



WORLD TRADE
ORGANIZATION

Trade, Intellectual Property and Technology in Coffee



Global coffee trade connects farmers in tropical regions with consumers around the world. From the coffee seeds to the final cup, knowledge, technology, quality, reputation and trade shape how value is created and shared.

Intellectual property and AI-enabled technologies can support the protection of innovations, distinctive origins and trusted brands throughout the coffee value chain.

Coffee origins

Coffee is grown in tropical areas of Africa, Asia and Latin America. It supports around 12.5 million farming families worldwide¹.

TROPIC OF CANCER



TROPIC OF CAPRICORN

Arabica (*Coffea arabica*) and Robusta (*Coffea canephora*) are the two principal commercial coffee species. In coffee year 2024/25, Arabica accounted for approximately 58% of global coffee production while Robusta accounted for about 42%. Arabica is generally grown at higher altitudes in milder conditions and is often associated with aromatic and complex flavour profiles.

Robusta is generally more resilient to heat, pests and diseases and is widely used in blends and soluble coffee. Of the 170 coffee varieties recorded at the International Union for the Protection of New Varieties of Plants (UPOV), 154 were developed in Latin America. Cultivated varieties of both Arabica and Robusta are grown worldwide, each with distinct agronomic characteristics, quality attributes, and adaptation to local growing conditions².

¹ Source: International Coffee Organization

² World Coffee Research Catalog, available at: <https://worldcoffeeresearch.org/resources/coffee-varieties-catalog>

World Coffee Production

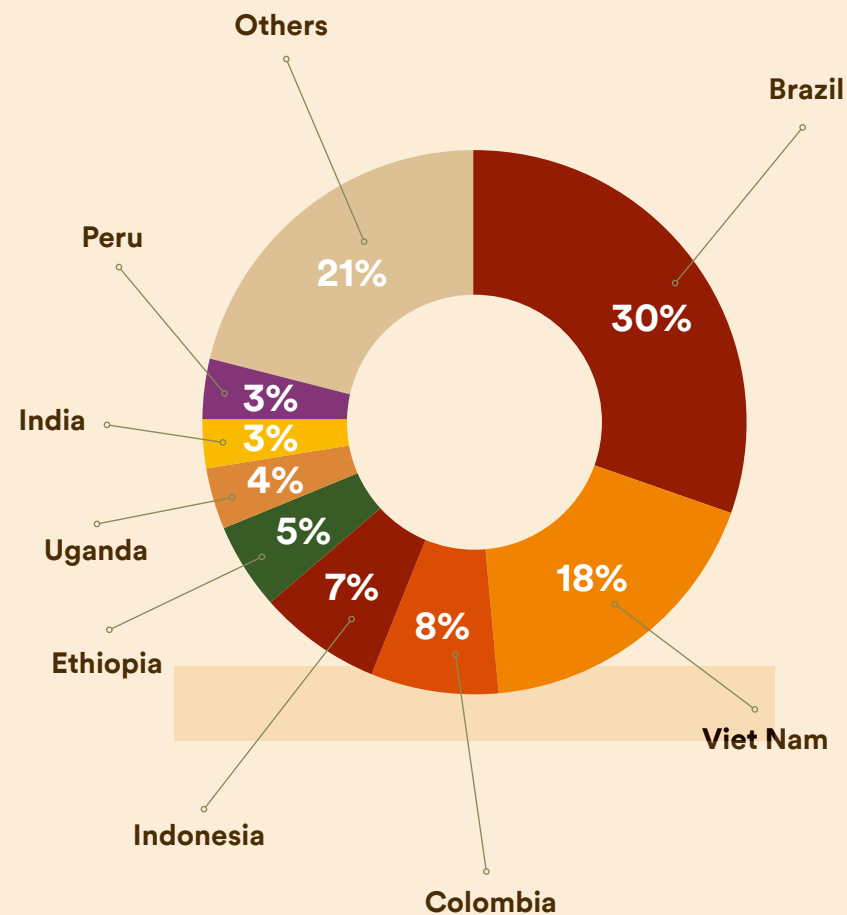


World coffee production reached an estimated 185.6 million 60-kg bags in 2024, according to the Food and Agriculture Organization (FAO). Brazil and Viet Nam together accounted for around half of global output³.

The European Union and the United States are among the largest coffee markets. Domestic consumption in producing economies has expanded over time, with particularly dynamic growth in Asia. Brazil is both the world's largest producer and one of the largest coffee-consuming markets.

³ Source: International Coffee Organization

World Coffee Production, 2024



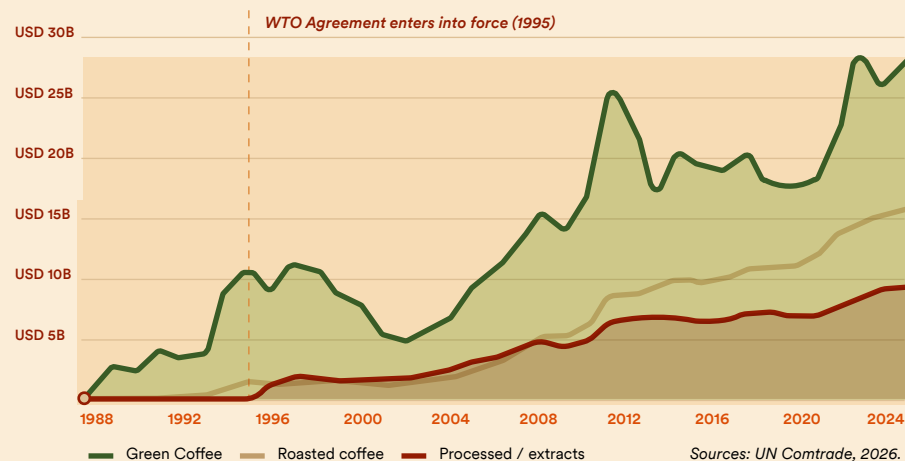
Source: FAOSTAT, 2026.

Trade: How coffee reaches global markets

Coffee is traded mainly in unroasted, or “green”, form. Green coffee travels relatively well and allows roasters to blend and roast closer to consumers, in line with local tastes and product requirements.

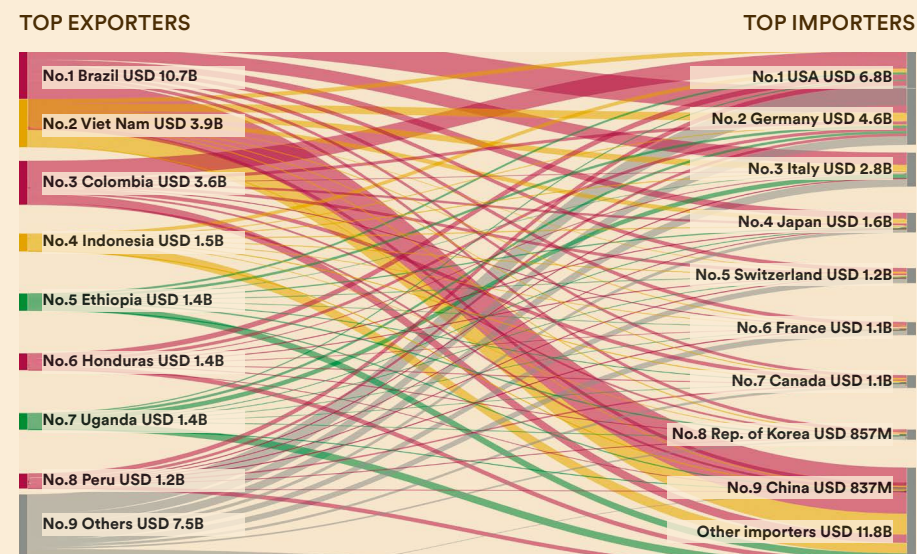
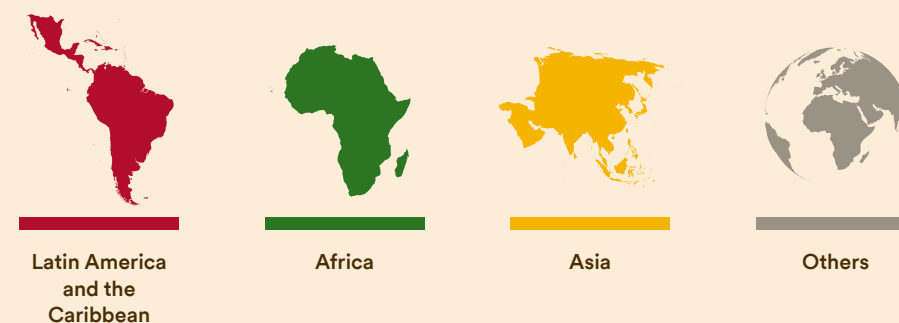
Coffee trade operates within a global system underpinned by WTO rules, which provide the framework for market access and how value is protected and shared across borders. In nominal terms, global green-coffee exports rose from around USD 0.5 billion in 1988 to USD 28 billion in 2024, with particularly strong growth since the establishment of the WTO in 1995.

World Coffee Export Value by Category, 1988-2024 (USD Billions)



Brazil, Viet Nam and Colombia are the leading exporters of green coffee. Major import and consumer markets include the United States, Germany, Italy, Japan, and Switzerland. Roasted and soluble coffee are also traded internationally, connecting producing economies, processing centres and consumer markets.

Green Coffee Trade Flows Exports and Imports (2024)



Source: UN Comtrade and ASEANstats, 2026.

Value beyond the bean – how knowledge, innovation, branding, origin and IP shape value

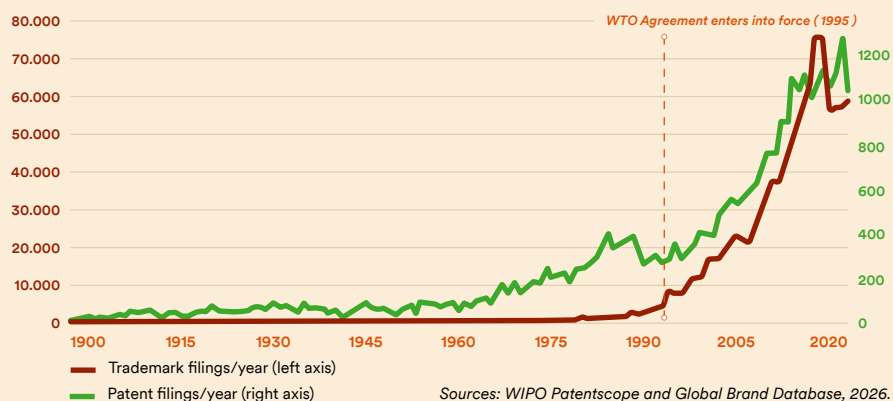
Coffee's value derives not only from the bean itself, but also from research, cultivation and processing know-how, quality-control systems, technology, origin reputation, branding and consumer trust. Intellectual property and AI-enabled technologies can help producers and businesses protect and manage these assets, communicate quality and origin, ensure traceability and differentiate coffee products in domestic and international markets.

“Coffee, Artificial and Intellectual Property in Practice

In the Philippines, AI and frontier technologies can create value across the agricultural chain. The Food Authenticity and Traceability Program is applying advanced analytical tools to coffee and other products to strengthen food authenticity and geographical-origin verification. New digital initiatives are exploring how AI can improve agricultural planning. Connecting these technologies with intellectual property, traceability and trusted data systems can help turn innovation into stronger market opportunities for Filipino coffee farmers.

Amb. Manuel Teehankee

Coffee-related patent and trademark activity illustrates the growing importance of technological innovation and market differentiation across the value chain.



Coffee is a growing field of innovation, technology and branding. Since 1995, annual coffee-related patent and trademark filings have risen sharply, reflecting investment across the value chain, from cultivation, processing and quality assessment to roasting, packaging, retail and the consumer experience.

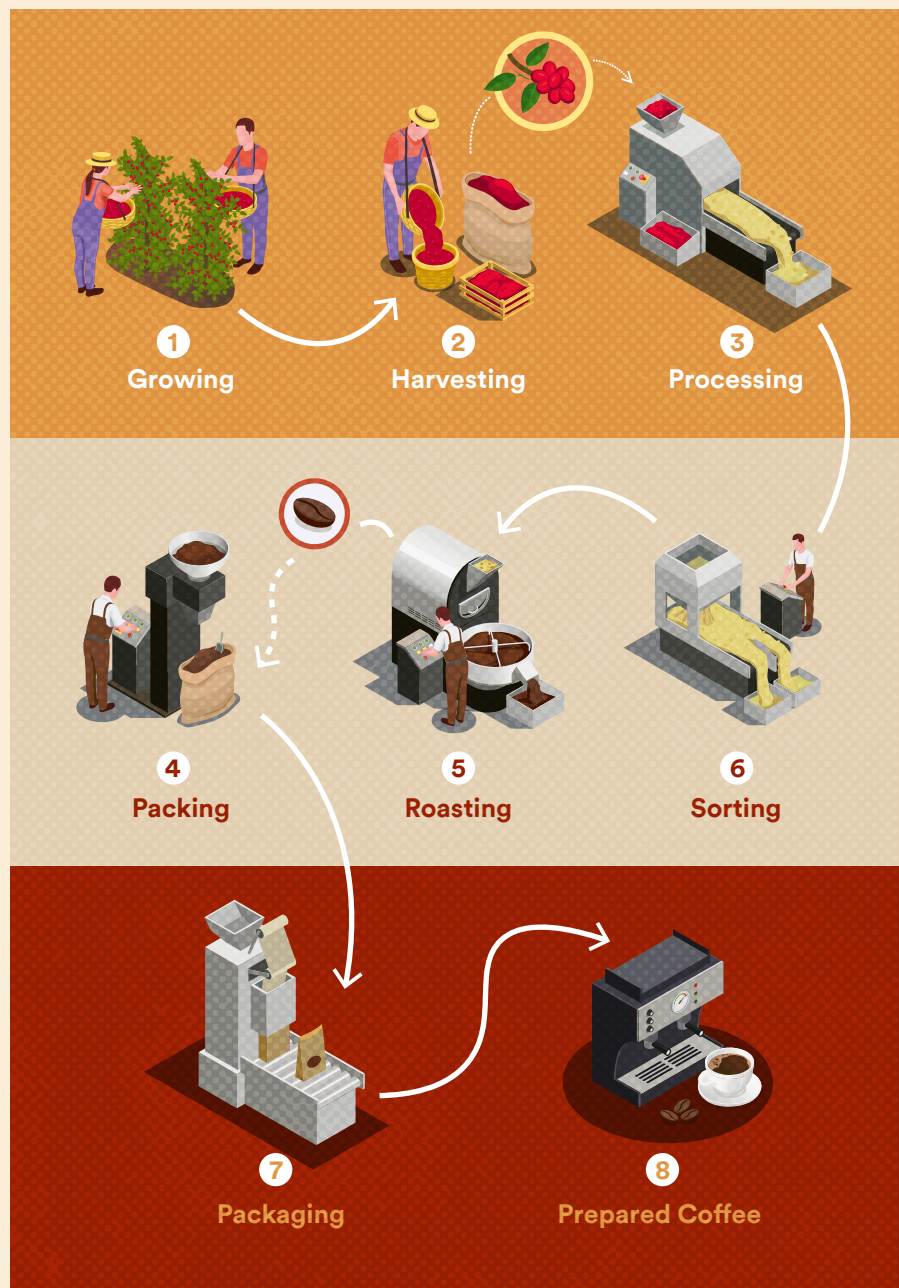
Digitally Transforming Supply Chains in the Coffee Industry⁴

UNIDO is advancing technology transfer in the coffee sector through an AI-enabled traceability initiative that combines satellite imagery, geospatial analytics, cloud computing and digital supply-chain records. In partnership with the International Coffee Organization and several companies, the initiative aims to equip coffee producers, cooperatives and exporters with tools to document origin, monitor risks and meet sustainability and market-access requirements. By strengthening local capabilities to collect, manage and use data, it supports more transparent, resilient and inclusive coffee value chains.

Patents can help protect innovations, including equipment, processing methods, digital quality-control and traceability systems. Trademarks, geographical indications and other distinctive signs help businesses and producer groups communicate quality, origin and reputation to buyers and consumers.

Together, these intellectual property tools help transform knowledge and distinctive coffee characteristics into longer-term commercial value. The growing role of artificial intelligence, digital traceability and data-driven quality assessment is creating new opportunities to innovate and differentiate.

4. <https://www.unido.org/solutions/digitally-transforming-supply-chains-coffee-industry>



From farm to cup, trade and intellectual property can help transform distinctive coffee origins, knowledge and quality into sustainable, long-term value. By supporting innovation, differentiation, traceability, branding and origin-based marketing, intellectual property and new technologies can create opportunities for coffee producers and businesses to participate more effectively in value chains and global markets.

Looking Ahead



Artificial intelligence and frontier technologies are becoming part of coffee's journey from farm to cup. Digital tools can support farm management, weather and pest monitoring, quality assessment, traceability, logistics and consumer information. Artificial intelligence may help analyse data, identify patterns and support decisions across the coffee value chain. The development and diffusion of new technologies depend on skills, infrastructure, data governance and investment.

Powering the Coffee Value Chain

Trade connects coffee origins with global demand. Intellectual property, artificial intelligence and frontier technologies can help farmers, cooperatives, exporters, roasters, retailers and coffee shops create and retain value when combined with quality, market access and long-term commercial relationships.

“ Digital traceability and Building a Coffee Geographical Indication

Rwanda is harnessing digital transformation to build a more productive, transparent and competitive coffee sector. Artificial intelligence, geospatial technologies and data analytics can strengthen production management, disease detection, traceability, quality control and origin verification. These tools can also support the development of Rwanda's first geographical indication for North Corridor Coffee, protecting its identity and reputation. For farmers to benefit, digital solutions must be practical, affordable and supported by connectivity, skills, interoperable systems and data protection.

Amb. Urujeni Bakuramutsa

A protected name, brand or geographical indication is most effective when underpinned by consistent quality, traceability and credible information for buyers and consumers. This is where artificial intelligence and frontier technologies can help shape the future of the coffee value chain. For coffee-producing economies, an effective strategy can include:

- Differentiating coffees based on origin, quality, variety, processing method or other distinctive attributes.
- Investing in AI tools to strengthen post-harvest practices, traceability and quality control systems.
- Strengthening producer organizations, commercial capabilities and long-term buyer relationships with the support of artificial intelligence and frontier technologies.
- Developing brands and safeguarding their reputation against misleading or unauthorized use and leveraging border enforcement tools against counterfeits.
- Using AI tools to predict and adapt to weather-related events, pests, diseases and changing consumer preferences.

Coffee Geographical Indications in Export Markets

Geographical indications can be valuable when protected in destination markets, where they help distinguish coffees by their origin and associated characteristics for importers, roasters, retailers and consumers. This is especially relevant in major consuming markets that do not produce coffee themselves, like the European Union, in order to preserve the reputation and value attached to an origin as coffee moves through international value chains.

The European Union's GIview database lists 20 coffee geographical indications from Latin America that are protected or registered in the European Union; most are protected through international agreements. This illustrates how GI protection abroad, and the agreements that facilitate it, can complement protection at origin and support price premiums in export markets.

Coffee producers, roasters and related businesses can create and retain value by developing, protecting and managing a range of intangible assets. These assets, including technology and know-how, brands and GIs, data, organizational capabilities and business relationships, can be enhanced by artificial intelligence and other frontier technologies.

Asset	Relevant intellectual property	Contribution to the coffee value chain	Illustrative example
Technology	Technical know-how; research and development; patents and utility models; trade secrets; plant variety protection; software, data and databases.	Develop, apply and protect innovations in weather resilience, cultivation, processing, quality control, roasting and brewing.	A cooperative uses improved fermentation protocols and AI digital quality-control systems, while keeping its processing parameters confidential as know-how or trade secrets.
Branding	Trademarks; collective and certification marks; geographical indications; designs; copyright in packaging and marketing material and reputation.	Build trusted brands and communicate distinctive origin, quality, sustainability and product attributes.	A regional producer group protects an origin-linked coffee name as a GI, or through a collective mark, and applies common quality specifications and packaging to distinguish it in export markets, supported by AI tools to ensure traceability and enforcement.
Relationships and market access	Commercial know-how; customer and supplier information; traceability data; contracts and licensing arrangements; reputation, goodwill and organizational capabilities.	Strengthen direct connections among farmers, cooperatives, exporters, roasters and consumers to support transparency, traceability, market knowledge and shared value.	A cooperative establishes a long-term supply arrangement with a specialty roaster, sharing AI-driven traceability and quality information while using contracts to govern use of the cooperative's brand and origin claims.
Resilience	Agronomic and weather-related know-how; research data; early-warning and traceability systems; breeding innovation; technical and organizational capabilities.	Use knowledge, data and innovation to respond to weather-related risks, pests, diseases and evolving consumer preferences.	Producers combine disease-monitoring data, climate-adapted cultivation and post-harvest practices to maintain quality and supply in changing weather conditions.

A predictable, rules-based multilateral trading system supports the cross-border flows of goods, services, knowledge and investment on which internationally traded coffee depends. WTO rules promote transparency and predictability in market-access conditions, helping coffee-sector actors plan, invest and build commercial relationships across markets.

The TRIPS Agreement provides a common multilateral framework for the protection and enforcement of intellectual property. Its disciplines are particularly relevant to coffee, from the development of new climate- and pest-resilient species to the branding of a coffee experience.

IP tools can help coffee-producing economies, producer organizations, exporters, roasters, retailers and coffee shops protect reputation, manage data and know-how, and participate more fully in AI- and frontier technology-enabled value creation. Further work could explore how intellectual property, artificial intelligence and other new technologies are shaping the coffee value chain. Digital traceability systems, data-driven quality control, geospatial tools and AI-based analysis can help strengthen origin verification, improve production and processing decisions, and support responses to climate risks, pests and diseases.

“ Protecting origin through AI and IP

In El Salvador, the partnership between the Ministry of Education, Science and Technology, the University of El Salvador and the Salvadoran Coffee Institute is advancing the digital transformation of coffee through artificial intelligence, Internet-of-Things sensors and traceability. These tools can help ensure quality and origin, and support compliance with international requirements. Recent initiatives also link AI and intellectual property to the protection of denominations of origin and coffee genetics, helping to strengthen the competitiveness and value of Salvadoran coffee while supporting coffee-growing families.

Mr Mauricio Sansivirini

President, Salvadoran Coffee Institute

From farm to cup, trade, technology and intellectual property, supported by the WTO's rules-based multilateral trading system, can help transform distinctive coffee origins, knowledge and quality into sustainable, long-term value.



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