocarbon contamination of green coffee can be caused by jute coffee bags because of the batching oil used to soften the jute fibres before spinning. There have been instances of contaminated oil being used (old engine oil, for example).

The International Jute Organization has established specifications (IJO Standard 98/01) for the manufacture of jute bags to be used in the food industry (see www.jute.org).

- **Analytical criteria.** Ingredients used as batching oils must be non-toxic and approved for use in packaging materials that will come into contact with food. Batching oils must not contain compounds that could produce off-flavours or off-tastes in food packed in jute or sisal bags.

- **Chemical criteria.** The amount of unsaponifiable compounds (which cannot be converted into soap by boiling with alkali) shall be less than 1,250mg/kg. The method described in British Standard 3845:1990 is recommended to determine the added oil content of jute yarn, rove and fabric. Method 2.401 of the International Union of Pure and Applied Chemistry is recommended for determining unsaponifiable matter.
- **Organoleptic criteria.** Jute bags shall be analysed for their olfactory qualities. No undesirable odours, or odour untypical of jute, shall be present. No unacceptable odours shall develop after artificial ageing of the sacks. The ageing procedure to be followed shall be the one described in European Standard EN 766 for use on sacks for food transport.

Organizations and private companies in India and Bangladesh have developed a hydrocarbon-free lubricant, based on vegetable oil, to soften the jute fibre. It is a non-toxic, biodegradable oil, and bags made with it can be classified as food-grade bags. However, the fact that vegetable oil is used for batching is not sufficient. The oil used must be stable and may not turn rancid.

Furthermore, green coffee can be contaminated through container dressings made of paper for the transport of bulk and bagged goods in containers, or open-bulk goods such as coffee. Roasted coffee can show traces of mineral oil saturated hydrocarbons/mineral oil aromatic hydrocarbons. These traces are often identified as polyolefin oligomeric saturated hydrocarbons from polyethylene packaging that migrates into the roast and ground coffee.

Mineral oil-saturated hydrocarbons/mineral oil aromatic hydrocarbons can be transferred into the beverage. Analytical results are still poorly comparable. Liquid and gas chromatography with subsequent flame ionization detection is recommended as a screening method, but may lead to false-positive results. Therefore, gas chromatography–mass spectrometry should be used as a selective confirmatory method to allow understanding of the source of mineral oil hydrocarbon contamination.

Obsolete pesticides or herbicides

Pesticide or herbicide residues in coffee are increasingly becoming an issue, making their monitoring a vital aspect of any HACCP system. The following points must be observed to prevent unnecessary pesticide or herbicide residues:

- It is absolutely essential that coffee growers maintain chemical registers that detail, in chronological order, the type and quantities of all chemicals used and the timing of their application;
- Only chemicals that have been approved for use on coffee may be used, and then only within the withholding limits specified by the manufacturers;
- A pesticide must be applied strictly following the pesticide manufacturer's instructions;
- Exporters and shipping lines must ensure that only clean containers are used to avoid cross-contamination by previous cargoes.

When developed countries prohibit the use of dangerous chemicals, a logical question arises: What can be done about existing stocks in lower income countries?

Over time, stocks of banned chemicals and pesticides have accumulated worldwide, some of which are persistent organic pollutants. These substances also become obsolete through ageing, rendering them less effective (past sell-by date) but no less unsafe. They may be left over from pest-control campaigns or simply stay around because they are no longer wanted or needed.

The condition of obsolete pesticide stocks and waste can vary from well-stored products that could still be used, to products leaking from corroded drums and other containers into the soil. Disposal is sometimes attempted by dumping into pits or burning and covering with soil. Over time, severe environmental harm in the form of soil and water pollution – often permanent – may occur.

Storage sites are often unsupervised and pose severe health risks, particularly to children. The World Health Organization has estimated that pesticides poison as many as 3 million people every year, most of them in lower income countries. The use of prohibited pesticides is therefore strongly advised against.

Ochratoxin A and mould prevention

Contamination by some naturally occurring moulds causes mycotoxins, though not every mould type produces mycotoxins. Ochratoxin A is the most relevant mycotoxin for coffee. OTA causes kidney toxicity in different animal species and kidney tumours in rodents. OTA is genotoxic both in vitro and in vivo; however, the mechanisms of genotoxicity are unclear.

Fungi of the *Aspergillus* genus (*A. ochraceus*, *A. carbonarius*, *A. niger*) produce OTA in coffee. It is mostly concentrated in the husk, which suggests that naturals (coffees dried in the cherry) are most at risk of contamination. In the framework of an HACCP system, it is recommended to envisage measures for mycotoxins in general.

The initial contamination of coffee with OTA takes place through spores in the air and in the ground. These spores may produce a mould, but only if the right circumstances (humidity and temperature) prevail. The importance of proper moisture management throughout the entire processing and supply chain cannot be overemphasized.

Farmers, middlemen and exporters should also be aware that OTA contamination (mould) may be very localized in a coffee shipment, making sampling extremely complex. Careful inspection of visual appearance and any mouldy or earthy smells can be useful tools for checking.

LEGAL REQUIREMENTS

In the European Union, the following maximum limits apply to finished coffee products, effective by summer 2021: roasted coffee – 3ppb (parts per billion) of OTA; soluble coffee – 5ppb. Furthermore, foodstuffs complying with the maximum levels may not be mixed with foodstuffs exceeding these maximum limits. This means, for example, that equal volumes of roasted coffee containing 4ppb of OTA cannot be mixed with roasted coffee containing 1ppb to achieve an average of 2.5ppb.

No maximum OTA limit is set for green coffee. This was confirmed when Regulation No. 105/2010/EU was amended in 2010 to read that setting maximum levels for green coffee is unnecessary because the OTA content is already monitored in another, more appropriate stage of the production process.

The danger for producers is that once a producing country is identified publicly as a potential source of OTA contamination (for instance, through the EU 'rapid alert' system used by customs authorities to distribute information on shipments with a food safety risk), the reputation and marketability of its coffee are likely to suffer. Identification of a shipment with an excessive OTA level can automatically lead to a producing country being placed on a 'high risk' list, and it will not be removed until several 'clean' shipments have been received.

In the United States, the presence of OTA in agricultural products is one of several food safety aspects that receive routine attention at the FDA. Although the FDA monitors for contaminants, including mould, based on a risk assessment analysis, no specific guidelines exist concerning OTA levels in coffee products.

Sampling and analysis

Another issue is how green coffee would be sampled for OTA. If a coffee is suspected of containing OTA, the food business operator should define how to sample it. Samples should be taken throughout the lot to total at least 5kg per 20 tons. For the OTA analysis, the food business operator should choose a laboratory that holds ISO 17025 accreditation.



MOULD PREVENTION

The importance of mould prevention cannot be stressed enough. Coffee exceeding the OTA limits may not enter the EU market. Article 21 of Regulation 882/2004/EG might force the roaster to reject the coffee. Failure or inability to re-export will result in the destruction of a rejected consignment. Hence, it is entirely possible that in time, the well-known United States contract condition 'no pass no sale' could also be introduced for coffees shipped to Europe and elsewhere.

Studies have shown that the most important sources of OTA contamination in green coffee are inadequate sun drying of cherries leading to OTA formation in the pods and parchment husks, and defectives (including black beans), pods and husks (and dust). The drying stage is the most favourable time for OTA to develop. Adequate drying to uniformly low moisture levels and avoiding local wet spots caused, for example, by uneven drying, rewetting or condensation, are crucial in prevention. Simple and cheap devices for solar drying of coffee greatly help improve drying practices, including prevention of rewetting by rain or dew.

Tests have also shown that the presence of an earthy/mouldy smell in green coffee is an early indicator of the presence of mould damage. Not every mould is OTA-forming, but an earthy smell (or cup) should trigger further investigation. Similarly, coffees that show no visible damage (i.e. rewetted bags/beans, broken beans, insect-damaged beans) are much less likely to be significantly contaminated.

A food business operator who must guarantee coffee quality in respect to OTA should do the following.

IDENTIFY CRITICAL CONTROL POINTS

- For green coffee, the first critical control point is the sales sample.
- Additional critical control points are receipt of outturn sample and samples from coffee arriving at the factory.
- In all instances, later samples must be checked to determine that they match the original sample.

Even though no minimum residue level has been established for OTA in green coffee and green coffee is not consumed as such, analyses should be conducted on it. Quality assurance or HACCP procedures applied to green coffee should ensure that the maximum limits on finished products are being met.

ESTABLISH CRITERIA FOR OTA CONTROL

The goal of OTA control is to ensure that the final product stays within the established maximum limits. Any food business operator should determine if the coffee has any of the following:

- Earthy/mouldy smell
- Visible damage
- Dried cherries/pods/husks

If suspicions are raised on the basis of these criteria, the coffee should not be used and the sample should be analysed for OTA in a second step.

All preventive steps apply as much to wet-processed coffees as dry-processed (natural) Arabica and Robusta. Good housekeeping is essential.

Prevention is the only effective way to combat OTA at farm level. It should be noted that removing mouldy cherries, or reprocessing mouldy coffee, does not guarantee that the clean bean is free of micro particles or spores.

See www.ecf-coffee.org under the publications section for extensive, practical information about OTA as an issue in the production and trading of green coffee, including details of relevant legislation on OTA in the European Union.

Coffee as a final product

Following the coffee cultivation, processing and production processes from green to roasted coffee that we have already explored, we finally come to the final product: the coffee beverage.

Final processing and elaboration of coffee also influence the quality and sensory experience of the final product. However, this publication focuses mostly on coffee's green form and quality. Plenty of resources are available today to guide readers on the intricacies of roasting, grinding, water quality and brewing.

Roasting allows different aromas to develop over time, depending on the coffee type used. There are different types of roast (light, medium, dark and varying degrees in between) that aim to bring out the coffee qualities and meet consumer preferences.

Grinding is the process of transforming the roasted beans to coffee powder, fragments or small granules by applying mechanical forces, in preparation for the next phase of elaboration. The main aim of grinding is to increase the specific surface area of the coffee particles that come into contact with the water, thus optimizing the extraction yield of the soluble and emulsifiable substances present in the roasted coffee.

Ground coffee quality can be defined as the correct quantity and quality of components retained by the roasted bean and available for extraction, regardless of whether it is intended for further elaboration or for the packaging process. The grinding operation makes a fundamental contribution to the final product's quality.¹⁸¹

Instant coffee (also called soluble coffee) is an elaborated product that consists of soluble solids extracted from the coffee. It is obtained by processing the roasted and ground coffee in a particular way, with specific tools and techniques, in various phases. It is achieved through spray drying or freeze drying.

'Coffee becomes an elaboration to drink when the powder comes into contact with water (or other products such as milk), thus undergoing an alteration; in this case, passing from a solid state to a liquid one, from a packaged product to a beverage.'

Coffee Sapiens, 2019



181. Adrià, F., elBullifoundation and Lavazza (2019). *Coffee Sapiens: Innovation through understanding*. Phaidon Press.

Coffee as a beverage can be prepared at home, in the office or in a coffee shop, either by the consumers themselves or by a barista who serves it in the appropriate cup. The standard brewing techniques of coffee are extraction or infusion.

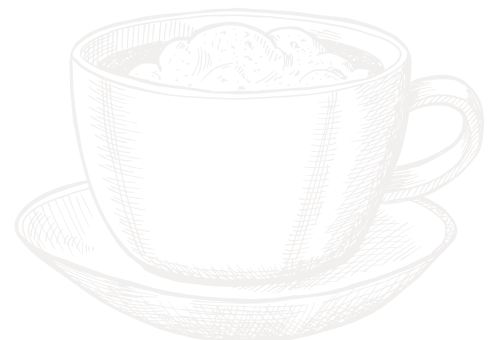
From country to country, coffee comes in different flavours and sizes, serves different functions and is consumed at different times of day. Coffee is a big part of national culture and reflects it in the way it is consumed.

The trends of the new millennium have opened up product differentiation, transforming coffee from a commodity to a luxury item. The third wave, described in Chapter 1, has added a new layer of complexity to the elaboration of coffee as a beverage and opened up endless product opportunities.

Some of the many ways to drink coffee today include:

- Filter (prepared in various ways)
- Americano
- Espresso
- Espresso ristretto
- Espresso con panna
- Espresso macchiato
- Café au lait
- Cappuccino
- Latte
- Latte macchiato
- Mocha
- Affogato
- Flat white
- Ibrik
- Cold brew
- Nitrogen coffee
- Frappe
- Iced latte
- Irish coffee and other coffee-based alcoholic cocktails

Brewing equipment and techniques are wide and varied, mechanized or manual. The different forms of the coffee beverage vary in popularity depending on the country or region, as does the choice of equipment and techniques.

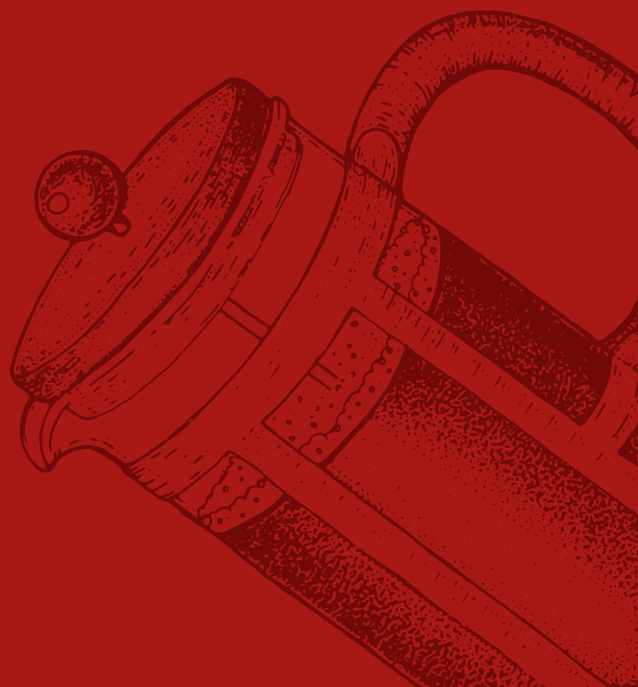




CHAPTER 6

FUTURES MARKETS AND HEDGING

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Cup of coffee and business strategy on wooden table.

FUTURES MARKETS AND HEDGING

The financial tools explained in this chapter provide critical structure and mechanisms to the broader coffee trade and industry. However, only a small portion of coffee sector actors have the means and know-how to access and adeptly use these tools.

Futures and options: Efficient market tools for everybody?

These tools generally remain unreachable to the largest group of actors: smallholder coffee producers, who often lack adequate economic resources and specific financial education. Access to these tools is also extremely complicated for non-organized farmers.

The generally disaggregated nature of smallholder coffee producers globally means they must accept the role of 'price takers' of these globally leveraged financial mechanisms, because they often lack the resources to participate directly. The global coffee supply base, on which the whole coffee industry relies, does not benefit from these risk-mitigating and often price-stabilizing mechanisms the same way that other actors in the supply chain do.

DEFINITION

Futures are financial contracts binding both parties – seller and buyer – to trade an asset (in this case a coffee futures contract) at a specific, predetermined future price and date.

Options are like an insurance, giving the holder (the buyer) the right but not the obligation to buy (call option) or sell (put option) the underlying security (coffee futures contract) at a predetermined price.

Futures and options can be used for speculating or hedging purposes.

This inequitable access to these financial tools should encourage us to consider how we can expand access to more actors in the value chain, especially small-scale coffee farmers. This is made all the more urgent by the fact that the coffee market has not sustained significant price increases in more than four decades, which jeopardizes the livelihoods of the most vulnerable populations of coffee producers globally. It is necessary to identify ways farmers can benefit as well.



Coffee beans on coffee bean futures chart.

Speculating with commodities

Commodity speculation is the purchase or sale of a commodity in the expectation that it will yield a profit when its future market value changes. There is a certain amount of pure speculation in commodity futures, although its magnitude is difficult to measure. The discrepancy becomes more evident when comparing the absolute traded amount of 'paper' (lots on the futures markets) with the underlying physical commodity (in this case, coffee):

Table 1: Differences between futures and physicals

Year	KC-ICE lots (in bags equivalent*)	Arabica world production*	RC-ICE lots (in bags equivalent*)	Robusta world production*
2017	2,649,682	96,000	742,356	64,000
2018	3,647,396	105,000	711,370	70,000
2019	4,119,988	92,000	840,271	76,000

*'000 bags of 60 kg

Note: KC-ICE is the contract symbol for Coffee C Futures (global benchmark for Arabica coffee). RM-ICE is the contract symbol for Robusta Coffee Futures (global benchmark for the pricing of physical Robusta coffee).

Source: ITC, trade sources, ICE.

The number of coffee futures being traded on the exchanges has grown consistently in recent years.

Throughout the 1970s, however, high levels of inflation and exchange rate uncertainty were associated with a greater degree of nominal price volatility for primary commodities. This, in turn, gave a tremendous boost to futures speculation. The presence of speculators in the futures market enhances its liquidity, which is essential to avoid undue price distortions that can be caused through sudden changes in hedging and investment strategies.

Excessive speculation can lead to wider price fluctuations, and markets become 'overdone on the upside and on the downside' (prices move to greater extremes than expected). This continues until the excess of either the long or short positions is finally unwound.

By virtue of an individual or firm's expectations and willingness to take risks, speculators aim to make an uncertain profit from their operations in the market. Speculators may take positions according to their price expectations on a set of different base-pricing logic. They are known as spot prices, future prices and spread prices, which can be combined.

Certain futures exchange features attract speculation. These include the standardization of the futures contract, the relatively low transaction costs and the comparatively low initial funding required (leverage).

Differences between hedging and speculation

Hedging is often confused with speculation. In both cases, operators are concerned with unforeseen price changes. They decide to buy or sell based on their expectations of how the market will move in the future.

However, where hedging is essentially a means to avoid or reduce price risk, speculation relies on the risk element. For instance, it would be irrational to sell futures for hedging purposes if the market was absolutely certain to rise. In the absence of absolute certainty about future market movements, hedging offers an element of protection against price risk. Speculation, on the other hand, involves deliberately taking a risk on price movements, up or down, in the hope of profiting.

One of the principles of speculation involves the opportunity for gain that the investor achieves by agreeing to accept some of the risk passed on by the hedger. In other words, the hedger gives up some opportunity in exchange for reduced risk. The speculator acquires opportunity in exchange for taking on risk.

Coffee buyers and sellers who aim to minimize their price risks in the physical market assume opposite positions, or risks, in the futures market. At any given moment, there are a number of buying and a number of selling hedge operations. However, it is unlikely that demand for hedges against buying risks will exactly balance demand for hedges against selling risks. Speculators take up the surplus of buying and selling risks that the usual hedgers have not covered.

To absorb the vast numbers of futures entering the coffee exchanges, many speculators willing to buy those lots are required. Likewise, considerable purchasing pressure occurs when traders or roasters hedge to cover their future needs. Prices would increase unless speculators were willing to step in as sellers.

If producers who wish to hedge could always find counterparts who also wished to do so, there would be no need for speculators. However, this situation is unlikely to occur regularly, partly because producers do not normally carry out hedging operations at the same times as roasters. The speculator provides the link between these two different time periods and interests. Nevertheless, large speculative positions can unduly influence the market. Producers and exporters should monitor developments closely, as their objective is to lock in profitable prices rather than to speculate.

DEFINITION

*The terminology of **long** and **short** is commonly used in commodity trading. It also applies when trading green coffee.*

*A **long** – or a long position – is held when the total amount of purchased coffee is greater than the total amount of sold coffee.*

*When the amount of sold coffee is greater than the amount bought, this is called a **short** – or a short position.*



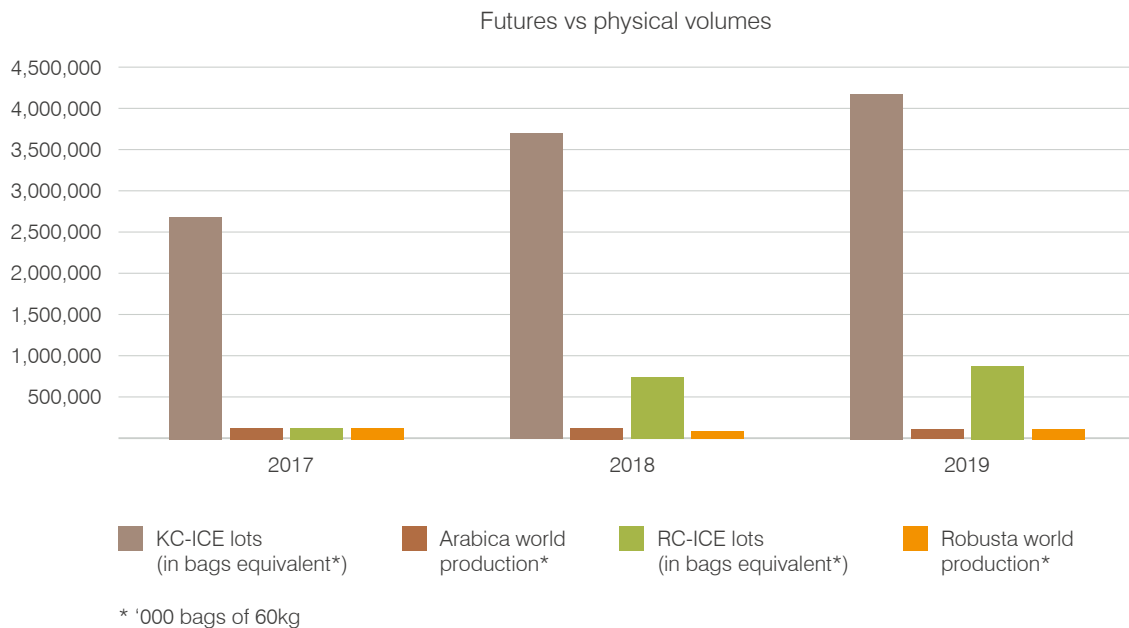
DEFINITION

***Hedging** attempts to reduce the risk and volatility of an asset.*

***Speculation** tries to make a profit from betting on price changes of a specific asset.*



Figure 1: Discrepancy between physical coffee and coffee futures



Source: ITC and trade sources.

Types of speculators

The extent of speculative involvement in any futures market can be high, and the coffee markets are no exception. The New York market attracts the most attention, and longer-term speculative involvement can reach as much as 30% of the open interest. Day traders can account for an extremely large percentage of the daily volume.

Day traders are so-called because they always square their position at the end of each trading day – they never carry any long or short position overnight. The day traders in coffee are referred to as locals because many operate for themselves. They take short-term positions (for minutes or hours) based on the order flow they see in the market and are well positioned to take advantage of price aberrations caused by other market participants. They are prepared, for example, to deal at a few points under the market level if they judge that the distortion will be short-lived and that prices will return to their previous levels.

Thus, locals can liquidate their contracts at a profit, although the profit may be quite small. This is made possible by the fact that locals receive a beneficial commission rate that enables them to repeat their operations several times a day.

Commodity funds and hedge funds provide the greatest source of speculative activity and their financial power can greatly influence price movements. Funds operate on a variety of mathematical algorithms able to combine moving averages, trends and momentum indicators.

They have become more complex over the years, and some now incorporate an element of in-depth market research in their strategies. Fund managers generally have a large portfolio of markets to trade, so they view coffee as only one facet in their total risk management. A hedge fund could, for example, lose in coffee and make profits in other markets (such as bonds or currencies) to return an overall profit, or vice versa.

Hedge funds can follow longer-term strategies. They are also able to reverse their market positions quickly if their algorithms show new trends.

Speculative funds that trade in coffee have been around for some time, but their volume has grown in recent years. Index funds have also recently entered the fray. These funds are large and can affect the market dynamics. While speculative funds move in and out of the market and can create short-term changes in supply and demand, index funds enter a market as part of a long-term investment strategy for coffee within a basket of other commodities. They never liquidate their positions and usually rebalance their positions just once a year.

This means that once a year, the fund's managers may decide to add or subtract a certain quantity of coffee futures to balance the fund and adjust the percentage of coffee contracts relative to the other commodities in the index fund. Hence, these funds maintain certain long positions by rolling futures contracts forward. In essence, they create additional demand for coffee, which influences prices.

In the United States, the Commitments of Traders Report documents activities of both speculative funds and index funds. Exporters and all industry hedgers should monitor these funds' activities and accept that real supply and demand for coffee can be affected in both the short and long terms. When these funds buy or sell in unison, they create much larger volumes in future trading than the coffee industry can offset and, in so doing, can move prices.

Websites of interest include www.cftc.gov and www.theice.com, which offer charts and spreadsheets showing the weekly commitments of traders and index funds.

High-velocity traders have been around for a while in the equity markets and are not new to the commodity industry. It has been suggested that high-velocity traders create 65% of volume (end-2019 figures) on the Intercontinental Exchange. These funds use proprietary algorithms to electronically buy and sell large quantities of futures, in microseconds, sometimes nanoseconds, to make a return on investment.

The problem for the coffee industry is that these high-velocity traders can also move prices but, unlike speculative funds and index funds, they do not maintain large positions for any length of time. This makes it virtually impossible to see what they are doing to the market. High-volume trading is normally good for liquidity, but these funds trade so quickly and aggressively that the only feature they add to the market is higher volatility.

Most professional coffee traders do not have the luxury of this diversification or the financial backing that the funds control. Therefore, they must be aware of the funds' positions in the market to manage their own coffee books accordingly.

Coffee trading houses, as well as large non-coffee-related speculators, take strategic positions in the futures market. Such positions could be to anticipate a directional move or to take advantage of price variances between different market positions. This can include a discounted switch structure in the same market (price difference between one futures month to another in the same market) or an arbitrage between the New York Arabica and London Robusta markets (price difference between the two coffee markets).

Non-professional speculators operate in commodity markets that are likely to experience sudden price changes and, hence, offer a greater profit potential. They are usually guided by information and comments from second-hand sources, such as bulletins published by brokers, daily newspapers and, more recently, the internet. This category of speculators normally involves small investors, many of whom rely on the advice of commission houses.

Uncertain futures markets

The extreme volatility of the coffee markets causes drastic price fluctuations over months, weeks, days or even hours. Crop prospects vary widely due to unforeseen events such as drought, frost or disease. High coffee prices encourage production growth, while low prices result in falling output.

However, volatile prices make planning difficult and risky, given the length of time it takes from the farmers' decision to grow coffee to its availability for sale compared with the supersonic speed at which contemporary markets move. The balance of supply and demand is subject to many uncertainties that directly affect prices. All levels of the coffee industry are exposed to the risks associated with sudden price changes.

Coffee futures represent coffee that will become available at some point in the future, based on standard contracts to deliver or accept a predetermined quantity and quality of coffee at one of a known range of delivery ports. The only points to be agreed when concluding a futures contract are the delivery month and the price. The delivery period is chosen from a preset range of calendar months, called the trading months. Market forces at the time of dealing determine the price.



Two main futures market centres serve the global coffee industry: New York and London. In New York, the Intercontinental Exchange (NYSE: ICE or ICE US), deals with Arabica coffee beans (the New York C contract – market symbol KC). In London, the market is also owned by the Intercontinental Exchange (NYSE: ICE or ICE EU) and deals with Robusta coffee beans (market symbol RM). Both can be consulted online at www.theice.com.

For ease of reference, this guide mostly refers to these markets as New York Arabica and London Robusta.

The internet has made it easy to access price information from the main markets. The exchanges have their own websites, and all the major commodity news services (such as Reuters and Bloomberg) supply price quotes for the major coffee futures markets. Some internet sites that deal specifically with the coffee business provide market quotes. Most sites are easy to navigate and usually include a page with the latest futures price quotations.

To locate online market information, it helps to understand the market coding systems. Using the symbols mentioned above, RMX22 would refer to a quote on the London Robusta market for the November 2022 delivery period.¹⁸² In the same way, KCZ22 would symbolize a quote on the New York Arabica contract for the December 2022 delivery period. Some websites are easier to navigate and read using these official market symbols; others spell everything out in plain English.

Free access price quotations are subject to 20–30 minute delay. Anyone requiring real-time quotes must register with a subscription service, which means paying monthly fees. There are many such subscription services with monthly fees ranging from \$200 to \$1,000, depending on what other news and trading services are included.

Box 1: How are prices 'made'?

Participants enter the market showing the price levels at which they would like to buy or sell. The buying bids are organized from highest to lowest, and the sellers' asks are organized from lowest to highest. When the system finds a match, that becomes the new market price.

Example

Buyers (bid)	Sellers (ask)
122	122
121	123
120	125
118	128
110	130

For this example, let's pretend that each line equals the willingness to buy or sell just one contract at a time. In this case, we see a match in price at 122, thus, that transaction gets completed: one contract is sold and one contract is bought at 122, and that becomes the new market price.

However, we see that for the next transactions, buyer and seller are two points apart, with the bid at 121 and the ask at 123. With the new information about the market price being 122, they both have the opportunity to come closer to the market price by increasing their bid or lowering their ask. If, for example, the bid goes up to 122.50 and the ask can go down to 122.50, a new match would be made, and 122.50 would be the new market price.

Now imagine this happening with thousands of transactions every second, and you will understand how market prices come to be and how the stock market just makes it easy for people to see them in real time, but cannot interfere in changing them.

Source: ENCAFE Business School.

¹⁸²The monthly codes for Arabica (KC) futures are H (March), K (May), N (July), U (September) and Z (December). The monthly codes for Robusta (RM) futures are F (January), H (March), K (May), N (July), U (September) and X (November).

The function of futures markets

Coffee futures exchanges were originally created to bring order to the process of pricing and trading coffee and to ease risks associated with chaotic cash market conditions. The futures prices that serve as benchmarks for the coffee industry are openly negotiated in the markets of the coffee futures exchanges.

To support a futures market, a cash market must have certain characteristics: sufficient price volatility and continuous price risk exposure to affect all levels of the marketing chain; enough market participants with competing price goals; and a quantifiable underlying basic commodity with standard grades or characteristics.

The futures exchange is an organized marketplace that provides and operates the facilities for trading; establishes, monitors and enforces trading rules; and stores and disseminates trading data.

The exchange does not set the price. It does not even participate in coffee-price determination. The exchange market supports five basic pricing functions: price discovery, price risk transfer, price dissemination, price quality and arbitration.

The exchange establishes a visible, free-market setting for trading futures and options, which helps the underlying industry find a market price (price discovery) for the product. It also allows the transfer of risk associated with cash price volatility. As price discovery takes place, the exchange disseminates prices worldwide.

Continuous pricing information availability contributes to wider market participation and to optimal pricing quality. This is because more buyers and sellers in the marketplace means better liquidity and, therefore, better pricing opportunities. To ensure the accuracy and efficiency of the trading process, the exchange also resolves trading disputes through arbitration.

The physical and futures markets

To understand the coffee futures market, we need to distinguish between physical coffee and coffee futures.

In the coffee cash market, participants buy and sell physical green coffee of different qualities that will be delivered either immediately or promptly. In this case, the cash transaction involves the transfer of the ownership of a specific lot of a particular quality of physical coffee. The cash price for the coffee is its current local price.

In the coffee futures market, participants buy and sell a price for a standard coffee quality. The transaction centres around anticipating the coffee price at a certain point in the future and bidding on it in an open auction. The futures price is the price one expects to pay, or receive, for coffee at a specific future date. The futures contract is a standardized legal commitment to deliver or receive a specific quantity and grade of a commodity or its cash equivalent on a specified date and at a specified delivery point. Its standardization allows market participants to focus on the price and the choice of contract month.

Buying physical green coffee now for later delivery, known as forward contracts, is not the same as coffee futures. Forward contracts cover the physical trade of green coffee (for details, see Chapter 7).

Traders in the futures markets are primarily interested in risk management (hedging), investment opportunities or speculation, rather than the physical exchange of coffee. Although coffee delivery can take place under the terms of the futures contract, few contracts lead to physical exchange. Instead, purchases are usually matched by offsetting sales and vice versa, and no physical delivery occurs.

In addition to its pricing functions, the coffee futures market also serves to establish clearly defined standards of quality and grade.

DEFINITION

Offsetting transactions

A trader who buys a futures contract and has no other position on the exchange is 'long'. If this purchase is not offset by an equivalent sale of futures, then the buyer will have to take delivery of the actual commodity. Alternatively, a trader who sells a futures contract without an offsetting purchase of futures is said to be 'short'.



Price risk and differential

As the futures contract is standardized in terms of the quantity and quality of the commodity, the futures price represents an average range of qualities and is, therefore, an average price. The price for each individual origin and even quality of physical coffee is almost never the same; it may be higher or lower.

Prices for physical coffee often fluctuate quite independently of the futures market. The physical premium or discount, also known as the differential, represents the value the market attaches to such a coffee compared to the futures market. This price differential can be higher or lower than the futures price and reflects local physical market conditions, as well as coffee quality and grade.

In the coffee trade, price risk therefore has two components:

- The underlying price risk: The price of the corresponding futures market. The futures price may rise or fall.
- The differential risk or basis risk: The difference between the price on the physical coffee market for a particular quality or origin and the price on the futures market is known as the differential. The differential price has its own dynamic and may increase or decrease.

Futures markets can be used to moderate exposure to the price risk because they represent the state of supply and demand for an average grade of widely available deliverable coffee. They cannot be used to moderate the differential or basis risk, which attaches entirely to a particular coffee origin, type or quality.

For conventional coffees, price risk is almost always greater than differential risk, so the futures market's risk reduction capability is an important management tool. Differential or basis risk can, admittedly, be very high at times and should never be ignored. It is helpful to examine historical differential pricing to identify periods of increased differential risk. There may be seasonal patterns, for example.

Liquidity and turnover

Liquidity is crucial to determine a futures market's success. A futures market must have enough participants with competing price goals (buyers and sellers) to ensure a turnover high enough to permit the buying and selling of contracts at a moment's notice without direct price distortion. Large transaction volumes provide liquidity to the market and enable traders to pick the most appropriate contract month, corresponding to their physical delivery commitments, to hedge the price risks inherent in those physical transactions.

More bids to buy and offers to sell in the market at any given time create greater pricing efficiency for the participants. Currently, only the New York and London markets provide this flexibility on an international scale, while the Brazilian market, although extremely active, is mostly relevant to local interests.

Futures prices do not always reflect cash market reality, however. This is especially true over the very short term, when large volumes may be traded for purely speculative reasons. The volume of futures trading and the underlying quantity of physical coffee it represents easily exceed total production of green coffee, or even global total volume of physical coffee traded.

The large volumes on futures markets not only affect futures prices, but inevitably influence the price of physical coffee as well. It is important for those involved in the physical coffee business to be aware of the activity of speculators and derivative traders. For that reason, the futures industry regularly examines and publishes the ratio of speculative and hedging activity in the market.

Speculators are absolutely necessary to the efficient functioning of a futures market. Speculative activity directly improves liquidity and, therefore, serves hedgers' long-term interests. Over the last decade or so, hedge fund activity and the development of options on futures markets have both led to an increase in short-term speculative activity.

While futures options provide another speculative opportunity in the futures market, they also represent an important risk-management tool that has become very useful in recent years.

Not all options result in actual futures contracts. However, they do represent potential quantities to be traded on the strike dates should the holders decide to exercise their options rather than simply letting them expire. In any event, the large turnover in actual futures demonstrates futures markets' impact on the daily trade of physical coffee. In recent years, physical prices have largely been determined by applying a differential to prices in the futures market.

The following table and graph demonstrate the huge growth in volume of the trade in options and futures.

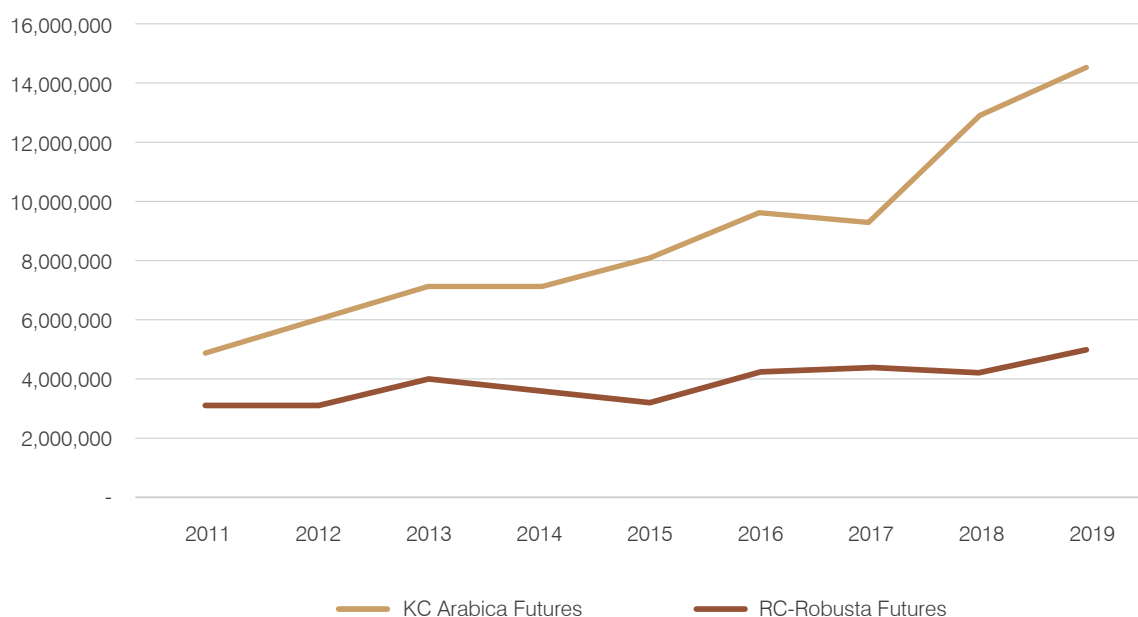
Table 2: Turnover in futures and options has been climbing

	KC-Arabica	KC-Arabica	RC-Robusta	RC-Robusta
Year	ICE lots Arabica	ICE lots in bags* equivalent	ICE lots Arabica	ICE lots in bags* equivalent
2011	4 858 783	1 377 464 981	3 178 689	529 781 500
2012	5 897 437	1 671 923 390	3 093 239	515 539 833
2013	7 122 195	2 019 142 283	4 099 478	683 246 333
2014	7 097 139	2 012 038 907	3 710 471	618 411 833
2015	8 136 929	2 306 819 372	3 240 954	540 159 000
2016	9 701 604	2 750 404 734	4 212 838	702 139 667
2017	9 346 322	2 649 682 287	4 454 135	742 355 833
2018	12 865 593	3 647 395 616	4 268 221	711 370 167
2019	14 532 587	4 119 988 415	5 041 627	840 271 167

*bags of 60kg

Source: ITC, www.theice.com

Figure 2: Arabica vs Robusta futures and options (consolidated volumes)



Source: ITC, www.theice.com

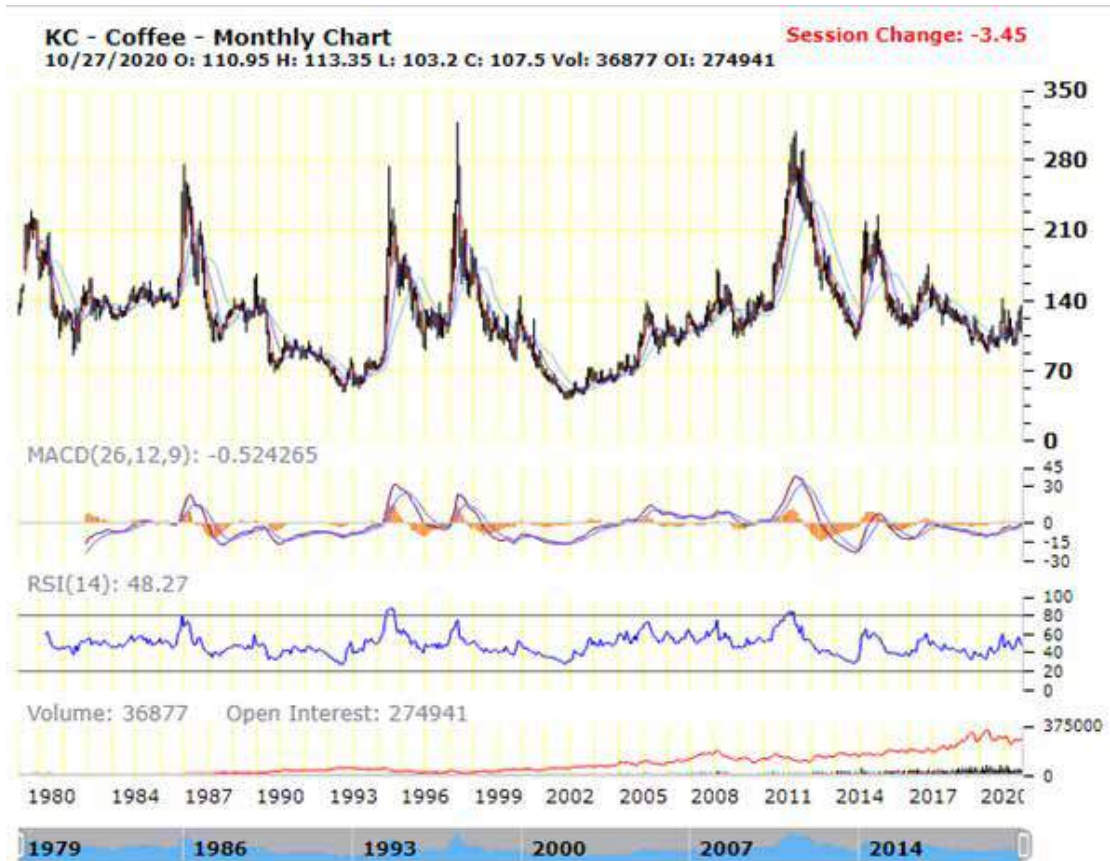
Volatility

The extreme volatility of coffee prices can be seen historically in both the size and suddenness of price moves. In April 1994, for example, New York Arabica 'C' futures were around 85 cts/lb. After frost damage in Brazil, they skyrocketed to 248 cts/lb – a rise of almost 300% in less than three months.

Values eventually fell back to around 90 cts/lb, but by May 1997, they exceeded 300 cts/lb. Then prices plummeted again. By mid-2001, the nearest position on the New York Arabica 'C' contract had fallen to below 50 cts/lb – a 30-year low just four years after the 1997 highs. By the end of 2005, the near position (spot month) once again stood above 100 cts/lb, reaching the 300 cts/lb level again in the first half of 2011.

After that, prices declined until early 2014, dropping to 100 cts/lb once again. A short spike in 2014, plateauing at about 220 cts/lb, was again followed by a falling market, bottoming out at levels slightly below 90 cts/lb.

Figure 3: Arabica futures prices over 40 years



Source: <https://futures.tradingcharts.com/chart/CF/M>

A useful tool for following the development of market prices can be found at www.futures.tradingcharts.com/chart/CF/M. Charts on this website show price movements over the last two decades.

Modern communication technologies enable markets to move quickly because all events affecting price become known to all market players more or less simultaneously. This can lead to a stampede to sell, depressing prices, or a rush to buy, inflating them. The result can be that prices jump or fall by as much as 10 cts/lb or more. In times of extreme volatility, this gap means traders can be left with a position they cannot liquidate when they wish to, because nobody or not enough buyers (or sellers) are willing to buy (or sell).

Leverage

Leverage, or the use of debt to finance speculation, is a principal characteristic of the futures market. In light of coffee price volatility, it is important to be aware that futures contracts are leveraged instruments, meaning that a trader does not pay the full market price for each contract.

Instead, futures traders pay a small portion of the contract's total value (usually less than 10%) in the form of margin, a good faith deposit to ensure contract performance. This is known as the 'initial margin'. A New York Arabica 'C' contract trading at 200 cts/lb would be worth \$75,000 (each contract is for 37,500lb of coffee). If the margin requirement is about \$5,400 per contract, buying 10 contracts (e.g. at 200 cts/lb) means paying a \$54,000 margin, representing a long (unsold) position worth \$750,000.

Leverage offers advantages, but it also carries an equal amount of risk. If the market falls by 10 cts/lb before a selling trade can be achieved, then the \$37,500 loss in this case represents about 70% of the original \$54,000 investment and requires payment of a variation margin (see later in this chapter). On a side note: traders using the futures market to hedge their physical position might incur a loss on the futures side of this operation, while realizing a comparable gain on the physical side of the business. This is why traders use the futures markets to hedge (and herewith protect) their physical transactions.

The exchange sets the minimum initial margins to ensure that everyone involved in futures transactions can bear the cost of their positions. The exchange varies margin requirements to discourage speculative trading.

The loss of one side of the trade is the gain of another side. Therefore, the exchange must guarantee that all parties involved can get paid and thereby secure the system's trustworthiness. Large margin calls (additional payments necessary to maintain the original margin level) sometimes further increase volatility when inability or unwillingness to raise the additional deposits causes traders or speculators to liquidate their positions, again fuelling the price movement up or down.

Organization of a futures market

Trading of futures

Traditionally, only exchange members were permitted to trade futures contracts on the exchange floor. But electronic trading means anyone with the appropriate trading rights agreement with a clearing firm, directly or through brokers, can now trade futures electronically. However, these non-exchange members must offer substantial guarantees before they can open a trading account. In origin countries, licensed commercial banks may offer such facilities.

Purchases and sales positions for the same contract month offset each other and are built up on a daily basis. Rather than forcing traders to carry such trades until maturity, a clearing house matches offsetting positions and clears them from the records of the brokers who handled them. The clearing house takes the place of the buyer or seller: it performs the role of seller to all buyers and that of buyer to all sellers. In this way, a maximum number of direct settlements is automatically possible at the close of each trading day.

The New York Arabica contract

The Coffee C contract is the global benchmark for Arabica coffee. The contract prices physical delivery of exchange-grade green beans from a licensed warehouse in one of 20 countries of origin to one of several ports in the United States and Europe, with stated premiums/discounts for ports and growths.

The original Coffee Exchange of the City of New York was founded in 1882 to deal in futures contracts for Brazilian Arabica. The New York Board of Trade was established in 1998 as the parent company of the Coffee, Sugar and Cocoa Exchange and the New York Cotton Exchange.

Box 2: What is a clearing house?

A clearing house ensures financial security for the market by establishing and enforcing rules and guidelines on the financial aspects of all exchange transactions. To guarantee its independence from market players, the clearing house is usually a separate corporation. Through its system of financial safeguards and transaction guarantees, it protects the interests of the trading public and exchange and clearing corporation members.

The clearing house checks, settles and reports each day's business and guarantees the fulfilment of each contract. This is done by paying margins and collecting outstanding obligations from members within 24 hours. Members pay into a permanent guarantee fund, so the clearing house can assume financial responsibility in case of default.

The clearing house also assigns tenders and re-tenders of deliverable coffee after making sure each lot meets certain standards of quality, storage, packing and so on. In addition, the clearing house conducts all futures business, including the tendering (delivery) of physical coffee beans under the terms of the futures contract.

Source: ITC.

Today's C contract, or NYKC, mainly covers mild washed Arabica coffee from 19 countries and washed and pulped natural coffee from Brazil. Some of these coffees can be delivered at basis price, while others are traded at differentials above or below the basis price.

In January 2007, the New York Board of Trade merged with the Intercontinental Exchange. This resulted in the introduction of the electronic trading of six soft commodity futures contracts on the board, including Arabica coffee, alongside the existing open outcry trading.

Open outcry trading stopped in early 2008. Since then, all futures, options and against actuals (also known as AA transactions) are electronic.



View of the trading floor of New York Stock Exchange.

Market symbol, quotations, price fluctuation limits

MARKET SYMBOL (CODE): KC

Quotation

For all bids and offers, quotations are in United States cents and decimal fractions of a cent. No transactions, except against actuals transactions, are permitted at a price that is not a multiple of five one-hundredths of one cent per pound, or five points per pound.

The contract unit (lot) is 37,500 lb

Grade/standards/quality

A Notice of Certification is issued based on testing the bean grade and by cup, testing for flavour. The exchange uses certain coffee varieties to establish the 'basis'. Coffees that are judged better are sold at a premium; those judged inferior are offered at a discount.

Minimum price fluctuation:

5/100 cent/lb, equivalent to \$18.75 per contract.

Settlement: Physical delivery

Deliveries, delivery months, tenderable growths and differentials

Delivery locations

Exchange-licensed warehouses are located in the ports of New York District, Virginia, New Orleans, Houston, Miami, Bremen/Hamburg, Antwerp and Barcelona.

The New York and Virginia delivery points are par; the New Orleans, Miami and Houston delivery points are at a discount of 0.50 cent per pound; and the Bremen/Hamburg, Antwerp and Barcelona delivery points are at a discount of 1.25 cents per pound.

Delivery months: (or trading positions) are March, May, July, September and December. Ten trading positions are always quoted, giving a two-year period. For example: July 2021 (N21), September 2021 (U21), December 2021 (Z21), March 2022 (H22), May 2022 (K22), July 2022 (N22), September 2022 (U22), December 2022 (Z22), March 2023 (H23) and May 2023 (K23). The first or nearest month is known as the current or spot month. When months repeat, the further out positions are sometimes referred to as red: in this example, the March 2023 and May 2023 positions would be known as red March and red May.

Table 3: Tenderable growths and differentials at the Intercontinental Exchange

Tenderable growths	Deliverable at
Costa Rica, El Salvador, Guatemala, Honduras, Kenya, Mexico, Nicaragua, Panama, Papua New Guinea, Peru, Uganda, United Republic of Tanzania (all washed)	Basis or contract price
Colombia (washed)	Plus 400 points per pound
Burundi, India, Rwanda, Venezuela (all washed)	Minus 100 points per pound
Dominican Republic, Ecuador (all washed)	Minus 400 points per pound
Brazil (only washed and pulped natural)	Minus 600 points per pound

Source: www.theice.com

Certification of deliveries

No coffee can be submitted for tendering without having first obtained a certificate of grade and quality from the exchange. A panel of three licensed graders examines all coffee submitted for certification. The examination is blind, or neutral, as the graders know the country of origin, but not who submitted the sample. The quality is determined on the basis of six evaluations and measurements:

- Green coffee odour (no foreign odours)
- Screen size (50% over screen 15, no more than 5% below screen 14)
- Colour (greenish)
- Grade (defect count)
- Roast uniformity
- Cup (six cups per sample)

Supervision by CFTC

The Commodity Futures Trading Commission (CFTC) supervises trading in commodity futures and reports directly to the US Congress. It aims to protect the trading public from possible abuses by the futures industry, such as market manipulation and other practices that might prevent the market from correctly reflecting supply and demand factors. It also seeks to ensure that exchange members are financially viable.

Exchange bylaws, rules and regulations are statutory and have the force of law. CFTC Act provisions require every intermediary that deals with members of the public investing in futures to be registered with the National Futures Association, a self-regulatory body created by the act. The ICE exchanges, using electronic surveillance and professional personnel, monitor trading activity and enforce trading rules and regulations.

As part of CFTC's efforts to promote market transparency, it publishes Commitment of Traders reports, which clearly show the position of large commercial and non-commercial traders. Positions of 50 contracts or more must be reported to the CFTC. This is valuable for small players as it gives them access to information that otherwise would be available only to very large operators.



Entrance to the US Commodity Futures Trading Commission at its headquarters in Washington

In the coffee market, it is not uncommon for large speculative hedge funds to hold 20%–25% of the open (uncovered) interest, long or short. Producers and exporters need to know in which delivery months these funds hold their positions. The speculative nature of such fund positions means it is equally essential to know their size, because rapid market movement could become imminent (liquidation of the longs or buying against the shorts) if the tonnage of either their long or short position moves to extremes.

CFTC produces a weekly Commitment of Traders report on futures, and a fortnightly one on futures and options combined. These are available on the CFTC website at www.cftc.gov. The reports offer information on four categories of market players: Commercial, SWAP Dealers, Managed Money and Other Reportables.

The London Robusta contract

The Robusta coffee futures contract is used as the global benchmark for pricing physical Robusta coffee. It is actively traded by producers, exporters, trade houses, importers, roasters and managed funds, as well as institutional and short-term investors.

Following the removal in 1982 of exchange controls in the United Kingdom, the London International Financial Futures and Options Exchange was set up to help market participants better manage exposure to both foreign exchange and interest rate volatility. In 1992, it merged with the London Traded Options Market and, in 1996, it merged with the London Commodity Exchange. This is when soft and agricultural commodity contracts were added to the financial portfolio.

Contracts currently traded are cocoa, Robusta coffee, white sugar, wheat, barley and potatoes. There is also a weather contract.

Commodity futures have been traded in London for decades – Robusta coffee futures first started trading in 1958. Quotations then were in pound sterling but, since 1992, both futures and options have been trading in United States dollars.

Delivery locations, delivery months, tenderable growths and differentials

Delivery locations

Delivered in an exchange-nominated warehouse in Europe or the United States.

Delivery months are January (F), March (H), May (K), July (N), September (U), and November (X). As in New York, 10 trading positions are always quoted.

For more information, visit www.theice.com.

After New York Stock Exchange bought the London International Financial Futures and Options Exchange, the exchange was renamed NYSE Liffe, although in the trade it is still referred to as LIFFE. Nowadays, it is an integral part of the Intercontinental Exchange and is known as the ICE Robusta market.

Market symbol, quotations, price fluctuation limits

Market symbol (code): RM

Quotation

\$/ton ex warehouse.

The contract unit is 10 tons with a minimum price fluctuation of \$1/ton.

Grade/standards/quality

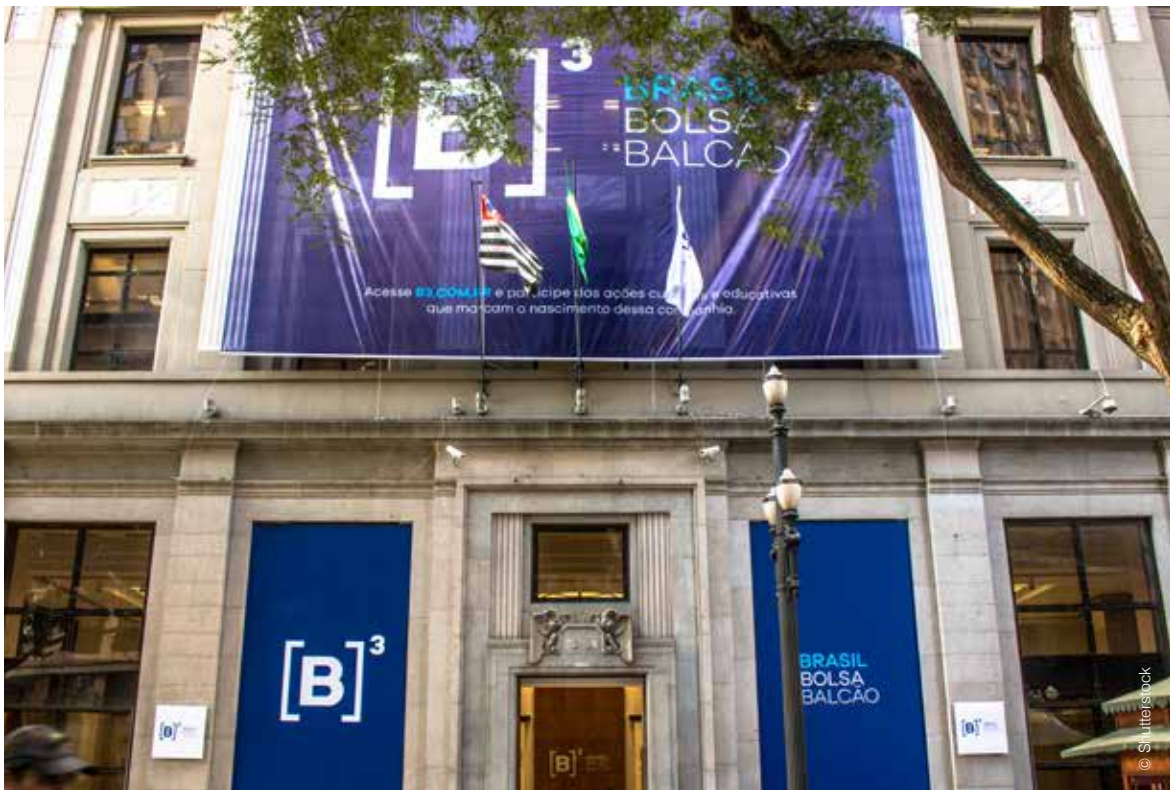
Robusta coffee from any country of origin that meets the minimum quality requirements is tenderable, provided it is freely available for exportation.

Class 1 Robusta coffee deliverable at contract price. Other qualities deliverable at set premiums and discounts.

Minimum price fluctuation:

\$1 per ton (\$10)

Settlement: Physical delivery



Facade of the B3, a stock exchange in São Paulo.

Other coffee price discovery tools

International: The Specialty Coffee Transaction Guide

Developing and championing alternatives to commodity-based price references allows sellers and buyers to agree on prices that reflect the value that is inherent in premium and specialized coffees. These prices should cover production costs, living wages for workers and the risky investments that producers make on their farms and during post-harvest processing to achieve higher-quality output.

In this respect, the Specialty Coffee Transaction Guide presents a valuable tool that summarizes recent transaction data based on actual premium and specialized coffee purchases. This should equip producers and buyers with more appropriate reference points for their negotiations. Disclosing this data to all stakeholders along the value chain informs everyone. It also encourages market outcomes where prices reflect and reward the non-commodity characteristics of premium and specialized coffees.

As price conversations and negotiations adjust to the revised information, specialty coffee producers receive payments that are consistent with the end value of their contributions. The 2019 Specialty Coffee Transaction Guide – based on 41,000 contracts covering more than 725 million pounds of green specialty coffee valued at over \$1.5 billion – reports a median price of \$2.80 per pound in each of the last three harvest years. More information can be found on www.transactionguide.coffee.

Brazil: B3 Brasil Bolsa Balcao

The first Brazilian commodity exchange was founded in São Paulo in 1917. The now rebranded B3 Brasil Bolsa Balcao (previously known as Bolsa de Mercadorias & Futuros or Brazil's Commodities and Futures Exchange) was established in 1985. The two exchanges merged in 1991. Six years later, a merger with the Brazilian Futures Exchange of Rio de Janeiro consolidated the position of Bolsa de Mercadorias & Futuros as the leading derivatives trading centre in the Mercosur¹⁸³ free trade area.

The exchange conducts business in many areas, including coffee. For more details, see www.b3.com.br.

Through the CME Globex system, B3 is linked to exchanges in the United States and elsewhere, and its coffee contracts are accessible to non-residents of Brazil. This enables foreign traders and roasters to hedge purchases of Brazilian physicals against Brazilian futures, thus avoiding the differential risk that comes with hedging on other exchanges.

B3's contract size (100 bags of 60kg each) means it is accessible to smaller growers, clearly demonstrating that this exchange operates in a producing country. Two contract qualities are traded on the exchange: Arabica Coffee Futures 6/7 and Arabica Coffee Futures 4/5. Both contracts run against March, May, July, September and December plus the next two positions of the following year.

These contracts are aimed at local market operators. Brazil is not just the world's top producer – it is also the second-largest coffee-consuming country. Using US dollars facilitates linkage with the export market.

Ethiopia: Ethiopian Commodity Exchange

This national multicommodities exchange was established in April 2008 in Addis Ababa.

Commodities such as sesame, wheat, maize and navy beans are traded on this standardized platform for agricultural goods and their future deliveries. Coffee was added later to replace the older Ethiopian auction system. The exchange counts 55 warehouses in 17 regional locations.

Physical coffee is moved through exchange warehouses in the coffee regions. Here, every lot of coffee is thoroughly inspected in terms of cup quality and appearance and finally graded. Coffee is usually stored at the Ethiopian Commodity Exchange warehouse premises to guarantee traceability to the village level.

Through the exchange platform, suppliers and exporters bid for and sell the coffee. Only Ethiopian nationals can trade on the platform.

183. Mercosur brings together Argentina, Brazil, Paraguay, Uruguay and Venezuela, as well as a number of associate members.

Kenya and United Republic of Tanzania: Coffee auctions

Kenya's Nairobi Coffee Exchange organizes a weekly auction. Marketing agents present the coffee to the exchange. Exporters have access to samples and can cup and analyse the coffees before they are sold. Before the COVID-19 pandemic, buyers had to be present physically at the auction premises. Today, bidding occurs digitally.

The Tanzania Coffee Board holds regional auctions in the northern (Moshi) and southern (Mbinga and Songwe) coffee regions. Samples are made available to exporters for their individual assessment before the auction. The buyer's physical presence is paramount.

Technical analysis of futures markets

Technical analysis is the study of the market itself rather than an evaluation of the factors affecting the supply and demand for a commodity (which is called fundamental analysis). The important components of technical analysis are prices, market volume and open interest. As this technical approach only considers the market, it must take account of fluctuations that reflect traders' actions that are not associated with supply-and-demand cycles. All technical analyses assume that the future market be forecast merely by studying its past behaviour (although many in the coffee trade find this hard to accept).

Detailed technical analysis is not possible for all or even most traders. The key elements for accurate decision-making are close contacts with the markets and with knowledgeable individuals in the trade. However, if charting specialists supply the analysis in a usable period of time, technical analysis can provide useful insights, particularly for medium-term forecasts.

The main tool of technical analysis is charting past price patterns. The changes in the volume of open positions (i.e. the number of futures or option contracts outstanding on a given commodity) and the total volume of operations in the market are also examined.

Charts often use a moving average to record and interpret price trends. In most charts, an average moves with time as the newest price data are incorporated into the average and the oldest price is discarded. For example, a simple three-day moving average of a commodity's daily closing price changes as follows: on Wednesday, the sum of closing prices on Monday, Tuesday and Wednesday is divided by three; on Thursday, the sum of closing prices for Tuesday, Wednesday and Thursday is divided by three; and so on.

Analysts can average prices over a period of hours, days, months or even years, depending on their needs. The moving average value always lags behind the current market price. When prices rise in bullish markets, the moving average falls below the current price. However, the moving average in a bear or falling market will be higher than the current price. When the price trend is reversed, the moving average and the current price cross each other.

While charting advocates accept that fundamental factors are the prime determinants of commodity prices, they note that these factors cannot predict prices. They argue that the graphs incorporate the fundamental factors that shape prices and reflect the subjective market reaction to these factors. The counterargument holds that, although the price curve and other elements of the graph are real and objective, the interpretation is necessarily subjective. Thus, the same graph can give contradictory signals to different readers.

In reality, the fundamental approach and the charting approach are likely to overlap. Operators commonly determine the market trend by studying fundamental factors and then select the right time to enter the market by referring to the charts.

Similarly, chart advocates study other factors beyond the limit of technical analysis. They may consider the number of marketing days left before a position expires, the amounts notified for delivery on the exchange, the situation of the longs and the possibility of accepting deliveries on the exchange without adverse results.

DEFINITION

Animals in coffee: About bears and bulls

Commodity and financial markets use expressions such as 'bullish' when prices rise or are expected to do so. In case markets collapse or are expected to fall, then the move is often defined as 'bearish'.

Bears and bulls are symbolic of the way these animals treat their enemies: bears bring them down with their paws while bulls lift them up with their horns.



Many companies specialize in producing charts for various commodities. Most have their own websites, where it is possible to access charting information, such as price history, volumes, open interest and technical studies. All coffee information websites (such as www.theice.com and www.tradingcharts.com) also possess charting ability and analysis.

Open interest

The total of a clearing house's outstanding long or short positions is called the open interest. The size of the open interest indicates the degree of current liquidity on a given market.

If a broker who is long in a futures contract sells his/her position to another trader who wants to be long on futures, the open interest remains the same. However, if the position is sold to a trader who is short and is, therefore, closing out his/her position, the volume of open interest falls.

When considering the open interest, it is important to distinguish between the types of operators entering the exchange. The term 'strong hands' describes those who can make margin payments over an extended time period. 'Weak hands' are operators who cannot easily meet the substantial variation margins demanded when prices move significantly.

Strong hands are generally resilient to price changes. One type of strong hand is an operator who uses the exchange for hedging. Such an operator may want to liquidate a position because of an opportunity, for example, to carry out an operation in physical coffee. Price changes do not affect this operator once the hedging operation has begun.

Another type of strong hand is the speculator who holds large amounts of capital. Such operators can withstand a setback on the market without being forced to sell their positions because they have the financial resources to cover the margins. Small non-professional speculators who generally operate through a broker are considered weak hands because they are more vulnerable to price changes.

Looking at prices in isolation can indicate whether buyers or sellers are dominating the market, but it does not distinguish new purchases from hedging operations. If new purchases are the predominant activity, it is possible to forecast the continuance of the market's upward trend, as these purchases signal that new operators are entering the market in the hope that it rises. However, if these purchases are largely for hedging purposes to cover short positions, the market is considered weak, because buying pressure subsides once these short positions are covered.

Volume of operations

The volume of operations, or turnover, equals the number of trades in all futures contracts for a particular commodity on a given day. Technical analysts regard volume and open interest as indicators of the number of people or degree of interest in the market and, thus, of the likelihood of a price rise. A gradual increase in volume during a price upturn could suggest a continuation of the trend.

The rise in volume could also result from anticipation of higher prices. It may also indicate that traders with long or short positions are leaving the market because of a price drop. Trade volume is a good guide to the breadth of the outside support given to a price movement on the market.

Relationship between open interest, volume and price

Charting elements must be interpreted together, as they are meaningless or potentially misleading on their own. Analysing changes in open interest and volume together with price charts may signal certain trends.

When both volume and open interest expand against a background of rising prices, a bullish trend occurs. A rise in open positions stems from the ongoing entry of new long and short positions into the market. However, with every subsequent price increase, the shorts that previously entered the market incur worsening losses that are harder to sustain. Eventually, traders with short positions will be forced to buy, which adds buying pressure to the market.

Persistent growth in both volume and open interest, accompanied by rising prices, is a good indicator of a bull market. In this scenario, more new participants enter the market on the long side, looking for higher levels. When the volume and open interest start to decline, this could signal a trend reversal. For the New York market, the Commitment of Traders report yields a powerful analysis of the open interest, not only by trader category, but also by weekly change.

If daily volume and open interest are falling and prices are decreasing, a so-called bearish trend is in motion. When there are more sellers than buyers in the market, long positions suffer increasing losses until they are forced into a selling position. Declining volumes together with declining prices mean it will be some time before the lowest price of this bearish trend is reached.

An explosion of volume can also indicate a turning point in the market, if a day's trading at very high price levels is recorded against a very large volume and if lower volume levels accompany subsequent price movements, either up or down. This is a good sign that a reversal is imminent. Similarly, a price collapse after a severe downtrend, recorded against a high volume, can signal an end to the bearish trend.



Forex chart drawing and desktop with coffee and items on table background.

Charting

The two most commonly used charts in technical analysis are bar charts and point and figure charts. Other types of analysis include trend lines, moving averages and stochastics or probabilities.

Bar charts use a vertical bar to record the high and low range of a price for each market day. The bar length indicates the range between the highest and lowest quotations. A small horizontal line crosses the vertical at the closing price level. Therefore, in just one line per day it is possible to show the closing price as well as the minimum and maximum quotations registered for that day. A record is made daily, forming a pattern that may cover several weeks, months or even years.

Some chartists insist that a new bar chart should be started as soon as a new futures position is opened. However, it is common to continue the original chart with the new position following the position that has just expired. As the new position may have discounts or premiums in relation to the old position, the chart should be clearly marked to indicate where the new position starts and where the old position ends.

Continuous plotting can be done in various ways. One way is to show the first position until it expires and then to continue with the new first position. Another way is to show only one position until it expires and then to continue with the same month of the following year. The drawback of the second method is that once a position expires, say, in December 2021, and the next position taken is December 2022, prices may have changed significantly, so the chart may show a large increase or decrease.

Trend lines on charts reveal important trend changes, but obscure subtle changes in supply and demand factors. The trend line is best suited to record long-term changes in indices or other financial and economic data. The market registers three types of trends: a bullish trend when prices rise, a bearish trend when prices fall and a steady or lateral trend when prices are steady. A steady trend sustained for a long period is known as a 'congestion area'. The larger this area, the greater the possibility that the market will begin a definite trend, either bullish or bearish.

Point and figure charts differ from bar charts in two important respects. First, they ignore the passage of time. Each column of the chart can represent any length of time.

Second, the trade volume is unimportant as it merely reflects price action and contains no predictive significance. The measurement of change in price direction alone determines the chart pattern. The assumptions underlying this chart primarily concern the commodity price. It is assumed that the price, at any given time, is the commodity's correct valuation. This price is the consensus of all buyers and sellers in the world and results from all the forces governing supply and demand laws.

Moreover, no other information needs to be included in this chart, because the price is assumed to reflect all the essential information on the commodity.

Real time and delayed charts can be obtained from various sources, including www.theice.com, www.tradingcharts.com and www.coffeenetwork.com.

Daily and monthly coffee price futures charts, offered free of charge by www.futures.tradingcharts.com, are easy to access.

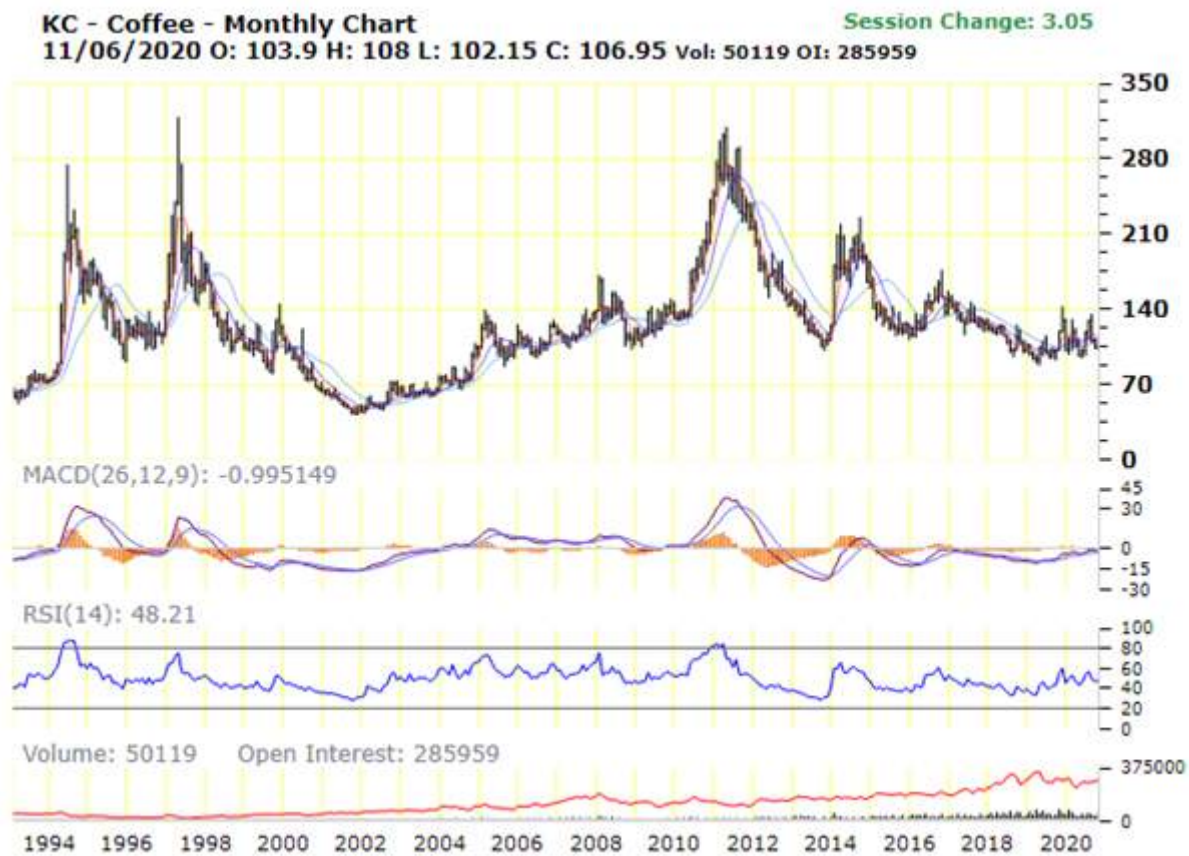
Figure 4: Example of a daily coffee futures price chart



Note: MACD: Moving average convergence/divergence. RSI: Relative strength index.

Source: TradingCharts.com, www.futures.tradingcharts.com.

Figure 5: Example of a monthly coffee futures price chart



Source: TradingCharts.com, www.futures.tradingcharts.com

Hedging explained

Coffee prices are inherently unstable. Irrespective of whether one is a producer, exporter, importer or roaster, a strategy to manage price volatility is critical. For operators using borrowed funds, most banks insist on a solid risk-management strategy. Most of these strategies are designed using coffee futures and options to offset the price risk inherent with holding coffee inventories or commitments to deliver coffee.

Sometimes, hedging can be done by offsetting the sale of one type of physical coffee with the purchase of another type. This type of hedging is very difficult, as the physical coffee market is less liquid than coffee futures and it may be difficult to find a buyer at short notice for that particular coffee.

Hedging helps manage the risks posed by unforeseen price movements. There are many strategies for hedging. Most call for using coffee futures or options to offset normal price risk incurred with either (i) holding unsold coffee stocks or inventories, which is referred to as being physically long, or through (ii) forward sales of coffee not yet bought, which is known as being physically short.

While hedging does not eliminate risk, it is an effective management tool for mitigating it. Professional risk managers, sometimes called traders, know many different hedging strategies and what kind of price protection each strategy generates.

Hedging allows one to offset price risk through opposing but matching transactions in both physical green coffee and futures. But only the price risk, not the differential risk, can be hedged. Hedging has become popular, mainly because few banks finance transactions where price risk is not managed. But hedging in severely volatile markets requires increasingly large capital outlays, at times rising to unaffordable levels for all but the strongest hands. Successful hedging strategies, therefore, require backing from experienced banks, well-versed in the financing of the commodity trade.

Risks

Coffee producers are a natural 'long' in the physical coffee market. They always have coffee that is subject to price changes. Producers own stocks of already harvested coffee or coffee still on trees. They also have future coffee production that are subject to price swings in the market. They may not know the exact quantities of their future production, but experienced coffee producers have a good idea how much a farm produces in any given crop year. Hence, the next or following year's production must be seen as part of the producer's long position.

Coffee roasters are a natural short in the market, because they need to buy coffee to stay in business. Inventory and forward purchases may reduce the need to buy coffee, but they roast what they have as business continues and will need to buy more at the market price. Price swings can greatly affect their business. While roasters have a good idea of their future sales volume, they have no idea of the price they will pay, unless they hedge.

Exporters and importers are true middlemen. They must buy coffee when the producer wants to sell, and sell when the roaster wants to buy. Exporters and importers can be naturally long or short, depending on whether they have more purchases or sales in their physical (green coffee) position.

Types of price risk

Before there were active futures markets, coffee was bought and sold at fixed prices. That means purchase and sale contracts would show a simple amount per pound or per ton. This is also called outright pricing.

Today, physical coffee can be traded with outright pricing. A trader who bought coffee at \$1.60/lb that had not already been sold (bought long) could only hope the price would stay the same or rise. If a seller sold coffee for \$1.60/lb that had not already been bought (sold short), the hope would be for the price to stay the same or drop. Whenever such a contract is closed, the trader is exposed to price movements in the market.

Another type of pricing is coffee bought or sold on a differential basis. In this case, there is a commitment to deliver or take delivery of coffee not at a fixed price, but at a difference to the futures market. Theoretically, a trader can buy or sell at a difference to any published price (that is, ICO indicators), but almost all differential business is done against futures markets.

More specifically, Robusta coffee is normally bought or sold against the RM Robusta contract and Arabica coffee is bought or sold against the KC Arabica contract. Differential contracts are mostly priced against future markets because they are liquid and prices can be fixed any time these markets are open.

Differentials link prices for widely differing types and qualities of green coffee with prices on the futures markets where standard qualities and quantities are traded. In recent years, increasing activity on the futures markets has translated into greater price volatility, often unrelated to changes in the supply and demand of the coffee itself. As a result, differentials for many individual origins fluctuate not only in response to domestic changes in, for instance, quality or availability, but also because of (sometimes unexpected) movements on the futures markets that are caused by speculative activities.

Box 3: Long and short positions and rallies

Long means unsold stocks or bought positions against which there is no matching sale. The total unmatched quantity is the long position.

Short is the opposite: sales exceed stocks and one has outstanding sales without matching purchases – the short position. When large holders sell off their longs, the market speaks of liquidating. When traders buy in against shorts, then market reports speak of short covering.

Rising market prices are known as rallies. A rally usually involves a quick and substantial move to the upside and can be a consequence of an extended period of falling or flat prices.

Source: ITC, trade sources.

It is important to note that differentials also bear a price volatility risk. For example, Colombian coffee (Excelso UGQ) trading at around ICE KC plus 15 cts/lb rose sharply in 2010 to ICE KC plus 80 cts/lb. Someone who had sold that coffee at plus 15 cts/lb and was now forced to cover it at plus 80 cts/lb would have lost 65 cts/lb on the differential, before the contract itself was even fixed. This example is extreme, but it did happen and it will likely happen again with some coffee quality.

Nevertheless, it is safe to say that price differentials are less volatile than futures prices. With differential or price-to-be-fixed (PTBF) contracts, one can reduce the price risk by taking positions, either long or short, and avail those positions to all risk-management tools available in the futures and options markets.

Risk cannot be eliminated. Still, most large roasters buy on a PTBF basis and anyone wishing to participate in their business must understand this sort of trading. PTBF contracts are discussed later in this chapter.

The advantages of hedging

Hedging offers advantages to commodity producers and costs comparatively little. Hedging with futures allows producers to lock in a price that reflects their business goals. The producer should identify the price in the futures market that supports the production cost plus a profit. If prices fall, the producer still achieves something near the originally intended pricing goals.

If prices rise, however, the producer forgoes a larger profit margin. The loss of this potential (speculative) extra profit is balanced by the protection afforded against dramatic and damaging market declines. There are also other advantages in addition to this price-insurance aspect of hedging.

First, hedging offers a flexible pricing mechanism. Producers who feel they have made the wrong decision on the exchange can have an alternative order executed easily and immediately.

Second, hedging operations involve only small initial outlays of money. If the futures price rises, the producer who has sold futures may be asked to pay additional margins and would need extra financing – though this would be compensated by an increase in the physical stock's price. Nonetheless, the need for additional finance might become an issue for the producer.

Third, as a futures contract provides considerable price protection, banks and other financial institutions are more likely to finance producers, exporters and traders who hedge their crops and positions than those who do not.

Finally, commodity trade banks and risk-solution providers put together different risk-mitigation instruments that are tailored to a client's requirements. For example, a put option can be graduated to extend over the usual marketing season by spreading equal portions over two or three futures trading positions at different strike prices. Each individual portion can then be exercised individually.

Alternatively, solution providers may simply guarantee a minimum price. For a premium payment, they undertake to make good any shortfall between the insured price (the minimum price the producer wants) and the price ruling for the stated futures trading positions (New York or London), either at a given date or based on the average price over a number of trading days. In doing this, the producer buys a floor, a guaranteed price minus the premium cost.

The selling hedge

A producer, exporter, processor, importer or dealer holding unsold stocks of a commodity wants to safeguard against the risk of falling prices. This risk is offset by a forward sale of a corresponding tonnage on the futures market: the short or selling hedge. If prices decline, long holders lose on their physical coffee. However, they would be compensated by profits made at the exchange because the futures contract would have been bought back at a lower price. This relies on the assumption, usually accurate, that futures prices decrease when physical prices fall.



A straightforward example would be that of, say, a Guatemalan exporter who on 15 September buys 1,000 bags of prime washed Arabica coffee ready for shipment in October. As there may be no buyers on that day willing to pay his asking price (basis FOB Guatemalan port), the exporter sells four lots of the New York C December position instead. He does this because the price obtainable is very close to his asking price, plus or minus the differential, for the physical coffee.

If the market for the physical coffee goes down, the exporter protects himself from the lower price at which he may eventually have to sell by buying in his short sale of New York C December. Should the market go up, he makes up his loss on the December futures with the higher price he receives when selling the 1,000 bags of physical coffee – assuming that the futures and physical coffee prices move in tandem.

Differentials are usually lower when futures prices are high, and higher when futures are low. However, differentials can be extremely volatile. Although these variations can sometimes work in an exporter's favour, at other times they can come as a nasty surprise. Differentials vary due to assorted factors, including production or supply problems at origin or outside influences on futures markets.

The buying hedge

Roasters may have customers who want to buy a certain percentage of their requirements at a fixed price for monthly deliveries up to a year ahead. But it would be both economically and physically impractical to purchase spot green coffee, finance it and store it for that period of time. Instead, the roaster can buy futures positions for as far forward as necessary to cover the sale of the roasted coffee.

This enables the roaster to purchase a specific growth and quantity of physical coffee when needed, to fulfil commitments to customers. Upon buying the needed coffee, the roaster can sell out his/her position on the exchange or tender it as an against actuals transaction.

Dealers or importers who have entered into a forward sale of up to 12 monthly deliveries to a roaster can purchase the various trading months of the futures contract to protect their sale until they are able to buy the physical coffee to be delivered against the forward sale. Once physical coffee is purchased, they sell back that part of their long position in futures on the exchange. As in the selling hedge, both parties have protected their price risk, regardless of market fluctuations.

Swap agreements

Swap means to barter or exchange, and this also applies to hedging. For example, producers can swap price risk by giving up the benefits from future price rises in exchange for a guaranteed minimum price. Such a swap agreement could even cover more than one crop year, with tonnages and settlement dates set for each quarter. In other words, they are written or tailored to address different individual requirements. Swaps are often mentioned in commodity market reports but, generally speaking, are of limited interest to exporters.

The price fixing necessary to finalize coffee swaps would rely on the relevant futures market without actually having to trade futures. This avoids the problems that using futures can cause, such as having to secure investments with a deposit, particularly when it comes to distant positions. In addition, futures trading or hedging does not always address individual price insurance requirements.

Swap agreements are negotiated directly between those wishing to acquire them and solution providers who are prepared to offer or write them. As such agreements are concluded away from formal futures trading, they are usually known as over-the-counter products. Swap agreements are extensively used in financial and energy markets, but less so in agricultural commodity markets. Nevertheless, demand for them is set to grow, partly because financial institutions are increasingly risk-averse.

This is pertinent because both parties in a swap deal face performance risk, especially for longer-dated agreements. In contrast to futures, there is no central clearing mechanism for agricultural swap agreements and, as a result, defaulting is possible. This limits their attraction as a price insurance vehicle.

To tackle this shortcoming, ICE in New York introduced a clearing facility for agricultural swap agreements – initially for sugar, coffee and cocoa – in February 2009. This enhances the suitability of swaps mechanisms to limit price and credit risk.

Trading at price to be fixed

The trading described above assumed that buyers and sellers worked with fixed or outright prices and focused on the primary market or price risk implied in the futures market price. Hedging cannot offset differential risk. In recent years, a growing volume of physical coffee has been traded at prices that are to be fixed against the futures markets. These contract types are called price-to-be-fixed contracts.

The PTBF contract is a great tool to manage price risk as it combines hedging with the act of buying or selling physical coffee. Through PTBF contracts, an outright price risk changes to a differential price risk, which is inherently less volatile. Further, once a PTBF contract is signed, the buyer and seller can fix their respective prices (which can be different) any time a futures market is open without having to wait for a bid or offer in a physical market that may lack liquidity.

Like any risk-management tool, PTBF can cause more damage than good if it is used improperly. There are many examples of how parties enter into PTBF contracts without knowing how they work. Instead of managing risk, the parties can unknowingly increase their exposure. There are known examples of exporters fixing PTBF contracts without actually having bought the physical green coffee or delaying fixing until long after the physical green coffee was bought. This is not risk management – it is pure speculation.

Yet the fact remains, a well-executed PTBF contract limits price risk to changes in the price differential and makes it possible to fix purchase or sale prices whenever future markets are open. However, to take advantage of this last attribute, buyers and sellers of PTBF contracts must have access to coffee futures.

To do so, a relevant delivery month on the futures market is chosen. As the quality of the physical coffee (the green coffee) is worth more or less than the quality on which the futures contract is based, the price stipulation will read, for example, 'New York C December plus (or minus) 3 cts/lb', or 'London Robusta November plus (or minus) \$30/ton'. The plus 3 or plus 30 is the differential.

The relevant month of the futures market is usually the month traded nearest to the delivery/shipping month of the physical coffee. For instance, Colombian coffee shipped in December would normally trade against a March C contract. The number of futures contracts used to fix the physical delivery price is determined by taking the total quantity of the physical contract and dividing it by the size of each futures contract. If a fraction of a futures contract is involved, the total number of contracts is rounded up or down.

All these contract terms – differential, futures month(s), number of futures lots – should be specified when the contract is initiated.

The contract constitutes a firm agreement to deliver and accept a quantity of physical coffee of a known quality and under established conditions. These conditions are based on the quotation for the specified delivery month of the futures market at the time of fixing, plus or minus the agreed differential. The advantage to the buyer and seller is that each has secured a contract for physical coffee, but the price remains open.

In other words, the buyer has separated the operational decision to secure physical coffee (thereby avoiding problems of shortages) from the financial decision to fix the cost of that coffee (which the buyer prefers to postpone). This arrangement provides flexibility for both buyer and seller.

Fixing price-to-be-fixed contracts

Beside the differential that is determined when the contract is initiated, there are three other prices: the price at which the seller fixed, the price at which the buyer fixed and the invoice price.

It is preferable – if not imperative – that sellers and buyers of PTBF contracts have access, directly or via an intermediary, to futures trading accounts. For exporters or producers who lack a futures account, the buyer's account can be used for fixations. The seller can fix the sales price in a PTBF contract by selling the number of futures specified in the contract. The buyer can also fix the buying price by doing the opposite – buying.

The invoice price for the PTBF contract is set when either buyer or seller transfers these lots to the counterparty. In the case of PTBF buyer's call, the buyer transfers futures to the seller. In the case of PTBF seller's call, the seller transfers shorts from his/her futures account to offset the longs in the buyer's account, fixing the invoice price.

In all PTBF contracts, the coffee selling price is the invoice price plus the profit or loss in the seller's futures account. The coffee buying price is the invoice price plus the profit or loss in the buyer's futures account.

Box 4: Against actuals and switches

Against actuals

For this transaction, both the buyer and seller of green coffee must have a futures account. They need to agree to make a futures transaction at a specific price of the exact same futures month and lot quantity, and define the broker each party is using.

Against actual transactions are used to allow any price level that the position had achieved since it started. However, due to stricter financial rules today, it is common to agree on a price level that has been traded during the day the AA will be performed or use the settlement price, which is the closing price of a certain day.

Switch

Switching is used for rolling forward a futures position. This is done by closing a near month contract and opening a later month contract, thereby switching their positions.

For example, a coffee exporter with a long physical coffee position must keep the position hedged. As time moves on, first notice day approaches and the futures contracts expire soon afterwards. Therefore, the exporter will close the near month contract with a futures position and move the futures position into a more distant trading month. This will happen simultaneously when buying or selling the switch.

Source: ITC, trade sources, ENCAFE Business School.

Why sell PTBF?

Many exporters (who often double up as processors) must be constantly present in the market – that is, they need to buy when their growers or collectors want to sell. But buying coffee without a home for it can be dangerous, so many exporters (and their bankers) prefer for such purchases to have a potential destination. After all, trading coffee requires substantial funds. Most exporters use credit lines and therefore require bank approval for their trading operations.

But selling at a fixed price for forward deliveries without already having the coffee is equally dangerous. PTBF contracts allow the price to be fixed at a later date, while providing a guaranteed home for the coffee that will be bought.

In its most basic form, PTBF sales contracts should be fixed when the physical coffee is purchased, possibly each time a container load has been reached. In this case, larger contracts must allow for multiple fixations. How much coffee to accumulate before fixing is an individual decision, but selling PTBF is a risk-management tool and not intended for speculation.

When the seller calls for the fixation, the buyer sells the appropriate number of futures in the manner that should have been agreed in the contract. The seller can give the buyer a different fixation order, such as 'at market', or 'on opening'. As soon as the futures market price trades at the selected level, the order is filled and the price is fixed. This kind of operation requires trust between the two parties involved.

Trading PTBF is also risky for the intermediary buyer. What if the exporter/shipper calls for fixation without actually owning the coffee? By doing so, the exporter becomes fully exposed to market volatility. Should things go badly wrong and the exporter defaults, then the importer who arranged the fixation is in serious difficulty. The importer would have to cover the entire loss on the futures and would still have to fulfil the sales contract for the physical coffee. This is why some buyers only allow fixing from a certain date, particularly for extended forward contracts.

Avoiding the fixation trap

A PTBF sale is like being a passenger in an elevator without knowing whether it is going up or down, with 'fixing' being the floor buttons. If you do not push the button, you may end up somewhere unexpected.

To avoid falling into the fixation trap (an inability to decide), internal stops should be set to ensure that fixing takes place automatically when a certain amount of time has elapsed or a price is reached. Fixing orders can be given on the basis of 'good till cancelled'. However, in a very volatile and fast-moving market situation, the 'gap trading' phenomenon may make the timely execution of such good-until-cancelled orders difficult, if not impossible.

Producers or exporters who have both the coffee and a PTBF sale (i.e. they have the differential, but no base price) must appreciate that while they have eliminated the differential risk, a decision not to fix exposes them to market or price risk. Some shipment contracts allow fixation to be delayed, at the exporter's request, sometimes even until after the goods have already been shipped.

When fixed-price sales are not feasible, another simple alternative is to sell PTBF and to fix immediately. This fixes both the futures price and the differential that, together, make up the final sales price. Concerns such as 'Are we fixing too early?' or 'What if the market goes up?' can be addressed by also buying a call option, accepting that the cost of this comes out of the sales price for the physicals.

Margins

Sellers must sell futures for their account to lock in their sale price on a PTBF contract, and buyers must buy futures for their account to lock in their price. The futures account for both parties stays open until the lots are transferred, offsetting the futures transaction (longs minus shorts should equal zero).

Daily margin calls must be paid while the futures accounts stay open. If the market rises, the shorts pay margin. If the market falls, the longs pay margin. On a PTBF contract, the margins are recovered when the futures transactions are squared – that is, when the coffee is delivered and invoiced.

Remember, however, there can be a long time between fixation of price and the actual delivery of the coffee. The parties must have enough cash to finance these margin calls until coffee delivery. Most commodity bankers follow a margin call and grant additional financing, but only if they are confident that the PTBF contract is properly executed and backed up with real coffee and a real commitment to sell.

Options

Another risk management approach is buying or selling options on futures as price insurance. Options give buyers the right to buy or sell a stated quantity of a commodity at a specified price on or by a specific future date. This is why options are often referred to as insurance. This insurance still entails costs, but it enables traders to limit potential losses in the futures market without having to pay margin calls, which constrain their financial liquidity. It is important to note that options are not actual insurance, but can be used analogously.

Calls and puts are the two basic types of options.

Traders purchase **call options** assuming that a futures market price will rise. It gives them the right, but no obligation, to buy the underlying commodity (futures coffee contract) at an agreed-upon price (known as the strike price). Options are embedded into a preset time-frame with a specific expiry date.

Put options are the mirror transaction of call options. They give the buyer the right, but no obligation, to sell the underlying commodity (futures coffee market) at an agreed-upon price within a specific time. Traders expecting falling futures market prices typically buy this kind of option.

Call buyers can exercise their options and get delivery of a long futures position and put buyers of a short position at the strike price. Exercising call options only makes commercial sense if a strike price is below the underlying futures coffee market price prevailing at the specified time. They are then called 'in the money'. If the futures coffee market price is below the call's strike price, this is referred to as being 'out of the money'. For put options, the reversed logic applies.

When an investor buys an option, the risk of loss is limited to the value of the premium paid for the option. The option can be exercised at any time, no matter how far the market moves, so there is potentially no limit on returns. Moreover, investors are not required to deposit any margin when purchasing options. Options work like insurance, because the payment of a premium provides a level of protection against loss.

In contrast, the risk is potentially unlimited if one sells or writes a new option. The option writer is paid a premium (limited return) and must perform, no matter how far the market moves (unlimited risk). Option writers must maintain margin accounts. Because of the potentially unlimited risk, only experienced hedgers and traders should consider selling or writing options.

Buying options is particularly attractive to small producer associations that want to establish a price floor (above production costs) without committing capital to a margin account. They buy a put option securing their production costs (assuming the futures coffee price trading at that moment exceeds their cost of production). This assures them of a price floor. If the market collapses, they can execute their put option and protect their sales price. If the market climbs, they sell at a higher price and let the put option expire.

Options alone or in combination with futures also give risk managers greater flexibility in designing their hedging strategies.

Pricing options

Two prices are quoted for options, the strike price and the premium. The strike price is the price at which the option can be exercised and is quoted in the option. The price for an option is based on three factors: the intrinsic value, the time to expiration (or time value) and the implied volatility. The premium (cost of an option) is related to how close the strike price is to the market price ruling when the option contract is concluded. As with futures, there is an active trade in option contracts.

A risk classification denoted by letters from the Greek alphabet determines the premium:

- **Option Greek Delta.** The amount by which an option price changes if the price of the underlying coffee future changes by one.
- **Option Greek Gamma.** The sensitivity of an option's delta to changes in the underlying entity's price. In other words, Gamma measures Delta's change rate vis-à-vis the change in the underlying entity's price.
- **Option Greek Theta.** The amount by which an option price changes when the time remaining for its expiry date falls by one day. The option price declines as the time remaining for its expiry date decreases. Thus, Theta is always negative.
- **Option Greek Vega.** The implied volatility of an underlying stock is one of the most influential factors in determining the price of an option. Vega measures the amount by which an option price changes when the implied volatility of the underlying future changes by one.

An option's intrinsic value is the strike price compared with the actual market price. If this intrinsic value is negative, then it is considered to be zero. To illustrate, consider this scenario. If December futures are trading at 154 cts/lb, then a December call with a 150 cts/lb strike price might be quoted at a 6.50 cts/lb premium. The intrinsic value then is 4 cts/lb because the option is 'in the money'. But a December call with a strike price of 160 cts/lb might trade at a 3 cts/lb premium, meaning the intrinsic value is nil because the option is 'out of the money'.

Of course, an option buyer can choose to pay a higher premium for a greater level of price protection. The time value of the option also determines the premium. A longer time until the option expires increases the likelihood that the option will be exercised.

Box 5: In the money or out of the money options

Options have a strike price. An option trades at a certain market level, and the difference between the strike price and the actual level reveals if an option is in the money or out of the money.

An in the money option has a market level already above the strike price. An out of the money option has not (yet) reached the strike price.

Source: ITC, trade sources.

OUT OF THE MONEY OPTIONS

Roasters often sell out of the money puts, as they are always short. Producers can sell out of the money calls, but they should be cautious, risking only a small percentage of an annual crop.

Some large producers, for example in Brazil, are comfortable selling call options in spite of the infinite risk. This is because producers are always long coffee. They have coffee stocks and future production on the trees. If a futures market exceeds their cost of production, they often sell a small part of their production by selling call options. If these options are struck, they can put their coffee against the struck options, pocketing the strike price and the premium.

It is the same as selling forward futures, but at a premium to the futures market. The downside for producers is that they must leave the call option percentage of their crop unsold, unhedged and not fixed in price until the call options expire. If a producer were to sell everything and the call options outstanding were struck, the producer would be net short, at least until the next crop arrived.

Implied volatility, which is based on a mathematical formula, evaluates the premium on the expected price volatility of the underlying futures contract. It is important to realize that the price of an option can change because of time and volatility factors, even when the underlying futures price does not move.

Option strategies are extremely diverse, and almost any strategy can be developed using options (obviously at a cost and a risk). Different names have been attributed to various strategies – strangles, condor, calendar spread, butterfly and many others.

The scope of option trading is vast and an explanation of all the strategies would take a book in itself. Call options are of little direct interest to producers and exporters. Selling or writing options is only for experienced hedgers because, as noted earlier, it involves potentially unlimited risk. Both, therefore, fall outside the scope of this publication, but more information can be obtained from the Intercontinental Exchange.



CHAPTER 7

THE COMMERCIAL ASPECTS OF THE COFFEE TRADE

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Coffee grinders lined up in rows on store shelves.

THE COMMERCIAL ASPECTS OF THE COFFEE TRADE

It is said that coffee is the second most traded commodity after oil. While this may have been true in the 1960s and 1970s, it is certainly not more than a myth today. In fact, measured by its value or volume, green coffee trade does not even make it into today's top five.

Nevertheless, the size of the international coffee trade is massive. More than 130 million coffee bags are exported annually. This is the equivalent of roughly 400,000 20-foot container loads. Stuffed in the biggest available container ship (carrying 22,000 20-foot equivalent units), about 18 such vessels would be needed to carry this quantity. If stacked one container on top of the other, they would reach as high as satellites in low Earth orbit (ranging altitudes between 600km and 2,000km).

This is a lot of coffee, so its trade must be well organized to avoid costly problems and disruption

Introduction to contracts

The international coffee trade would be impossible without general agreements on the basic sale conditions. Otherwise, it would endlessly be necessary to repeat every contract stipulation for every transaction – a very time-consuming process that is open to mistakes.

To avoid this, the coffee trade has developed standard contracts. Those issued by the European Coffee Federation (ECF) in Europe and the Green Coffee Association (GCA) in the United States are the most frequently used.

Many individual transaction details must be agreed upon before a contract is concluded. However, the basic sale conditions – which apply time and time again – can be covered simply and easily by stipulating the applicable standard form of contract. Even so, an offer to sell (or a bid to buy) must stipulate the quality, quantity and price, the shipment period, the sale conditions, when the offer or bid is valid, and so on.

This methodology has been curated repeatedly and has proven to be both fair and transparent. Details are precise, so they leave little room for misinterpretation. Facts are transparent and understandable for all parties involved. There is also space for individual adjustments, allowing flexibility.

Proper preparation is paramount

This chapter examines the main details needed for all parties involved to understand the basic rules of the game. Proper preparation diminishes potentially avoidable errors and makes the coffee trade more profitable for everyone involved – from coffee producers to coffee roasters.

Most coffee trading is based on thin margins and big volumes. Even minor mistakes can mean the difference between profitability and loss. Quick and effective communication is imperative: if notified in time, the buyer may be able to reposition the contract and resolve the problem. If buyers are not promptly informed, it becomes impossible for them to protect themselves and, indirectly, often the exporter as well.

If it is clear that the quality is not what it should be, the seller must tell the buyer. If a shipment is delayed, the exporter should immediately notify the buyer. The European Standard Contract for Coffee (ESCC) explicitly states that the buyer must be kept informed without delay. If a claim is reasonable, settle it promptly and efficiently. The buyer is not an enemy, but a partner – and should be treated as such.

Social and environmental dimensions play a role in coffee quality. Today, most coffee evaluators would agree that quality in the cup also depends on quality in the environment and the lives of the people who produce that coffee. Simply put, sustainability has become an intrinsic component of quality.

Coffee is a truly international product. Its supply chains reach across the globe. When moving products around the world, it is almost impossible to avoid problems and mistakes, delays and even disasters. In such a case, the most important rules are to be prepared and keep the buyer informed.

Box 1: Why is coffee traded in dollars?

This question is often asked, particularly when the United States dollar is weak. When local currencies in coffee-producing countries strengthen against a falling dollar, growers suffer or do not benefit, even if global prices rise.

What are the possibilities of selling in currencies other than the US dollar, such as the euro, especially considering that the European Union is by far the world's top consumer of coffee?

There are many sides to this issue. However, the points below suggest that although change is always possible, it is unlikely for the time being.

Coffee is a global commodity that is traded worldwide on a daily basis. It would be very difficult to maintain this global liquidity if some coffees were priced in different currencies. For instance, in 1992, the London Robusta market dropped the pound sterling in favour of the dollar for that reason, thereby facilitating arbitrage between the New York and London futures markets.

Price risk management would become very difficult if the market had to interpret movements in both futures and currency prices for every hedging transaction. Moreover, 80%–90% of the market is mainstream coffee that is priced and/or hedged against the New York and London futures markets, both of which are priced in dollars. In addition, New York is by far the world's leading futures exchange and would be most unlikely to move away from the United States dollar. Finally, using different currencies in a single transaction could mean that a correct decision on the coffee price might be totally offset by a wrong assumption on the currency front.

The currencies of many countries are loosely linked to the US dollar, in the sense that they often follow or are linked to dollar movements – particularly in Latin America, where the United States is the predominant trading partner. This is not the case in most of Africa, where the European Union plays that role. The US market will, of course, continue to purchase in dollars and many, if not all, producing countries will oblige.

If elsewhere coffee were traded in a different currency, this might distort prices and add currency-based arbitrage to an already speculative coffee trade. One should also bear in mind that buyers will always protect themselves. If having to buy in a different currency means more risk or a disadvantage, this will be priced into the transaction. Therefore, it is difficult for individual exporters or smaller producing countries to pursue this unless such a change was in the context of a general industry move, triggered by some external event or situation.

Source: ITC.

Commercial details of a contract

Quality can be specified in different ways.

Specifying quality: On description

On description: The quality usually corresponds to a known set of parameters relating to country of origin, green appearance and cup quality. Most descriptive parameters are open to varying interpretations. For example, in the description 'Country XYZ Arabica grade one, fair average quality, crop 2022, even roast, clean cup', the only objective specifics are that the coffee must be of the 2022 crop in country XYZ and that the bean size and defect count should correspond to what country XYZ stipulates for grade one Arabica.

A growing number of contracts in the premium and specialized quality segments use quality descriptions according to the Specialty Coffee Association logic. Cup scoring (e.g. 86 points) as well as defect count (for example, green coffee beans have no more than five full defects in 300g of coffee. No primary defects are allowed) need to be specified accordingly.

In addition, the seller and buyer must state if certifications are required, such as Fairtrade, organic, Rainforest Alliance, UTZ, etc. These parameters become part of the agreed quality and need thorough documentation. In such a case, both buyer and seller need to be certified according to the agreed standard and comply with the chain of custody.

Some examples of quality definitions:

Fair average quality: This essentially means the coffee represents the average crop quality, but there is no defined standard for this. The buyer and the seller must agree on further detailed descriptions of the quality.

Even roast: This implies that the roasted coffee does not contain too many pales (yellow beans) and has a reasonably even appearance.

Clean cup: This indicates that the cup should not present any unclean taste or be off-flavour, but otherwise says nothing about the cup quality. Nevertheless, buyers know roughly what the cup quality ought to be. If, for example, the cup were completely flat or lifeless, they would argue that this is not consistent with fair average quality for country XYZ.

The qualities of the premium and specialized segments have a more detailed and precise description. This might include the exact region or location from which the coffee comes, its process (washed, natural, honey), screen size, the name of the plot or the farm, a cooperative name or the producer's name.

The trade in Arabica is largely based on descriptions. These convey the quality being sold fairly well because the cup quality of Arabica does not normally fluctuate as widely as that of Robusta. Descriptions greatly facilitate the coffee trade, but it should never be forgotten that the roaster (the end-user) always considers cup quality when assessing the overall coffee quality.

Nevertheless, Arabica descriptions are becoming more detailed, showing remarks on their preparation (e.g. washed or natural) as well as screen sizes and defect counts. Proper preparation with lower defect counts often lead to a truly good cup profile.

Box 2: Long and short positions

The terminology of long and short is commonly used in commodity trading. It also applies when trading green coffee.

A long – or a long position – is held when the total amount of purchased coffee exceeds the total amount of sold coffee. When the amount of sold coffee exceeds the amount bought, this is called a short – or a short position.

In cases where the amounts bought and sold are similar, this is known as a square or neutral position.

Taking a long or short position does not always mean that someone will take advantage of a falling or rising market. It can be used as protection or it can sometimes be simply a result of seasonality.

Source: ITC, trade sources.

Specifying quality: On sample basis

Descriptions provide a minimum of detail concerning quality, so they are seldom if ever used for the trade in high-quality coffee. In addition, buyers know that different sellers have their own interpretation of fair average quality and prefer to deal with shippers whose interpretation is acceptable to them. However, traders wishing to short sell XYZ Arabica Grade 1 FAQ forward do not necessarily know in advance from which exporter they will later buy.

In this case, the term 'first-class shipper' can be added to the description, thereby implying that a reputable exporter is shipping the coffee. But the term 'first class' is open to interpretation as well, so the contract may stipulate the names of exporters who may ship the coffee. Large roasters are quite flexible about the origin of standard coffee. To widen their purchasing options, they may leave the seller, often a trading house, free to deliver an agreed quality from one of a number of specified origins and shippers.

Subject to approval of (pre-shipment) sample: This is one way to eliminate most of the quality risk inherent in buying unseen coffee from unknown shippers, as buyers are not obliged to accept any shipment that they have not first approved. Subject to approval of sample obliges the exporter to provide an **approval sample before shipment**.

Here, there are three generally recognized possibilities:

- Subject to approval of sample, no approval, no sale: If the sample is not approved, the contract is automatically cancelled.
- Subject to approval of sample, repeat basis: If the first sample is rejected, a second or even a third sample may be sent. The contract sometimes mentions how many subsequent samples can be submitted. This option provides maximum quality security without immediately jeopardizing the contract, and works well in long-standing relationships.
- Subject to approval of sample, two or three samples for buyer's choice: When the buyer's quality requirements are very specific, and to save time, multiple samples may be submitted at the same time. To avoid confusion, such contracts should stipulate whether repeat samples may be sent or whether no approval means no sale.

Theoretically, an exporter who feels aggrieved by what seems to be an unreasonable (intentional) rejection and cancellation could declare a dispute and proceed to arbitration. The chance of success would be extremely slim if not non-existent, however, not least because an arbitration panel might rule it has no jurisdiction over what was, in essence, a purely conditional contract that never became binding (because the buyer did not approve a sample). Exporters should, therefore, be fairly selective when agreeing to sell subject to approval of sample.

Stock-lot sample: Selling on stock-lot sample avoids potential approval problems. The sample represents a parcel that is already in stock, so there should be no discrepancy between the sample and the shipment, including the screen size (even if the screen size was not stipulated). Day-to-day business would become too cumbersome if one insisted on stock-lot samples for all deals. For newly established exporters, or for those wishing to break into a niche market or to trade premium or specialized coffees, though, stock lots are usually the best route.

Once a satisfactory delivery has been made, an exporter may wish to sell a similar quality again. Rather than send new samples, the exporter may offer 'quality equal to stock lot X'. This guarantees that the coffee is of comparable quality and suitable for the same end use as the original purchase. The words 'equal to' must be used because the sample was not drawn from the new coffee lot.

An exporter who feels that the quality is very similar, but that a little latitude is needed regarding the bean size or green appearance of the coffee, may say 'quality about equal to stock-lot X'. Such stipulations are usually between parties in a long-standing relationship who know each other well.

Type sample: Once a few transactions have been satisfactorily concluded, buyer and seller may decide to make the quality in question a type. Both parties are now confident that the quality will be respected and business can proceed without samples (although some roasters will still insist on pre-shipment samples). The type quality is usually kept confidential between shipper and buyer.

In general terms, specialized and premium coffees are mostly sold on sample basis, while standard qualities can be traded on description. In most cases and irrespective of the quality segment, pre-shipment samples are a very efficient way to minimize quality-related claims. Therefore, it is extremely important that pre-shipment samples accurately represent the coffee that is finally shipped. Discrepancies between pre-shipment samples and arrivals of coffee at destination will probably result in a claim.

Specifying quantity: Availability

Another key component of any contract is the coffee availability. The amount of coffee defined in the contract can be expressed in different units. It can be traded in kilograms, metric tons or bags. In case of bags, it is vital to define the size of the bags (for example, 60kg, 69kg, 70kg) or any other unit that was agreed upon.

Quantity can be determined by the most common logistical transportation unit. This is very often the container. A 20-foot container can fit up to 21 tons of coffee.

The exporter needs to be fully aware not to oversell and to manage inventories carefully and accurately. Overselling can cause exporters unnecessary difficulties.

Specifying price: Outright or differential

Green coffee prices can change on a daily basis because supply and demand shift constantly. The quality and availability of a particular coffee at a determined point in time are the main drivers of negotiations around price. Other factors affecting price formations include climatic disruptions, market expectations, speculative actions and changes in currencies.

Green coffee prices can be fixed (also known as outright price) or unfixed. In the latter case, the customer and supplier first agree on a price differential. This is the difference between the futures market price and the price for a specific coffee quality. It considers the physical availability of this particular quality, the terms and conditions of sale, the local currency situation compared with the US dollar, and so on.

Differentials can be extraordinarily volatile. No mechanisms exist today to offset the differential risk.

Once the price is fixed, the differential is added to the futures coffee price of that specific moment for a final price.

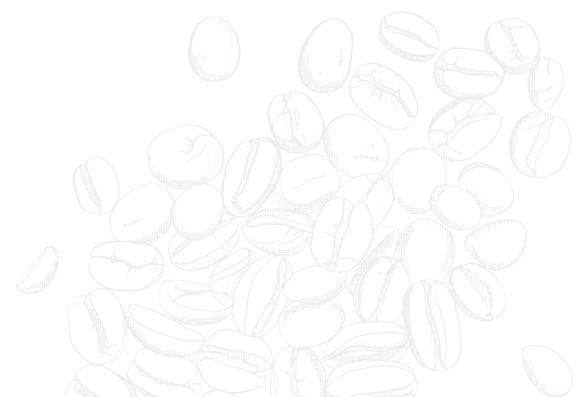
Prices are generally quoted in US dollar cents per pound or cts/lb (for Arabica coffee) or US dollar per metric ton or \$/MT (for Robusta coffee). Other pricing norms also exist, such as \$/46kg, \$/50kg or \$/kg. To avoid unnecessary hassle during negotiations, both the number (e.g. 145) and the corresponding units (e.g. cts/lb) should be stated to correctly define the price.

When discussing a contract on a differential basis, it is important to define the corresponding futures month and futures market against which the fixation will be done at a later stage. It is also crucial to stipulate if either buyer or seller has the right to fix the contract (known as buyer's or seller's call for fixation) as well as the earliest and latest timing for fixations.

Box 3: Shipping months and corresponding futures months

Arabica shipping month	Arabica futures month	Robusta shipping month	Robusta futures month
December, January, February	March – KCH	November, December	January – RMF
March, April	May – KCK	January, February	March – RMH
May, June	July – KCN	March, April	May – RMK
July, August	September – KCU	May, June	July – RMN
September, October, November	December – KCZ	July, August	September – RMU
		September, October	November – RMX

Source: Trade sources.



The shipping period

The most frequently encountered trade terminology includes:

- **Shipment period:** This is usually stated as a specific month or time span during which the shipment is to be made, such as February or February/March;
- **Prompt shipment:** Shipment within 30 calendar days, counted from the contract date;
- **Immediate shipment:** Shipment within 15 calendar days, counted from the contract date.

Further information that can be included in the contract:

- **Spot goods:** The coffee has already arrived at its shipping destination. For example, it is available ex warehouse Hamburg.
- **Afloat:** The coffee is en route, i.e. on board a vessel that has sailed but not yet arrived.
- **Named vessel (or substitute):** Shipment must be made on a specified vessel. Adding 'or substitute' ensures that shipment can also be made if the shipping line cancels the named vessel or replaces it with another. Many contracts simply stipulate the shipping line that must carry the goods.
- **Date of shipment:** The on board or shipped date mentioned in the bill of lading. Contracts should always stipulate from which port(s) shipment is to be made.

Shorter shipping periods reduce the exposure of roasters to market fluctuations and ensure more precise physical and financial planning. As buyers usually look for less exposure, double months are not popular. For example, shipment March/April means that shipment can be made at any time during a 61-day period, which does not sit well with the increasingly favoured just-in-time philosophy.

However, sellers in landlocked countries or those with inefficient shipping connections are often forced to sell in double months. By contrast, countries such as Brazil and Colombia can guarantee coffee to be available in Europe within 21 days from the sale date (10 days or so for the United States). Inability to offer precise shipping options (named vessel, immediate or prompt shipment, etc.) can be a marketing handicap.

Delivery commitment

Offers and contracts must stipulate the point at which the exporter has fulfilled its commitment to deliver, that is, the point at which risk and responsibility are transferred to the buyer. There are a number of options for defining the transfer of responsibility.

Free on board: The goods are loaded at the seller's expense onto a vessel at the location stipulated in the contract (for example, FOB Santos). The seller's responsibilities and risk end when the goods cross the ship's rail. From then on, the buyer bears all charges and risk.

Under the ESCC contract, the price to seller is expressed as FOB. However, the buyer is responsible for insuring the goods from the last storage place ahead of loading on board, such as the port warehouse, which is not the case under the GCA FOB contract. Most coffee contracts stipulate the price to the sellers in terms of FOB, but the ESCC can be described as an ill-defined cost and freight contract. The use of free carrier (FCA) contracts seems to be rising.

Free carrier: In landlocked countries, the sale is frequently FCA, with buyers themselves arranging transport to the nearest ocean port and onward carriage by sea. International transporters, usually linked to shipping lines, often offer one-stop services, taking the goods in hand in, say, Kampala, Uganda, and delivering them to Hamburg, Germany. They do so using a single document known as a combined bill of lading covering both inland and maritime transportation.

Risk of loss is transferred when the coffee is delivered to the freight carrier at the place of embarkation. All freight charges, including loading onto an ocean vessel, railcar, trailer or truck (combined bill of lading), are payable by the buyer. The exporter provides the customs clearance documentation. Unless special arrangements have been made with the carrier, such shipments must be repacked at the shipment port if a less than container load (LCL) bill of lading is required.

Cost and freight (CFR): The seller is responsible for paying costs and freight (but not insurance) to the agreed destination.

Cost, insurance and freight (CIF): This is similar to CFR, but the seller is also responsible for taking out and paying the marine insurance up to the agreed discharge point.

Table 1: Sellers are responsible for most cost

	FOB	CIF/ CFR	FCA
Loading at premises of seller	S	S	S
Inland transport (from the named place)	S	S	B
Trade documentation at origin	S	S	S
Customs clearance at origin	S	S	S
Export charges	S	S	S
Loading terminal handling charges	S	S	B
Ocean freight	B	S	B
Unloading terminal handling charges	B	B	B

Note: S = seller; B = buyer

Source: ITC (2021).

In all cases, it is the seller's responsibility to deliver the shipping documents to the buyer. When a container is loaded onto a vessel, a mate's receipt is issued to the ship's agent. This is the legal basis for the bill of lading, which should be prepared and issued immediately. Shippers are entitled to the bill of lading as soon as the goods have been loaded. Some agents release them only once a vessel has sailed, but this is incorrect and causes unnecessary cost.

The International Chamber of Commerce's *Guide to Incoterms® 2020* contains a more detailed description of these and other shipping terms. However, the standard contracts used in the coffee trade all state or imply that even under an FOB sale, the seller is responsible for booking freight space, arranging shipment and producing a full set of shipping documents. These stipulations in standard coffee contracts differ from, and supersede, the Incoterms® definition of FOB.

Ocean freight

Most coffee contracts are effectively FOB. In this case, the buyer pays for the freight. Buyers prefer this because they can negotiate rates that individual exporters or producing countries may be unable to obtain. This is why bills of lading do not always indicate the freight charge, or simply state 'freight as per agreement'.

As they are liable to pay the freight, buyers believe they should also negotiate the rates (and argue, indirectly, that they are better placed to do so). This may be so, but whenever the freight charges from a particular port rise, buyers adjust their cost calculations for the origin in question because what counts for them is the cost at the destination port or roasting plant. If the freight rate from a certain country rises, the prices bid for coffee from that origin eventually increase. The coffee market price is compared on a 'landed-cost' perspective.

Terminal handling charges are an important part of container transport costs and can vary widely between shipping lines – sometimes to the point where an apparently attractive rate freight is, in fact, not attractive at all. Exporters should keep abreast of the terminal handling charges imposed directly or indirectly by individual shipping lines at the ports they use, as they can face unexpected costs if buyers specify a line whose freight rates are low (buyers' advantage) but whose terminal handling charges are high (shippers' disadvantage).

Weights

Most standard forms of contract stipulate that sellers are to refund natural loss in weight exceeding a certain percentage. This is known as the weight franchise. Coffee attracts or loses moisture depending on climatic conditions. This means it may lose a little weight during storage and transport.

To counter this weight loss, some exporters pack a little more per bag than they invoice. This helps to ensure that arrival weights are as close to the agreed shipping weight as possible. Buyers know from experience

what weight losses to expect from most origins and take this into account when calculating the cost at landed destination or roasting plant. However, shipping in bulk has greatly reduced weight loss and, as a result, such a franchise has been reduced to a minimum (0.5% under both the ESCC and the GCA contracts).

Net shipped weights: The weights established at the time of shipment are final, subject to the stipulations of the underlying standard contract form. Under an FCA contract, the parties can also agree that the net delivered weight is final, together with the procedures and conditions that apply.

Net delivered weights or net landed weights: The goods are reweighed upon arrival and final payment is made on the basis of that reweighing.

If buyers are suspicious about the accuracy of the shipping weights, they may require an independent weigher to supervise the weighing. Sellers may stipulate the same when selling basis net delivered weights¹⁸⁴ or when weights are disputed and reweighing is ordered.

Payment conditions

Payment conditions are usually, and wisely so, agreed in advance, even when dealing with known business partners. While this may occasionally be waived in longstanding business relationships, the payment conditions must always be specified in advance, particularly with new buyers.

Paying with a letter of credit

In the context of this guide, a letter of credit is a contract between a bank and a seller whereby the bank undertakes to pay the seller an agreed sum against delivery of an agreed set of shipping documents.

A payment against a letter of credit requires the buyer to establish a letter of credit before shipment occurs. This is an undertaking from the buyer's bank to the seller's bank that payment will be made against certain documents, such as the invoice, certificate of origin, weight note, certificate of quality and bill of lading (for sea transport) or waybill (for road or rail transport). The exporter should check that the documents specified in the letter of credit are obtainable. Buyers sometimes require verification of documents by an embassy or consulate not located in the exporter's country, or they may include documents the exporter is not contractually required to provide.

The timing of letters of credit is very important. The letter of credit must be available for the exporter's use from day one of the agreed shipping period, and it must remain valid for negotiation for 21 calendar days after the last date that shipment is permitted to be made. Watch the timing carefully. Once the expiry date has passed, the letter of credit is only as good as the buyer's willingness to extend it.

If the terms and conditions of a letter of credit are not met, the exporter's bank will not pay the exporter until the buyer has confirmed that all is in order. This may involve sending the documents abroad without payment. If the buyer refuses to make payment at that stage, the exporter may be left with an unpaid shipment in some foreign port. The importance of conforming to all the conditions in a letter of credit cannot be stressed enough. Exporters should always consult their bankers to confirm that a letter of credit is acceptable.

Stay away from ordinary (i.e. revocable) or unconfirmed letters of credit, as these are nothing more than an uncertain promise to pay if certain documentation is submitted. Use only irrevocable letters of credit, which cannot be cancelled once established. The exporter can be certain that funds will be available if valid documents are presented. Even so, the exporter's bank may pay the exporter only when it has received the funds from the bank that established the letter of credit. This can create problems if, for example, the buyer argues that the documents are not correct or the buyer's bank is slow to make payment.

Under a confirmed and irrevocable letter of credit, the exporter's bank confirms payment upon the timely presentation of valid documents, without reference to the establishing bank. By adding its confirmation, the exporter's bank guarantees payment. If the negotiating bank discovers a minor discrepancy in the documents, such as a spelling error, it may still negotiate them if the exporter signs a guarantee that in case of refusal by the buyer, the exporter will refund the payment received until the matter is settled.

Whenever exporters believe letters of credit are required, they should insist that they are confirmed and irrevocable. Even then, extreme care must always be taken to ensure that all details are respected, even to the spelling of words and shipping marks.

184. The goods are reweighed upon arrival and final payment is made based on the weights then established.

Alternative payment methods

Payment net cash against documents on first presentation is another possible payment term. Here, the buyer is expected to pay when the documents are first presented. Exporters agree to this payment method if they know their buyers well and have confidence in their financial strength and integrity.

An exporter can submit the documents through the intermediary of its own bank, which then asks a correspondent bank abroad to present them to the buyer, collect the payment and remit the funds, minus all collection costs, to the instructing bank for the account of the exporter. This includes the charges raised by the buyer's bank, which is now acting on the instructions of the seller's bank and, therefore, the seller.

This way, the documents remain in the banking system until payment has been received, ensuring that the exporter does not lose control of the goods. Exporters who need prompt payment can ask their own banks to advance all or part of the invoice value. This is known as negotiation of documents. The exporter remains responsible for the transaction – if the buyer does not pay, the exporter's bank will demand its money back.

Payment net cash against documents in trust is a variation on this method. Assuming the exporter's bank does not object, documents may also be sent directly to the buyer with the request to make payment upon receipt of the documents. This is known as sending documents in trust. As the term implies, the decision to do this depends entirely on the trust the two parties place in each other.

Under payment net cash against documents upon arrival, payment is due when the goods arrive at the port of destination. When selling on this basis, an exporter should always stipulate that payment must be made after a certain period expires, whether the goods have arrived or not. This guards against late payment if, for some reason, the goods arrive months late or do not arrive at all because the vessel has been lost. Contracts should, therefore, always stipulate 'payment net cash against shipping documents upon arrival of the goods at [destination] but not later than 30 [or 60] days after date of bill of lading'.

Credit policy

Exporters must decide which payment conditions to accept. They must assess the financial status of their buyers and act accordingly. Some information can be obtained from bank references that indicate a client's creditworthiness. Although such reports are useful, they cannot provide all the desired information nor do they place any responsibility on the bank that issues them. Exporters using borrowed working capital are usually subject to stringent conditions concerning their buyers and the payment conditions they may offer.

When entering into contracts and deciding on payment terms, sellers should investigate their buyers' identity. International trading groups often work through foreign and local subsidiaries whose commitments are not necessarily guaranteed by the parent firm, even though they may trade under the same or similar names. When in doubt, a seller can demand a guarantee from the parent firm that it accepts responsibility for the contracts with, or documents handed to, a given subsidiary.

In some countries, the monetary authorities dictate payment policy for exports, for instance, by insisting that letters of credit cover all exports to avoid possible foreign exchange loss. This kind of blanket regulation results in some of the world's largest corporations with impeccable credentials being asked to establish letters of credit. Many buyers refuse to establish letters of credit, and those that do establish them calculate the cost and inconvenience involved. Ultimately, it is the coffee farmer who pays for such restrictive red tape.

Scope and validity of an offer

The scope and validity of an offer (or bid) must be specified to determine when acceptance constitutes a firm commitment for both parties.

An exporter wishing only to publicize a potential availability at an approximate price uses terminology such as 'price idea' or 'we offer/quote subject to availability or subject unsold'. To the buyer, this suggests there is a good chance of obtaining the coffee in question if the indicated price is accepted. Although the exporter is not bound to sell, the buyer has some reason to be disgruntled if the exporter refuses to do so for no obvious reason (or was simply fishing for price information).

A firm offer, however, does commit the seller if the buyer accepts it within a reasonable time. 'Reasonable' is open to interpretation, so sellers must stipulate a time after which the offer lapses. Bids from buyers also must be specific. 'Subject to immediate reply' means the reply should be immediate, but even 'immediate' is not precise. It is always better to say, for example, 'subject to reply here by 15:00 our time'.

The choice of time limit depends on the exporter's situation and the type of buyer to whom the offer is addressed. An exporter who is keen to sell may wish to try various markets at the same time. Exporters who have only limited stocks of the coffee in question cannot make multiple firm offers and can, instead, offer subject to availability or subject unsold. Alternatively, they can make firm offers for short periods to individual buyers. Conversely, they can give a buyer or, more probably, an agent an entire day to consider an offer, but the exact time at which the offer expires should always be stated.

Modern communications offer almost instantaneous exchanges, especially through e-mail and other digital tools, enabling exporters to contact many potential buyers rapidly. Acceptance, verbal or otherwise, within the time limit of a firm offer or bid constitutes a firm and binding contract. Disputes can be submitted to arbitration, but the best approach is to ensure that the wording of offers or bids is clear and precise.

Example: 'We offer firm for reply here today by 17:00 our time 1,000 bags XYZ Arabica Grade 1 as per sample 101 at 170 cts/lb, FOB [port], NSW (net shipping weight), shipment February/March 2022 our option, payment of [net cash against documents] first presentation.' This assumes that the parties have previously agreed on the applicable standard form of contract. For a new buyer, the applicable standard contract should be mentioned as well.

If a buyer counterbids a lower price against a firm offer, this automatically releases the seller. The offer is no longer binding, because the buyer has rejected it by counteroffering. If the seller rejects the counteroffer, the buyer cannot subsequently revert to the original offer: that firm offer lapsed when the buyer countered, unless the seller agrees to reinstate it.

Minimizing loss

When loss is likely, both the seller and the buyer must mitigate the loss as much as possible. Regardless of who is liable to pay, both parties are responsible to keep the loss to a minimum.

A good example is when documents are lost. While it is the seller's responsibility to trace and present them as soon as possible, the buyer cannot just let the coffee sit on the dock incurring late penalties (demurrage, container charges, etc.). The buyer must take all reasonable action to keep the late charges to a minimum and, when claiming damages, has to prove both the reasonableness of the claim and that all possible action was taken to keep the loss to the unavoidable minimum.

Changes to standard forms of contracts

Commercial contracts are often concluded with conditions other than those of the standard contract forms, as long as these are well understood and set out in unambiguous language (leaving no room for differing interpretations). For example, one might agree to change the tolerated variance in the shipment quantity in Article 1 of the ESCC contract from 3% to 5%. In this case, the contract should include a paragraph to the effect that 'Article 2 of ESCC is amended for this contract by mutual agreement to read a tolerance of 5%'.

If a contract modification is agreed, it should be confirmed in writing and preferably countersigned by both parties. Adding the words 'without prejudice to the original terms and conditions of the contract' ensures that the modification does not result in unintended or unforeseen changes to the original contract. If a modification is not confirmed in writing, one of the parties could subsequently repudiate or dispute it. Human memory is fallible and there is nothing offensive in ensuring that all matters of record are on record.

The same applies to business under GCA contracts. Some North American roasters have small booklets containing their proprietary terms and conditions, which all suppliers must accept before they can be approved vendors. In the GCA XML (electronic) contract, there is a substantial field (350 characters) of entitled exceptions.

Using intermediaries – who is who

Importers and traders:

Traders buy or sell in their own name and for their own account. The growing interest in specialized and premium coffees, accompanied by the expanding specialty scene of the third and fourth waves (see Chapter 1), has stimulated importers to source more widely.

Importers of premium and specialized coffee can find desired qualities while also assuring the complex quality control required for these high-end products. Moreover, they are able to provide marketing expertise, financial support and other green coffee-related services, such as logistics, insurance and warehousing. Today, many importers cooperate with coffee farmers and individual exporters to promote particular types of coffee. This is a potentially attractive alternative to the commission agency option.

It is very important for specialized importers to carry stocks, so less widely traded coffees can be immediately available in the main import markets. Larger, more vertically integrated trading houses usually handle more standard coffee qualities. This is one reason some green coffee multinationals have acquired or built their own specialty coffee trading divisions, to keep the two types of business separate.

Agents (or brokers):

It is not always feasible to deal directly with individual buyers in more than just a few markets, especially when time differences come into play. This is why many exporters still use agents. A local agent is on the spot, speaks the language of the import market, knows the buyers and can usually discuss a range of producing countries with the buyer, not just one country, as is the case with a specialized exporter. This makes an agent an interesting conversation partner who is more likely to get the attention of a buyer.

And for exporters, agents provide two-way information flow, because they know local conditions and often gain insight into the activities of competitors.

Agency agreements must make clear what each party is permitted and expected to do. If an agent is given exclusivity in a given market (sole agency), the exporter can demand that he/she does not also market any of the exporter's direct competitors. Larger agency firms sometimes represent a stable of exporters, including some from the same origin. Smaller exporters may have to accept this, because they cannot generate sufficient business to make a sole agency worthwhile for the agent. Firms that do not work under an actual agency contract really function more as preferred sales channels than as true agents.

Brokers work within a given geographical area, bringing local buyers and sellers together. Like agents, they declare the names of both the buyer and the seller. They receive a commission, but do not represent a party.

Agents or brokers who do not declare the buyer's name operate as traders because they take the coffee over in their own name.



Contract documentation

International coffee transactions are executed by title transfer rather than by the physical transfer of the coffee. The bill of lading – accompanied by a set of additional documents, together known as the shipping documents – represents the title to goods shipped under contract by sea from one country to another.

The document of title for goods already stored in the port or place of delivery under a spot contract can be a warehouse receipt or storage warrant issued by a recognized public warehouse. The only difference between the traditional chain of paper documents and electronic documentation is that the paper versions have largely been eliminated. This is why it is sometimes called paperless trading.

Using electronic documentation does not change the buyer's or seller's contractual responsibility. The only differences are in how/when documents are issued, and how/when they are made available to the buyer.

Shipping documents must comply in all respects with the conditions of the contract between the parties. If they do not, a seller may not be paid on time or, in extreme circumstances, may lose the money. The shipping documents must show or state that (i) they represent the contracted and shipped coffee, (ii) a known series of shipping rules has been complied with and (iii) they conform in all respects to the sales contract between the parties and to the standard form of contract on which that sales contract is based. Shipping documents must also be presented on time.

Letters of credit

Where payment against a letter of credit is stipulated, the seller should obtain full details of the buyer's letter of credit as soon as possible. This is to ensure that the required documentation is obtainable, that there is sufficient time to obtain such documentation and that there are suitable shipping opportunities to the named port of destination within the stipulated period of shipment.

The ESCC only requires a full and complete letter of credit to be available for use from the first day of the contractual period for shipment, even though the letter of credit may contain stipulations on what must be done before loading. Therefore, it may be wise to provide specifically in the contract for earlier receipt of the full and complete letter of credit. Sellers should also ensure that the letter of credit remains valid for the negotiation of documents for at least 21 days after the date of shipment.

Both ECF and GCA stipulate this. If the length of validity is not carefully checked, one could fulfil all the letter of credit conditions only to find it has lapsed.

Buyers calculate all costs (from FOB to delivery at final destination) to arrive at the final cost 'price landed roasting plant', taking account of any extra costs. For example, an origin that habitually delivers documents late (i.e. after the vessel has arrived) is penalized, as the buyer provides for this eventuality in the calculation to 'landed plant'.

Destinations, shipment and shipping advice

It is not easy for the seller to organize shipment if the port of destination is unknown. For forward shipment or FCA contracts, the ESCC stipulates that the port of shipment must be declared by the 14th calendar day before the first day of the contractual shipping period (GCA stipulates 15 days' notice). Otherwise, it might not be possible to complete the processes required for shipment within the agreed period. See also 'port of destination' for more on how the GCA approaches this particular aspect.

For immediate and prompt shipment or FCA contracts, the destination must be declared at the latest on the first calendar day following the date of sale (and at the time of contract by GCA).

Shipment must be made during a vessel's last call at the agreed port of loading during that particular voyage. This rule is intended to exclude vessels that trade up and down the coast of a country with several ocean ports until enough cargo has been accumulated to make the main journey more profitable.

The coffee must be shipped on a port-to-port or a combined transport bill of lading issued by a shipping line that, using one or more vessels, carries the goods throughout the voyage without further intervention by seller or buyer. The line issues a bill of lading at the port of origin to cover the entire voyage, so the buyer can see the shipment details on the first vessel and claim the coffee at final destination from another vessel.

Transshipment is when the first vessel discharges at an intermediate port and the goods are reloaded onto another vessel that takes them to the final destination. This happens more and more as shipping companies

rationalize operations and container vessels become bigger. In particular, the use of containers has encouraged the development of shipping hubs – larger or more central ports that are fed containers from outlying ports by smaller or feeder vessels for loading onto large container vessels.

As soon as the required information is available, the seller must communicate certain specific details about the shipment. This is known as the shipping advice.

For a shipment on terms other than CIF, which the seller insures, the shipping advice enables the buyer to insure the shipment and either make the necessary arrangements to receive it at the port of destination or declare an optional port of destination in time for the shipping company to arrange discharge there. A series of time limits in ESCC are designed to ensure that these objectives are met, and to give the buyer the freedom to procure a replacement parcel elsewhere if no shipment is forthcoming.

ECF contracts list the details to be included in the shipping or delivery advice. The buyer is entitled to receive such advice, or advice of delayed shipment/delivery, or advice of *force majeure*. Failure to receive such advice theoretically entitles the buyer to cancel the contract and claim compensation for any loss suffered.

More stringent security measures at ports of entry in both the United States and the European Union require shippers to provide more detailed shipping advice. For example, GCA states that the shipping advice for certain shipment contracts must include all information required by the US Food and Drug Administration.

Delayed shipments

Seller must advise buyers of delayed shipment as soon as, for example, they become aware that a vessel may not load within the contracted period due to problems connected with the operations of the vessel itself, such as a delay on the inbound voyage. Sellers must also show, using independent documentary proof, that a late shipment is not their fault.

If a problem of a much wider scope and more serious nature arises that prevents the seller, as well as other shippers, from shipping within the contracted period then, in addition to sending the notification of delayed shipment immediately, the seller may be able to claim *force majeure*.

Under ECF contracts, the effect of both advice of delayed shipment (or delivery) and advice of *force majeure* is initially to extend the period allowed for shipment. Cancellation of the contract follows if the problem continues after that period (although cancellation would be rather unusual). However, GCA does not specify any extension and explicitly excludes events occurring before the goods arrive at the port of shipment.

Experienced exporters know that quick and frank admission of shipping problems usually helps them to reach an amicable settlement with their buyers. Failure to ship is bad enough, but failure to keep buyers informed is even worse, as it prevents them from making alternative arrangements in time.

The bill of lading

The bill of lading usually contains the following:

- The names of the seller at origin (the shipper), the buyer (the consignee) and, specified by the buyer, the party to whom delivery is to be made and who is to be notified of the shipment's arrival (the notify address).
- The bill of lading's unique number, the vessel name, the port of loading, the destination and the number of originals that have been issued.
- Details of the cargo and whether shipped LCL/LCL or full container load/full container load (FCL/FCL), together with the container and seal numbers, when shipment is in containers.
- A statement that the coffee is on board or shipped, i.e. not simply received by the shipping company for shipment, and that there is no record of damage to the coffee (a clean bill of lading) and the date of onboard shipment.

A 'received for shipment' LCL bill of lading may be acceptable if the buyer has previously agreed to it.

Bills of lading are issued in sets of identical originals, normally two or three, with a variable number of non-negotiable copies for record purposes only. Each original can be used independently to claim the coffee shipped, although the shipping company at destination will not automatically hand the goods to everyone holding an original bill of lading. The bills of lading specify who is allowed to claim the goods.

Title and endorsement of a bill of lading

When bills of lading are made out or endorsed to a named consignee, only that consignee can take delivery of the shipment. A bill of lading made out to a named consignee can be endorsed only by that consignee, not the shipper. Once a consignee has been named, the original shipper no longer has any power to alter the bill of lading in connection with title to the shipment.

If the consignee is not known at the time the shipper instructs shipment on a particular vessel, then the bills of lading may also be made out to order. In this case, only the party to whom they are endorsed with the words 'deliver to ...' or 'deliver to the order of ...' can take delivery. The shipper who is named on the bill of lading makes this endorsement. Buyers occasionally stipulate in their shipping instructions that the goods be consigned to order.

A bill of lading is a negotiable instrument and can be passed from a shipper through any number of parties, each party endorsing it to assign title to the next party. The sole condition is that title can be assigned only by the party shown on the bill as having title at the time. Any failure to respect this condition breaks what is known as the chain of title. All purported assignments of title after such a break are invalid.

Before paying for documents, buyers should carefully examine the bill of lading to see that they are named on it as consignee, either on the face or on the reverse in an endorsement. In the latter case, buyers also make sure the endorsements show an unbroken chain of title through to them.

The greatest security of all is afforded by issuing or endorsing a bill to a buyer-nominated bank with an instruction to the bank to endorse and hand the bill over to the buyer when, and only when, payment has been made. This is primarily done through letters of credit or cash against documents through bank presentation transactions.

Dispatching bills of lading

Since in theory each original bill of lading in a set can be used to claim the goods at destination, a buyer will want to have all the originals in a set before making payment. Documents are often sent in two dispatches with the bills of lading split between them, simply to minimize the risks of them being lost or delayed. Payment only happens when the buyer has received both dispatches, unless the first contains a bank guarantee for any missing bill of lading. Many exporters use courier services and send all documents at once.

Certificates

ICO certificates of origin, which are issued for every international shipment of coffee from producers to consumers (whether the importing country is International Coffee Organization member or not), are used to monitor the movement of coffee worldwide. The forms contain details of identity, size, origin, destination and time of shipment of the parcels in question.

These certificates were particularly important when ICO export quotas were in force, as they were also used to enforce the quota limits for individual exporting countries. The certificates are now less important and some consumer countries no longer insist on them. But it is in the interest of exporting countries to comply with ICO regulations on certificates of origin as they enable ICO to monitor coffee movements and produce accurate statistics on each country's exports.

Moreover, ICO exporting members are required to ensure that all coffee issued with certificates of origin complies with the minimum quality standards indicated by ICO resolution 407.

Preferential entry certificates: Countries that levy duties or taxes on coffee imports sometimes grant duty exemptions to certain exporting countries. Entitlement to remission of duty or tax is obtained by submitting an official certificate of exemption (EUR1, GSP and others). Individual sales contracts often state that an exemption certificate must be provided where appropriate. This certificate must accompany the shipping documents, failing which the buyer can deduct the duty difference from the invoice and pay only the balance.

The seller can obtain a refund of the shortfall by submitting the required certificate retroactively, but only if the buyer can obtain this within the applicable time limit from the authorities in the importing country. Sellers who are uncertain whether such a certificate is required should ask their local chamber of commerce or trade authority. Also note that under ESCC, a buyer may stipulate a country of importation other than that of the port of destination.

Insurance certificates: Under a CIF contract, the seller must provide a certificate, issued by a first-class insurance company, showing that insurance has been taken out in accordance with the terms of the sales contract. The certificate must enable the buyer to claim any losses directly from the insurance company. The certificate entitles the holder to the rights and privileges of a known and stipulated master marine insurance policy that may cover a number of shipments. The certificate represents the policy and is transferable with all its benefits by endorsement in the same manner as bills of lading.

Other certificates: Many other certificates are available for special contractual requirements. Recognized public or private organizations in the country of origin supply some, such as weight and quality certificates. Others, such as health, phytosanitary and origin certificates, are often supplied on application by government bodies, in a set format prescribed by local law and regulations. The variety of formats available for special purpose certificates is so great that it is not practical or useful to discuss them here.

Shippers should be familiar with the format of local certificates and should investigate their availability and cost before entering into any contractual obligation. Failure to do so may render them unable to supply a document at all or may require a price increase to cover costs.

Sustainability certificates: If the traded coffee is certified with a sustainability standard (Rainforest Alliance, UTZ, Fairtrade, organic, etc.), the buyer is entitled to withhold payment of documents until the exporter provides a corresponding transaction certificate, or evidence of registration on the relevant marketplace. Some inexperienced sellers do not provide such documents in time and their absence may cause detention of the freight at the port of destination and lead to expensive port charges.

Moreover, shippers should be aware when selling certified coffee that they need a valid licence or certification even before the coffee is offered for sale. Severe payment reductions can occur in the case of noncompliance or in the absence of valid certification when selling.

Missing and incorrect documents

Sellers under the GCA contract must provide a guarantee issued by a bank in the United States. Exporters who have not arranged with a bank in Europe or the United States to issue such guarantees should consider specifying in all their contracts that guarantees issued by a first-class international bank are accepted.

In principle, a set of shipping documents made up of documents and guarantees can be acceptable. Payment can be made and the coffee delivered to a buyer even though no original documents and only guarantees have passed between seller and buyer. But when the absence of documents prevents the importation of a shipment, buyers will not pay on the basis of a guarantee because they cannot access the shipment.

While bank guarantees from seller to buyer are generally acceptable for missing contractual documents, guarantees for missing bills of lading must be made out to the shipping company and forwarded to the buyer. Shipping companies provide their own preprinted guarantee forms for this purpose.

A buyer may also accept the seller's personal guarantee for missing documents without a bank's involvement. The seller may take steps to rectify errors in documents, especially when the documents relate to prompt landing and importation of a shipment (for example, bills of lading) and when the time saved by amending them on the spot either benefits the buyer or prevents charges to the seller. The buyer can give the bills of lading to the shipping company's agent at destination. The agent amends them on receipt of authority from the seller via the shipping company's agent at the port of shipment.

Occasionally, an entire set of documents is lost or destroyed in transit. The shipping company can then be asked to issue duplicate bills in return for an unlimited bank guarantee as indemnity against possible future liability to a holder of the lost documents.

As far as incorrect documents are concerned, obvious clerical errors that do not materially affect a document do not entitle a buyer to delay or refuse payment under ESCC. If mistakes invalidate a document or affect its reliability, the document is regarded as a missing document and a guarantee can be submitted in its place. The seller then returns the document itself for reissue or amendment.

European Coffee Federation and Green Coffee Association contracts

Changes to standard forms of contract are rare, but they do occur. For ECF contracts, consult the latest version at www.ecf-coffee.org – look for ‘Contracts’ under ‘Publications’. For GCA contracts, go to www.greencoffeeassociation.org and look for ‘Contracts’ under ‘Resources’.

Overriding principle

The standard contract forms set out generally accepted rules, practices and conditions in the international coffee trade for which the terminology and precise meaning have been standardized under the aegis of ECF in Europe and GCA in the United States. GCA contracts are also available in an electronic or XML (extensible mark-up language) version, together with a price fixing letter, a price fix rolling letter and a destination declaration letter. The data files are available, free of charge, from GCA at www.greencoffeeassociation.org. For more information on using the XML versions, exporters should contact their US buyers or agents.

Both ECF and GCA publish template contracts dealing with different types of transactions. Most coffee is traded using these standard contracts. Others exist, but are rarely used.

ECF and GCA contracts state expressly that no contract shall be contingent on another and each contract is to be settled between buyers and sellers without reference to other contracts covering the same parcel.

European Coffee Federation contracts

The Committee of the European Green Coffee Merchants Associations published the first European Contract for Coffee in September 1956. It was primarily intended for use by exporters in producer countries and traders in Europe. Individual trade associations had been using (and some continued to use) their own standard contracts. Gradually, though, with trade within Europe growing, the European Contract for Coffee became the recognized default contract.

There was a call within the trade for a spot contract. In January 1983, the Committee of the European Coffee Associations (the successor to the European Green Coffee Merchants Associations) brought into effect the European Contract for Spot Coffee.

Until this time, members of the Committee of the European Coffee Associations had been meeting informally to discuss contractual matters. At its 1983 annual general meeting in Lille, France, however, the organization agreed to establish a formal Contracts Commission. The European Contract for Coffee in Bulk followed in January 1995 and was incorporated into the European Contract for Coffee in 2002.

Historically, the green trade had overseen contractual conditions. But with changing purchasing methods and the establishment of their own specific conditions, manufacturers took greater interest in the standard contracts. For a time, representatives of the European Association of Coffee Roaster Associations attended meetings of the Contracts Commission.

Formed in 1981, the European Coffee Federation was the voice of the Committee of the European Coffee Associations and the European Association of Coffee Roaster Associations when the two associations agreed to work in unison. However, they agreed to disband in 2005 and ECF adopted statutes establishing itself as the European body for the entire coffee trade and industry.

A consequence of this was that the two standard contracts of the Committee of the European Coffee Associations came under the ECF's authority when a formal Contracts Committee was established. In 2012, ECF published the European Delivery Contract for Coffee and the FCA contract.

Clearly, it was not ideal for ECF to publish four separate standard contracts. The Contracts Committee was therefore tasked with integrating the contracts. This resulted in the European Standard Contract for Coffee.

ECF publishes a Code of Practice that serves as a guide to interpret the contract. Only the English version of the ESCC is considered official.

The ESCC covers three types of contract:

Shipment: Such contracts are usually under FCA, FOB, CFR or CIF terms. While the seller's responsibility ends upon delivery at the place named in an FCA contract, the buyer must ship the goods within a stipulated period to benefit from the seller's obligations regarding weights and quality. Generally, FCA contracts are based on loaded weight while FOB, CFR and CIF contracts are based on shipped weight (or landed weight for CIF sales).

When the European Contract for Coffee was first adopted, it was noted that in the coffee trade, even if the price is expressed 'free on board port of shipment', the contract is to be considered as an ill-defined cost and freight contract (with the freight being to the buyer's account). Consequently, FOB sellers not only have to reserve space, but are equally responsible for the coffee shipment. They must also establish all necessary shipping documents. Therefore, their responsibility ends only at the moment the coffee crosses the ship's rail, precisely as in a CFR contract.

As this deviates from general trade practice, however, this obligation must be clearly stipulated in the contract. Buyers who wish to purchase using FOB conditions must state this before the contract is concluded and give the necessary instructions to the sellers in due time. Shipment contracts basically cover movement of coffee from the port of shipment to the port of destination. However, buyers commonly arrange for on-carriage of coffee without stripping the container and reloading, so they have the right to arrange for on-carriage of containers in the stipulated conditions.

Delivery: These contracts are generally envisaged to be made for coffee for delivery at an agreed place in Europe, basis in/ex store or FCA. The coffee eventually tendered under a delivery contract will not necessarily be located in Europe at the time of sale and, importantly, any failure by the seller to obtain coffee does not release the seller from the obligation to tender.

Spot: Spot coffee is coffee located in a warehouse in Europe at the time of sale. Usually, the conditions are in/ex store, FOB, FCA, DAT, DAP or DDP.

See www.ecf-coffee.org for the full contract.

Green Coffee Association contracts

Many North American roasters buy coffee ex dock. This means the importer/trade house handles all the shipment and landing formalities, including customs clearance and passing the obligatory FDA sanitation check, which is particular to the United States.

All contracts for importation into the United States carry the stamp-over clause 'No pass – no sale'. This means that if any or all of the coffee is not admitted at port of destination in its original condition due to failure to meet the legal requirements, the contract is deemed null and void regarding the portion of the coffee which is not admitted in its original condition at point of discharge.

Furthermore, any payment made for any coffee denied entry must be refunded within 10 calendar days of denial of entry.¹⁸⁵ If coffee is refused entry under a contract that does not bear this stamp, in addition to having to refund payment, the seller may also be required to make a replacement delivery within 30 days.

Contracts should stipulate whether they cover commercial-grade or specialty-grade coffee. This determines the type of arbitration that would be held. If nothing is specified, the contract is automatically assumed to cover commercial-grade coffee.

There are nine types of GCA contracts. Four deal with coffee sold outside the destination country, four deal with coffee sold inside the destination country and one deals with coffee delivered at the border or frontier. The main distinction between the contract types is how cost and risk are allocated between the parties.¹⁸⁶

In addition to FCA, FOB, CFR and CIF contracts, there are also:

Delivered at frontier: Under these contracts, risk of loss is transferred when the coffee is delivered to a named point at the frontier. Delivery takes place once the trailer, truck or rail car arrives and the coffee is cleared for export, but not for import.

¹⁸⁵For more on this, see www.cfsan.fda.gov or order the information booklet titled 'Health and Safety in the Importation of Green Coffee into the United States' from the National Coffee Association.

¹⁸⁶The full contracts are available at www.greencoffeeassociation.org

Ex dock: When coffee is sold ex dock, the transfer of the risk of loss takes place on the dock at the port of destination, after all ocean freight and terminal handling charges are paid, and after customs entry and all government regulations have been satisfied.

Ex warehouse, delivered and spot contracts are outside the scope of normal export business and not discussed here.

Price to be fixed: This does not feature in ESCC. However, GCA stipulates that PTBF contracts shall specify the differential (value) that is added to or subtracted from an agreed price basis. When applicable, the number of lots of coffee futures should also be mentioned, as well as whether the buyer or seller has the right to execute the fixation.

If a margin is payable between the time of fixation and time of shipment/delivery, it must be determined when the contract is drawn up. Finally, the earliest and the latest fixation date must also be specified at the time of contract. Any changes must be by mutual agreement and in writing.

Incoterms®: ECF and GCA contracts do not refer to these – not because of any disqualification or disagreement, but because Incoterms® are a general, not coffee-specific, set of international trade definitions. The exclusion is purely to safeguard the standalone status and clarity of the ECF and GCA contracts that have been written for the trade in coffee.

Incoterms®

Incoterms® are standard international trade definitions used every day in countless contracts – both domestic and international. International Chamber of Commerce (ICC) model contracts facilitate trade, especially for smaller companies that may lack access to adequate legal advice. However, they do not apply to the standalone standard forms of contract for green coffee shipments of the ECF and the GCA.

Nevertheless, some exporters prefer to apply at least some definitions used by Incoterms® to their green coffee shipments (for which, of course, the buyer's agreement is needed). In addition, the ECF/GCA standard contract forms do not cater to the export of manufactured goods, such as roasted and packaged coffee.

The Paris-based International Chamber of Commerce was established in 1919. Since then, it has expanded to become a global business organization with thousands of member companies and associations in 120 countries representing every major industrial and service sector. Today's ICC is also the main business partner to the United Nations and its affiliated agencies in matters of international trade.

ICC has published various sets of internationally recognized rules and standards since 1936. The most well known to the coffee trade are probably Incoterms® themselves, and the Uniform Customs and Practice for Documentary Credits (UCP 600).

Experts and practitioners brought together by ICC developed and maintain the Incoterms® rules, which are the standard in international business rules setting. They help traders avoid expensive misunderstandings by clarifying the tasks, costs and risks involved in delivering goods from sellers to buyers. The United Nations Commission on International Trade Law (www.uncitral.org), which formulates and regulates international trade in cooperation with the World Trade Organization, recognizes Incoterms® rules as the global standard for the interpretation of the most common terms in foreign trade.

The terms are periodically updated – the latest version being the Incoterms® 2020. However, parties to a contract can agree to use an earlier version. In this case, they should specify which version the contract is based on (for example, Incoterms® 2010).

The full set of Incoterms® 2020 rules can be obtained from the ICC website (www.iccwbo.org/incoterms). Guidance Notes explain the fundamentals of each Incoterms® rule, such as when it should be used, when risk passes and how costs are allocated between seller and buyer. The Guidance Notes are not part of the actual Incoterms® 2020 rules, but are intended to help the user accurately and efficiently steer towards the appropriate Incoterms® rule for a particular transaction.

The ICC also offers a helpful wall chart illustrating each party's obligations under different delivery conditions.

Types of rules

Incoterms® set out two distinct classes of rules.

1. Rules for any mode or modes of transport:

- EXW: Ex works
- FCA: Free carrier
- CPT: Carriage paid to
- CIP: Carriage and insurance paid to DAT: Delivered at terminal
- DAP: Delivered at place
- DDP: Delivered duty paid

This class includes the seven Incoterms® 2020 rules that can be used irrespective of the selected mode of transport and whether one or more modes of transport is employed. They can be used even when there is no maritime transport. It is important to remember, however, that these rules can be applied when a ship is used for part of the carriage.

2. Rules for sea and inland waterway transport:

- FAS: Free alongside ship
- FOB: Free on board
- CFR: Cost and freight
- CIF: Cost, insurance and freight

In this class of Incoterms® 2020 rules, the point of delivery and the place to which the goods are carried to the buyer are both ports, hence the label sea and inland waterway rules. Under the last three Incoterms® rules, all mention of the ship's rail as the point of delivery has been omitted in preference for the goods being delivered when they are on board the vessel. This more closely reflects modern commercial reality and avoids the rather dated image of the risk swinging to and fro across an imaginary perpendicular line.

Terminal handling charges

Under Incoterms® rules for CPT, CIP, CFR, CIF, DAT, DAP and DDP, the seller must arrange for the goods to be carried to the agreed destination. While the seller pays the freight directly, it is actually covered by the buyer, as the seller normally includes freight costs in the total selling price.

The carriage costs sometimes include the costs of handling and moving the goods within port or container terminal facilities. The carrier or terminal operator may well charge these costs to the buyer who receives the goods. In these circumstances, the buyer will want to avoid paying for the same service twice: once to the seller as part of the total selling price and once independently to the carrier or the terminal operator. The Incoterms® 2020 rules seek to avoid this happening by clearly allocating such costs in articles A6/B6 of the relevant Incoterms® rules.

Rules for domestic and international trade

Incoterms® rules have traditionally been used in sales contracts where goods pass across international borders. In some areas of the world, however, trade blocs such as the European Union have made border formalities between different countries less significant. There is also greater willingness in the United States to use Incoterms® rules in domestic trade.

Consequently, the subtitle of the Incoterms® 2020 rules formally recognizes that they apply to both international and domestic sale contracts. As a result, the Incoterms® 2020 rules clearly state in several places that the obligation to comply with export/import formalities exists only where applicable.

Logistics and insurance

Basic shipping terms

Below is an explanation of some basic shipping terms relevant to the coffee sector.

Cargo

Containerized cargo is placed in a container throughout the journey, often to the final inland destination. Coffee can be stored in bags or in bulk inside the container. Most, if not nearly all, coffee now travels in containers and breakbulk services are no longer on regular offer. Breakbulk only occurs on some coastal stretches, such as from ports that lack the required lifting equipment or that use lighters to transfer cargo to coasters waiting offshore.

Such cargo (coffee in bags) would then be containerized at the port where transfer to the deep oceangoing vessel takes place. As a result, shipping small parcels (less than a container load) has become a problem (discussed later in this chapter).

Container transit is faster, more efficient and more secure than breakbulk. Modern container vessels spend only short periods in port as all cargo is assembled before arrival, and container handling can proceed irrespective of weather conditions. Strict schedules can be maintained, and turnaround times are shorter.

Ro-ro (roll-on roll-off) vessels carry containers on trailers that are simply driven on and off the ships. This avoids the need for gantry cranes. Ro-ro vessels are mostly used between smaller ports, for example in Europe, although some bagged coffee is also exported from West Africa on flatbed trailers.

Breakbulk means coffee is stowed in the ship's hold in bags and the cargo is loose. The bags are sometimes left in the loading slings to speed up discharge at destination. However, this comes at the expense of less freight capacity per cubic metre.

The disadvantages of breakbulk shipping are numerous: the goods can be exposed to the weather during loading and discharge; the bags can be torn; there is a risk of contamination from other cargo during the voyage; and bags may be lost or mixed with other shipments. Marine insurance is usually higher for breakbulk cargo.

Shipping services

Liner services are regular, scheduled shipping services between fixed groups of ports that operate regardless of cargo availability. Tramping vessels, however, make irregular, opportunistic calls at ports when cargo is available. In theory, importers can also charter vessels for larger tonnages, but chartering is a complex business and conditions for each charter must be negotiated individually. However, major shipping lines often include chartered vessels in their scheduled liner services, using standard charter contracts.

Unless specifically stated to the contrary, all coffee contracts automatically stipulate that shipment is by liner vessel, operated under a regular, scheduled service.

Vessel-sharing agreements unify several carriers offering a joint service by agreeing on a frequency and capacity from and to certain ports. The lines share the vessels that each contributes, but each carrier markets and sells freight space on an individual basis. Individual freight contracts can still be negotiated with each line and, depending on the space available, receivers can also nominate a choice of carriers for the goods.

For most shipments, the receiver (rather than the shipper) pays and negotiates the freight costs. The advantage for the shipping lines is better cost control and increased efficiency. For receivers, there is more flexibility in that they can negotiate rates and, in a sense, play the market. But the number of sailings is not necessarily guaranteed and may change.

Shipping hubs

Shipping hubs and container feeder vessels are becoming increasingly important as the shipping industry evolves to meet the demands of globalization. The proportion of larger vessels in world fleets is growing. For example, HMM Algeciras can carry as many as 24,000 20-foot equivalent units (TEU).

These ships are longer and wider than anything built before, but their revolutionary design and propulsion systems supposedly reduce costs considerably and cut CO₂ emissions per container carried. This latter aspect fits well with the growing interest in green supply chain management, and still larger vessels may become operational in the foreseeable future. However, such mega-vessels call only at ports with the required deep water that offer the cargo and the mechanized capability to handle it quickly and efficiently.

As a result, smaller ports increasingly feed cargo to the nearest regional hub, in rather the same way as airlines have been doing for years. This practice is already well established in some producing countries, but elsewhere it is creating some problems for the industry, partly because the supply of smaller feeder vessels is not necessarily keeping up with the growing number of very large container ships.

It is not uncommon for coffee importers to receive proper advice of shipment, within contract terms, but still not know the name of the vessel that delivers at the final port of discharge. This is because the name of the transshipment or mother vessel is not always known at the time of loading.

Web-based track-and-trace services offer solutions, provided the shipping advice includes the container numbers and or the bill of lading number (which shippers must provide in the shipment advice). Larger receivers working on the just-in-time supply system require carriers to inform them directly by e-mail, within a given time limit, of all transshipment arrangements, including the name of the mainline vessel and its estimated time of arrival at destination. Other issues can arise when authorities in a transshipment port impose conditions on cargo that is to be shipped through there.

Ocean freight and surcharges

Ocean freight is mostly quoted as a lump sum per container, regardless of the payload. Coffee in bulk containers is usually shipped under FCL/FCL conditions (loading and discharge costs are not included in the freight rate). In contrast, bagged coffee in containers is shipped LCL/FCL (loading supervised by the shipping line and cost included in the freight rate) or FCL/FCL. The cost of loading and discharging containers varies between container terminals and shipping lines, sometimes considerably, and can be a significant cost item.

Ocean freight includes variable elements beyond the control of shipping companies. The most important are the cost of fuel and exchange rate fluctuations. If a European shipping line accepts a freight rate expressed in US dollars, movement in the rate of exchange of the dollar against the euro is reflected in its income. To avoid having to speculate on potential fluctuations in fuel prices or currencies, freight contracts instead allow for price adjustments whenever notable changes occur.

Surcharges imposed when fuel costs are adjusted are called the bunker adjustment factor. They are usually applied as a sum per container. A surcharge due to currency fluctuations is called currency adjustment factor, expressed as a percentage of the freight sum. The bunker adjustment factor is applied to the basic rate of freight and the currency adjustment factor to the resulting sum.

Contracts may also provide for surcharges when other costs change, such as port usage charges or tolls on seaways and canals. Shipping lines may also levy special increases on freight from or to ports where congestion causes excessive delays to vessels. 'All in' rates of freight are also available, particularly to large shippers and receivers. These remain fixed for specific periods during which no bunker adjustment factor or currency adjustment factor surcharges can be applied.

War risk is another potential cause for surcharging freights as shipowners pass on higher insurance premiums for vessels operating on difficult or dangerous trade routes. Such unforeseen costs result from *force majeure* and may be passed on to shippers or receivers, usually at a flat rate per container. More about insurance is discussed later in this chapter.

Other surcharges may be levied as well, depending on the carrier and the voyage. These may include cargo documentation/customs fees, a piracy surcharge, stacking charges and transshipment fees.

Freight charges are very important to producing countries, because for the roaster, the real cost of coffee is the final price when it lands at its destination. If coffees bought from country A and from country B are used for the same purpose, the two qualities can be substituted and should, therefore, be priced the same.

If, for example, the freight costs from country A are notably higher than those from country B, then A's asking price must be lower to match the landed cost of B. And if freight rates from country B falls, then the FOB price or differential for that coffee eventually rises accordingly if freight rates elsewhere do not follow suit.

Freight rates fluctuate all the time and are negotiable. Different companies almost certainly apply different rates during the same time period, making it pointless to list actual rates in this guide. It is much more important to have a good grasp of the general principles governing freight.

Factors more numerous and complex than, for example, the distances involved often influence freight rates. The dominant practice today is for shippers and receivers to negotiate individual freight agreements with shipping lines, sometimes on a worldwide basis. As a result, actual freight rates for many receivers are not general knowledge, with many bills of lading simply stating 'freight as per agreement' or 'freight payable at destination'.

Nevertheless, industry bodies in both exporting and importing countries should meet regularly with individual shipping lines that are important in the transport of coffee to review issues of mutual interest. These include shifts in coffee production and demand, port developments in producing countries and at destination, technical and physical issues (such as hygiene and food safety), and other topics relating to coffee logistics and levels of service.

Terminal handling charges

Terminal handling charges and post-terminal charges are important components of the cost to transport containerized coffee. Terminal handling charges cover the cost of the loading and discharge of containers, not charges for inland transportation. A freight quotation by itself may be attractive, but the cost of getting a container on board or transporting it to the roasting plant after discharge may well be higher than the norm and so offset any perceived advantage. For these reasons, terminal charges are important when evaluating the competitiveness of individual carriers.

Remember that unless stated otherwise in the contract, under an FOB contract, the shipper is liable for terminal handling charges at origin and the receiver is liable at destination. If a receiver negotiates a lower freight rate but the terminal handling costs at origin increase, the outcome is that freight costs are being moved around the supply chain – in this case, to the exporter's detriment. (Under an FCA contract, the receiver is liable for both sets of terminal handling charges, so this is not an issue.)

Bills of lading and waybills

A bill of lading is firstly a receipt: The carrier acknowledges that the goods have been received for carriage. But it is also evidence of the carriage contract and a promise to deliver that cargo. The contract starts when the freight space is booked. The subsequent issuance of the bill of lading confirms this and provides evidence of the contract, even though it is signed by only one party: the carrier or its agents.

A bill of lading is also a transferable document of title. Goods can be delivered by handing over a bill of lading, provided the shipment was consigned 'to order' and all the subsequent endorsements are in order.

If a bill of lading is lost or does not arrive in time for the receiver to take delivery (such as when transit times are short), the carrier can usually assist by delivering the goods against receipt of a guarantee. The guarantee safeguards the carrier in case the claimant is not the rightful owner of the goods. Wrongful delivery would constitute a breach of contract and the carrier will insist on a letter of indemnity from the receiver backed by a bank guarantee whose wording meets the carrier's specifications, usually for an amount of 150%–200% of the actual CIF value of the goods, valid for one to two years.

Although there is no express time limit beyond which the holder of a bill of lading can no longer claim the goods, a guarantee for one or possibly two years should cover the carrier's obligations. Nevertheless, a letter of indemnity can never invalidate the actual contract of carriage, which is the bill of lading.

Carriers are not obliged to deliver goods against guarantees. That decision is entirely at their discretion and the receiver may have to negotiate the terms with the carrier, who may wish to consult the original shipper.

Note that ECF contracts clearly state that buyers are not obliged to take delivery under their guarantee and, if the bill of lading is still not available 21 calendar days after arrival, and with a three working day notice to the seller by the buyer, the buyer may declare the seller to be in default. The remedy here would be for the exporter to provide the guarantee instead. GCA does not specifically refer to missing documents and leaves settlement of any unresolved claim or dispute in this regard entirely to arbitration.

Different types of bills of lading

The carrier's responsibility starts with the physical acceptance of the goods for carriage. If this occurs at an inland point, a combined transport bill of lading is issued. If the handover is in a port, then a port-to-port bill of lading is issued.

The term 'through bill of lading' should not be used, as it means the issuing carrier acts as principal only during the carriage on its own vessel(s) and acts as an agent at all other times. This implies that the responsibilities

and liabilities may be spread over more than one carrier under different (possibly unknown) conditions at different stages of the transportation chain.

Under a combined transport bill of lading, the carrier accepts responsibility, subject to the normal stipulations in the bill of lading, for the whole carriage, inland and marine, from door to door, or from door to container yard or container station. The carrier arranges both the marine and the inland transport, but it should be noted that different international conventions govern marine and overland transport. This can have an effect on the settlement of claims, because the carrier's financial liability for inland carriage is not necessarily the same as it is for the marine voyage (on board ship, i.e. 'from tackle to tackle').

The carrier usually assists in any claims procedure initiated by the receiver and/or insurance company, but will not necessarily accept responsibility for settlement if the damage occurred during the overland stage. For example, there is no liability if a truck is stopped at gunpoint and the driver is told to 'disappear', or if an accident occurs because of driver negligence, even if liability exists according to local jurisprudence.

Obviously, large receivers find it easier than smaller companies to resolve such matters. Note that for FCA contracts (also known as free on truck in some origins), the buyer must lodge the necessary claims under their insurance policy. In these cases, insurance coverage should start at the inland point of loading.

Whether a bill of lading is of port-to-port or combined transport depends on whether the box 'place of receipt' (or 'place of delivery') has been filled in.

Sea waybills

Like a bill of lading, a sea waybill is a receipt and evidence of a carriage contract, often used for through cargo. But such a bill is not a document of title. Unlike bills of lading, sea waybills cannot be issued 'to order' and they cannot be negotiated – i.e. they cannot be endorsed.

The advantage is that there is no need to transmit paper documentation to the point of destination to secure delivery, because delivery is made – automatically and only – to the named consignee. They can be used when payment does not depend on the submission of documents, for example, because the shipment is between associated companies or payment has been made in advance. Thus, sea waybills can facilitate paperless transactions.

Customs documentation charges or **cargo declaration fees** are a new type of charge, introduced by shipping lines to cover the cost of complying with maritime cargo security regulations now in force for both the United States and the European Union. Cargo that does not comply with these regulations may not be loaded and the lines have to ensure that only correctly documented cargo is loaded.

While there is no denying that there is an administrative and tech cost to this, many exporters consider these charges to be linked to importation and, therefore, that they should be paid by the receiver. However, the consensus on the receiving side is that these charges are part of the cost of bringing cargo to FOB, i.e. they form part of the export charges and, as such, should be paid by shippers.

Carrier's liability – burden of proof

Full container load simply means the seller or shipper was responsible for stuffing the container and the cost thereof. But the contents of a sealed container cannot be verified from the outside.

The FCL bill of lading simply states 'received on board one container STC [said to contain] X number of bags [or for bulk: kg] of coffee, shipper stow and count'. In other words, in an FCL bill of lading, the shipping line acknowledges receipt of the container, undertakes to transport it from point A to point B without losing or damaging it, and to deliver it. But the shipping line does not commit itself regarding the contents.

There is no clear connection between FCL or LCL and Incoterms®. The terms FCL and LCL are common in most coffee-producing countries, but do not always have exactly the same meaning. Combining FCL with the term CY (container yard: container is received), and LCL with a container freight station (CFS: goods are received), removes any room for confusion. However, CY and CFS are not freight terms, but represent delivery locations.

Less than container load means the carrier is responsible for the container's suitability and condition, and its stuffing. The carrier pays for this and then charges an LCL service charge. The bill of lading states 'received in apparent good order and condition X number of bags said to weigh Y kg'. Now the carrier accepts responsibility for the number of bags, but still not for the contents of the bags or the weight.

In the interests of service to clients, although not in all coffee-producing countries, shipping lines agree to carry coffee as LCL provided the containers are filled on the carrier's premises, ideally at a container freight station. It has become accepted practice in some countries for containers to be stuffed at the premises of sellers at their expense, under the supervision of the carrier or the carrier's appointed agent.

Although a higher freight rate still applies than for an FCL shipment, this arrangement is valuable to smaller shippers or those who are relatively unknown. Importers and their bankers increasingly check the credibility of exporters, including the documentation they supply, and do not accept unknown FCL bills of lading.

For some exporters and origins, the stuffing and weighing of containers 'under independent supervision' is now the order of the day – not only for LCL shipments, but also for FCL, to satisfy the legitimate security concerns of all involved in the coffee trade. Such services are often provided by collateral managers who verify correct procedure in an exporter's operations on behalf of the bank that finances the business, sometimes right through to delivery at the receiving end.

Claims on shipping lines have dropped as a result of these services, suggesting that past discrepancies in containerized cargo were at least partly the result of inadequate supervision during stuffing. However, the main cause of claims on containerized coffee in bags has always been condensation damage, which is much less likely to occur when coffee is shipped in bulk.

The term LCL is something of a misnomer in that containers are nearly always full and freight is charged per container, not by weight. The term is often used because it permits marine insurers and/or receivers to lodge insurance claims directly on shipping lines.

But just as roasters argue that roasting and distribution are their core business – not transporting, storing and financing green coffee stocks – so shippers consider their business to be carrying sealed containers safely and efficiently from A to B, and not to be concerned with the contents. Shipping lines intend to eliminate the LCL bill of lading, in time.

This will mean greater use of independent weighing companies and supervisors, although the reliability of such services will still vary from port to port and from country to country. If weight or quality claims still arise after such inspections, there will be serious differences of opinion between shipper and receiver. This is mainly because it is not always understood that providing a certificate of weight or quality does not absolve the shipper from contractual obligations.

Transshipment issues

The rapidly growing size and capacity of container vessels means transshipments are much more common. Increased transshipment means that ever stricter instructions must be given, in writing, about the type of 'cargo care' that is required, while details of the shipment's routing must be known and agreed in advance.

It is not unusual for shipments to be transshipped three or four times. For example, a feeder vessel may transport a shipment from the local port via a larger national port to a regional shipping hub where the large 'mother vessels' call. A shipment may also move from the national port to the regional hub for transshipment to a final destination, for instance, discharge at Antwerp and onward shipment to Helsinki. This means longer transit times, particularly if a feeder vessel is late and misses the mother vessel's slot at the hub port.

Modern container vessels spend the vast majority of time at sea – days in port are kept to a minimum and late cargo simply gets left behind. Such events make it difficult for importers to guarantee on-time delivery to their roaster clients and lead to additional costs (particularly financing), which they will wish to recover.

However, as most, if not nearly all, green coffee shipped from origin is sold on FOB or FCA basis, the exporter's responsibility usually ends when the goods cross the ship's rail or are handed to the stipulated carrier. Naturally, this presupposes that shipment is made according to the contract terms and conditions, i.e. those of the underlying standard form of contract, as well as those that the buyer may have stipulated, including any 'cargo care' notes. Of course, quality and other claims always remain a possibility.

Although selection of the carrying vessels is sometimes left up to the exporter, FOB buyers, in particular, should engage with the process by being well informed about shipping opportunities from a certain port and by insisting that the most suitable options and routings are chosen. Once the goods are on board the ship, they have become the buyer's responsibility in the sense that the buyer must ensure they are insured, settle the freight charges and, of course, take delivery.

If any claims arise after loading due to delays and/or damage, then it is for buyers to lodge these with the shipping company if they think there is a case for doing so.

However, exporters are duty-bound to make sure they keep buyers informed of any changes to the shipping process, including when they are told about changes in transshipment dates, vessels or schedules after the goods are shipped. All parties to a transaction must always exercise due diligence: that is, they must be able to prove they acted correctly at all times. The shipping agents at origin should monitor transshipment cargo and keep their principals fully informed, which is not always the case.

Nevertheless, in most cases, the buyer is liable for any extra costs, at least initially. Where appropriate, an exporter may be asked to help with the lodging of claims. It would make good sense to assist where possible.

When buyers realize that delays are occurring regularly for goods shipped from a particular port, they adjust their cost calculations from FOB origin port of shipment to ex dock at destination. When it comes to individual cases, the buyer usually suffers the consequences. Exporters always bear the cost in the longer run, though, because they receive lower bid prices or lose business. These losses are passed on to coffee farmers.

Unfortunately, there are no magic solutions to the transshipment issue. A port can drop off the international schedules of the major shipping companies. This can occur for various reasons – main or mother vessels are too large to call there, the cargo on offer is insufficient or cargo handling is inefficient. When this happens, that port and everyone using it must adjust and make the best of it through improved efficiency and other cost-saving measures. These include:

- Keeping up to date and ensuring your buyer knows what you know when you know it;
- Choosing the right shipping agent, one who does not simply book on 'friendly' vessels, but who offers the most efficient routing and transshipment connections;
- Making sure all appropriate cargo care details are stated in the cargo booking. Do not rely on the shipping agent to take care of this;
- Demanding the origin shipping agent monitors the cargo all the way and keeps you informed, and liaising closely with the shipping companies, both coastal/regional and international. This is usually best achieved through an exporter association, a coffee authority, a chamber of commerce or another body that brings together several parties with individual but similar interests;
- Conducting regular reviews of recent shipping experiences, highlighting buyers' concerns and claims/comments, etc;
- Stressing the fact that, in the final analysis, all extra costs come off the producer price, meaning this is an industry issue – not just one that concerns exporters.

Small lot logistics

Exporters and buyers of lots that are smaller than a container load face both logistical and cost constraints. Indeed, many importers refuse to consider anything less than a container load: 19 tons to about 21 tons in a 20-foot container, depending on the type of coffee.

This effectively bars many potential small producers of specialty or organic coffee from participating directly in the overseas market. As a result, many small pockets of quality or exemplary coffee in producing countries go unrecognized, simply because they vanish in the mainstream of a country's total exports. Nevertheless, improved and simplified processing technology today allows even very small grower groups to produce high-quality coffee. But if this cannot be marketed successfully, then what is the point?

Initiatives such as the Cup of Excellence programme and the specialty industry as a whole have identified many pockets of excellent quality coffee in different countries, but the logistics of getting small lots from A to B are daunting. Few if any carriers today even quote freight rates per ton, let alone accept micro lots. Simply put, no room is available on container vessels for breakbulk or loose cargo, only for containers.

Modern shipping offers few alternatives. Transport now represents the one great limitation on smaller producers wishing to access the specialty market.



Coffee lots being prepared for transport to warehouses in Addis Ababa, Ethiopia.

Box 4: What are the options for small lots?

Combine or consolidate cargo: Finding compatible cargo to fill a standard container at least close to capacity can be difficult, and still means having to wait until a full load is assembled. Organic coffee may not be shipped in a container with other coffee because of the contamination risk.

Mini containers within a single, large container could be a solution. But these would probably have to be disposable because of the difficulty of attracting suitable return cargo. This is where flexible intermediate bulk containers (bulk bags, super bags or jumbo bags) could play a role. When hermetically sealed, such bags help to preserve quality, which is especially important for the more expensive specialty coffees. However, most roasters, especially smaller ones, are not equipped to handle bulk bags.

In many countries, freight consolidators (specialized freight forwarders) arrange for the consolidation of compatible cargo to use containers more effectively. However, this may not be easily done from smaller ports in producing countries. In addition, one would have to be absolutely certain that the other goods in a consolidated container load would not affect the coffee, and that the buyer agrees.

Another and probably less complicated option, depending on the buyer, is to combine a small parcel of top coffee with a parcel of easily sold, cheaper quality coffee (for example, 50 bags of specialized with 250 bags of a standard coffee quality together in one container shipped as FCL).

In some countries, producer associations help producers of specialized quality coffee to create container loads by combining different shipments for specific markets. There are also instances where specialty buyers join together to combine shipments. But this requires significant organization and support from exporters and importers alike.

Pay for dead freight: Some buyers or shippers simply absorb the cost of dead freight (the cost of any empty space in a container), especially when the coffee in question is of high value. How much dead freight can be absorbed will vary from transaction to transaction, but there is little doubt that producers of very small quantities stand little chance of becoming regular exporters if they cannot consolidate with others. It does not really make sense to ship a container for 25 or 50 bags. And the negative impact on the CO₂ footprint needs to be considered.

Air freight: If a small lot of expensive specialized coffee can bear the cost of paying freight for a full container, then it may sometimes be just as cost effective to use air freight instead. However, customs and security issues play a role here. Coffee is not normally exported or imported this way, so airlines and air freight companies do not always know how to handle the associated administrative procedures.

Finally, yet another problem facing shippers of small lots of top-quality coffee is that quality can be compromised if transit times are too long due to, say, multiple transshipments.

Source: International Trade Centre.

Shipping in containers

Bagged coffee in 20-foot 'dry containers' (and today even in 40-foot containers) is a major improvement over the old breakbulk method, but still involves extensive handling and does not fully exploit the carrying capacity of a container. This is important, as transport and freight costs are charged per container rather than by weight. The cost of handling bagged cargo is also escalating, especially in importing countries.

When correctly lined with cardboard or sufficiently strong Kraft paper, and if properly stuffed, standard 20-foot dry containers are suitable for transporting bagged coffee. This does not mean that this type of container is suitable for prolonged coffee storage. At the same time, more and more coffee is being shipped in bulk.

Experiments with bulk shipments began in the early 1980s. After a period of exhaustive trials, mostly on coffees from Brazil and Colombia, the conclusion was that standard containers are perfectly suitable to transport coffee in bulk. However, they must be fitted with appropriate liners (usually made of polypropylene) and the coffee's moisture content must not exceed the accepted standard for the coffee in question.

Some container facts:

TEU stands for a 20-foot equivalent unit with a maximum total weight of 30.48 tons and a maximum gross payload of 28.28 tons (i.e. including the weight of packaging, liners). This is the most important category.

FEU stands for a 40-foot equivalent unit with a maximum total weight of 30.4 tons and a maximum payload of 26.4 tons.

GP in the United States stands for a general-purpose container. The European Union calls this a DC or dry container.

The net load of a standard, general-purpose steel TEU container averages about 21,000kg of green coffee. This varies, depending on the type of coffee being shipped. Large beans can be as low as 19,000kg, while small beans can be as much as 24,000kg. It is impossible to use the entire theoretical payload capacity of a TEU because coffee is relatively bulky and so space is the limiting factor here.

Ocean freight for coffee shipments is always charged per container. As such, it is up to the shipper to decide how much of the available space to use and how much to leave empty.

Bagged coffee in containers: Condensation risk

Condensation occurs because moisture is always present in the air and hygroscopic (water-attracting) materials such as coffee normally contain some moisture as well. Coffee with moisture content in excess of 12.5% (ISO 6673) should never be shipped, whether in containers or bagged, as the risk of condensation – and, therefore, fungi growth – occurring becomes unacceptably high beyond this point. The only exceptions could be specialty coffees that traditionally have high moisture content, such as Indian monsooned coffees.

This is not to suggest that a moisture content of 12.5% is commercially acceptable for all coffee – for certain coffees, origins and buyers, it definitely is not. The figure of 12.5% simply represents a known technical point at which the risk of damage from condensation and mould growth during storage and transportation becomes unacceptably high. Shippers in certain regions habitually ship at higher moisture contents.

Many buyers now include maximum permissible arrival moisture content in purchasing contracts. The growing focus on food health and hygiene in consuming countries should motivate exporters to acquaint themselves with their buyers' requirements in this regard.

Coffee is often loaded in tropical or otherwise warm areas for discharge in places where temperatures are much lower. Warm air holds more water vapour than cold air. When warm, moist air cools down to dew point, condensation occurs. Dew point is the temperature at which a sample of saturated air condenses.

Put differently, the temperature of coffee travelling from producing countries during the Northern Hemisphere summer changes much less than when travelling during the Northern Hemisphere winter. Vessels may arrive when snow and ice conditions are prevalent, particularly in Northern Europe. Of course, such conditions are entirely beyond anyone's control, including the shipping company.

On other routes, cargo may pass through multiple climate zones during transit. For example, a container of coffee may travel from the Pacific Ocean ports of Guayaquil (Ecuador) and Buenaventura (on Colombia's west coast) to the East Coast (Atlantic Ocean) of the United States. When passing Cape Hatteras in the State of North Carolina on the East Coast in the winter, vessels may experience a drop in the outside temperature of up to 20°C in just four hours.



Container vessel in snow during winter.

During transit, the temperature outside the container gradually cools down and the steel container allows the chill to conduct from the outside of the panels through to the inside. On arrival, the container has a cool roof and side panels, and moist warm air in the space above the cargo and within the stow. The coffee beans themselves will have given up most of the moisture.

When the temperature of the panels falls below the dew point of the air inside the container, condensation starts and continues until the interior dew point falls to that of the air outside.

Apart from making sure that the coffee's own moisture content is acceptable, condensation cannot be avoided. All one can do is try to prevent the condensation falling onto the coffee as droplets. If temperature changes are gradual and enough time passes, the coffee beans will absorb the excess moisture from the air in the container and the container will again be dry. But temperature differences of 8°C to 10°C over short time periods almost inevitably result in condensation.

In severe cases, water droplets, mostly consisting of dislocated moisture from the coffee itself, form on the interior roof and side panels, and then drip onto the cargo, causing water damage and mould. Correct stowage mitigates against the air above the cargo reaching dew point. This can be supported by adding a drying agent or desiccant – provided, of course, that these can be used with foodstuffs and are accepted by the final receiver.

In summary, temperature differences plus the time factor and the speed of events combine to release moisture from the coffee. Given enough time, the coffee will reabsorb the moisture. If events unfold too fast or moisture is excessive, however, the coffee cannot reabsorb what it gave up and condensation continues if the temperature difference between the steel of the container and the air inside it exceeds 8°C.

In producing countries, condensation occurs when containers are stuffed at high-altitude locations with high temperatures during the day that fall rapidly at night, leading to the same scenario. The risk increases if full containers are left outside in the radiant heat of the sun, so containers should not be stuffed too far ahead of the actual time of shipment.

The only answer to all such weather-related events is to exercise the utmost care when lining and stuffing containers, and to ensure correct stowage the ship.

CONTAINER APPROVAL FORM

Before entering a container, check that no labels are attached indicating that it carried dangerous goods or, in the case of fumigation, what kind of substance was used. Check that a fumigated container has been properly de-gassed before entering it.

When ordering a container from the carrier, specify in writing that it must be suitable to carry coffee beans, i.e. foodstuffs, that you reserve the right to reject any container you consider unfit and that you will claim compensation for losses resulting from unsuitable containers. This is no guaranteed protection, but it alerts the carrier. Even so, you are fully liable to select a suitable container, so reject any suspect container, irrespective of who supplies it.

Note that when the shipping line delivers an empty container to the shipper's premises (carrier haulage) and it is validly rejected, the line must pay to replace it. But if the shipper's transporter collects the container from the shipping line (merchant haulage) and it is then rejected, the shipper is liable for the cost.

The basic premise is that condensation cannot always be avoided, but it is possible to prevent the condensed water vapour from spoiling the coffee. It is important to consider the following:

- **Containers must be technically impeccable:** dry, clean, odourless and watertight; free of corrosion on the roof and sides; intact door locks, rubber packing and sealing devices.
- If possible, **check the floor's moisture content.** At the least, insist on a dry container that has not been washed recently. It takes a long time for the floor to dry out and without an instrument (Penetro meter), you have no reliable means of checking the floor's moisture content (which, ideally, should not exceed 12% for bagged cargo). Up to 14%, place extra protection (cardboard or Kraft paper). If it is over 14%–16%, use plastic with cardboard or paper on it. Above this, use dry pallets, but note that containers with a floor moisture content above 18% are basically not suitable for bagged coffee.
- When stuffing takes place at the shipper's or at CFS premises (in LCL status), **the shipping line must inspect the containers.** An inspector, acting on behalf of the shipping line, should enter the container and close the doors. If any daylight is visible, the container must be rejected immediately.
- When stuffing takes place at the shipper's premises (in FCL status), **the shipper or its representative should inspect the containers** as above and, of course, conduct the goods tally.
- The inspector should check for **noxious smells** by remaining inside the closed container for at least three minutes. There have been incidents of coffees arriving with a strong phenolic smell that renders them unfit for use. A phenolic smell or taste is reminiscent of disinfectant or an industrial cleaning agent, such as carbolic acid.

Inspectors should reject containers that show evidence of a prior load of chemical cargo or that have an Inter-Governmental Maritime Consultative Organization or International Maritime Organization dangerous cargo sticker or label affixed.¹⁸⁷ Coffees tainted by **chemical contamination or smell** will attract claims on arrival of 50%–100%, to which must be added the costs of destruction.

- **Wooden container floors** (where fitted) must have been treated against infestation. Details of the treatment method are found on the Container Safety Convention plate on the container door. This is important because of the rules on wood packaging materials that are used in international shipments.
- The actual **container stuffing should take place under cover**, in case there is a rain shower. **Bags should be sound**, with no leaking, slack or torn bags, no wet bags and no stained bags. The number of bags loaded is to be tallied and signed for by both warehouse staff and loading supervisor (in case of LCL shipments representing the shipping line).
- **The container should never be filled to absolute capacity** in that there should always be some room above the stow. This applies equally to bulk cargo.
- For bagged cargo, it is best to **line the container with cardboard or two layers of Kraft paper**, preferably corrugated, with the corrugation facing the steel structure, so no bag comes in contact with the metal of the container. When stuffing is complete, a double layer of Kraft paper should be fitted on top of the bags all the way to the floor in the doorway. This ensures that the paper at least partly absorbs any possible condensation from the roof.

In a fully lined container, cardboard or Kraft paper is between the bags and the corner posts, in the junction between the upright walls and the floor, at the back of the container and at the doors, and covering the top of the stow as well. Cardboard is stronger and preferable to Kraft paper.

¹⁸⁷For more information on the International Maritime Dangerous Goods Code and dangerous cargo labels, see www.imo.org, the website of the International Maritime Organization.

- **Desiccants or dry bags** are sometimes used. They are meant to avoid the air in the container reaching dew point (100% relative humidity) during the voyage. The need depends on local circumstances, but desiccants should only be used with the receiver's express prior permission. Many receivers do not allow their use under any circumstances, and the exporter must decide if they are acceptable. Other materials that can help manage conditions inside a closed container also exist, but fall outside the scope of this guide.
- **Liners for bulk coffee should be 100% sound**, which means no pinholes, etc. Any condensation that forms and drips from the roof may collect in puddles on the liner and soak through if there are pinholes, which means a claim can be made.
- Under International Maritime Dangerous Goods Code rules, coffee still under **fumigation** or not yet properly aired should be booked, documented, labelled and handled for shipment as IMO Classified (Class 9 UN no. 3359 'fumigated unit').

Box 5: Examples of different coffee bags

Sample bags:



Standard 60kg jute bags with polyethylene inlay for better qualities:



30kg paper bags:



Standard 60kg and 69kg jute bags:



1,500kg high barrier plastic big bag:



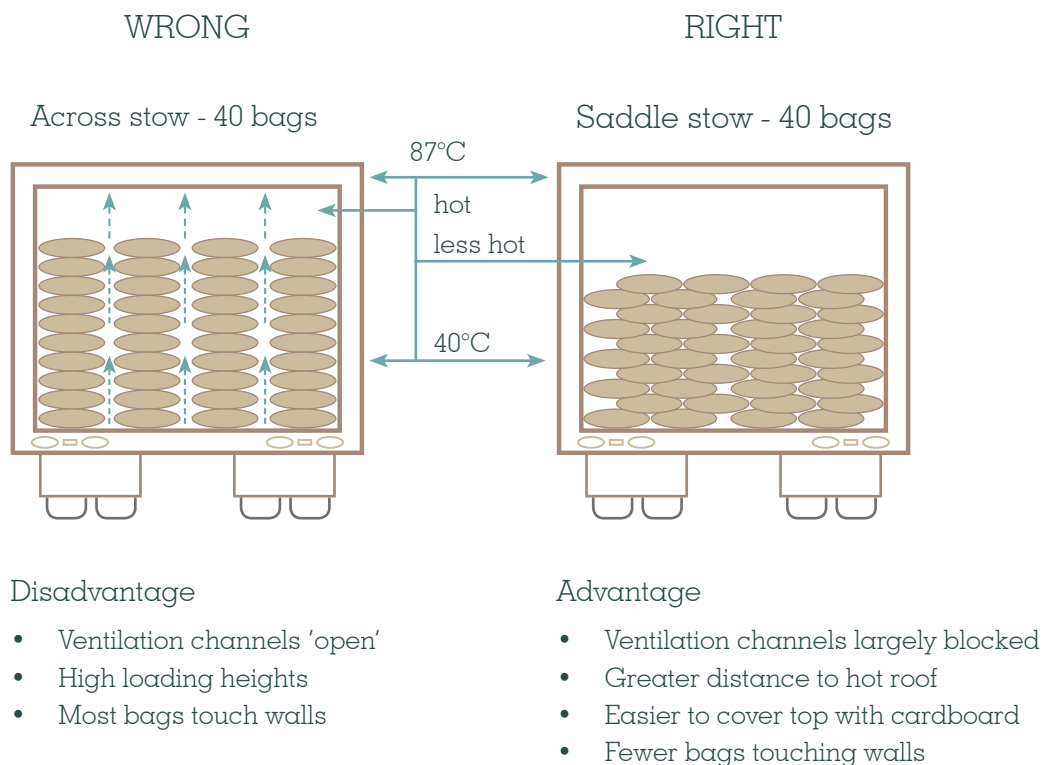
Source: Brazil Specialty Coffee Association, trade sources, Grainpro, Ecotact and Videplast.

Bagged coffee in containers: Stuffing and shipping

Coffee is hygroscopic and contains water. When out in the open, the container roof heats up during the day and cools down at night. If air circulates relatively freely, the warm, humid air released from the coffee rises to the cooler steel plates, where condensation can be severe. The effect of this thermal flow is serious when coffee is stowed in bags, because there are air channels in the stow (because of the bag shape). Those air channels are even larger when stowing is across, as illustrated in the chart below.

Individual receivers may and do stipulate their own stowage patterns and there is no standard method. However, the golden rule is to minimize the air within the stow (i.e. between the bags) as much as possible, because condensation occurs when that air is cooled during transit.

Figure 1: Saddle stow blocks air channels better than across stow



Source: ITC.

Transit time: Experience shows that most of the condensation problems encountered during maritime transport are caused at origin (containers are stuffed too early ahead of actual shipment or not properly lined) or immediately after offloading (especially for containers arriving in winter). This makes it extremely important to limit transit times (by using dedicated sailing/routings) and the dwell periods and land legs of the transit as much as possible.

Note that without knowing the exact stowage position of a container, it is very difficult to prove that the cause of damage was the incorrect positioning of the container on board the ship. The damage might already have happened on shore, before loading. In any event, demanding special care from the carrier can never compensate for improper stuffing of a container (bags touching the roof or bulk coffee not levelled).



© Brazil Specialty Coffee Association

One way to stow coffee bags.



© Pacorini

Another way to stow coffee bags.

The advantages of bulk coffee in containers

The movement of coffee in bulk, using normal dry containers fitted with a liner, has increased considerably recently. Exact data are not readily available, but informed shipping sources suggest that several major producing countries now ship most of their coffee in bulk, other than to the United States.

Shipping in bulk offers several advantages. Shippers save on the cost of bags (and there is no need to dispose of them at the receiving end), minus the liner cost.¹⁸⁸ In addition, a container can hold 21–24 tons of coffee in bulk and this, depending on the coffee type, can represent a potential payload increase of almost 17% over bagged coffee.

At the receiving end, the inland transport of, say, 50,000 tons of green coffee in bulk a year for a large roaster is reduced from 2,777 movements of 18 tons to 2,380 movements of 21 tons. In Brazil, for instance, 2 million bags shipped in bulk means close to 1,000 fewer individual containers.

Other obvious benefits are time and labour savings because bulk containers are emptied mechanically, using a tilt chassis. But there are also other advantages that are not always immediately apparent.

When correct liners and procedures are used and the coffee is shipped at the correct moisture content, there are far fewer claims on coffee shipped in bulk than on coffee shipped in bags. Shipping in bulk avoids most problems associated with bagged cargo: no baggy smells, no weight losses due to handling and generally better quality preservation. Good quality liners also help to preserve coffee quality.

In recent years, a few of the originators of the bulk coffee shipping process have patented in the United States some of the more ingenious parts of the bulk liner. The patents are on the strapping and bulkhead systems that hold the liner in place when the container doors are opened.

All major importers and roasters in the United States have been cautioned to use only licensed liners for coffee shipments. As no one has contested the patent claims, the US coffee industry has more or less agreed to use only licensed liners for coffee shipments. Shippers should check with their US buyers what brands of liners are licensed under patents.

Most shipping companies and freight forwarders can provide information on the availability and cost of liners, but exporters should try to obtain their buyer's agreement before choosing any particular type or make. Note also that coffee should only be shipped in bulk with the buyer's prior consent.

Bulk containers: Lining and filling

The same inspection procedure must be carried out as for bagged coffee – a container is either suitable or it is not.

The liner itself is best described as an oblong sack or envelope whose size is equivalent to the inner space of a 20-foot container. It is attached to hooks in the upper corners after which loose coffee is blown in, gradually filling the entire container with coffee. Container liners are used in the containerized bulk shipment of dry, free-flowing cargo, such as coffee. They are quick and simple to install and enable bulk cargo to be shipped door to door with minimum handling, thereby minimizing cargo spillage and waste.

Liners are usually made from virgin polyethylene (film or woven polyolefins), allowing coffee to be transported safely in an enclosed chamber, thus avoiding contamination from pollutants and salty sea air. The liner protects the coffee from external influences, such as moisture, and, in case of condensation occurring on the inside walls of the container, it ensures that this does not affect the coffee.

Once full, the liner is sealed and not opened again until discharge at destination, either into the reception system of a roasting plant or into a silo storage system, such as in a port. Bulk shipping means that export bags are no longer needed and more coffee fits into the container (generally about three tons more), thus saving on transport costs. Bulk coffee is discharged mechanically at the receiving end, avoiding the use of expensive manual labour.

In Western Europe, the disposal of empty coffee bags costs money as well. Today, large roasters may receive as much as 90% in bulk. But medium-sized and especially smaller roasters are more likely to use bagged coffee for ease of blending. Nevertheless, being able to supply coffee in bulk is a definite advantage, with cost savings for both shipper and receiver. Containers carrying bulk coffee should display a warning sign stating 'bulk cargo' or such-like statement.

¹⁸⁸Jumbo bags or super sacks are much larger than conventional bags, holding as much as 500kg or more. They are mostly used for intermediate transport cum storage and must not be confused with liners that make use of the container's entire load capacity, which jumbo/super sacks cannot.

Fixing the liner

The inner polypropylene liner must fit snugly against the walls, roof and floor when full – improper placing of the inlet could cause tearing – and the load must be as evenly levelled as possible. The liner roof must not sag; it must be tight so the inlet or roof never rests on the coffee after loading. Ideally, built-in reinforced straps in the front panel of the liner (bulkhead) will prevent bulging when the container is full, allowing for easy closing of the doors. Strapping ropes can also be used.

There should be no pressure on the doors when closed after loading. The liner must be properly fastened to the container interior, including at the far end. At the discharge point, the container is tilted so the coffee can slide out of the liner, rather than the filled liner sliding out of the container.

Containers can be filled in two ways. One method is to take the coffee from the silo with the aid of a blower or to empty individual bags into the blower's reception hopper. Blowing air into the liner makes it align itself with the container walls, roof and floor. Once the liner fits correctly inside the container, the blower spews the coffee into the now fully lined container. During this process, the displaced air must be able to escape. Some types of piping may cause static electricity build-up and should preferably be earthed.

Do not blow a heap into the centre, leaving space at the rear and the doors, but fill the liner evenly. To ensure the coffee stays away from the hot container roof, avoid contact between the stow and the liner's roof panel as much as possible, preferably by a margin of about 70cm. Some receivers stipulate that there must be space between the roof panel of a liner and the top of the coffee load.

Another way is to fill the container using a telescopic conveyor belt that extends into the lined box. This eliminates the need for air pressure and, with it, the risk of damage to the beans.



Dry bulk coffee liner.

Insuring against different operational risks

Utmost good faith

All insurance contracts are subject to the principle of utmost good faith. The insured must truthfully inform the underwriter of every material fact that may influence the insurer in accepting, rating or declining a risk. This duty of disclosure continues throughout the life of the policy.

Insurance is, in effect, a partnership between the commodity owner, who wishes to avoid or minimize the risk of loss or damage, and the insurance company, which takes on that risk against payment of a fee. The commodity owner must practise risk avoidance, just as the insurer must pay out for legitimate losses.

Insurance is the most obvious and the oldest form of risk management, one that existed long before futures markets and other risk-management instruments were created. It is beyond the scope of this guide to go into the precise detail of what constitutes a good insurance policy. There are almost endless variations on a very basic theme: if the loss was unavoidable, then the cover should stand.

But insurance cover is only as good as what is stated in the policy document. One view is that only what is expressly included is covered. Another (more attractive) perspective is that anything that is not specifically excluded is covered.

The risk trail to 'free on board'

To judge the need for insurance cover, one must first analyse the type of risk that exists, how prevalent it is and what potential loss it represents. Only then, consider whether to purchase cover. Always look at the monetary value of coffee when considering risk. As coffee prices fluctuate, so does the value of a truck or container load. It is not always recognized that a container load of coffee can be more valuable than a load of television sets or other electronic goods.

From farm gate to processing

As buying agents usually carry cash, money in transit represents an obvious risk. An insurance company may offer cash in transit cover as part of a general policy, but the extent of such coverage is always limited, so be sure to find out exactly what is covered and what is not. When coffee values change, the amount of necessary cash changes as well.

At inland buying stations, coffee is often packed in unmarked bags and is very difficult to identify. Keep stocks at such stations to a minimum and transfer them to a central location as soon as possible. Unless there is a good, formal record system at the buying station, it may be difficult to insure risk at this stage. Be certain to advise the insurance company of all circumstances, including negative aspects, to prevent difficulties arising after a loss occurs.

Inland transit often involves small trucks and variable conditions of transport quality. Arrivals must, therefore, be checked for quality, weight and moisture content. To make fraudulent manipulation more difficult, a member of the quality-control department rather than warehouse staff should take samples.

Warehousing and processing

The better organized the warehousing, the easier it is to obtain cover and negotiate the best terms and conditions. Like banks, insurance companies want to know and understand how a business operates. Ensure coffee is stored in an easily identifiable manner, using a numbered bay system in the warehouse with the bay numbers and boundaries painted on the floor. Coffee must always be stored on dry, clean wooden baulks or pallets, off the floor and away from walls.

Keep back-up warehouse records in a secure and separate location. Failure to do so creates a nightmare for the owner. Make weekly stock checks, preferably using people who do not know what is expected and, therefore, can only report what they find. All stacks should bear a clearly visible stack card, showing the detail and history of the coffee stored. No unidentified or unmarked coffee should be in any warehouse.

Make regular random weight checks to verify that bags are of the correct weight and that no one has tampered with the scales. Occasionally tear down a stack, again at random, to verify there is no hole or empty drum in the middle.



A woman examines green coffee beans in Ethiopia.

Other obvious general risk factors include flooding, fire, lightning, explosion, theft, burglary and embezzlement. Others are deterioration due to excessive moisture content, prolonged storage or infestation (but not all of these types of risk are insurable).

The buildings themselves can pose risks if roofs are not tight, drainage pipes are blocked, ventilation is inadequate or the walls and floor are of poor quality. The warehouse location may pose risks if neighbouring buildings are used to store or produce hazardous or smelly goods.

The risk of faulty or improper processing cannot be insured. Processors must depend on their staff's qualifications and good quality control at the purchasing end to achieve the expected results. Nevertheless, accurate storage and processing records with daily out-turn reports go a long way to exposing any unexpected or unwelcome variations. Processing is always a weak point in that out-turns cannot be forecast exactly. Ensure scales are correctly set, bags are weighed properly and, above all, do not allow any unmarked coffee to lie around.

Transport to port

There are no uniform patterns for inland transportation to the port. Each producing country has different arrangements, but all have some risk principles in common.

- The truck that collects the coffee at your facility must have been properly cleaned, as you do not know what it carried before. Closely inspect all trucks for smells and other contamination. Look for holes in the roof or flooring through which water could penetrate or through which coffee might be stolen by the use of probes.
- The same applies when containers are used for inland transportation. In addition, take a very close look at the locking devices of the doors and at the door hinges.
- Check the moisture of any wooden flooring of trucks or containers with a moisture-measuring instrument. Even a moisture content of more than 20%, a level that would definitely damage coffee, cannot be verified by simply touching or feeling the floor.
- If the inland container is also to be used to ship the coffee, be sure the container is properly lined, with the coffee fully enveloped by strong Kraft paper or cardboard (depending on the season and your type of trade) or an adequate container liner in the case of a bulk shipment.
- Depending on climatic conditions, heat radiation may be a potential hazard. Even if this is not the case, coffee in a container should never be stored in the open for any prolonged period.

- Ensure that only known and trusted parties or people handle the coffee. It is advisable to operate with as few truckers or trucking companies as possible to build a mutual relationship. It may also be wise to clearly define which trucks and which drivers may be used.
- Keep in contact with the driver(s) by mobile phone and/or use a Global Positioning System to monitor a truck's progress.
- Do not permit overnight trucking or prolonged stops at unknown places. If the distance to the port is too far to make the trip in a single day, make sure the truck driver stops at places that can be trusted, and stays overnight only in a safe and secured compound. Under certain circumstances, convoy systems can also be helpful.
- In some countries, security services should be used. Before adopting such costly safety measures, however, ask how quickly you will be notified if something goes wrong and who does what within what time period after such information is received. Have an established accident or crisis management procedure.
- Ensure the coffee is delivered to a safe and suitable location, and that the operator knows how to handle coffee. On arrival, the goods should be properly checked and a certificate of receipt issued. This is to ensure there is a credible paper trail that the insurer can verify.
- Remember, the climate in most shipping ports is far from ideal for coffee. In high temperatures and high humidity, coffee absorbs moisture, possibly to a level where permissible limits for safe transportation are exceeded and where severe condensation and mould may become unavoidable.

Exporters should bear in mind that the coffee always travels and is stored at their risk. They are also obliged to deliver a particular quality and quantity at a given time and place. Poor management of the risks to FOB may ruin any chance of claiming a mishap or *force majeure*.

Delivery to free on board:

Full container load terms

Up to this point, there is no difference between shipping FCL (full container load) or LCL (less than container load), because it is always the shipper's responsibility and risk that the coffee arrives at the point and time in the contract, usually FOB of a particular vessel. The following are the additional responsibilities and risks an exporter assumes when shipping FCL:

- The shipper is responsible for selecting a suitable container. This is not limited to deciding whether a type of container is appropriate in principle, because each individual container must be suitable to carry foodstuffs. As per the bill of lading, only the shipper is responsible for selecting a suitable container, for checking its condition and for preparing it in every respect for the voyage.
- The shipper is responsible for proper container lining or for enveloping the coffee in a suitable form.
- The shipper is responsible for loading the correct quantity. Only evidence that the container has been tampered with will absolve the exporter from having to make good any short weights. The shipper is responsible for what is loaded into the container, right until the doors are closed.
- It is solely the shipper's task to prepare the container to carry goods. Any damage that cannot be proved to have occurred from external causes is for the shipper's account. In this context, weather or temperature changes are not an external cause.

The shipper is responsible for proper stowage and must ask the carrier to 'stow away from heat, cool stow and sun/weather protected' or 'stow in protected places only/away from heat and radiation' (i.e. no outer or top position). The European Standard Contract for Coffee also stipulates that shippers shall pass on to the carrier all relevant shipping instructions received from buyers.

Remember, the burden of proof is always on shippers, who must show that everything was in good order when the container left their premises or was loaded. If there is any doubt, the shipper is held responsible, regardless of any supervision certificates issued by any party at origin.

Such weight or supervision certificates do not provide an ultimate safeguard, because only the verifiable facts at destination count. This does not prevent shippers from employing trustworthy individuals with good knowledge to control and verify what is being done – their simple presence may already be enough to avoid manipulation. But unless expressly agreed, such inspectors or inspection companies seldom assume any financial liability arising from their work.



One way to stow coffee bags.



Coffee containers being loaded onto a ship.

Full container load terms in bulk

Bulk shipments are made almost exclusively on FCL terms. Shipping companies in only a few ports offer the service of bulk loading coffee that is delivered to them in bags. For bulk shipments, be aware of all risks for FCL shipments, and of the following additional factors:

- While the need to select a suitable container for bagged coffee is essential and obvious, this is even more so for coffee in bulk, because separating out any damaged beans is far more difficult and expensive. In particular, the container must be clean, free of taint, watertight and with locking and sealing devices intact. Only responsible, experienced and reliable people should be entrusted with checking containers before stuffing.
- Using the appropriate liner is essential. These are made from woven polypropylene or similar material that allows the coffee to breathe.
- The liner must be filled properly with the correct quantity and quality of coffee.
- Sealing the container is a good option to secure evidence of what has been done. The carrier will probably also affix a seal. If so, check carefully that the seal is applied correctly, and the seal number is noted and mentioned in the shipping documents. (The ESCC requires shippers to provide seal and container numbers in their shipping advice.)

Less than container load

Less than container load means the carrier is responsible for the container's suitability and condition and its filling, for which it charges an LCL service fee. The bill of lading states 'received in apparent good order and condition X number of bags said to weigh Y kg'. The carrier accepts responsibility for the number of bags, but not the contents or the weight. The liability of the exporter is reduced, but not eliminated, because again, the carrier can only be blamed if the cause of any arrival discrepancies can be proved to be external.

Defining where risk changes hands

Depending on the terms of the sales contract, risk may terminate at different stages of the shipping process.

FCA (can be either CY or CFS): The buyer or its agent takes delivery at an inland place, probably at the seller's mill or warehouse, the receiving station or on the carrier's truck. No risk of physical damage or destruction attaches to the exporter after this point, but exporters remain responsible for errors or omissions that occurred while the goods were under their care and responsibility.

In other words, delivering an FCL container that is unsuitable (for example, it is tainted) means you remain responsible for all the consequences. The same goes for short weights beyond the permitted tolerance. But if the container is stolen after it leaves the premises, the loss is not the responsibility of the exporter.

FOB (and CFR): There are differences between FOB according to Incoterms® and FOB as per the ESCC and GCA contracts for coffee. In insurance terms, the following applies:

- **Incoterms®:** FOB means exporters must bring the goods safely and in sound condition on board the ship at their own risk and expense.¹⁸⁹
- **ESCC:** FOB means the risk, or rather the obligation, to keep the goods insured passes to the buyer when the coffee leaves 'the ultimate warehouse or place of storage at the port of shipment'. This certainly does not mean the entire inland haulage or storage is at the buyer's risk. All it means is the very short time span from the last place of storage immediately before shipment. This stipulation removes any uncertainty regarding insurance cover being in place for FOB shipments.

In the case of container shipments, it means the removal of the container from the stack in the port of shipment for direct placing under the ship's tackle – not the removal of the coffee from the warehouse for stowing into containers. ESCC then says 'the sellers shall have the right to the benefit of the policy until the documents are paid for'. This ensures that the exporter has recourse to the buyer's insurance policy in case the goods or the container itself are damaged, destroyed or stolen between the time the container is placed in the export stack in the port and its receipt on board.

189. See www.iccwbo.org/resources-for-business/incoterms-rules/incoterms-2020/.

- **GCA:** Under Green Coffee Association contracts, however, title to the goods is transferred when they cross the ship's rail and the shipper is, therefore, obliged to insure up to this point. The structure of the North American coffee trade is different from that in Europe. The vast majority of North American roasters buy coffee ex dock, so the trade house or importer deals with marine insurance matters, while in Europe, many roasters buy on FOB basis.
- **CIF:** In addition to paying the ocean freight, the shipper must also arrange and pay for insurance that conforms with the ESCC stipulation: warehouse to warehouse, all risks including SRCC (strikes, riots and civil commotions commodity trade) risk, and war risks at a value of CIF + 5%. Very few cost, insurance and freight sales take place today.

Arbitration

A contract becomes final and binding when buyer and seller agree on a transaction verbally, but ideally in writing. For this to be possible, they must have agreed to all standard terms and conditions in advance, including how to settle possible disputes. Arbitration provides a neutral, specialized platform to resolve a dispute when amicable settlement proves impossible.

The international trade in coffee is complex, so dispute resolution can be quite complicated as well. It requires experience and insight not easily found outside the coffee trade itself. Disputes must be resolved quickly and fairly, preferably amicably, with buyer and seller agreeing to a mutually acceptable solution.

If this proves impossible, arbitration provides the means to resolve the matter in an impartial manner without involving a court of law where proceedings could be subject to delays (possibly holding up disposal of the goods) and where expert knowledge may not be easily accessible. The exercise could also be very costly.

This is the main reason European Coffee Federation and Green Coffee Association standard contracts expressly exclude recourse to the law to settle disputes, stating instead that this shall always be done through arbitration.¹⁹⁰

The coffee associations in importing countries have set arbitration rules. The most important arbitration centres in Europe are London, Hamburg and Le Havre. Other arbitration centres are Amsterdam, Antwerp, Genoa, Rome and Trieste. In the United States, arbitrations have always been held in New York but, since 2006, they can also be held in other locations as approved by the GCA. Interested parties should contact their US connection or the GCA for an up-to-date list of GCA-approved locations.

Types of dispute and claims

There are two types of disputes:

- **Quality disputes** – resolved through quality arbitration
- **Technical disputes** – (any other dispute) resolved through technical arbitration

As quality disputes affect the fate of a coffee parcel (delays are costly and quality deteriorates), the rules and time limits for lodging a claim differ from those for technical disputes:

- **ECF contracts:** Quality claims must be lodged within 21 calendar days from the date of final discharge at the port of destination. All other claims (technical) must be filed no later than 45 calendar days after discharge, provided the documents were available to the buyer, or from the last date of the contractual shipping period if the coffee has not been shipped.
- **GCA contracts:** Quality claims must be lodged within 15 calendar days after discharge or within 15 calendar days after all government clearances have been received. For all other claims (technical), there is no time limit for filing the claim, but a demand for technical arbitration must be lodged within one year from the date the issue first arose.

Either party to a contract can lodge a claim, preferably in writing, by notifying the other party about a dispute within the stipulated time limits. Should amicable settlement prove impossible, the claimant can proceed to arbitration. Suppliers must carefully consider their handling of claims. It is almost inevitable that forcing a claim to be settled through arbitration will mean the end of the relationship with the buyer in question.

¹⁹⁰ See www.ecf-coffee.org and www.greencoffeeassociation.org for the full contract texts.

Buyers are most likely to claim on matters of quality, weight, delayed or non-shipment, or incorrect or missing documentation. Suppliers' claims are more likely to involve late, incomplete or even non-payment or, for example, frustration of a contract by a buyer who fails to provide shipping instructions.

As an example, the Court of Arbitration of the German Coffee Association at the Hamburg Chamber of Commerce registers 5–10 cases annually. Nonetheless, the worldwide case count is falling. Fewer quality claims make it to arbitration because the supplier/shipper does not want to risk the relationship, whereas larger buyers, in particular, do not bother to pursue relatively minor claims, preferring simply to strike the offending supplier off their register, sometimes even without notification.

Common errors

The buyer is not the enemy. Keeping buyers informed usually means that most if not all problems can be resolved amicably. Hiding bad news, on the other hand, guarantees trouble. Knowingly shipping substandard quality shows disregard for the integrity of a contract, or a lack of quality knowledge, or both. Not reporting that a shipment may be delayed can cause much greater damage than may immediately be obvious.

The buyer and the seller are partners in a transaction. Both must play their role to ensure the successful completion and to minimize the impact of potentially harmful situations. Keeping the buyer informed of any problems enables timely corrective action to be taken, saving costs and mitigating damage. Arbitrators take this into account when it comes to making an award.

If a claim is received, deal with it promptly and efficiently. Do not ignore a claim in the belief that it will go away. If a claim results in the initiation of arbitration proceedings, cooperate fully because, otherwise, the exercise will proceed without your input.

Remember that those who see the coffee trade from only one side, such as exporters, do not always appreciate why and how certain actions or lack of action can cause their counterpart to suffer loss or damage. It is not uncommon for some to feel later that they have been treated unfairly in the arbitration proceedings.

Look for local assistance, because local representatives usually have more experience with the arbitration system and can guide an exporter through some of the details. A local representative might not know exactly how an arbitration award was decided, but he or she should clearly understand the proceedings and be able to explain more or less how the outcome was determined. This is very helpful for an exporter in deciding whether to appeal an award.

Appointing arbitrators

Appointing an arbitrator does not mean acquiring a defender who advances one side of a dispute, no matter what. Arbitration means the arbitrators impartially consider and pronounce on the merits of a case, regardless of who appointed them. They are more like judges than lawyers.

Only well-known, experienced and respected members of the coffee trade can become arbitrators. They are selected by their peers to serve on their association's panel of arbitrators. As per his or her particular sphere of expertise, an arbitrator may serve on the quality panel, the technical panel or both.

Depending on the rules of the association concerned, the parties to the dispute, or the association itself, can appoint arbitrators. Where the parties to a dispute appoint their own arbitrators, usual practice is that these arbitrators themselves then select a third, the umpire.



CHAPTER 8

RISK AND FINANCE

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Stock exchange trading on portable device concept.

RISK AND FINANCE

Organizations in the coffee sector face risks at every stage of the supply chain and need financial resources, which flow from different sources and under different terms. Finance, or the lack of it, is a risk in itself and a way to manage other risks.

This chapter highlights the risks that characterize the coffee business, the options available to mitigate those risks, and how financing interacts with risk and risk mitigation by either hindering or creating opportunities for a more sustainable coffee sector. We focus on the nature of risk and financing at each stage of coffee global value chains.

Risk management in coffee value chains

The way the coffee business is organized and financed perpetuates social, economic and gender inequalities. Moreover, the sector struggles to address the impact of climate change on the environment and the livelihoods of rural communities. As a result, smallholder producers remain highly disadvantaged, even though the coffee sector has the financial and technological resources required to progress towards more socially and environmentally sustainable forms of production and competition.

This chapter identifies critical bottlenecks and shortcomings of risk and finance in the sector and shows how new approaches to risk management and financing can improve the coffee business. This chapter offers a roadmap to navigate the issues and opportunities associated with risk and finance, regardless of the location, size or stage of the coffee value chain at which stakeholders operate, or plan to operate. This helps them gear their understanding and decision-making towards achieving a greener, fairer and more just coffee trade.

Operating in global value chains

The concept of global value chains is used to capture the fragmentation of production activities and tasks across different countries and business actors. A GVC comprises the full range of activities carried out to generate a final product by individuals and business organizations based in different locations. It highlights the economic and power dynamics that organize production in an industry.

GVCs help us to better understand the relationships among the different actors involved in coffee production. These are:

- **Smallholder producers;**
- **Producer organizations and agricultural small and medium-sized enterprises (agri-SMEs):** For example, producers' cooperatives and local processors, which aggregate green coffee for processing and export and provide services to smallholder farmers;
- **Local traders and national buyers in producing countries,** which connect producers and agri-SMEs to export markets;
- **International traders and multinational enterprises;**
- **Roasters and distributors** in importing countries.

The coffee value chain representation in Chapter 1 and the Specialty Coffee Association Systems map in Chapter 2 illustrate the roles and dynamics across the global coffee supply chain.

From a business perspective, risk in the coffee industry is inherent to the sector's GVCs and the role that each actor plays within such structures.

Operators in coffee global value chains face risks that influence production, sales, distribution, market entry, long-term profitability, access to finance and investments, and the overall stability of commercial relationships. Accordingly, knowledge about the risks involved is essential to help players navigate market opportunities, embark on growth trajectories and boost the resilience of the sector. Organizations and entrepreneurs face inherent risks, regardless of where they are involved on the GVC. General risks affect coffee operators, although impact varies from actor to actor. Beyond these, specific risks are associated with each stage of the GVC. The nature of such risks is connected to the peculiarities of production, processing, trade, roasting and marketing operations.

Smallholder producers across geographical regions are at a systematic disadvantage in terms of both risk and access to finance. With conventional trade and lending practices imposing high costs on and providing little protection to smallholders, coffee GVCs still perpetuate old inequalities. Innovative approaches to mitigate risk and enable more sustainable forms of financing for smallholders are critical. This section looks at innovations designed to make coffee trading and financing more socially and environmentally sustainable.

General risks

Environmental risk

Climate change and the destruction of biodiversity threaten all operators in coffee GVCs in the short, medium and long term. Besides harming the livelihoods of farming communities, climate change affects the suitability of land for growing coffee, which in turn drives deforestation and forest degradation.¹⁹¹ Operators across coffee GVCs must confront this risk to secure coffee production and quality in the years to come without further jeopardizing nature in the process.

Production risk

Coffee growers and producers face risks ranging from plant diseases and unpredictable weather events to the climate crisis and environmental degradation. Technologies and innovations for coffee farmers, such as disease-resistant varieties or efficient irrigation systems, are critical to manage production-related risks.

However, investment in coffee-related agricultural research is inadequate in most producing countries. The competitive nature of coffee production and export also means the spillover of technologies developed in one country to other countries is limited. Boosting research spending and investment in innovative solutions is vital for farmers to respond and adapt to the climate crisis. Innovation can lower risk and bring opportunity.

191. Coffee Barometer 2020.



Checking and measuring a coffee plant in Guatemala.

Physical and security risk

Physical and security risk concerns the possibility that the goods to be traded do not materialize or somehow get lost. This risk is attached to any transaction at any point in time in the coffee value chain.

When funds are advanced against stock in trade, the goods that are financed are usually pledged to the lender as guarantee of repayment. They become the security or collateral. Banks usually take out a general lien over stocks and collectables (outstanding invoices) through which beneficial ownership rests with the bank until all outstanding advances have been repaid in full.

Banks may be satisfied with this arrangement in long-established relationships. They may leave the management and physical control of the goods to the borrower, especially if general international guarantees are in place, for example, from a trade house's parent company.

But for smaller operators – and certainly those in new or relatively recent relationships – banks want to make sure that checks and balances are in place. These checks could include having the goods stored by public warehousing firms that issue warrants or warehouse receipts in the bank's name or hand warrants to the bank 'endorsed in blank', which permits the bank to transfer or assume title. The bank's lien extends to the proceeds of any insurance claim that may arise, as all the goods must be insured with an agreed insurer, on conditions acceptable to the bank. Even so, banks may demand additional security guarantees.

Market risk

Market risk refers to significant market price fluctuations, which could expose market players to losses they may be unable to recover.

For example, the market price of coffee could drop below the cost of the inputs, creating an automatic loss for smallholder producers and agricultural SMEs. Or it could fall low enough to cancel the profit margin for a local trader or exporter who purchased the coffee at a price set on the basis of different market information.

Higher market prices also create risk. For instance, a big price increase could tempt suppliers away from existing buyers and to sell to the highest bidder. Rising prices could lead some producer organizations and agricultural SMEs to default because they cannot cover their short positions. For instance, this can occur when a small firm or farmer association had already fixed the prices on an export contract in advance of the harvest, but had not yet collected the coffee from producers. The trader may then lose its margin or be forced to default on the buyer contract.

What is behind market risk?

A simplified explanation is that the value of unsold stocks falls when demand declines or there is oversupply. Conversely, the cost of covering (buying in against) a short or forward sale increases when demand rises or there is a supply shortage.

However, many other micro- and macro-economic factors also influence market risk. For example, major weather or political disruptions in producing countries, sociopolitical factors in leading consumption countries and market speculation on the derivative markets all influence coffee prices.

Aside from major trade disruptions, world demand for coffee has been relatively stable over the last two decades. There is little scope for greater trade profitability in coffee GVCs. This leads to more competition, consolidation, expansion or diversification of activities, and innovation.

Diversification usually means getting involved with different or more commercial counterparts, which can increase performance risk. Diversification strategies are often paired with innovation, which in coffee is connected to the development of new product qualities that meet sustainability criteria in the production process and the construction of new narratives for coffee consumption (i.e. the third and fourth coffee waves in the specialty segment).

Country risk

Country risk is a rating applied to international lending, based on the lender's assessment of the political, social and economic climate in the country in question. It often weighs quite heavily in the total risk assessment of the financing of trade with coffee-producing countries. The more unstable a country or its economy, the poorer the country risk rating.

Such ratings also include an assessment of the probability that a country may suddenly introduce or reintroduce exchange controls or other limitations on financial transactions. Poor country ratings increase the cost of borrowing and may lead banks to demand loan guarantees from sources independent of the country concerned. If banks feel the country risk is unacceptably high, they will buy country or credit insurance, the cost of which adds to the lending rate to be charged.

What is not always appreciated is that country risk also applies to importer countries. If an exporter trades with bank-supplied finance, the bank usually reserves the right to pre-approve the exporter's buyers and sometimes even the individual transactions. If a sale is to be made to an unusual destination, country risk plays a role in that approval process. It is easier for an international bank than an individual exporter to make such judgement calls.

However, country risk goes beyond the financial aspects of the coffee trade. The costs of GVC operations reflect the political, social and economic environment of producing countries. For example, a highly inefficient and corrupt bureaucracy obstructs the effective allocation of economic resources to smallholder producers and agri-SMEs, limiting innovation and growth at the bottom of the chain. It also slows formal transactions among actors in the value chain and erodes the gains of participation in the coffee industry.

Currency risk

Fluctuating domestic currency rates may cause losses, such as when the domestic currency strengthens against the currency of sale.

Most of the international trade in coffee is expressed in US dollars and coffee is known as a dollar commodity. In many producing countries, the local currency is not linked to the dollar. This means exporters face the risk that the dollar exchange rate will move adversely in relation to their own local currency, affecting both export revenues and internal coffee prices.

The currency risk can usually be limited by borrowing in the currency of sale, provided local regulations permit such foreign currency advances to be offset against the export proceeds. If advances are immediately converted into local currency that, in turn, is immediately used to pay for spot goods whose shipment is invoiced in US dollars, then the cost of goods is expressed in dollars and not local currency. If the cost of goods represents 80% of the sales value, then, in this case, exposure to currency risk is limited.

But in many countries, local banks are not always able to make substantial dollar advances. Individual companies and bankers approach currency risk in different ways, but the guiding principle should always be that commodity export and currency speculation do not go together.

Historically, the local currency in many coffee-producing countries was more likely to depreciate (exporters ought to profit on stocks bought in local currency) than appreciate (exporters are likely to lose because they receive less local currency on export). But there have also been numerous examples, especially since the 2007–2008 financial crisis, where the local currency appreciated against the dollar.

Today, macro shifts in the wealth of nations are changing old currency and interest rate trends and international flows of capital are affecting relative currency rates and, with them, coffee prices. As a result, the supply and demand value of coffee does not always translate into the actual price that is paid. Changing trends in the national currency of producing countries affect global coffee supply in visible ways, especially when combined with specific sector strategies.

Box 1: The effects of currency fluctuations in Brazil

To be competitive in a global export market characterized by oversupply, coffee growers from some key producing countries – such as Honduras, Nicaragua and the United Republic of Tanzania – must tackle issues of productivity per hectare, lack of credit, and high fertilizer and labour costs.

These issues are not as challenging for Brazilian producers, who benefit from two critical factors. Firstly, Brazilian agri-SMEs invested heavily in improving productivity over the last decade, which has boosted the competitiveness of their products.

Secondly, the weakening of the Brazilian currency, the real, has helped producers in the country. The real lost 29% of its value against the US dollar in 2020, falling for the fourth year in a row. The depreciation of the real gave Brazilian coffee exporters more of their local currency for every dollar of coffee shipped overseas, which constitutes a critical incentive to further expand coffee production and its infrastructure.

Coffee farmers in many parts of the world must contend with international benchmark prices that fall short of their production costs. As a result, increasing numbers of smallholders are exiting the coffee business due to prolonged losses and limited access to credit. This is not happening in Brazil, where the real remains weak, allowing producers to extract a profit, which they reinvest in expanding and renewing their coffee farms.

Brazil is not the only country where a depreciating currency maintains profitability and investments despite declining prices on the futures markets. Viet Nam and, to a lesser extent, Colombia, have also benefited from cheap national currencies to propel productivity.

Although this situation is rewarding coffee producers in Brazil and Viet Nam, it is also leading to oversupply of coffee and the emergence of an increasingly duopolistic market, which feeds price volatility. Even though Brazil and Viet Nam together already account for more than 55% of global coffee production, they continue to gain market share at the expense of producers in Africa and Latin America.

Source: International Trade Centre.

Performance risk

One of the parties to a transaction does not fulfil its contractual obligations. This could be because of short supply or unexpected price movements, resulting in loss for the other party. A seller does not deliver, delivers late or delivers the wrong quality. A buyer does not take up the documents, becomes insolvent or simply refuses to pay. This is known as performance risk.

The first line of defence against performance risk is a correctly structured transaction. Further safeguards can then be put in place using collateral management, beginning at the point of purchase and ending with the handing over of the shipping documents. This is more difficult for exporters, as it is impossible to know the financial status and health of all potential importers or roasters.

This is why banks insist that sellers trade only with ‘authorized buyers’ – companies that are known and in which they have confidence. In addition, the bank may require that a sales contract be in place before any money is advanced to buy stocks. In that case, selling at a price to be fixed facilitates the process.

This resolves the performance issue, but still leaves open the questions of price and differential risk. As a general rule, most banks dislike advancing the entire cost of a purchase, often preferring to stick to a percentage of

the value, say 80%. This provides reasonable cover against a worst-case scenario. The percentage varies according to the risk rating of the country where the borrower conducts its business, and the bank's assessment of the borrower.

Global value chain disruptions

The entire global value chain could come to a crashing halt at either regional or global level, because of unpredictable and largely uncontrollable events that disrupt basic economic operations. COVID-19 highlighted the issue of global value chain disruption. Even before the pandemic, though, severe interruptions to trade and production were occurring with increasing regularity, albeit not globally.

Major geophysical or climatological events (such as volcanic eruptions or hurricanes), military conflict, terrorism and trade disputes are examples of severe shocks that hindered coffee production and sales at multiple or all levels of the chain in extended regions. With GVC disruptions lasting a month or more occurring every 3.7 years, according to McKinsey & Company, investors, buyers and producers must take measures to create resilience against such unforeseeable shocks.

The first and most far-reaching consequence of GVC disruptions is the impossibility to ship and process production across large distances, causing borrowers to default on their loans. While most coffee operators are powerless in the face of the disruption, key preventive strategies to limit risk for all principals in a transaction are starting to emerge.

Catastrophe insurances and bonds are financial products that seek to offer reparation to buyers and sellers in the case of natural disasters that compromise production. Alliances among producers, policymakers and financial institutions can sustain emergency measures to delay or postpone repayments and restructure debt without jeopardizing the financial sustainability of producer organizations.

Finally, producers investing in the development of local markets and buyers investing in the diversification of supply channels to alternative locations can help maintain some revenue generation during major shocks, securing the resources to comply with lenders' minimum requirements.

Risks for roasters and distributors

The reputations of major roasters and retailers can be damaged by negative publicity about the sustainability and fairness of their business practices. Key industry players are increasingly exposed to this kind of reputational risk. Consumers are paying greater attention to sustainability issues, which boosts demand for value chain transparency and traceability. Government economic policies are aligning with those concerns, in both Europe and the United States.

Moreover, the general public is demanding stronger corporate efforts to address climate change based on binding standards. The integration of green criteria into national and international trade and policy frameworks also suggests that roasters and distributors may eventually find themselves legally and financially liable for failing to deal with the negative environmental impact of their activities.

Roasters and distributors must manage their supply chains more sustainably to address the negative consequences of reputational risk. This entails participation in multistakeholder programmes and the development of corporate initiatives that address the public's sustainability concerns. For example, some key players in the roasting and distribution stages of the chain are involved in initiatives to help smallholders adapt to climate change, such as the Coffee and Climate initiative (<https://coffeeandclimate.org>), and the shift to emission-free shipment systems, such as Fairtransport (<https://fairtransport.eu>).

Another way to mitigate reputational risk is B-Corp certification, which measures the social and environmental performance of firms, their transparency and their legal accountability. The requirements to obtain B-Corp certification vary, based on the size and structure of the company, but they are conceived to cover all aspects of the business (<https://bcorporation.net/certification/meet-the-requirements>).

A growing number of businesses are acquiring B-Corp certification, including companies renowned for their approaches to sustainability, such as Patagonia, and coffee roasters including Origin Coffee, 23Degrees, Coffee Circle, Montville Coffee, Jasper Coffee, Coffee By Design, Bocca Coffee Roasters and Vava Coffee (for a full list, consult the directory of B-Corp-certified organizations at <https://bcorporation.eu/directory>).

Despite the relevance of voluntary standards, they are not a panacea for sustainability issues. The reputations of roasters and distributors are ultimately best served by long-term investment in solutions that are jointly developed by and shared with the different actors in the coffee GVC.



Container of coffee arriving at port.

Risk for importers and exporters

Volatility risk

The time lapse between each stage of the value chain exposes coffee importers and exporters to the risk of high losses due to price volatility.

Many operators increasingly struggle to trade back-to-back (make matching purchases and sales simultaneously). Position-taking is becoming more necessary. Inventories and market prices must be closely monitored to fix contract prices strategically at key moments and reduce exposure to rapidly changing prices.

Modern communication technologies provide instant market news worldwide, which causes greater price volatility. Although the general price risk can be hedged, it is impossible to hedge the differential risk, i.e. the risk associated with the difference in price between a bean variety and the underlying futures rate. Moreover, many exporters – especially farmer associations – historically lack the resources, information and training to hedge price risk through the derivatives market.

More details on price risk management are presented below.

Transport to port

The material risk of trade in import–export operations starts with the transportation of the goods to port. There are no uniform patterns for inland transportation to the port. Each producing country has different arrangements, but all carry some common risks. These include the risk of contamination during storage, damage to the coffee beans or their quality, theft and loss.

Exporters should bear in mind that the coffee always travels and is stored at their risk. They are also obliged to deliver a particular quality and quantity at a given time and place. Poor management of the risks of delivering the shipment to the port may ruin any chance of claiming a mishap or *force majeure*.

Risk management through credit insurance

Credit insurance is provided by specialized companies that assess the credit risk posed by the individual clients of an importer or roaster, particularly those requiring extended payment terms. The aim is to cover the risk that one or more clients fail to pay for goods that have been delivered. Credit insurers place limits on the amount of credit that can be insured for each individual buyer. In times of economic uncertainty, such limits can suddenly be sharply reduced or even withdrawn altogether.

In such a situation, smaller importers and wholesalers, which rely on the security of the insurance, may have to stop supplying certain clients altogether or demand cash up front. Moreover, it is important to underline how credit insurance is irrevocably linked to an organization's access to finance. In fact, most financial institutions grant funding to exporters, importers, roasters or wholesalers conditional on having adequate credit risk insurance in place.

Credit insurers usually require importers to take out cover for all their clients or for none. Whether to insure depends on the type of business that is conducted and the premium required. If the great majority of clients are top roasting companies, the cost may not be warranted or may simply be too high.

Cost would appear to be one reason why the use of credit insurance is not widespread in the US coffee market, although it is used in the specialty segment. It is quite widely used in Europe, but mostly among smaller companies that do not normally sell (regularly) to the majors. The cost is usually relatively modest.

For many importers and traders, the willingness of a credit insurer to cover a (potential) client is a good indication of that client's financial standing. This is particularly important given that many smaller roasters demand extended credit terms.

The importance of taking out credit insurance varies according to the type of coffee value chain in which a business operates. From a credit insurance perspective, retail supermarket chains differ greatly from chains owned by roasters or local coffee businesses that source directly from producer organizations.

The major roasting companies, which rely largely on trade houses for their green coffee supplies, mostly service supermarket chains. These chains are demanding ever more credit from suppliers and this, in turn, means similar demands from major roasters.

For example, instead of buying based on 'cash against documents on first presentation', some of the major operators buy green coffee based on 'payment on arrival', thus shifting a substantial financing burden to their suppliers. While accepting that major roasters present little or no credit risk, this shift still obliges potential suppliers to find additional funding. Major operators find this easier than smaller operators, some of whom may be unable to compete because they cannot raise the extended finance.

Warehouse receipts as collateral

A warehouse warrant automatically provides title to the goods in most countries, but this is not necessarily the case with warehouse receipts. National legislation may be unclear or silent on the enforceability (execution) of rights over the underlying goods. Although warehouse receipts have existed for centuries, not all national legislation recognizes them as negotiable documents of title.

Even if the common legal framework and trade legislation provide sufficient basis for using warehouse receipts as negotiable documents of title, banks and other creditors may still encounter unexpected obstacles when trying to use a warehouse receipt to take over title of the goods. In some countries, there are reasons why a creditor may have title but cannot enforce the rights this supposedly confers.

Where rights under a title are obtained, legislation that allows the creditor to trade or export the goods still needs to support the execution. Does the creditor need a trade licence? An export licence? Can the sales proceeds be transferred out of the country? What are the chances of the execution process being interfered with or delayed?

Debt execution creates huge problems for banks in some countries. Therefore, no credit risk assessment can avoid examining the legal and sometimes physical difficulties surrounding the execution of the lender's rights.

The usefulness of warehouse receipts in general is well established, for example, as a source of credit for producers of seasonal crops who may then avoid having to sell during periods of oversupply and low prices. But for the coffee export industry, warehouse receipts may represent only part of the answer to the concerns of banks about debt security and debt or collateral execution.

Freely negotiable warehouse receipts present a potential for fraud, as the documents themselves may be stolen or falsely endorsed. This is why some international collateral managers prefer to issue their own, non-

negotiable receipts as part of 'guaranteed total performance' packages, which they back with liability and indemnity insurance.

It could be argued that the real value of such insurance is only known when a huge claim arises, because insurance cover is only as good as what is stated in the policy document. One view is that only what is included is covered.

To recapitulate, in the context of coffee export trade finance, warehouse receipts may generally be considered as valid collateral if:

- An approved entity issues the receipt;
- The goods are identifiable, records are maintained and no commingling is permitted;
- The issuer holds no superior rights (liens) over the goods;
- The receipt can be transferred by endorsement or assignment (if negotiable), or it is issued in favour of the lender;
- The receipt can be used to pledge or sell the underlying goods;
- Insurance cover against loss or unauthorized release of the underlying goods is adequate;
- No third party can have superior rights over the underlying goods;
- Local legislation enables the beneficial holder to enforce its rights over the underlying goods, that is, the debt the goods represent can be executed ahead of any claims that others may have.

Credit insurance to manage risk for smaller operators

Importers, traders and wholesalers largely supply smaller roasters and coffee shops (particularly those catering to the specialized coffee segment). The provision of credit has always been an accepted way of doing business in this segment. This is especially so in the specialty business, where most small roasters expect to receive 30 or more days of credit from the date of delivery.

When the economic climate worsens, however, so does the availability of finance. Even medium-sized roasters may turn to their suppliers for additional credit by way of later payment – also because their own clients may seek extended credit terms. Larger trade houses may deal with this more easily by, for example, channelling their specialty and smaller client business through separate companies that can afford to take out cover for all their clients.

For smaller operators, selling on (extended) credit is not really advisable without credit insurance, as they would otherwise remain exposed to the risk of their buyers failing to pay for the goods. This is central to the functioning of almost every retail supply chain, including coffee. Without access to adequate credit insurance, many smaller importers and wholesalers may be unable to trade freely.

If credit insurers suffer underwriting losses, they are likely to react by reducing exposure – at times by cancelling individual buyer coverage. If that happens, an importer may have to retreat from certain types of business and/or clients, irrespective of the availability of bank finance.

In addition to this type of justified cancellation of individual clients, a deteriorating economic climate may also dictate general reductions in the accepted exposure. Individual reductions may also happen as a result of specific information that the insurer received, for instance, from annual accounts lodged by privately held companies with chambers of commerce or similar institutions.

Providing extended credit, of course, limits liquidity because funds that are tied up in credit to buyers cannot be used for new trading. It is important to note here that credit insurance does not improve one's liquidity – the insurance only comes into play if a buyer defaults.

Factoring is one way around the liquidity problems associated with extending credit. It is the selling at a discount of a company's receivables (outstanding invoices) to a third party, the factor, who advances most (but not all) of the expected proceeds immediately and pays the balance once the buyer in question has settled the amount due. This is at a cost, but the availability of the released funds for new business, i.e. the improved liquidity that is generated, probably offsets most if not all of this cost.



Coffee researcher checking a coffee plant in Guatemala.

Risks for producer organizations and agri-enterprises

Production risks

Producer organizations and agricultural SMEs assume much of the risk inherent to the coffee trade. Although such risks are usually seen as a component of production, they deeply influence the financial options available to producers. This can harm their profitability and ability to access financing.

When production-related risks manifest themselves, they exacerbate the financial exposure of the producers, compromising their ability to repay pending loans and endangering the long-term productive capacity of the system. It is worth noting that, although producers are well aware of the nature and impact of production risks, they are often unable to quantify it and factor it into their strategic decisions.

General GVC risks – such as market risk (primarily price volatility), climate change and the mishandling of processing that results in low product quality – heavily affect production and processing. A major risk factor is the inability to renovate coffee plantations and invest in critical innovation, such as developing new bean varieties. Producer organization and agricultural SMEs can also face labour and capital shortages.

Crop renovation. One of the most pressing needs for coffee growers is the renovation of their ageing plantations to preserve or boost productivity in the medium to long term. However, they face two challenges.

First, it is extremely difficult for rural organizations to obtain funding for this type of investment, which buyers and commercial banks consider to be too long term and risky. In addition, crop renovation requires not only the capital to buy seedlings and finance labour, but also capital to secure cash flow and liquidity during the periods (possibly years) that entire portions of the farms won't be productive.

Second, even if the capital to fund a replanting project is available, the inputs to implement it are often missing. Lack of nurseries and seedlings is a common issue in most producing countries, making it difficult to prioritize crop renovation in the absence of targeted policy support and public-private partnerships that tackle the issue. Some of the new financing approaches described in Chapter 2 (agricultural funds, blended finance and impact investments) were developed specifically to try to address these types of bottlenecks.

R&D. Given the limited investment to develop risk-reducing and productivity-enhancing technologies, there are few technological options for risk management – even for producers who understand their greatest challenges. Nonetheless, research, innovation and the sharing of technological outcomes within producing communities, clusters, countries and regions helps eliminate bottlenecks in coffee GVCs, strengthen producer organizations and SMEs, and enable more environmentally sustainable production practices.

For example, new varieties, agronomic management approaches, irrigation technologies and innovation in the supply of inputs for coffee production would all help improve livelihoods through better productivity, profitability and climate resilience. As more climate change effects on production are proven and quantified, it will be easier for the supply chain to understand the effects of production disruptions on national and global supply and better prioritize investment in the innovation agenda to reduce the frontline risks facing producers.

The more traditional coffee financing mechanisms do not address these risk elements. However, emerging trends in financing and investments, and governments endorsing them, are critical to increase research and innovation and ensure that new technologies are shared and adopted.

New coffee varieties. Lack of knowledge about and research into new coffee varieties hinders crop renovation. Investing in new varieties can unlock great potential for producer organizations and agri-SMEs. Producing countries have not sufficiently researched the development of varieties that are better suited to tackle productivity challenges and address climate variability. Large roasters and distributors have shown no commercial interest in investing in this area, despite its sustainability benefits. Future initiatives to address climate change and production risks must consider the development and diffusion of new coffee varieties.

Labour shortages. Local labour shortages raise the cost of basic business operations including harvesting, farm renovation, transportation and dry processing. This means that producers often need to borrow to hire workers. Lack of liquidity to do so can lead to a drop in the quality and quantity of production, exploitative practices towards workers and greater indebtedness of the organization due to its reliance on short-term credit provided at high interest rates.

Coffee growers, especially Arabica producers on hilly terrain, often mention the lack of local labour. This signals that improving labour productivity, with a focus on technology development to reduce drudgery and address key challenges, will require more attention over the next few decades.

Inadequate working capital. Producer organizations may lack the liquidity to finance production and/or commercialization, especially when coffee prices rise. Activities as basic as those connected to the coffee harvest and sale can be compromised when producers cannot access sufficient capital to procure inputs or secure the services needed to export.

The only option available to many organizations is credit channels that formally or informally provide short-term capital at very high interest rates, taking as collateral future contracts, livelihood essentials (home or vehicle) or organizational infrastructure (processing plant or storage facilities). That capital is used to finance business-as-usual activities, not to improve quality and volumes of production, or to enter premium markets. Therefore, the lack of access to working capital at sustainable rates puts producers at severe risk of entering vicious debt cycles, limiting their opportunities to grow and improve their livelihoods.

Traditional risk management: Price and marketing

Producer organizations and agri-SMEs in many countries are mostly locked out of risk-management markets for reasons including insufficient knowledge, high costs and inappropriate contract sizes. While individual smallholders have little room to seek risk-management solutions, some options are available to organized producer groups and small enterprises. They can approach price risk management simply as an insurance that they purchase, or as part of the marketing process. Either way, without some limitation of price risk, access to affordable credit remains a distant dream.

Non-marketing price risk-management options. Price risk management as pure insurance means there is no direct link between the insurance of the price risk and the marketing of the coffee. Various solutions are potentially available in this context:

1. **Straight hedging by selling or buying futures.** This exposes the seller to margin calls, bringing the risk of potential hedge liquidity traps. Lending institutions or risk solution providers finance such an operation only with firm guarantees and collateral – a challenge for both small growers and solution providers.

2. **Buying put or call options.** This is the right, but not the obligation, to sell futures at a stated price at some point in the future. It is a much simpler solution than hedging. The cost that must be financed is known up front, and there are no margin calls. The premium depends on circumstances, but can be substantial. Even so, it may be easier to raise financing for this than for straight hedging. As always, the provider needs to be reassured about how the cost of the option will eventually be recouped.
3. **Tailored solutions.** Risk solution providers can tailor risk instruments to the requirements of clients. For instance, options can be graduated to extend over the usual marketing season by spreading equal portions over two or three futures trading positions, if so wished, at different strike prices. Each individual portion can then be exercised individually.
4. **Minimum price.** Alternatively, solution providers may simply guarantee a minimum price. Against payment of a premium, they accept to make good any shortfall between the insured price (the minimum price the growers wish to secure) and the price ruling for the stated trading positions in New York or London, either at a given date or based on the average price over a number of trading days. The producer has bought a floor – the guaranteed price minus the cost of the premium. (Consumers would buy a cap to protect themselves against future price rises.)

Price risk management, however, can also be a part of marketing. The potential solutions in this area are the following:

Forward sales of physical coffee at a fixed price. This is the most straightforward form of price risk management as part of marketing. The size of the expected crop is reasonably well known, prices are satisfactory, and buyers have enough confidence in the seller to commit to prices on a forward basis. This is perhaps the ideal situation, but it is seldom encountered nowadays. And when prices are very low, fixed-price forward contracts look attractive only to the buyer.

Selling physicals forward at price-to-be-fixed buyer's call. This means growers lose all control over the fixation level, and therefore the price, unless they simultaneously also sell a corresponding amount of futures. But this would expose them to margin calls and potential liquidity problems, assuming they could even find the funds to finance the initial deposits.

Selling physicals forward at PTBF seller's call. Unless the seller fixes immediately, this deal establishes a contractual obligation to deliver and accept physical coffee.

The PTBF sale sets the differential the buyer pays in relation to the underlying futures position(s), but the general price risk and the decision when to fix remain open. In other words, the PTBF sale does not mean the seller has made a price decision – that will only be the case once the seller has fixed. Many sellers refuse to fix at unattractive levels, and in falling markets, a good number even roll fixations from one futures position to the next, preferring to pay the cost (usually the difference in price between the two positions) to gain more time in the hope that prices will eventually rise.

This situation does not only happen when prices are low. In a falling market, sellers find it hard to accept that they must fix today at a lower price than they could have done yesterday or the day before. To avoid such fixation traps, exporters should set internal 'stops' so fixing takes place automatically when a certain price (up or down) is reached. Such orders to fix can be given to whoever is responsible for the actual execution, on the basis of 'good till cancelled'.

Other risk-mitigation approaches

Producer organizations and SMEs need risk-reduction solutions to facilitate access to credit and reduce their exposure to price volatility. Moving beyond specific price and marketing risk-management tools, recent trends highlight that many areas in the life of a business and its enabling environment benefit its risk profile. In addition, new insurance and financial products are increasingly available for smallholders. These prioritize the safety of their livelihoods and are not necessarily connected to their commercial relationships.

Improving resilience. A priority for coffee producers is to develop resilience both in production and income generation. Resilience, defined as the capacity to bounce back from a crisis, helps producers resist and recover from any risks that materialize, such as the disruption of trade demand or price shocks.

From a financial standpoint, increased resilience entails risk mitigation. As producers and SMEs manage to maintain revenue generation and production capacity during major crises, the risk they will default on loans declines and their ability to obtain credit during a crisis increases. While it is hard for financial institutions and buyers to quantify exactly the resilience of a producer organization, various visible factors are very likely to guarantee greater resilience.

Certifications. Organizations and producers that participate in GVCs centred around the trade of certified products (i.e. Fairtrade, Rainforest, organic) are better positioned than non-certified organizations to resist crises and access better quality financing. In fact, sustainable markets involve the payment of a premium that organizations can invest in community activities and assets, enabling them to upgrade their social or environmental status and enhancing their resilience. Selling certified products also translates into higher value-added export markets.

Standard compliance implies a more transparent value chain, with fairer financing and production practices in place and a higher capability to measure and quantify the volumes and quality of trade. Thus, although sustainable markets still leave many vulnerabilities of producers unaddressed, they represent a first key step towards building more resilient coffee organizations. Furthermore, investors and financial institutions often look at product certification in combination with export capacity as a prerequisite for lending to coffee organizations operating at the bottom of coffee GVCs.

Diversification and greener practices. Partially linked to standard compliance and the acquisition of product certification, the ability to diversify markets and goods and to 'green' production practices are key to developing resilience and becoming more attractive to financial institutions.

For instance, ITC gathered evidence in 2020 showing that organizations that sold coffee to the United States, Europe and locally maintained at least one source of revenue – and sometimes two – during the disruption in coffee demand caused by the COVID-19 pandemic. This not only enabled these organizations to survive the crisis, but also to use their continued profitability as collateral to access new financing for working capital and upgrading¹⁹²

Greener production practices, such as supporting biodiversity and agroforestry systems, are essential to counter the effects of climate change, limit outbreaks of pests and diseases, improve long-term quality and facilitate access to niche markets for value-added products.

Catastrophe and resilience bonds. Many tools are being developed to help producer organizations and agri-SMEs manage climate change-related risk. New financial products have been developed at the macro level as risk-transfer mechanisms to shift the economic burden of natural disasters from producers to financial markets. That is the case with catastrophe or 'cat' bonds, which were created to deal with catastrophic risks such as hurricanes and earthquakes.

The issuer of the bonds is an insurer that uses them to finance payments to producers who lost their entire principal because of a natural disaster. In return, the investors – which can include institutional investors, funds and the general public – receive a regular payment interest. Catastrophe bonds are usually linked to indices and are normally in place for three to five years.

Resilience bonds are an even more recent development. They have the same structure as cat bonds, but finance investments in risk-reduction projects that boost resilience and reduce vulnerability.

GVC alliances. Alliances among different actors on the global value chain are critical to reduce risk and increase opportunities for sustainable growth for producers. GVC alliances usually take two (often overlapping) forms: commercial alliances and alliances to build managerial capacity.

Commercial alliances: The aggregation of production and financial capacity through the establishment of cooperatives or other forms of producer groupings is not new. However, evidence increasingly shows the benefits created by commercial alliances that bring together actors from all stages of the GVC, such as producers, traders, larger processors, import–export operators, and leading roasters and distributors.

Formulating common commercial strategies and synergies among producers, processors, exporters and local institutions addresses major production bottlenecks and supports the development of a safety net of mutual support and knowledge-sharing relationships. Lenders usually see this type of initiative as a risk-mitigating factor and a platform on which to structure tailored credit solutions.

Alliances to build managerial capacity: Risk mitigation makes producers and growers more bankable, but it is not enough to secure access to credit channels. Smallholders are often unable to satisfy the many requirements to obtain financing at good conditions. Evidence from fieldwork in the coffee sector highlighted the importance of creating alliances between producer organizations or SMEs and support institutions, such as research centres, extension services, NGOs and international agencies, to develop skills and competences specifically relevant to build bankability.

192. For more details, see 'Unsung Heroes: How Small Farmers Cope with COVID-19' https://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/Unsung_Heroes_Low-res.pdf

Three main areas of intervention in capacity building were key:

Financial literacy. Producer organizations and agri-SMEs often lack the skills to negotiate a loan and to build an accounting track record and a financial history to support their loan applications. Financial literacy training could help them access investments and working capital.

Cooperative management. Financial institutions may not find a cooperative organization attractive because of an unclear or dysfunctional management structure. Strengthening the decision-making process, consolidating the relationship with cooperative members and improving transparency in the organization can boost confidence and trust. Field research by Oikocredit and others shows the importance of mitigating key-person risk.¹⁹³ Building up the managerial capacity of different members of cooperative organizations helps secure its long-term ability to operate.

Policy support. As the challenges that rural businesses face become more complex, macro-level solutions to issues that a cooperative or a processor cannot address by itself become even more necessary. The role of policymakers is paramount to promote an enabling environment for the provision of credit to the coffee sector.

Policymakers must align public investments, scientific research and national production goals according to priorities addressing the top production risks. A coherent set of policy goals that promote strategic innovation in coffee production is more likely to attract private investments that integrate public sector efforts to tackle long-term issues such as climate change adaptation.

However, such a policy alignment requires the active involvement and committed collaboration of all coffee stakeholders in the country. It is especially important to draw significant inputs from actors representing each stage of the coffee value chain – particularly producers and processors selling in export markets – to ensure that the pursuit of innovation is commercially meaningful.

Targeting technical assistance towards producers and processors is crucial to implement effective policy changes that innovate the sector and promote access to credit. In particular, producers must have the capacity to meet new regulatory requirements and comply with the expectations of investors and institutions.

Risks for individual smallholders

The pipeline of technologies to improve productivity and reduce risk is limited. Lower productivity means fewer savings for producers to manage short-term shocks. Few insurance mechanisms help producers deal with longer-term challenges and bigger shocks. These kinds of risks are systemic among farmers in low- and lower-middle income countries, where there are few national safety nets and the enabling policy environment does not provide enough confidence for the financial system to develop these independently.

Financial tools to manage climate-change related risks

Climate change has long-term effects on producers and other operators along the value chain. However, some climate change-related issues have a dramatic and immediate impact on production operations. For instance, the greater frequency of extreme weather events urgently requires the development and adoption of on-farm practices to avoid high humidity and temperatures jeopardizing seasonal yields and quality.

Pests and diseases. Climate change has accelerated the spread of pests and diseases that severely damage coffee production. The drop in the volumes and quality of production reduces farmers' revenues, which makes it harder for them to repay any existing loans or access new financing. Underinvestment in technology to address these challenges is an additional threat to the continued sustainability of coffee production, as relevant risk-reducing technologies are not consistently available in all producing countries, even when farmers can obtain credit to invest in their operations.

Natural catastrophes. Hurricanes, floods and other natural disasters compromise the lives of coffee farmers across the world. Besides the immediate impact on the health and livelihoods of a community, environmental catastrophes threaten its production and commercialization capacity. The ability of coffee communities to bounce back from this type of crisis is a function of their available savings and insurance options, as well as the safety nets and support mechanisms provided by national or regional authorities. Producers must be able to access capital to address the damage caused by the disaster and to reinvest in production.

Catastrophe insurance and other emerging innovations. These are important innovations that leverage mobile and digital technologies to address climate change-related risks at the individual level of smallholder

193. This is when a cooperative's operations rely almost entirely on the decision-making and knowledge of its general manager. If the chief leaves, the cooperative is suddenly unable to operate and could fall apart.

producers. For example, catastrophe insurance, like catastrophe bonds, offers a safety net to farming communities against major natural disasters.

The challenge in offering insurance products to farmers is usually the difficulty to assess damage individually and reduce the basis risk. Catastrophe insurance overcomes this challenge by relying on a weather index. Payments are triggered when rainfall patterns and yields fall outside verifiable patterns.

Different methods can be used for these solutions. For example, some philanthropic foundations, corporate social responsibility initiatives and social enterprises harness mobile technologies so producers can use the texting service on their phones to access catastrophe insurance.

Producers send a text message from their farm to set up the contract and pay the premium with mobile money. The insurance company can detect the geolocation from which the producer sent the text message and monitors the rain patterns in that area. If the rainfall is lower or higher than the thresholds contemplated in the index at the start of the season, the producer is reimbursed accordingly.

In other cases, the public sector scales up and drives the use of catastrophe insurance.

In Mexico, the CADENA programme was implemented at the municipality level to offer ex-post coverage to smallholders hurt by climate change. The programme was expanded to other municipalities, with the federal government subsidizing up to 90% of the payments from state governments. Farmers growing staple crops on less than 20 hectares of rain-fed land were automatically enrolled in the programme at no cost.

Another new development in climate-change risk management is forecast-based financing, which uses early-warning scientific indicators to predict extreme weather events with a level of accuracy that was unimaginable until very recently. Financing is granted on the basis of such predictions.

Funding is mobilized at specific locations and according to specific timelines and modalities that anticipate the natural disaster and improve early action against its effect, reducing harm greatly as a result. Forecast-based financing, which relies heavily on new technologies, requires close collaboration among networks of scientists, development agencies or NGOs, governments and financial institutions.

Risk mitigation through insurance



Coffee farm landscape in Colombia.

New insurance and financial products have emerged over the past decade to address the major risk factors affecting producers and agri-SMEs. One example is swap agreements through which producers can 'swap' price risk by giving up the benefits from possible future price rises in exchange for a guaranteed minimum price. Swap agreements can cover more than one crop year, with tonnages and settlement dates set for each quarter. Swaps have been extensively used to limit exposure to currency and interest rate fluctuations.

Other risk-mitigation approaches for smallholders

Crop diversification. Smallholders can reduce their exposure to market volatility and the impact of climate change on production by reducing their reliance on coffee-generated income. Smallholders that diversify into food crops for family consumption and local trade improve household and local food security and add a solid, albeit small, revenue layer to their production portfolio. An example of this was when ITC's Alliances for Action in Ghana helped cocoa producers to diversify into yam and cassava, which are key staple crops for local populations.

Greener practices. Combined with better crop management, adopting greener agricultural practices such as agroforestry helps smallholders adapt to climate change and cope with its negative consequences. For example, an increase in above-ground biomass and well-managed shade helps the land to absorb more water, which improves resilience against storms and higher temperatures. This, in turn, reduces the spread of pests and diseases. Agroforestry systems paired with the right pruning practices, plant nutrition, selective pesticide use and the choice of specific varieties can prevent the outbreak of diseases.

However, the shift to greener forms of coffee production and farm management requires openness to innovation and the availability of relevant, effective innovations. Adaptation to climate change also requires long-term replanting programmes that leverage resistant varieties and adjust environmental goals to profitability needs. Given this complexity, governments and support institutions are critical partners for smallholders in their quest to adapt to climate change.

Cooperatives. Smallholders can reduce many risks by organizing into cooperatives. Properly structured and administered cooperatives enable producers to reach the economies of scale necessary to negotiate better prices with buyers and service providers. Coops also permit producers to engage with market actors and the enabling environment of public, private and non-governmental organizations, including financial institutions. This makes it possible to build critical capabilities and to access essential infrastructure to protect against production and financial risks.

Financing the coffee global value chain

Actors in the coffee global value chain rely on various sources of financing to sustain their operations. The diversity of credit channels available to coffee operators at the different stages of the GVC constitute a rather complex financing ecosystem.

Financial institutions outside the chain also supply a critical portion of the credit.

More recently, developmental and impact finance have driven the allocation of external capital by impact investors and other hybrid partnerships of actors seeking to generate direct or mediated sustainability outcomes at the production and processing stages. Such sources of finance target critical sustainability issues that traditional financing does not address, mainly because of risk concerns.

Agricultural funds, blended finance and impact investments leverage innovative financial products and strategic partnerships. They complement these with technical assistance to producer organizations and agricultural SMEs, to fund the types of investments that traditional coffee financing does not address.

As each actor targets different coffee production stages through different financing products, the implications and challenges this raises are heterogeneous and highly specific. This section navigates the complexity of the coffee sector's financial ecosystem.

Follow the money: Who finances the coffee sector?

Part of the credit and investments that feed trade and production comes from actors in the production value chain. For example, multinational buyers and major international traders often provide credit to exporters in producing countries. Similarly, input suppliers and local exporters often offer financing solutions to producer organizations and agricultural SMEs. Value chain financing has traditionally generated inequalities through lending practices that disadvantage smallholder producers.

Value chain and external financing

Agricultural value chain financing refers to all the financing provided by actors who are directly involved in the productive activities of the GVC. Traditional value chain financing in the coffee sector follows the vertical lines of buyer-supplier relationships. For example, multinational companies operating as buyers or international traders of green coffee may provide trade finance or pre-shipment financing to exporters based in producing countries.

Exporters, in turn, may secure the purchase of a future harvest by granting seasonal loans to agricultural SMEs that need working capital to finance the activities of smallholder farmers. These lending practices are often highly disadvantageous for producers. They receive financing under unfriendly repayment terms that do not consider their share of the production risk. In addition, they only gain access to working capital and no funds for infrastructural and long-term investments.

External financing refers to all the credit and loans provided by actors that are not directly involved in any stage of production in the global value chain for coffee. Financial institutions, such as commercial banks, investment funds and microfinance institutions, provide external financing to production, processing, trade, roasting and marketing operators.

It is important to note that, although outside the chain, these forms of financing are made possible by value chain relationships and mechanisms. Financial institutions issue loans and credit lines and make investments based on commercial relationships that exist within the chain and that constitute collateral and a profit opportunity for the financial operators. Moreover, finance originating from outside the chain could end up circulating within the chain through the buyer-supplier dynamics described above.

Table 1: Who is financing whom?

Function in the coffee GVC	Corresponding actors in the financing chain	Common types of financing	Targeted actors in the coffee GVC
Marketing	Banks (external)	Operating finance	Distributors
Roasting	Banks (external)	Operating finance	Roasters
Trade	Banks (external)	Operating finance	Importers
	Banks (external)	Trade finance and pre-shipment finance	Exporters
	Multinational buyers (value chain)		
	International traders (value chain)		
Processing	Buyers (value chain)	Value chain finance in the form of overdrafts, collection credits, stock advances, seasonal loans	Agri-SMEs, producer organizations
	Input suppliers (value chain)		
	Banks (external)		
	Private investors and investment funds (external)	Debt, equity, guarantees, grants	
	Impact investors (external)	Blended finance solutions	
	Development agencies and governments (external, indirect)		
Production	Credit unions (external)	Value chain finance in the form of seasonal loans, pre-harvest finance	Smallholder producers
	Microfinance institutions (external)		
	Money lenders (external)		
	Traders (value chain)		
	Input suppliers (value chain)		
	Agri-SMEs and producer organizations (value chain)		

Source: ITC (2021).

Commodity trade banks

Specialized commodity trade banks play a vital role in financing the coffee sector. Banks finance distributors, roasters and trade operations by providing trade finance solutions. They place trade credits where risk is manageable – that is, where they can seize collateral and quickly recover genuine debts through a reasonably modern and adequately functioning judicial system, and the funds so obtained can be transferred out of the country.

Such an approach to risk poses different challenges to traders. International trade houses can manage well enough with the requirements of banks. However, local exporters may operate with weak internal banking systems that are unable or unwilling to become deeply involved and help them access international credit. This puts local exporters at a disadvantage. They are forced to pay higher interest rates, and they cannot quickly or directly access international finance.

However, large commodity banks also face challenges when working with exporters in producing countries, and they must find local solutions for the in-country financing of exporters. Foreign banks sometimes do this by acquiring a stake in a local bank. Even then, local banks remain first and foremost commercial institutions with specific limits and regulations. They cannot always accommodate modern risk-management solutions, no matter which shareholder or international development agency backs them or provides the funding for specific packages.

The bank and the seller bear risk until the bank obtains receivables (invoices and shipping documents) on a pre-approved foreign buyer. Even if the foreign bank is only involved from a distance, perhaps by providing credit through a local bank and not directly to the borrower, it still evaluates both the credit risk and the value of the entire transaction. This is also true when the deal is fully collateralized, as in the case of warehouse receipts or warrants.

The relationships between commodity trade banks and import–export operators, as well as the features of the credit provided along those lines, is analysed below.

Multinational buyers and traders

Multinational buyers and international traders are the most traditional sources of value chain financing. They finance exporters by providing funds for trade and pre-shipment activities. Multinationals also sometimes own exporting companies in producing countries. Moreover, they often finance, directly or indirectly, agricultural SMEs and farmer organizations at the processing and production stage to ensure that producers can access the inputs they need to meet the order satisfactorily.

Leading firms in the coffee GVC that offer financing to agri-SMEs and producers usually do so directly (by providing, for example, pre-harvest credit to producers) or indirectly (such as through guaranteed sales agreements that enable producers to apply for financing from third-party institutions). For instance, in Central America, Starbucks invested in social lenders such as Root Capital, which, in turn, financed producer groups holding sales contracts with Starbucks. This financing scheme also includes the provision of a technical assistance package to producer organizations.

Buyers and traders typically furnish short-term financing, which creates extra risks. In addition to traditional market- and production-related risks, buyers face the risk that individual smallholders, producers and SMEs side-sell coffee that has been produced through their financing. Furthermore, not all producers can manage financing properly. In the long run, producers may become captive to the financing relationship with the buyer and stop innovating, diversifying and developing niche products, which harms the quality of their goods.

National buyers, traders and input suppliers

Local buyers, traders and input suppliers provide seasonal loans and pre-harvest finance to agri-SMEs and producers through formal or informal credit channels. Buyers such as marketing companies or large processors offer credit in cash or in kind. They lock in the final purchase prices and secure future supply, while producers and processors obtain the working capital they need to operate and fill orders. Input suppliers advance inputs to coffee farmers in exchange for repayment at an agreed time, usually during or after the harvest. The price set for the inputs factors in the credit cost.

The most conventional and common form of value chain financing for smaller operators is probably formal and informal credit provided by local traders – usually known as middlemen or intermediaries. Traders connect individual producers, producer organizations and agricultural SMEs to markets. They also give them the essential financing for inputs and harvesting, and sometimes for other household needs as well. Traders use their specialized knowledge of market players and the logistics of coffee to advance credit to fund production and processing in exchange for future resale at a preset price.

The role of intermediaries is as critical as much as it is criticized. While they often play an essential role in bringing coffee to market, they sometimes perpetuate the exploitation of smallholder producers.

Whether intermediaries are ‘good’ or ‘bad’ has a lot to do with the type of capital they use to fund production. Traders’ capital potentially comes from multiple sources: their own equity, local banks or advances they receive from further downstream in the chain. Depending on the conditions under which they obtain capital, traders may experience pressure that can create disadvantages for both them and the producers.

For example, they often stipulate coffee price without clear knowledge of the market; they must repay their capital providers, often at very high rates; they cannot know in advance the quality and quantity of the future harvest; and they may have to supply cash to hundreds of farmers. They mitigate these risks by offering very low prices to producers, who end up bearing the burden of this form of financing.

Nevertheless, the role of intermediaries remains relevant and important, and cutting out the middleman achieves little. More transparent and accountable relationships among producers, traders and buyers are necessary to ensure more sustainable financing.

Agricultural investment funds

Agricultural investment funds are an increasingly significant source of external financing in the coffee sector. FAO defines them as a ‘financial vehicle to pool the capital of different types of investors to provide capital to different agricultural stakeholders, especially agri-enterprises and agribusinesses’.¹⁹⁴

These funds diversify investments through a collective investment scheme that offers specialized fund management. This approach reduces risks for individual investors and improves governance, performance and access to financial markets to secure additional resources. Funds enable risk and reward sharing and multiply the type of companies and locations that investors can target.

Agricultural investment funds can be categorized into five types:

- **Agribusiness funds** that focus on large agribusiness enterprises;
- **Agribusiness SME funds** that focus on well-established SMEs and producer organizations that are usually active in processing;
- **Funds for producer organizations** that target organized groups of growers, such as cooperatives and SMEs that operate at the production stage and, sometimes, their GVC partners;
- **Microfinance investment funds** that gather capital for microfinance institutions specialized in microlending in rural contexts;
- **Other agricultural funds** that may focus, for example, on forestry or climate change-related rural initiatives.

As of 2016, FAO had identified 63 agricultural investment funds with a total capital base of \$7.1 billion invested in all kinds of commodities. Agricultural funds may prioritize the financial return on their investment or the creation of sustainability outcomes. They include institutional investors, development financial institutions, foundations and wealthy individuals. They use various financial instruments, spanning equity, quasi-equity and debt products.

Agri-SMEs and producer organizations funds target investees in the ‘missing middle’ of agricultural GVCs: producer organizations and SMEs that are normally excluded from mainstream commodity financing, despite their critical economic importance. However, it is hard for investment funds to reach most of the organizations in the missing middle, so they end up investing in the larger and more established agricultural SMEs. To reach smaller and emerging actors in coffee production and processing, they often operate indirectly, by investing in traders and buyers connected to the SMEs and producer groups or cooperatives.

Investing in agricultural SMEs and producers is still perceived as highly risky, especially when the investment takes place through equity. As a result, investment funds targeting coffee producers invest through debt, which can be easily guaranteed via contracts. But this translates into shorter-term financing, which does not always address all the upgrading and infrastructural needs of agricultural SMEs and producers.

194. Miller, C., Ono, T. and Petruļjeskov, M. (2018). *Agricultural investment funds for development: Descriptive analysis and lessons learned from fund management, performance and private–public collaboration*. Rome, FAO.

Due to their potential and limitations, agricultural investment funds represent a critical vehicle for the development of blended finance solutions addressing the sustainability bottlenecks that hamper coffee and other agricultural commodities.

Blended finance solutions

Blended finance is the strategic use of development finance to mobilize additional resources to achieve the Sustainable Development Goals in developing countries. The idea of blended finance builds on two factors. First, the inescapable need for investments to tackle the sustainability issues that affect production systems, especially agriculture. Second, the realization that the financial resources made available by development agencies and the public sector are not enough to achieve sustainability goals.

Organizations such as the Organisation for Economic Co-operation and Development and the International Fund for Agricultural Development use financing models that mobilize private investments in agriculture to scale up their own interventions.

Blended finance generates solutions to the financing needs of GVC operators, especially agri-SMEs and producer organizations. It uses financial instruments such as credit lines, direct investments in companies, guarantees and syndicated loans. In this sense, agricultural impact funds are an excellent tool to channel sustainable credit and investments to small-scale producers.

Funds that include development finance relating to field interventions and public sector alliances in producing countries are attractive for private investors because they are perceived as less risky than any traditional investment in agriculture. This can help unlock longer-term investments.

Blended finance solutions are becoming more widespread in the coffee sector. The Smallholder and Agri-SME Finance and Investment Network is a leading initiative in this field. It brings together financial institutions, philanthropic foundations, social lenders, technical assistance providers, farmer organizations and development finance organizations to boost agricultural investments and financially empower SMEs and producer organizations.

At the national level, public sector and coffee-producing organizations have devised creative blended solutions that can be replicated in other producing countries. For example, the ComRural project in Honduras addressed the traditional reluctance of private sector banks to lend to agricultural SMEs in the coffee sector by providing matching grants. SMEs are selected through a competitive process that requires them to present an economically sound investment project. The SMEs receive 60% of the approved capital from public funding and 30% as private loans from banks, and they contribute the remaining 10% themselves.

Impact investments

(Social) impact investments are designed to generate measurable social and environmental benefits in addition to an expected financial return. Impact investors are becoming meaningful actors in the finance of the coffee value chain. They mostly target agricultural SMEs and service providers in producing countries, by investing directly in them through a variety of financial instruments. Impact investments also constitute a possible way to deploy blended finance, as they sometimes use lending models that mix public, philanthropic and private capital to produce measurable sustainability outcomes.

Impact investors are usually categorized based on how they balance their socioenvironmental and profit goals. 'Impact first' investors prioritize social impact above all else, to the extent that they may accept the return of the capital invested at zero margin. Social lenders that invest in social enterprises and microcredit institutions that grant credit at advantageous conditions to coffee producers and SMEs usually fall into this category.

At the other extreme, some financial institutions prioritize profit over impact. They apply more stringent financial criteria when identifying the businesses in which to invest, to secure financial returns above certain thresholds. Individual private investors usually belong to this category.

Impact first investors usually offer repayment terms that are more advantageous than those small and medium-sized firms can get through other means of financing. This decreases the risk of default for rural organizations when they borrow working capital. Moreover, impact investments do not only fund working capital. In the case of more consolidated agricultural SMEs that can offer collateral and show good managerial capacity, investors provide longer-term loans and infrastructural investments.

Infrastructural investments, such as the construction of storage facilities or roads, or the introduction of new technologies and processing machinery, are essential to enable producers to upgrade their facilities and capacities. This helps them maximize their profits, add value and diversify their markets. Some impact

investors have begun to offer 'options financing', which experienced SMEs can use as liquidity to implement hedging strategies.

Coffee is one of the most attractive agricultural commodities for impact investors, largely because the sector has become more transparent over the last two decades thanks to the diffusion and consolidation of sustainability standards. Investors can easily learn about the production and trade dynamics of coffee, which may be absent for other commodities such as coconuts, soya or forestry.

Certification schemes and the many sustainability initiatives also make it easier to identify and measure sustainability indicators, which are key to showing impact alongside profit. As a result, impact investors in coffee represent a concrete and growing opportunity for agricultural SMEs and producer organizations.

Microfinance institutions

Microfinance institutions play a key role in directly financing smallholders. Microlending programmes can differ considerably, however, depending on the origin of their capital. Some microfinance initiatives draw from public funds, which usually involves friendly rates for producers but can also be politicized when it comes to the allocation of credit in rural communities.

Other institutions act as intermediaries to channel the resources deployed by impact investors, agricultural investment funds or GVC buyers. As a result, the extent to which microfinance institutions offer financing that is sustainable for coffee producers varies depending on the levels of risk and the impact–profit balance that their investors are ready to accept.

These considerations are important. Microfinance is often seen as a panacea to address the financing gaps faced by agricultural SMEs and producers, but this is not always the case. Microfinance lenders and credit unions that prioritize social impact help improve the standing of producers in the value chain. However, microfinance institutions that prioritize profitability may grant loans at conditions that do not necessarily facilitate these goals. When assessing the role of microfinance institutions, it is important to understand to what extent their requirements create a burden on the indebtedness and financial exposure of producers.

Fintech

Financial technologies (fintech) open up new gateways to finance for smallholders and producer organizations. Fintech has the potential to mitigate risk at farm level against major disruptions. For example, recent research by FAO shows that digital finance tools helped secure cash flow, credit, deposits, investments, salaries, government-to-person and peer-to-peer transfers during the COVID-19 pandemic.¹⁹⁵ In fact, the pandemic seems to have accelerated the shift towards using fintech to distribute developmental finance, fostering financial inclusion as a result.

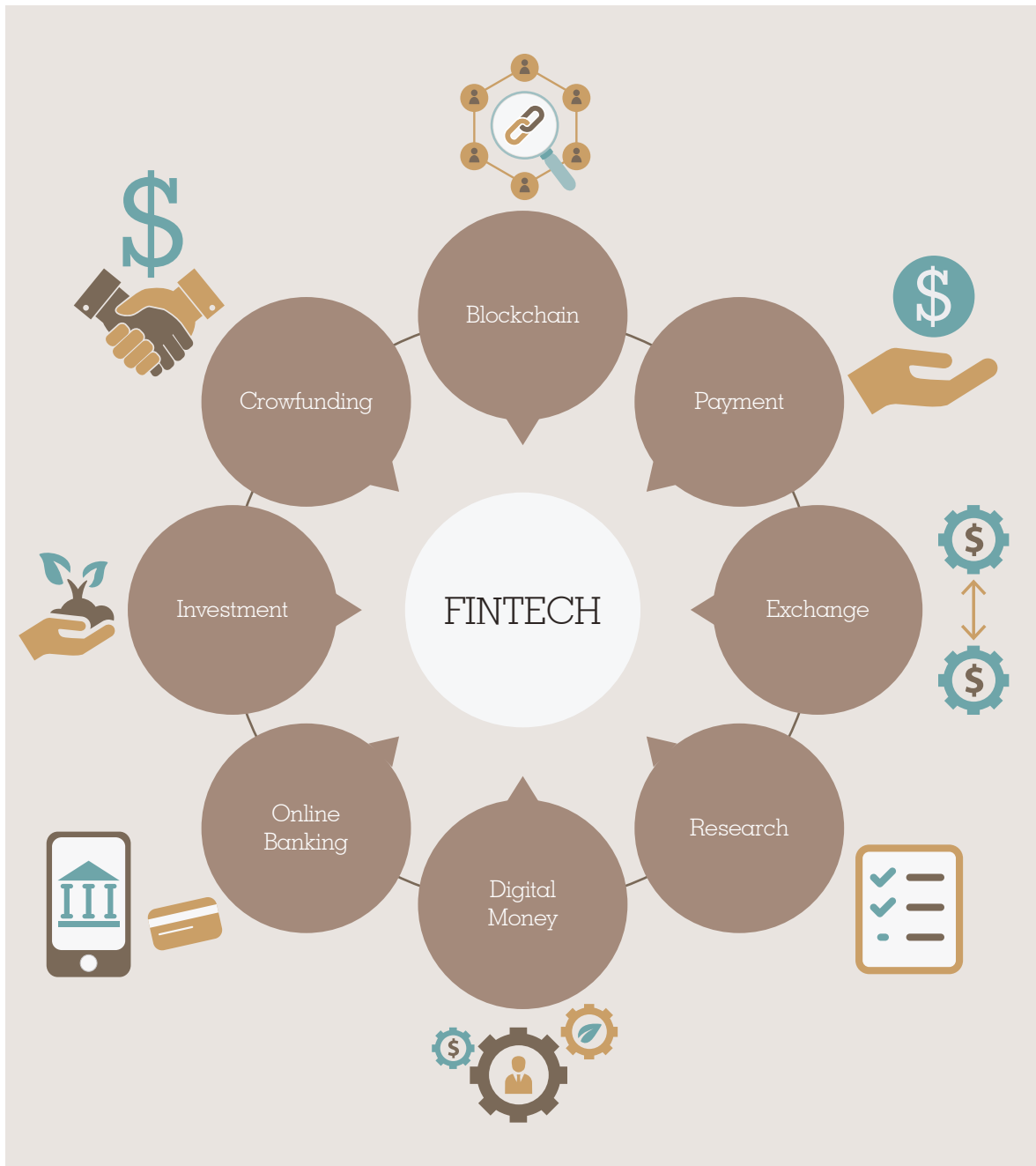
The opportunities that fintech creates for financial inclusion in the coffee sector are undeniable. However, the expansion of digital financial services in rural areas leads to two major concerns.

First, these services are largely commercial in nature, which means profit for the financial institution that offers the service is the dominant driver. As a result, the conditions under which smallholders can access digital finance are not necessarily advantageous or sustainable. They are also not subject to monitoring and oversight by third parties regarding their ability to address critical social and environmental sustainability issues within producer communities. On the contrary, fintech represents a grey area that fosters predatory lending and market monopolization by a few financial institutions.

Second, the expansion of fintech leads towards a cashless and digitalized financing system. This can increase inequalities and widen the gap between producer organizations that can access digital financial services and producers who lack the most basic infrastructure and the capabilities to engage with fintech. The development of fintech-based solutions is sustainable only as long as they are accompanied by infrastructural investments and targeted technical assistance.

195. Benni, N. (2021). *Digital finance and inclusion in the time of COVID-19: Lessons, experiences and proposals*. Rome: FAO.

Figure 1: Fintech branches off into many industries



Source: Shutterstock.

Crowdfunding

Crowdfunding is an emerging trend to raise capital for sustainability purposes in the coffee global value chain. Crowdfunding enables individuals to invest in coffee through the aggregation of small amounts of money, typically via specialized websites or the joint initiatives of different actors. Specialty coffee producers use crowdfunding to raise working capital, export finance and, to a limited extent, infrastructural investments.

A growing number of small agricultural firms, producer organizations and suppliers raise money through crowdfunding campaigns on Kickstarter, a New York-based crowdfunding platform. For instance, specialty supplier Raw Material has raised more than \$140,000 to build a community wet mill in Colombia to improve coffee quality and give farmers a stable, growing income.

Other actors engage directly with their customers to develop crowdfunding solutions. For example, Algrano, a digital platform that connects agricultural SMEs and producer organizations with specialty roasters, partnered with roasting machine manufacturer IKAWA to crowdfund the purchase of sample roasters. Access to sample roasters allows producers to roast on the farm, which improves their first-hand understanding of product quality. Producers better engage with buyers and roasters as a result.

Traditional trade finance for import–export

External financing includes the traditional trade financing solutions that banks offer importers, exporters and roasters. These solutions are often at the core of lending practices that trap smallholders in poverty and indebtedness, jeopardizing any opportunity to invest in growth and more sustainable practices at farm and community level. Nevertheless, they are the most common financial engine for operators in the coffee GVC.

Commodity trade banks and importers/exporters

In their relationship with coffee traders, financial institutions such as commodity trade banks increasingly insist on risk management as a prerequisite for credit. Using futures does not always fit the bill for traders or their banks, or it might not be possible. As a result, financial institutions are creating more off-market risk solutions tailored to the individual requirements of the client.

Such special packages can include facilities to automatically finance margin calls. For example, an exporter who sells green coffee to an importer or roaster that is on the bank's 'approved list' can hedge the operation by buying futures to protect the base price. If the same exporter concludes a sales contract on a PTBF basis, there is no need for hedging. However, exporters who buy green coffee directly from smallholders or intermediaries can hedge the purchase by selling futures.

The leading commodity banks often create in-house risk solutions for larger deals and more important clients. They do not necessarily offset these against the futures markets, but rather do so independently over the counter and sometimes even in-house. Importer, exporters and even roasters may request this type of solution.

Over-the-counter packages are significant for exporters, as they otherwise may be unable to trade directly with large roasters who insist on buying PTBF 'buyer's call'. The golden rule is that the more the financial institution is involved in a transaction (i.e. it is financing both the exporter and the receiver), the easier it is to access tailored credit or risk-management packages. Financial institutions never provide such facilities for transactions with unapproved buyers.

Exporters need a clear and dependable audit trail to access any risk solution with the financial institution. The quality of the control systems that the exporter has in place and its ability to prevent fraud and insure such risk are critical for the relationship with the financial institution.



Credit availability for import–export operations

The international banking system has faced serious disruptions and defaults in recent years. As a result, risk assessments for lending and new rules on the ratio of own capital to credit have become much more stringent. This ratio increases as risk increases.

The amount of credit available to coffee stakeholders has contracted and costs in the industry have climbed because of these rules. Financial institutions have become more selective as to how much, for what purpose and to whom they lend. Price volatility, lack of collateral and the other risks inherent in the coffee industry, such as over-trading, over-pricing and quality problems, have made financing the coffee trade riskier and less attractive – that is, less bankable to financial institutions.

As a result, fewer banks are willing to lend to commodity producers and traders. The traditional commercial banks that still operate in the coffee industry are mostly commodity focused. Their high level of specialization means they capture new opportunities, gather market information and develop valid insights into the business. These banks often finance the entire chain, from the roaster or importer back to the exporter, especially when the buyer actively supports the borrower's application.

Modern coffee trade financing solutions increasingly come from specialized banks from non-producing countries rather than from banks in coffee-producing countries.

The consolidation of sustainable markets structured around the growth of specialty segments and the diffusion of sustainability certification schemes mean less price volatility for many operators. In fact, specialty coffee escapes the 'commodity box' – its price is not set according to the New York and London exchanges.

Rather, the pricing of specialty coffee follows the independent strategies of buyers and producers to link its value to distinct origins, well-defined processes and superior quality features when compared to conventional (or undifferentiated) coffee. As a result, speculation in the commodity market, which is driven mostly by quantitative funds, does not directly affect this growing market segment. Specialty buyers are ready to pay higher prices and premiums to producers because they can trade coffee through more lucrative channels.

The price premium and greater transparency that the specialty and certified segments guarantee producers have positive consequences beyond the more stable revenue channel they create for producer organizations and small agricultural companies. The higher quality of the product and the network of support and capacity building that usually accompanies the shift to specialty coffee production also reduce the risks associated with transactions across the whole specialty chain.

Prefinancing production

Processors and exporters often prefinance to secure future supplies of particular coffees. Bank support for such deals depends very much on the track record of the parties and whether the buyer has a guaranteed sale for the coffee. It is difficult enough to obtain finance for unsold stocks, let alone for 'promised' stocks.

Prefinancing is a strength of trade houses that engage in long-term supply contracts with large roasters. They usually have a guaranteed outlet for their coffee with little performance risk. They can raise funds internationally, often at lower rates than those available in the producing country itself. But the individual exporter who deals with importers and smaller roasters usually finds that this type of buyer is not interested in providing any type of finance – and may even be looking for credit itself.

Multinational trading houses often establish their own exporting companies in producing countries. In this case, the prefinancing of production becomes more of an in-house issue, as the trading house channels credit downstream directly through its exporter. Local exporters who operate independently of leading trading houses and must seek their buyers among non-multinational importers and roasters are not in an advantageous position to access and move credit along the chain.

Stock advances

From an exporter perspective, the main issues with stock advances are what proportion of the value can be borrowed, what coffee type and quality will be collected or bought, at what prices, and how the coffee is physically handled. It is often assumed that borrowing against stocks or against batches for which a sales contract already exists is relatively risk-free. But although the lender has a formal lien over the goods, what if the weight or the quality is misstated? What if warehouse receipts are issued for non-existent goods? All exporters should ask themselves and their staff these questions.

Pre-shipment finance

Pre-shipment finance is usually obtained when the goods are lodged for shipment (as pre-shipment finance) or when shipment has been made and the documents become available (as negotiation of documents).

The term 'negotiation of documents' is often misunderstood – the bank merely advances of all or part of the invoice value against receipt of the shipping documents, which it then presents to the buyer for payment. The bank has automatic recourse to the exporter if the buyer does not pay, because although it 'negotiated' the documents, it did not take over the non-performance risk – that is, the risk that the buyer would not pay. Letters of credit are an option, but not all buyers are willing to establish them.

Guarantees

Banks need the guarantee that warehouse receipts will become receivables, that is, commercial invoices backed by negotiable bills of lading or other relevant documents of title to the goods. All the gaps and risks in the process from the first purchase to this point must be quantified and covered. For collateral managers, the risk is enormous. Cases of quality fraud, physical theft and document falsification do occur.

Therefore, if their guarantees are to be truly solid, they need to be backed by fidelity (indemnity) and liability insurance of a quality and level that is acceptable to banks. To be readily enforceable, the insurance policy – and, if possible, the underlying collateral management contract – must be based on an acceptable jurisdiction, for example, English law.

If the overseas parent company of a collateral manager provides the guarantees, then it could be said that the collateral manager takes at least part of the country risk on board. This makes it easier for banks to approve certain lending operations, especially when the total credit and risk-management package covers both the end-user and the producer or exporter.

Coupled with these packages, modern 'all in' collateral management has become a fundamental component of credit. The greater collateral and transaction security it offers facilitates access to credit and can help to bring smaller producers and exporters closer to buyers and end-users in consuming countries.

Conditionalities for credit

When financial institutions fund the coffee trade, they indirectly but automatically share the connected risks. Clearly, their assessment of the degree of risk presented by each borrower or type of operation plays a role in deciding the credit line, setting limits to its provision and determining what conditions and costs apply. In addition, institutions stipulate under what circumstances and for what purposes funds may be drawn. For example, money meant for trading coffee may not be used to finance other operations.

As a rule, international banks only finance the coffee trade in hard currency (in most cases, in US dollars) and under an agreed set of preconditions, including limits on a borrower's exposure to open and other risks, and a predetermined programme of actual transactions. The credit structure depends largely on an individual borrower's solvency, balance sheet and general standing. As a rule of thumb, smaller operators are subject to more stringent controls than bigger companies. Banks also distinguish between, and assess separately, the price (value) risks and the physical (goods) risks inherent in each lending operation.

Trade or commodity banks provide short-term credit to finance transactions including the purchase of stocks and the collection of export or sales proceeds. This usually means the credit is self-liquidating – funds lent for the purchase of a particular tonnage of coffee must be reimbursed when the proceeds are collected.

Put differently, credit buys stocks that turn into receivables (invoices to buyers, usually accompanied by documents of title, such as shipping documents) that generate incoming funds, which automatically offset the original credit.

To safeguard its funds and the underlying transaction flow, the lender establishes a security structure with the following components:

Exporter. Assignment of accounts, mortgages on fixed assets, pledges of goods. Assignment of contracts, receivables and insurance policies. Business experience and track record. Fixed price contracts, risk management or hedging. The monitoring of trading 'book' and the independent audit of accounts.

Price risk during and after transaction. Agreed transaction structure, hedging tools and built-in margin call financing.

Contract reliability. Pre-approved buyers only, agreed transaction structure and fixed price or agreed hedging arrangement.

Physical stocks. Stored in eligible (approved) warehouses. Properly marked, stored separately and identifiably. Commingling with other goods not permitted.

Stocks as security. Pledge agreement with title to the goods, i.e. warehouse warrants (note that depending on local law, warehouse receipts are not always documents of title in the legal sense and may need a court order to enforce rights). Take ownership of the goods (this does not protect the lender where export licences are required, or where local law may require attached collateral to be auctioned locally – sometimes within just 14 days after the default is confirmed).

How to ensure that no other lender, creditor or authority may have prior assignment over the goods? For example, if the claims of the national revenue authority take precedence, the goods may remain blocked for long periods.

Stock values. Daily verification of market value versus credit outstanding, based on futures exchange values where goods are quoted or valuation basis to be agreed. Top-up clause in lending agreement in case collateral value becomes inadequate. Monitoring of processing cycles and turnover speed.

Collateral management agreement. External legal opinion on the agreement itself, the fiduciary (based on trust) transfer of goods and the power of attorney to sell the goods. Due diligence on transport, shipping, warehousing, inspection and collateral management companies. Performance insurance including cover against negligence and fraud by the collateral manager. What pre-emptive rights, if any, do warehouse supervisors and collateral managers have over goods under their control? Do their storage and management charges take precedence?

Export. Goods must comply with industry, government and contract specifications. In case of default, does a bank require any special licence to trade or export the goods? What are the costs of export taxes, shipment and insurance? When does risk move from performance risk to payment risk (in other words, when does the lender get possession of actual negotiable shipping documents)? Are funds freely transferable in and out of the country? Collecting local currency against an outstanding amount in foreign currency is of little value if that local currency is not convertible or transferable.

Buyer. Exposure to price risk and volatility (affects both exporter and importer). Due diligence and pre-approved buyers only. Limit total exposure to any one buyer. Buyer must accept that lender may execute contract in case of exporter default.

Specific conditionalities. All or some of the following preconditions must be met before any lending agreement is considered:

- The borrower has obtained all necessary authorizations to export;
- All levies, fees and taxes are paid up to date;
- Legal opinion confirms the rights of the lender and the right to execute these without a court order;
- The right of the borrower to enter into the lending agreement is evidenced by, for example, a directors' or shareholders' resolution;
- Statements are available showing there are no outstanding or pending claims from tax or other authorities or institutions that could impinge upon the free and unconditional execution by the lender of its rights, or the free and unencumbered movement of the goods;
- Grading, bagging, inspection and quality certificates are available;
- The goods are and will be stored separately under the full control and responsibility of an approved collateral manager;
- Suitable commercial all-risk insurance cover is in place, covering storage, in-country transit and loading onboard ship;
- Suitable political risk insurance cover is in place, covering seizure, confiscation, appropriation, exporter default due to export restrictions, riots, looting, war, contract frustration and so on;
- Cash deposit or collateral deposit of X%.

The lending agreement usually takes effect only if:

- The goods are covered by fixed sales contract(s) pledged to the lender;
- All rights under the sales contract(s) are assigned to the lender with the acknowledgement of the buyer authorizing the lender to execute the contract in case of default by the borrower;
- The export proceeds (receivables) under the contract(s) are pledged to the lender;
- The borrower's export account (escrow account) and other assets with the bank are also pledged to the lender. An escrow account is an account under a third party's custody or control;
- All insurance policies are assigned to the lender with acknowledgement that the lender is the loss payee or beneficiary;
- A collateral management agreement with an eligible and approved collateral manager is in place;
- The coffee (stock in trade) is pledged to the lender. Eligible (approved) warehousing companies issue weekly stock statements under collateral management agreements, or countersigned by an independent collateral manager confirming that the quantity and quality are equivalent to or higher than required for tender against the pledged sales contract(s);
- All relevant forwarding and shipping documents, issued by eligible (approved) transport, warehousing and shipping companies, are assigned to the lender;
- The transaction structure and control over the goods is such that there are no obvious 'gaps' in the transfer of title documents.

Availability and cost of credit. The availability of credit depends on the exposure of a financial institution to a given country (each bank applies a 'country limit') or commodity, and the net collateral value (assets and stocks) an individual borrower may be able to provide (pledge). The ratio to pledgeable assets at which banks provide overdraft facilities varies, but it is never 100%.

Non-pledgeable assets are not considered, and banks always cap their exposure to each individual borrower. Borrowers must appreciate that while gaining market share and making margins is important to banks, these are not the primary considerations when evaluating credit applications.

The cost of credit to a borrower is built up from the regular lending rate to include all the considerations discussed under trend- and trade-specific risks. Each consideration adds to the base lending rate until one arrives at an interest rate at which both the risk factors and the bank's profitability are adequately covered. This is why lending rates differ from country to country and from borrower to borrower.

Monitoring credit. Monitoring of a borrower's operation is vital to avoid the chance that certain transactions are kept hidden – an audit trail needs to be established. Even so, it can still be difficult for a financial institution to determine whether a client is entirely truthful when, for example, it comes to forward transactions. A forward PTBF sale or purchase for completion six months ahead does not need to generate visible action or disclosure immediately and could, therefore, be kept secret.

Differential volatility is also a risk factor. Unless a deal is back-to-back, the position of the company contains an unknown price risk. This is another reason why financial institutions dislike financing unsold stocks. Lenders can monitor an exporter's open position, or the difference between coffee in stock compared to fixed-price contracts, in terms of volume to help assess exposure to price risk.

Similarly, financial institutions may find it difficult to determine whether someone is speculating. The world has seen spectacular collapses of loss-making speculative operations in several commodities and markets, usually because both top management and the banks hid at least some of the hits they suffer. Loss-making deals were kept secret and were rolled over until the loss became too high to manage. There have also been instances when rogue traders declared insolvency while keeping profitable transactions hidden.

As a result, most banks regularly audit the borrower's procedures and administration, including retrospectively checking adherence to position limits and contract disclosure. This may be done monthly.

Financial institutions also look for changes in client behaviour. They try to control the use of loan finance, for example, by making payments directly to authorized suppliers and by using collateral managers.

The degree to which a bank follows the borrower's operation varies from case to case. It is not unusual for a bank to price or 'quantify' its risk on a particular borrower daily. It should be understood that unsold stocks are valued at the purchase price or at market value, whichever is lower.

Stocks held against forward contracts that are to be shipped at a later stage may also be valued on the same basis, because they do not constitute receivables. This is because if a shipment is delayed, neither the

exporter nor the bank is likely to realize the sales value of the original contract, and they must dispose of the goods at the then-current market price.

It should be remembered that financial institutions are direct partners in the business's risk. As such, they should be entitled to all relevant information. The early and frank disclosure of unexpected events usually leads to shared solutions. Openness between the credit counterparts ensures the full support of the lender. For example, if a bank rules out a particular buyer, perhaps the exporter should be grateful rather than annoyed, as the real message being conveyed is 'watch out.'

Financing processing and production

Traditional coffee-financing mechanisms fail to address bottlenecks such as the lack of innovation and technology transfer, farm renovation and infrastructure. They also make it difficult for producers to finance day-to-day operations, such as hiring labour, paying for harvesting and commercialization, and covering the costs of standard compliance. With traditional coffee finance hindering opportunities for coffee producers and SMEs to operate more sustainably, a shift to more innovative and sustainable approaches is essential.

The efficiency of new financing approaches depends on multiple factors and considerations. Producer organizations and agri-SMEs often cannot acquire and manage financial resources, which makes them unlikely targets for impact investors and blended finance solutions. Consequently, the simple allocation of finance at sustainable rates and for innovation goals is not enough to resolve existing bottlenecks.

Financial programmes must be coordinated with holistic technical assistance. A shift to sustainable financing requires the parallel build-up of specific skills and an enabling environment to remove investment constraints and tackle production risks. Such a degree of complexity requires collaborative efforts centred around alliances among public, private and research actors, in addition to the financial institutions. Policymaking and the role of government agencies in producing countries are key to the success of sustainable financing.

Access to finance and investments, combined with technical assistance, is essential to mitigate risk and improve livelihoods at the production and processing stage. But efforts such as farm renovation and the development and adoption of new on-farm technologies remove bottlenecks only if they also help neutralize the exploitative commercial and financial ties hindering producers. For example, producer organizations must be able to use investments to escape their reliance on single buyers, informal financing from loan sharks and the very costly externalization of processing activities.

This is a radical change that challenges existing structures and could jeopardize the interest of traditional value chain operators. Multinational coffee buyers and traders and all actors at any stage of the chain must help transform coffee financing to reduce obstructionism to risk mitigation and sustainable financing.

Constraints on financing production and risk mitigation

Many agricultural SMEs and producer organizations operating in the coffee global value chain struggle to obtain the funding they need. The top constraint is their bankability in the eyes of financiers, such as buyers, traders, banks, investment funds and impact investors. The second major limitation relates to the context in which they operate, which indirectly affects their ability to access financing.

The bankability (or investability) constraints of agri-SMEs and smallholders may include:

- Limited financial literacy;
- Lack of borrowing or credit history;
- No or limited (realizable) collateral;
- Remoteness of the organization, which puts it outside the reach of formal banking services;
- High transaction costs/low profitability for financiers.

The contextual constraints mostly involve the regulatory challenges of lending to the coffee sector and the historical performance of past loans that financial institutions granted to the sector.

While coffee producers need working capital for harvesting, processing and commercialization, they struggle to access sustainable, friendly funding through formal channels. They are often trapped in financing mechanisms that maximize rather than reduce risk, and that enable nothing more than day-to-day operations on a seasonal basis.

Producers who must rely on financing from 'bad' buyers or intermediaries because they lack financial literacy, solid collateral and a formalized credit and business history must contend with high costs and high interest rates and with future contracts used as collateral. These conditions also make it impossible for producers to access credit channels to fund innovation, infrastructure and farm renovation. Typically, value chain buyers and intermediaries do not see these types of investments to be in their commercial interest, while commercial financial institutions assess them as too risky.

Blended finance and impact investments help overcome the bankability and contextual constraints of coffee producers and address the needs that GVC financing leaves unanswered. Although blended and impact finance involve different approaches and financial products, their bottom line is to leverage bottlenecks in the coffee value chain as opportunities to create markets and profit, with sustainable outcomes.

What makes this possible?

First, sustainable financing solutions are structured to minimize the investment risk. For example, agricultural funds and blended finance make it possible to pool the capital of the public sector and private investors, which minimizes the exposure to individual losses and encourages private investments. Second, this type of investment comes with technical assistance for the investees and the participation of GVC actors. This secures the long-term profitability of the investment through the build-up of the investees' capacities and the configuration of the right enabling environment.

However, aligning interests across the GVC actors and mobilizing technical assistance and funding efficiently is very challenging, and can undermine the success of blended and impact finance initiatives.

Exploitative financing for buyers and traders

Pre-financing is essential for producers to secure the ability of harvesting and commercializing the following season's yield. In fact, many producer organizations lack the liquidity to pay autonomously for labor, production inputs, processing operations, storing, and transportation. Accessing credit ahead of production from third parties is the only form to secure the business.

The most common type of prefinancing for producers is buyers' credit, which comes with certain risks related to the conditions under which is traditionally granted. Recent shifts to sustainable GVCs and new solutions linked to impact investing and blended finance aim to diminish the risks connected to prefinancing production and commercialization and move away from the 'bad' financing granted along the lines of conventional commercialization channels.

Many financial institutions including commercial banks, microfinance institutions and credit unions offer financing to producing organizations at the bottom of coffee GVCs. However, producer cooperatives and SMEs often rely on other (most likely informal) sources of credit. Their lack of financial literacy and history, remote position, inability to aggregate commercial volumes and the high risk involved in coffee production mean producers frequently secure the resources to harvest their coffee through financing provided by moneylenders and GVC buyers such as exporters and local processors.

Buyers' financing, in particular, is a typical arrangement in coffee GVCs. For example, most traders grant financing to smallholders at the beginning of the season to secure the coffee supply. These traders may themselves be receiving financing from exporters. This type of GVC-based financing overlaps with the commercial channels that structure the coffee trade. All financing is connected to the need of GVC actors to secure the coffee supply. However, these credit channels expose producer organizations and SMEs to great risk, as traders negotiate very low prices before the beginning of the season.

At least four factors make buyer and trader financing risky for producers:

Informal contracting. Most buyer financing is granted informally, which means producers have no formal title to exercise their rights. Financing by both buyers and local banks usually involves high repayment rates; this is also true of many microfinance programmes that prioritize profitability over social outreach.

Working capital at unsustainable repayment rates. With few exceptions, buyer financing is granted only as short-term working capital to sustain the basic operations of producers, such as securing procurement at the cooperative level; maintain farms; pay workers; and cover the costs of commercialization to local traders. Access to finance therefore only supports business as usual, with no realistic chance to mobilize resources to develop infrastructure or upgrade.

For example, agricultural SMEs cannot count on their buyers for capital to build a storage facility, buy new wet processing machines or invest in any other activity involving fixed assets that would help them to add value to their operations.

In addition, coffee producers often face very high repayment rates. This increases the likelihood they will end up highly indebted just to finance essential business operations – not to invest into new ventures.

Interestingly, working capital provided by buyers is the most common type of GVC financing available to producers – even in GVCs that trade certified coffee. Sustainable certification schemes, however, impose transparency requirements that enable borrowers to avoid informal and unsustainable repayment conditions. Still, producers may turn to ‘bad’ financing channels to obtain funds to develop infrastructure or when a bad harvest or price volatility prevents them from repaying obligations in the short term.

Challenges to provide collateral. Smallholder organizations can struggle to provide collateral to access credit from buyers or financial institutions. Furthermore, the collateral they end up providing often represents an existential asset for their livelihoods and for the long-term competitiveness of the organization.

Land is nearly always unsuitable as collateral. Even though it may be the only visible asset for most smallholders, in many countries such land is often held through traditional ownership structures that make the realization (the sale in debt execution) of the collateral impossible. Even where rural agricultural land is held under title deed, communal and political pressure may make its sale impossible, so smallholder-owned land is usually unacceptable as collateral.

Crops on the tree are also not meaningful as collateral until they become goods entered into storage against warehouse receipts. That is, credit is advanced only once the harvest is stored. Even so, coffee is usually best marketed when it is still fresh (new crop). Prolonged storage, (beyond the usual marketing season) or retention for speculative purposes is not recommended.

However, producers and cooperatives often use future sales contracts of coffee they are still producing as a collateral to obtain financing from their buyers. This exposes them to an elevated risk. Anything affecting their future harvest and any unexpected price drop against the value of the forward contracts they negotiated would prevent them from repaying the loan they received to sustain that production. This situation exposes them to the risk of prolonged indebtedness towards their buyers and may prompt them to seek ‘bad’ financing through informal channels to satisfy their original obligations.

Finally, sometimes the only option smallholders and SMEs have to access GVC financing is to provide as collateral a set of fixed assets that, if lost, compromise their livelihoods and the competitiveness of their organizations. Examples of this are individual producers putting their homes up as collateral or producer cooperatives using their dry processing facilities or trucks to obtain a short-term loan.

Lack of diversified financing channels. The way traditional GVC financing is structured means producers are at risk of entering dangerous spirals of indebtedness and remaining captive to their buyers and local banks for decades. Producer organizations that sell their entire production to a single buyer are especially at risk of this. In these cases, producers depend on one buyer for both market access and financial access.

Impact investments and blended finance for producers and agri-SMEs

Impact investments and blended finance offers options to the exploitative regime that characterizes many traditional credit channels in coffee GVCs. They achieve this in two ways. First, by providing working capital for day-to-day and short-term business needs under better terms than those usually available from buyers. Second, by financing specific sustainability strategies of coffee producer organizations and SMEs that seek to address the most critical bottlenecks at the production and processing stage of the chain.

Recent evidence from the field shows two main areas that benefited from new forms of sustainable financing.

Funding sustainability cost reduction. Adopting long-term sustainable practices in coffee is expensive, although only in the short term. The returns of sustainability investments are important and make production cheaper in the long run, but they require a sort of ‘start-up’ capital for sustainability that is often absent in coffee GVCs. For example, producer organizations often lack the resources to move to sustainable production and obtain or maintain a sustainable certification.

Actors such as the intermediaries of agricultural investment funds and the social lenders that deploy the capital that impact investors inject offer sustainable financing solutions that would otherwise be unavailable to producers. For instance, they can give low-cost credit with long-term repayment rates for producers to upgrade plantations, increase biodiversity with a focus on introducing agroforestry systems, boost the number of certified producers and cover the cost of extension services needed to maintain the certification(s).

Targeted infrastructural investments. This form of sustainable finance can grant long-term funding to support the development of new infrastructure as part of the diversification and value addition strategies of producer organizations. Typical investments target the construction of storage facilities, dry or wet processing plants, and roasting machineries, and the development of the know-how to manage the related processes, such as branding capacity to develop new goods for the local market.

This type of investment helps producer organizations move to value-added forms of production, directly access export markets without the involvement of other GVC actors and diversify their market access.

Accessing sustainable finance

Smallholders and SMEs must tackle many hurdles to access impact investing and blended finance, which promise to unlock the great potential of coffee producers. First, there is a risk diversification challenge. Many investors still see the coffee sector as a risky proposition. Organizations that operate in conventional markets and/or sell to a single buyer are deemed less attractive than those working through sustainable certifications and on multiple commercial channels, because they are more exposed to risk factors including price volatility and demand disruption.

Second, many impact and blended finance solutions need loans of a certain size to cover their costs or break even. For many investors, the minimum is \$150,000 to \$200,000. This amount is too large for many producers, who are therefore automatically excluded from a large portfolio of sustainable finance solutions. In addition, loans below \$500,000 have been shown to have an 80% higher risk of default.

Third, financial literacy remains an obstacle for many organizations – especially the ability to produce audited financial records and a credit history. Fourth, producer organizations are often unable to justify their loan requests. Impact investors typically require the submission of a sound business plan outlining how the funds are to be used and repaid. Smallholders must develop this skill to compete for impact financing.

Fifth, many organizations struggle to measure investments outcomes, especially when it comes to impact indicators. Measurement is key for impact investors, so organizations that are unable to track and monitor indicators appropriately are at a disadvantage when competing for financing.

Impact investors demand that producers and small enterprises develop quite complex capabilities. Technical assistance networks are required to support the development of these abilities. In certain cases, impact investors help producers build capacity. For less investment-ready organizations, however, participation in local alliances and specialized support from the public sector and international agencies is crucial to eliminate this capacity gap.

Impact measurement is essential to both impact investing and blended finance. Investors seek to integrate social and environmental factors in their investment decisions alongside risk and return. Developing indicators to collect and monitor comparable data on social and environmental factors is a priority to make impact investments an effective tool for sustainable development. Impact investors and social lenders are increasingly developing in-house indicators and methodologies to measure impact, although efforts are under way to harmonize these indicators and methodologies.

The type of indicators that producers and SMEs must track are rather holistic in nature. They span the spectrum of production and commercialization activities and track change across time stemming from the use of impact financing. For example, producers may need to track environmental changes caused by the use of pesticides and chemicals, biodiversity levels, and water access and consumption. Changes in the yields and price premiums, as well as the level and intensity of community services such as healthcare and education, may be tracked to measure social impact.

Finally, the road to blended finance and impact investments presents a structural challenge that goes beyond making producer organizations and SMEs investable. Blended finance and impact investments seek to tackle critical value chain bottlenecks, with the aim of improving the resilience, profitability and independence of coffee producers.

Improving the position of producers in the value chain would require meaningful change in the distribution of power and profit in the coffee industry. However, many downstream actors would be reluctant, if not hostile to such changes.

Therefore, sustainable coffee financing initiatives must engage in participatory and inclusive governance efforts to shepherd the structural changes they seek. With actors such as intermediaries, multinational buyers and traders potentially opposed to new lending mechanisms, a synthesis and alignment of these diverging interests is the wisest path forward.

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