

Supply Chain of Arabica Coffee in the Papua Highlands: A Case Study of Highland Roastery and Emas Hijau Cooperative

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Abstrak

Kopi merupakan salah satu komoditas unggulan pertanian di Indonesia yang berkontribusi signifikan terhadap perekonomian nasional. Salah satu varietas terbaik adalah kopi Arabika yang tumbuh di wilayah Pegunungan Papua. Untuk meningkatkan efisiensi rantai pasok kopi Arabika, terjalin kerja sama antara Koperasi Emas Hijau dan Highland Roastery dalam rangka mendorong produktivitas serta memperpendek jalur distribusi. Penelitian ini bertujuan untuk menganalisis rantai pasok kopi Arabika, meliputi aliran produk, aliran keuangan, dan aliran informasi, serta mengevaluasi efisiensinya melalui perhitungan Farmer's Share dengan studi kasus kolaborasi Koperasi Emas Hijau Papua dan Highland Roastery dalam pengelolaan kopi dari hulu hingga hilir. Metode yang digunakan mencakup pendekatan deskriptif kualitatif, studi literatur, serta analisis kuantitatif sederhana untuk menghitung Farmer's Share. Hasil penelitian menunjukkan bahwa semakin pendek rantai pasok, semakin besar pendapatan yang diterima petani. Hal ini tercermin dari nilai Farmer's Share sebesar 43%, yang mengindikasikan bahwa rantai pasok kopi Arabika di Pegunungan Papua melalui kerja sama antara petani, Koperasi Emas Hijau, dan Highland Roastery tergolong efisien.

Kata kunci: Rantai pasok, Kopi arabika papua, *Farmer share*

Abstract

Coffee is one of Indonesia's key agricultural commodities, contributing significantly to the national economy. Arabica coffee is one of the best varieties, growing in the Papua Mountain region. To improve the efficiency of the Arabica coffee supply chain, a collaboration was established between the Emas Hijau Cooperative and Highland Roastery to boost productivity and shorten the distribution channels. This study aims to analyze the Arabica coffee supply chain, including the flow of products, financial flow, and information flow, as well as evaluate its efficiency through the calculation of the Farmer's Share, using the case study of the collaboration between the Emas Hijau Cooperative Papua and Highland Roastery in managing coffee from upstream to downstream. The methods used include a qualitative descriptive approach, literature review, and simple quantitative analysis to calculate the Farmer's Share. The results show that the shorter the supply chain, the higher the income received by farmers. It is reflected in the Farmer's Share value of 43%, indicating that the Arabica coffee supply chain in the Papua Mountains, through the cooperation between farmers, Emas Hijau Cooperative, and Highland Roastery, is relatively efficient.

Keywords: Supply chain, Papua arabica coffee, Farmer share

INTRODUCTION

Indonesia is one of the four largest coffee-producing countries in the world, alongside Brazil, Vietnam, and Colombia. Coffee is a significant commodity that contributes significantly to the national economy and is an important foreign exchange source. In 2022, Indonesia ranked third among the world's largest coffee producers, with a production volume reaching 794.8 thousand tons, an increase of approximately 1.1% compared to the previous year. It reaffirms Indonesia's position as one of the leading coffee producers after Brazil and Vietnam (Nugroho *et al.*, 2025; Ramadhana *et al.*, 2024).

One of the coffee-producing regions in Indonesia is the Papua Province (Jamil *et al.*, 2023) According to data from the Central Statistics Agency (BPS) in the *Indonesian Coffee Statistics 2023*, the total coffee plantation area in Papua Province reaches 14,811 hectares, with an annual production of 3,156 tons. Most of these plantations are smallholder farms. Of the total area, around 9,400 hectares are located in Jayawijaya, Tolikara, Puncak Jaya, Lanny Jaya, Dogiyai, and Paniai Regencies. The main commodity cultivated is Arabica coffee. However, nearly 50% of the total area is classified as non-productive. Although the plantation area expands by an average of 100–200 hectares per year, total production only reaches about 1,900 tons annually, equivalent to an average productivity of 300 kilograms per hectare per year (BPS, 2023).

In addition, coffee farmers face various challenges, including the dominance of middlemen and limited market access, which make it difficult for farmers to increase their income (Marit, 2019). In general, farmers are still confronted with climate change, which affects crop productivity, and the regeneration of farmers remains uncertain (Abdullah *et al.*, 2024); and the limited labor force slows down the expansion of cultivated areas. Since most plantations are managed by smallholder farmers, integrated interventions from various stakeholders are crucial (Sunanto & Salim, 2019).

Several measures have been implemented simultaneously to overcome these challenges, including improving productivity, enhancing quality through adopting high-standard post-harvest practices, diversifying coffee varieties, and strengthening the role of the government and other stakeholders through agricultural technology support, farmer training, and market facilitation (Zacharie & Denny, 2024). As one of the seven priority regions in the national development policy outlined in the 2020–2024 National Medium-Term Development Plan (RPJMN), Papua focuses on equitable investment and economic transformation based on indigenous territories, from upstream to downstream. In

Presidential Regulation No. 18 of 2020 concerning the RPJMN, the Province of Papua is designated to develop priority commodities, including coffee (Dalulia *et al.*, 2022).

In addition, it is important to understand the supply chain of Arabica coffee in Papua. The supply chain refers to the network formed to deliver products from producers to consumers. Meanwhile, supply chain management refers to managing relationships and coordination within the system, involving all actors from producers to end consumers (Zacharie & Denny, 2024). There are three main flows in the coffee supply chain: product flow, financial flow, and information flow. The product flow describes the movement of coffee from upstream (producers) to downstream (consumers). On the other hand, the financial flow represents the circulation of money that moves in the opposite direction, from downstream to upstream (Zacharie & Denny, 2024). Meanwhile, the information flow involves exchanging data and information such as product prices, quality, and quantity of coffee bean production, both from upstream to downstream and vice versa (Noviana *et al.*, 2022).

To simplify the coffee supply chain, it is necessary to establish coffee relations or a collaborative business model between roasteries and farmers. This concept aims to minimize high transaction costs. The partnership model will be more effective if it involves the role of coffee processors as intermediaries from farmer-based organizations, such as cooperatives or farmer groups. Farmers who are members of such organizations have greater opportunities to increase their income than those who operate individually (Wiguna *et al.*, 2019). Therefore, this study aims to analyze the Arabica coffee supply chain, including the flows of production, finance, and information, as well as to examine the efficiency of the supply chain using the Farmer's Share approach. The study takes a case study of the collaboration between Koperasi Emas Hijau Papua and Highland Roastery in managing coffee products from upstream to downstream.

METHOD

The methods used in developing this article include several approaches to provide a more comprehensive understanding. First, a descriptive qualitative approach describes the roles and relationships among producers, cooperatives, and local roasteries. Qualitative research is conducted within a specific real-life (natural) setting to investigate and understand phenomena, what happens, why it happens, and how it happens (Adlini *et al.*, 2022). In this study, a descriptive qualitative research approach is specifically used. Descriptive qualitative research is one type of study that falls under the category of

qualitative research. In descriptive research, the researcher examines events or life phenomena experienced by individuals and asks them, individually or in groups, to share their experiences and life stories (Rusandi & Muhammad, 2021) This approach is based on data obtained from Koperasi Emas Hijau and Highland Roastery. It includes information on selling prices from producers to consumers, covering parchment coffee, green beans, and roasted beans.

Secondly, a literature review enriches the analysis with secondary data from various sources, including Google Scholar. This study aims to broaden the topic's understanding and provide a stronger theoretical foundation.

Third, a simple quantitative data analysis calculates the value added and the farmer's Share. This method allows for the formulation of calculations that illustrate how the value of coffee is distributed along the supply chain and how much of that value is received by the farmers within the overall process.

$$\text{Farmer's Share} = (\text{Price at the farmer level}) / (\text{Price at the consumer level}) \times 100\%$$

If the Farmer's Share value is $\geq 40\%$, the product distribution network is considered efficient, whereas if it is $\leq 40\%$, it is considered inefficient (Iswahyudi & Sustiyana, 2019).

RESULT AND DISCUSSION

Overview of Coffee Cultivation in the Papua Highlands

Papua has been a well-known coffee-producing region since the 1950s, with coffee initially introduced by the Dutch government or missionaries. Robusta coffee began to be cultivated in the Yapen Islands in 1929, while Arabica coffee is believed to have been introduced in the 1890s. After World War II, the Dutch intensified coffee cultivation in Papua, and in 1956 production had reached 100 tons. Missionaries also introduced coffee to the Kamuu and Paniai Valleys and opened coffee markets with products transported by airplane. During the 1970s and 1980s, Moanamani became the main coffee-producing area in Papua. The Typica variety of Arabica coffee, first brought by the Dutch East India Company (VOC) to Java, grew well in Papua's Central Highlands. Papua coffee is known for its distinctive flavor, and its varieties remain abundant in the region, while other areas have begun to lose their original coffee varieties (Marit, 2019).

For Arabica coffee, it is cultivated in the mountainous regions of Papua, at elevations ranging from 1,700 to 3,000 meters above sea level (Nawipa *et al.*, 2022). In

Papua, Arabica coffee is cultivated in several regions, including Intan Jaya Regency, Jayawijaya Regency, Yahukimo Regency, Lanny Jaya Regency, Pegunungan Bintang Regency, and Tolikara Regency (Mangiwa & Abulais, 2023; Marsi, 2018; Wandik *et al.*, 2020). Each region has its own distinctive flavor and aroma characteristics due to variations in agroecological conditions.

Table 1. Diversity of Coffee Varieties in Four Highland Regencies of Papua

Region	Variety	Altitude (masl)
Yahukimo Regency (Kurima, Hibiem)	Bourbone, LiniS	1800
Lani Jaya Regency (Tiom)	Typica	2200
Pegunungan Bintang Regency (Abmisibil, Kiwirok)	Typica	1800-1900
Jayawijaya Regency (Piramid)	Typica, Bournobe, LiniS	1760-1900

Production Flow, Financial Flow, and Information Flow of Papua Highland Coffee

The production flow of coffee in the Papua Highlands, from upstream to downstream, involves several key actors: local farmers as producers, cooperatives as intermediaries, and local roasteries as quality controllers and marketers. Farmers supply raw materials in the form of coffee beans, which are organically processed using an intercropping system. This approach not only enhances coffee quality but also adds value to the sustainability of the ecosystem.

After the coffee is harvested from various regions such as Pegunungan Bintang, Jayawijaya, Lanny Jaya, and Yahukimo (Mangiwa & Abulais, 2023), the coffee is then distributed to cooperatives, one of which is the Emas Hijau Papua Producers' Cooperative (Uopmabin *et al.*, 2023). This cooperative serves as a "hub" or connecting point uniting its members. The members include coffee farmers, roastery houses, and coffee shops. The main functions of the cooperative include coffee quality control, training farmers to improve coffee quality and production volume, and facilitating market access for Papua coffee.

In 2024, the cooperative achieved a significant milestone by successfully exporting 1.2 tons of Arabica coffee to the Netherlands and Japan. It marked an important first step in introducing Papua coffee to the international market. In addition, the cooperative also participated in prestigious events such as the World of Coffee Copenhagen 2024 and World of Coffee Jakarta 2025 (Ramadhani, 2024).

As one of the downstream stakeholders, Highland Roastery plays an important role in quality control and marketing. Highland Roastery was established in September 2014,

inspired by the idea of coffee as “green gold,” a commodity with great potential for future growth. The business initially started under the name Highland Coffee, to introduce coffee as a leading product from their region.

Over time, as the coffee industry developed, it decided to transform. In 2018, Highland Coffee was renamed Highland Roastery, reflecting their growing focus on developing the business as a coffee roasting facility after completing a roasting course (Roastery, 2025).

Moreover, Highland Roastery has demonstrated a strong commitment to building the capacity of young Papuans. In 2022 alone, around 20–25 indigenous Papuans (OAP) visited the business monthly for various purposes, such as delivering coffee beans from their harvests. The amount of coffee sent typically reached about five kilograms per day. In addition, 12 people participated in training courses, two of whom were among the 20 OAP who requested free lessons on coffee storage and brewing, as they wanted to maintain the quality of their beans. To date, there have been 50 alumni of these courses; some eventually have opened their own cafés, while others have become baristas. The training program typically lasts three to four days, during which participants learn about various aspects of coffee. (Faisal, 2016)

The rapid growth of the coffee industry has led Highland Roastery to expand its role beyond coffee production, becoming a training center for those who wish to learn more about the world of coffee. With support from the Green Economy program, in 2020, Highland Roastery officially established three main services: (1) Production/Roastery, (2) Coffee Academy, and (3) Coffee Shop, which also serves as a platform to promote their products.

At the end of 2020, they launched their first barista class, which continues to run to this day. This initiative aims to provide training and share knowledge about coffee with the community and coffee enthusiasts (Roastery, 2025).

In general, Highland Roastery receives coffee beans from farmers across four regencies in the Papua Highlands: Kiwirok and Sabin (Pegunungan Bintang Regency), Kurima, Tangma, and Puldama (Yahukimo Regency), Jiwika/Dokopma (Jayawijaya Regency), and Tiom (Lanny Jaya Regency) (Faisal, 2016). In the coffee supply chain, coffee beans are not received directly by Highland Roastery but go through a process. The process begins with farmers harvesting coffee beans in the four regencies mentioned above. It marks the first stage in the coffee supply chain of the Papua Highlands. Subsequently, the harvested coffee beans are delivered to the Emas Hijau Papua Cooperative, which acts

as a bridge between farmers and the market. Through the cooperative, farmers gain better market access and receive fair prices based on the quality of the coffee they produce.

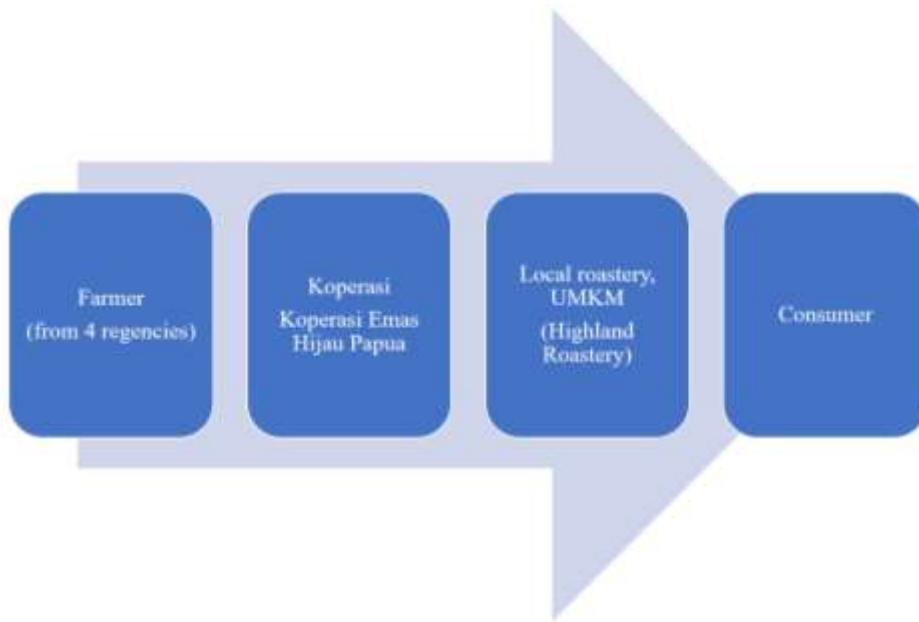


Figure 1. Papua highlands coffee supply chain scheme

As shown in Figure 1, after being collected by the cooperative, the coffee beans are delivered to local roasteries and small enterprises such as Highland Roastery, which play an important role in processing the beans into consumable products. Highland Roastery is responsible for the roasting process and focuses on improving coffee quality through training for local youth and developing coffee markets at both local and international levels. They ensure that the coffee produced meets quality standards and is well-received by consumers.

Finally, the coffee that has gone through these processes reaches consumers in local and international markets. These consumers enjoy high-quality coffee resulting from collaboration between farmers, cooperatives, and local roasteries. With a well-organized supply chain, it is hoped that the quality of Papua coffee will continue to improve. In turn, the local economy will also grow through mutual support among various stakeholders in the coffee industry.

Furthermore, several stages are carried out before the coffee beans reach consumers after being picked by farmers through the cooperative. As shown in Figure 2, Highland Roastery inspects green coffee beans for defects by checking their color, aroma, and physical shape. After that, the beans are sorted into primary and secondary categories.

The next step involves a physical inspection of the green beans and a basic cupping test to evaluate flavor and aroma. This process helps identify defects after roasting and provides an initial classification of whether the coffee can be sold commercially or categorized as premium.

Highland Roastery also promotes coffee products from local farmers to premium markets, domestically and internationally. This partnership helps strengthen buyers' confidence in the quality of Papua coffee. The collaboration between cooperatives, farmers, and roasteries has significantly impacted the coffee industry. One of the key outcomes is greater price stability. Coffee prices are now determined through mutual agreement among farmers, roasteries, and cooperatives, considering the coffee's quality. It ensures fair and stable prices for all parties involved.

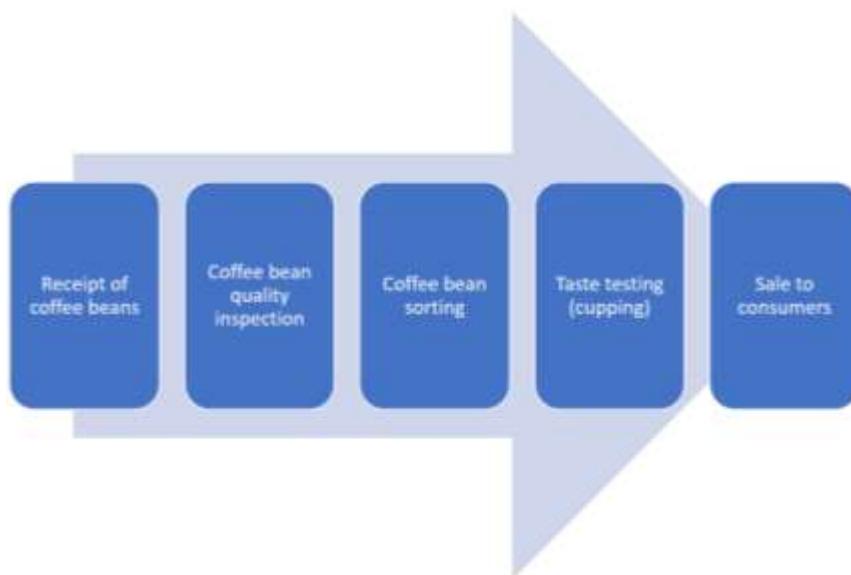


Figure 2. Coffee bean preparation process conducted by highland roastery

As a result, this collaboration has also increased farmers' awareness of the value of the coffee quality they produce, thanks to greater price transparency. Farmers can better understand how coffee quality affects its selling price with clearer information. Improvements in the quality and volume of coffee production have become evident, driven by downstream initiatives led by the cooperative and Highland Roastery.

This success is reflected in an impressive achievement: coffee exports reached 1.2 tons (1,200 kilograms) in 2024. This accomplishment was made possible through farmers'

growing awareness and commitment to improving the quality of their coffee beans, including better and more consistent post-harvest processing practices.

In 2014, Papua coffee processed using the semi-washed method was sold at the parchment coffee price of around IDR 50,000–55,000 per kilogram. After improvements in post-harvest processing, the price increased to around IDR 60,000–70,000 per kilogram. Between 2022 and 2023, the average selling price of Arabica green beans at the farmer level ranged from IDR 60,000 to 80,000 per kilogram. However, following the downstream collaboration and access to export markets, farmers began receiving prices ranging from IDR 120,000 to 135,000 per kilogram, depending on the coffee quality.

As shown in Table 2, coffee processed using the full-wash method experienced a price surge to around IDR 135,000–150,000 per kilogram in 2024. Moreover, the average cupping score of highland coffees, such as Pyramid coffee, reached 8.5 out of 10, indicating improved quality and competitiveness of Papua coffee in the global market. Adopting the full-wash method has also attracted buyers from Japan, the Netherlands, Russia, Bahrain, and Egypt, highlighting the growing global market potential for Papua coffee.

Table 2. Increase in Coffee Bean Prices per Kilogram

Year	Processing	Before intervention	After intervention
2014	Semi wash	Rp 50.000 - Rp 55.000	Rp 60.000 - Rp 70.000
2022-2023	Downstreaming	Rp 60.000 - Rp 80.000	Rp 120.000 - Rp 135.000
2024	Full wash	Rp 60.000 - Rp 80.000	Rp 135.000 - Rp 150.000

From the findings of this study, roasted bean prices were also examined. With roasted beans priced at around IDR 350,000 per kilogram, the Farmer's Share can be calculated by comparing the price of green beans to roasted beans as follows:

$$\text{Farmer's Share} = (150,000 / 350,000) \times 100\% = 43\%.$$

Before product diversification, the Farmer's Share was only about 17% (IDR 60,000 out of IDR 350,000). It shows that strengthening the supply chain increases the proportion received by farmers to 43%, making it fairer and more sustainable. A shorter marketing or supply chain model has proven to benefit coffee farmers significantly. With a shorter supply chain, the margin received by farmers increases, improving their welfare, as shown in Table 3.

Table 3. Value Added after Product Diversification

Product Diversification	Price/kg	Value added
Parchment Coffee (before downstreaming)	Rp 50.000	
Parchment Coffee (after downstreaming)	Rp 70.000	Rp 20.000
Green beans (before downstreaming)	Rp 60.000	
Green beans (after downstreaming)	Rp 150.000	Rp 90.000
Roasted Beans	Rp 350.000	Rp 200.000

CONCLUSION AND RECOMMENDATION

Based on the results of the analysis and discussion, it can be concluded that the Arabica coffee supply chain in Papua involves key actors, namely the Emas Hijau Papua Cooperative and Highland Roastery, who interact through three main flows: product flow, financial flow, and information flow. The Farmer's Share value shows that the shorter the supply chain, the greater the benefits received by farmers. In this case study, the Farmer's Share was recorded at 43%, indicating a reasonably high efficiency level.

Beyond industry matters, Highland Roastery shows a strong commitment to enhancing the capacity of Papuan youth. Furthermore, the collaboration between the Emas Hijau Cooperative and local roasteries such as Highland Roastery improves supply chain efficiency. It serves as a platform for implementing plantation management practices that support sustainable coffee productivity in Papua.

Further research can focus on several important areas. First, the impact of downstreaming on farmers' welfare is to understand how strengthening the supply chain and product diversification can increase farmers' incomes. Second, coffee processing methods, such as semi-wash and full-wash, should be compared to assess their effects on coffee quality and competitiveness in the international market.

Next, an analysis of Papua coffee export markets should be conducted to explore global market potential and the impact of training programs for local communities in improving skills and establishing new coffee businesses. Research on the influence of cupping scores on the competitiveness of Papua coffee is also important to understand how coffee quality affects its position in the global market. Finally, sustainable farming practices should be studied to ensure that coffee production is environmentally friendly and supports long-term sustainability.

These studies will help improve Papua coffee's quality and farmers' welfare, while strengthening Papua coffee's position in the international market. Once again, this research

shows that strategic partnerships between farmers, cooperatives, and industry actors can create added value, strengthen farmers' positions, and ensure the sustainability of the coffee sector in the region.

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