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Profitability and market performance of pineapple and arabica coffee in Jambi province, western Indonesia

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Abstract

The agricultural sector plays a crucial role in Indonesia's economy, particularly in the western region of Jambi Province. Jambi Province is known for its production of various agricultural commodities, including pineapple and arabica coffee. However, limited research has been conducted on the profitability and market performance of these crops. This study aimed to analyze the profitability and market performance of pineapple and arabica coffee production in the Jambi Province. Descriptive statistics, the gross profit formula, and the non-parametric Mann-Whitney test were utilized to assess the differences between input costs, variable costs, fixed costs, total costs, and profitability for 94 participants, comprising 30 pineapple farmers, 51 Arabica coffee farmers, and various traders. The results indicated that both pineapple and Arabica coffee farming are highly profitable, with profit shares exceeding 79%. Market behavior analysis indicated that middlemen and traders occupying key positions within the pineapple marketing channels largely dictate prices. Another key finding is that cooperative marketing channels are exclusively used in Arabica coffee farming, and pineapple farmers typically sell their produce to intermediaries. Therefore, policy initiatives aiming at increasing farmers' access to quality pineapple and Arabic coffee inputs, strengthening extension services, improving infrastructure, disseminating reliable market information, reducing unfair profit distribution and increasing bargaining power of farmers to accelerate rural economic growth. In addition, research institutes and universities should significantly contribute to releasing high-yielding and disease-tolerant varieties to improve the production and productivity of pineapple and arabica coffee in this region.

1. Introduction

The majority of Indonesian households derive their primary income from agricultural commodities, which play a pivotal role in the country's efforts to alleviate poverty and achieve food self-sufficiency (FAO, 2019). Small farms continue to dominate Indonesian agriculture, with no discernible trend toward consolidation (Winoto and Siregar, 2008). According to Lubis *et al*. (2020), Indonesia has significant potential in the agricultural commodity sector. Since a majority of the population depends on agriculture for their livelihood and the country has extensive land resources, the agricultural sector remains crucial. Specifically, agricultural crops such as coffee and tropical fruits like pineapple offer promising opportunities for economic growth and development. Coffee is one of Indonesia's primary export commodities and a crucial source of income for smallholder farmers (Raharjo *et al*., 2020). Arabica coffee is a valuable export commodity for Indonesia, contributing to foreign exchange earnings and economic growth (Tenriawaru *et al*., 2020).

Indonesia is the third largest coffee exporter globally, highlighting the coffee sector's importance to the national economy (Tenriawaru *et al*., 2020). The high value of Arabica coffee in the global market makes it a particularly important crop (Nangameka *et al*., 2023). Similarly, the development of fruit agro-industries, including pineapple, has been identified as a viable strategy for improving rural livelihoods (Budiastuti *et al*., 2021). Pineapples hold significant importance in Indonesia for several reasons; pineapple cultivation contributes to Indonesia's agricultural economy, providing income for farmers and generating revenue through domestic consumption, and pineapple stands out as a leading product for Indonesian tropical fruit exports

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(Rosmaina *et al*., 2019; Sukmaya *et al*., 2022). Indonesia is a major producer of arabica coffee and pineapples, particularly in regions like Jambi and North Sumatra (Andayani and Tilley, 1997). Jambi province is widely known for its thriving production of pineapple and arabica coffee. The region has emerged as a major center for these two valuable agricultural commodities, making significant contributions to Indonesia's overall agricultural economy (Rosmeli, 2019).

However, these commodities have not been the subject of much research in the region. Very few studies have examined the market performance of Arabica coffee (Saputera *et al*., 2022) or the profitability of pineapple (Jazuli and Sadik, 2023). Additionally, the factors that influence the market performance of these crops are not well documented (Budiastuti *et al*., 2021). This study addresses a research gap concerning the profitability and market performance of pineapple and Arabica coffee in the study area. A quantitative approach was employed to compare the profitability and market performance of these two commodities. To this end, this study utilized data from a direct economic survey of selected agricultural commodities in Jambi Province, western Indonesia. Furthermore, the research examines which entities derive the greatest benefit from the marketing channel structure implemented in the study area based on the survey data.

2. Materials and methods

2.1 Study area description

This research was conducted in Jambi, an Indonesian province, particularly in the Muaro Jambi district, which concentrates on pineapple farming, and in Kerinci, which focuses on Arabica coffee production (Figure 1). The distinctive peatland characteristics of the Jambi area are conducive to pineapple growth, resulting in high production rates and ample market prospects (Hernita *et al*., 2019).

Figure 1. Research location in Muaro Jambi district and Kerinci district, Jambi province.

Additionally, Jambi Province has recognized 1,346 hectares of land appropriate for Arabica coffee farming, highlighting its substantial agricultural potential. The region's advantageous climate and soil conditions enhance the feasibility of coffee cultivation and improve the yield (Putra and Rudiarto, 2019).

2.2 Sampling procedures

Semi-structured questionnaires were used to conduct in-depth face-to-face interviews with the farmers. Non-probability sampling was used in this study with purposive sampling techniques to collect detailed information on the sociodemographic and economic characteristics of 51 Arabica coffee farmers and cooperatives, and snowball sampling was used on 30 pineapple farmers. The marketing channel actors of the pineapple supply chain include 4 local traders, 2 wholesalers, 5 middlemen, and 2 home industry owners.

These farmers were specifically selected because they grow pineapple and Arabica coffee within the study area and are presumed to have similar farming characteristics, making them representative of the broader farming community engaged in these crops. All traders operating within these distinct marketing channels were purposively selected to ensure a comprehensive understanding of the entire marketing process and assess the varying impacts on different stakeholders.

2.3 Data analysis approaches

Descriptive statistics, including the mean, standard deviation, and percentage, were employed to examine the socioeconomic status and farming attributes of the farmers. Profitability indicators were calculated by multiplying the gross profit from the yield by the sales price. Subsequently, the gross profit was deducted from the total cost to calculate the net profit. To facilitate a comparison of the variations in each output's net benefits and ascertain the profitability of each, a benefit-cost ratio analysis was also conducted. The distribution of each cost item—variable, fixed, and total costs—was considered when calculating the costs.

In contrast to fixed costs, which were determined using the straight-line method—the most straightforward and popular approach for estimating depreciation—variable costs included tools, production and material costs, hired labor, marketing, and transportation. The straight-line method and the cost-benefit analysis equation are stated as follows (Del Giudice *et al*., 2016):

Cost-benefit Analysis:

$$\text{BC ratio} = \text{Gross returns/Total Costs} \quad (1)$$

Straight-line method:

$$Dk = (P - S)/n \quad (2)$$

Where P is the asset's purchase price, n is its useful life expressed in years, and S is its final salvage value in the nth year. Dk, where k = 1, 2, ..., n, is the annual

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depreciation in the kth year.

The computation of marketing margins involves subtracting the purchase price of each agricultural commodity at the selling agency from the marketing price. Consequently, the marketing margin and share profit were calculated by subtracting the initial product prices from the prices at each subsequent stage of the supply chain. The marketing margin function and share profit are illustrated as follows (Mujuru and Obi, 2020):

$$TFMM = SPi – PP– PTc \quad (3)$$

Where the terms "total profit marketing margin" (TFMM), "selling price (Spi)" "purchase price (PP)" and "production and transaction cost" (PTc) are used.

$$SP=PM/SL \times 100\% \quad (4)$$

Where SL stands for selling price, PM for profit margin, and SP for share of profit

For comparing groups with respect to input costs and profitability, parametric tests were deemed inappropriate due to the small number of observations and unequal sample sizes. Therefore, the non-parametric Mann-Whitney test was employed to assess the differences between input costs, variable costs, fixed costs, total costs, and profitability. A significance threshold of 0.05 was set for the alpha level, and R programming was used for data analysis.

3. Results and discussion

This study used non-probability sampling techniques because the detailed population was unknown. This approach is particularly useful in exploratory research and when dealing with hard-to-reach populations. According to Mariska *et al*. (2024), a study at Labuhanbatu University used nonprobability sampling techniques because the population was unknown. Additionally, it can also be justified when the researcher aims to understand an issue in greater detail for a particular population, rather than focusing on generalizability (Setia, 2016). The findings of this study can be explained in the following context.

3.1 Socio-demographics of participants

3.1.1 Farmers

As illustrated in Table 1, the overwhelming majority of farmers in the sample are male, comprising over 90% of the total. Analyzing the demographic and socioeconomic characteristics of the sample is essential to understanding their relationship to the marketing patterns of agricultural commodities among the households. In the research area, the average age of the sample households is 46 years for Arabica coffee farmers and 44 years for pineapple farmers. During the Dutch colonial era, the majority of Arabica coffee farmers were Javanese (96%), who originally came from Java Island to work on tea plantations in the Kerinci district. Similarly, 96% of pineapple farmers in the Muaro Jambi district are immigrants from the Bugis tribe in the province of South Sulawesi.

Table 1. Farmers' socioeconomic and demographic characteristics.

Socio-demographic	Pineapple (n=30)		Arabica Coffee (n=51)	
	Total	Mean	Total	Mean
Gender Ratio (%)				
Men	90		96.1	
Women	10		3.9	
Age (years)		43.83		45.7
Race (%)				
Javanese	3		96.1	
Bataknese			2	
Buginese	96			
Aboriginal	1		2	
Education (%)				
Elementary school	13.33		54.9	
Junior high school	53.33		29.4	
High school	33.33		15.7	
Bachelor				
Own or lease land (%)				
Own land	93.33		98	
Lease	6.66		2	
Secondary employment (%)				
No	100		15.17	
Yes			84.3	
Years of farming experience		20.03	7	

Regarding education, 33% of pineapple farmers have completed high school education, while only 16% of Arabica coffee farmers have reached this level of education. Farmers own over 90% of the land in the study area and lease less than 7% of it for both pineapple and Arabica coffee cultivation. In terms of employment, 84.3% of Arabica coffee growers and 100% of pineapple growers do not hold any secondary jobs. Pineapple farmers have a higher proportion of non-secondary jobs due to limitations on growing other crops on peat land and the limited presence of industries. Conversely, the fertile Arabica coffee land on the volcano slopes allows for intercropping with vegetable crops, and farmers can also work in agricultural cooperatives in the study area.

Based on the survey findings, farmers cultivating Arabica coffee and pineapples possess, on average, roughly 20 and 7 years of agricultural experience, respectively. Enhancing agricultural productivity and efficiency is largely dependent on farming experience

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(Bozoglu *et al*., 2020). Farmers with over 6 years of experience are generally considered proficient. However, pineapple farmers appear to have greater expertise in managing their farms. This finding is consistent with research by Saragih (2013), which discovered that productivity is positively impacted by more than two years of farming experience. Additionally, farming experience enhances farmers' ability to manage their agricultural businesses, with skills improving over time (Dewi *et al*., 2017).

3.1.2 Traders

The socioeconomic and demographic traits used to characterize the traders were age, experience, education, and family size (Table 2). The sample traders ranged in age from 35 to 53 years. Experience is crucial for increasing trading activity and marketing efficiency. The traders' experience ranges from 8 to 30 years, with the top 2 traders—one in the home industry and one among middlemen in pineapple commodities—having the most notable trading histories of 30 and 19 years, respectively. On average, the sampled traders have a high school education, with 90% of wholesalers possessing the highest level of education. All pineapple traders and cooperative Arabica coffee traders have completed a bachelor's degree. The families of the sample traders ranged from one to five members, with an average family size of 2.8 members.

3.2 Distinctive features of pineapple and arabica coffee farming

Table 3 displays the findings of the survey regarding the traits of pineapple and Arabica coffee cultivation. Price data is essential for farmers: all pineapple farmers relied exclusively on middlemen for price information, whereas 94.1% of Arabica coffee farmers obtained price details directly from cooperatives. There is a significant discrepancy between the price information provided by traders and the real market price. Middlemen often offer lower prices compared to cooperatives, which can be detrimental to farmers. This finding is supported by a study of pineapple farmers who relied exclusively on middlemen for price information (Oladapo, 2004; Sinaga and Dewi, 2016). Similarly, Piabuo *et al*. (2020) reported that Irish potato farmers received higher prices when obtaining price information from marketing cooperatives rather than from middlemen.

While 100% of pineapple farmers use traders, 100% of Arabica coffee farmers rely on cooperatives as their sales destination. Remarkably, more than half of the farmers belonged to regional farmer associations, whereas over 45% did not belong to any farmers' association. Local associations, which are based on relationships of familiarity, trust, and shared cultural experiences, can see farmers disaffiliate if they are dissatisfied. The most widely grown Arabica coffee variety was Sigarar Utang, cultivated by 60% of farmers, followed by Andung Sari, grown by 20%. In contrast, 97% of pineapple farmers cultivated the Paun variety, while only 3% grew the Tangkit variety, the latter being the least common.

The average Arabica coffee farm in the study area measured 1.1 hectares, while the average pineapple farm was 1.96 hectares. Over 92% of the land was owned by the farmers. The average production on pineapple farms was 16,546 fruits per year, while Arabica coffee farms produced an average of 4,668 kg per year. Notably, 90.2% of Arabica coffee farmers and 3.33% of pineapple farmers practised intercropping, primarily growing quickly harvested vegetables between coffee plants. Intercropping is less adaptable to pineapple farms on peat land, but it allows Arabica coffee growers to generate income while waiting for their crops to mature. Intercropping systems have been shown to significantly boost farm income and productivity (Saragih, 2013).

Table 4 illustrates the annual production and profitability of pineapple and Arabica coffee. By calculating production costs and revenue, we assessed the profitability of these agricultural commodities. The total variable cost includes labor, materials, tools, marketing, and transportation. A significant difference (p

Table 2. Demographic and socio-economic characteristics of all traders.

Variables	Pineapple (mean)			Arabica coffee (mean)	
	Local buyers (n=4)	Wholesalers (n=2)	Middlemen (n=5)	Home industry (n=2)	Agricultural cooperative (n=1)
Age (year)	53	51	47	61	35
Experience (year)	15	14	19	30	8
Education (%)					
Elementary school					
Junior high school	97	10	82		
High school	3	90	18		
Bachelor				100	100
Family size (number)	2	4	3	5	2

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Table 3. Characteristics of pineapple and arabica coffee farming.

Characteristics	Pineapple (n=30)			Arabica coffee (n=51)		
	Total	Mean	SD	Total	Mean	SD
Pricing information (%)						
Cooperative				94.1		
Ground coffee grinding				5.9		
Government						
Middlemen	100					
Sales destination (%)						
Cooperative				100		
Next traders	100					
Farmer group (%)						
Joined	53.33			54.9		
Not joined	46.67			45.1		
Price determination (%)						
Government						
Cooperative				94.1		
Traders	100			5.9		
Plant variety						
Sigarar utang				60		
Andung sari				20		
P-88				20		
Tangkit	97					
Paun	3					
Land ownership						
Own land	93.33			98		
Lease	6.66			2		
Capital Source (%)						
Private	96.67					
Sharing	3.33			100		
Farming size (ha)		1.96	0.72		1.1	1.1
Labor (no.)		0.17	0.65		3	1.34
Productivity (fruit/month), (kg/ha)		1379	97.27		389	195.5
Yield (fruit/year), (kg/year)		16546	1167.19		4668	3.4
Use of certified seed (%)				3.9		
Multi-cropping (%)		3.33		90.02		

= 0.0000) was observed in the total variable costs between the two commodities, with values of IDR 6,197,333 for pineapple and IDR 4,869,510 for Arabica coffee. Depreciation, land rental fees, and maintenance and repair expenses were included in the estimated total fixed costs. The total fixed costs for Arabica coffee (IDR 110,569) and pineapple (IDR 131,667) differed significantly (p = 0.0000). However, the cost of upkeep and repairs was not statistically significant, with a p-value of 0.0756.

The largest expense associated with pineapple and Arabica coffee farming production was the total variable cost. This finding aligns with (Begum *et al*., 2019), which reported that the greatest expense in growing turmeric in Bangladesh was also the total variable cost. The average annual yield for Arabica coffee was 4,668 kg, while the average yield for pineapples was 16,546 fruits. Arabica coffee was priced at IDR 8,500/kg, which is considerably more than the IDR 2,530/fruit of pineapple (p = 0.0000). Furthermore, the gross profit for Arabica coffee amounted to IDR 39,678,000, whereas for pineapple, it reached IDR 41,861,380. As a result, the net profit for farmers growing Arabica coffee and pineapple was IDR 34,697,921 and IDR 35,532,380, respectively. The benefit-cost ratios for pineapple and Arabica coffee production stood at 6.61 and 7.97, respectively. The analysis indicates that both crops demonstrate economic viability, which constitutes the most significant finding from the survey. These results align with previous studies, including those on Arabica coffee in India (Pongener and Das, 2021) and pineapple

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Table 4. Profitability and production of pineapple and arabica coffee (year/ha).

Item Cost	Type of Agricultural Commodity				Pooled data (81)		*P*-Value
	Pineapple (n=30)	Share (%)	Arabica coffee (n=51)	Share (%)	Cost (IDR)	Share (%)	
Variable Cost (IDR)							
Machine	400000	6.32	72549	1.46	472549	4.18	0.0000*
Manufacturing and material (year)	5503333	86.95	4195296	84.24	9698629	85.76	0.0000*
Workers	284000	4.49	501176	10.06	785176	6.94	0.0000*
Marketing and shipping	10000	0.02	100489	2.02	110489	0.98	0.0000*
A. Total variable cost	6197333	97.92	4869510	97.78	11066843	97.86	0.0000*
Fixed cost (IDR)							
Depreciation	100000	1.58	41353	0.83	141353	1.25	0.0000*
Repair and upkeep (year)	15000	0.24	30000	0.60	45000	0.40	0.0756
Rent of land (year)	16667	0.05	39216	0.79	55883	0.49	0.0000*
B. Total fixed cost	131667	2.08	110569	2.22	242236	2.14	0.0000*
C. Cost production (D/E)	383	0.01	1067	0.02	1449	0.01	0.0000*
D. Total cost (A+B)	6329000		4980079		11309079		0.0000*
E. Yield (fruit/year), (kg/year)	16546		4668				0.0000*
F. Sales price (IDR)	2530		8500				0.0000*
G. Gross profit (E x F)	41861380		39678000				0.0000*
H. Net profit (G-D)	35532380		34697921				0.0001*
I. Cost-Benefit ratio (G/D)	6.61		7.97				0.0000*

*Statistically significant at $p < 0.05$

in Nigeria (Ojeleye, 2021), which also emphasized their profitability. This highlights the benefits of growing pineapple and Arabica coffee in the region and indicates that these crops can be developed on a commercial level, with significant implications for the advancement of pineapple and Arabica coffee farming locally.

3.3 Pineapple marketing channel

The present study identified three distinct pineapple marketing channels and their respective carrying capacities. The findings demonstrated that the sample respondents collectively brought approximately 16,546 pineapple fruits to the market on an annual basis. The main agents that bought pineapple from the farmers were middlemen, local traders, home industry, and wholesalers. with corresponding calculated amounts of 65%, 15%, 10%, and 10%. In addition, channel I is a place where pineapples are sold in bulk to middlemen without quality grading, then local buyers buy from middlemen before reaching the end consumer. Channel II is a route for poor harvests that are bought up by middlemen and sold to local home industries for local food production. Channel III is for superior-quality pineapple that is exclusively purchased by wholesalers. The following marketing channels were shown in the study (Figure 2).

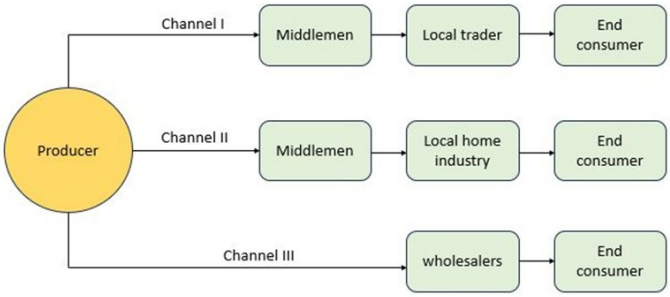

Figure 2. Pineapple marketing channel.

3.4 Profit margin and share across pineapple marketing channels

Table 5 displays the production and transaction costs incurred by producers, middlemen, local traders, local home industries, and wholesalers, along with the profit margin share for each actor in the study area. All figures pertain to a single cycle transaction. The profit margin for pineapple producers was lowest in Channel II (IDR 500) and highest in Channels III and I (IDR 2,500 and IDR 2,030, respectively). Channel II involves low-quality pineapples primarily sold in bulk to the local food processing industry through middlemen. In contrast, Channel III features superior-quality pineapples, resulting in a higher selling price and a profit margin of IDR 3,000 for wholesalers. Local traders receive a profit margin of IDR 1,500, while the local home industry, which purchases low-quality pineapples at a low price and sells them as high-value derivative products, achieves a profit margin of IDR 4,600. This result aligns with Andriesti and Rasoki (2022), who found that making chips is more profitable for farmers than selling fresh cassava in Bengkulu, Indonesia.

The analysis of the marketing channel distribution

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Table 5. Profit margins and profit share across the pineapple marketing chain.

Channel	Actors	Purchase price (IDR)	Selling price (IDR)	Production and transaction costs (IDR)	Profit margin (IDR)	Share of profit (%)
Channel I	Farmer	0	2530	500	2030	80.24
	Middlemen	2530	7500	1000	3970	52.93
	Local trader	7500	10000	1000	1500	15
	Total			2500		
Channel II	Farmer	0	1000	500	500	50
	Middlemen	1000	1500	200	300	20
	Local Home Industry	1500	9000	2900	4600	51.11
	Total			3600		
Channel III	Farmer	0	3000	500	2500	83.33
	Wholesalers	3000	12000	6000	3000	25
	Total			6500		

reveals that middlemen occupy two critical positions: Channels I and II. This suggests a significant influence of middlemen on the pineapple marketing chain in the study area. Notably, middlemen in Channels I and II earn profits of IDR 3,970 and IDR 300, respectively, which is considerably higher than the profit earned by farmers. These results are consistent with Piabuo *et al*. (2020), who observed a notable difference in profit and price between Irish potato farmers in Cameroon and middlemen. Middlemen play a dominant role in the research area and have been vital in ensuring the sustainable production of agricultural commodities (Lee, 2013).

The findings indicate that farmers generated the maximum share of profit margin among traders in all channels, with values of 80.24%, 50%, and 83.33%, respectively. Nevertheless, it is important to note that, unlike other traders who can access all pineapple farming products in the study area, farmers can only profit when they harvest from their farms. The findings indicate that farmers achieved the highest profit margins compared to traders across all channels, with figures of 80.24%, 50%, and 83.33%, respectively. Nevertheless, it is essential to recognize that, in contrast to other traders who have access to all pineapple farming outputs in the study area, farmers can only profit from their own harvests. The study's findings underscore the significant role intermediaries play in maintaining profit margins within the region. This observation is consistent with the research by Kopp and Sexton (2021), which highlighted that middlemen in agricultural markets often diminish farmers' profit margins by exerting substantial control over pricing.

Various factors, including market power, logistics costs, and information disparities, collectively shape the economic landscape for farmers. Often, middlemen possess greater market power than farmers, allowing them to dictate prices, which can lead to reduced earnings for farms. The phenomenon of "double marginalization" occurs when both buyers and sellers within the supply chain exert market power, further constraining farmers' profits (Kopp and Sexton, 2021). Moreover, the presence of middlemen generally results in increased prices for consumers while farmers receive lower payments, as middlemen procure goods at reduced prices and sell them at higher rates (Oguoma *et al*., 2011). In addition, the function of middlemen often leads to escalated consumer prices while farmers earn less, since middlemen purchase goods at minimal prices and sell them at a profit (Oguoma *et al*., 2011).

3.5 Arabica coffee marketing channels

Arabica coffee uses a direct marketing channel through agricultural cooperatives to reach final consumers. Farmers deliver 389 kg of Arabica coffee cherries per month to cooperatives for processing into green beans. Farmers often lose out on this arrangement when they sell their coffee to traders or middlemen (Rosiana *et al*., 2017). Therefore, farmers can benefit from unbroken marketing channels by dealing directly with intermediaries or traders in the research regions. Figure 3 depicts the marketing flow.

3.6 Profit margin and share across the Arabica coffee marketing chain

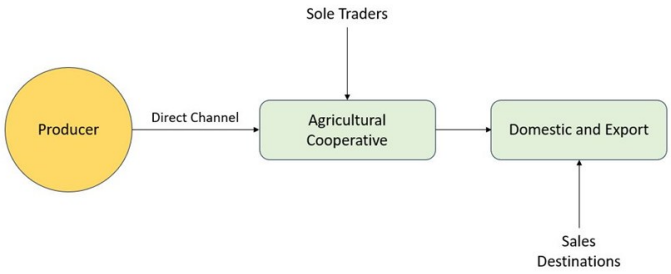

Figure 3. Arabica coffee marketing channel.

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Table 6 presents data for one-cycle production of Arabica coffee. The study reveals a significant difference in production costs between cooperatives and smallholders, with costs amounting to IDR 1,067 and IDR 66,173, respectively. Cooperatives incur higher production costs due to the greater operational inputs required compared to independent smallholders who use fewer tools and labor. The total costs were IDR 1,767 for farmers and IDR 71,173 for cooperatives. The selling prices were IDR 8,500 for cooperatives and IDR 80,000 for farmers. The difference in selling prices arises because farmers supply raw materials as producers, while cooperatives act as processors and traders, resulting in higher value-added Arabica coffee sales. The profit margins were IDR 6,733 for farmers and IDR 8,827 for cooperatives. Farmers' share of profit was 79.2%, while the cooperatives' share was only 11%.

This indicates that cooperatives generate a larger profit margin compared to farmers, but a smaller share of profit. In contrast, farmers' profit margins in one season of Arabica coffee production cover their production costs, allowing them to sustain their operations as side gigs. Cooperatives, on the other hand, must cover production expenses and distribute net profits to shareholders. Farmers retain all of their net profit, while cooperatives' profits are distributed among shareholders. Institutions in the business world anticipate that cooperatives will generate larger profit margins. However, this study shows that farmers' profit values are substantially higher than those of cooperatives. The findings suggest that farmers gain greater advantages from this marketing channel approach. This result is consistent with the study conducted by Ma *et al*. (2022), which revealed that cooperatives have a substantial impact on profit margins and improve the financial outcomes of banana farms for farmers in China.

4. Conclusion

Pineapple producers supply their fruit to middlemen, local traders, the local home industry, and wholesalers. The local home industry and middlemen generate higher profit margins than other actors in the pineapple market chain, while producers are more profitable when they sell directly to wholesalers with superior pineapple quality. The second major finding is that Arabica coffee farming exclusively utilizes cooperative marketing channels. Producers sell their products solely to cooperatives, bypassing middlemen and traders. This allows producers to capture a significant share of profits. Based on the findings, the following core recommendations are proposed to improve the profitability and market performance of pineapple and Arabica coffee. The overall profitability analysis shows a positive profit margin and room to enhance the profitability of pineapple and Arabica coffee production by increasing productivity, ensuring fair prices, and eliminating lengthy distribution channels, which is particularly important in the pineapple market due to its weak oligopolistic structure.

To improve pineapple and Arabica coffee production, government and non-governmental organizations should enhance extension services through digital information dissemination. Reducing market intermediaries can minimize marketing margins and inequitable profit distribution, ultimately increasing producers' incomes. Relevant agencies should improve input supply systems to ensure farmers receive the appropriate type, quantity, and quality of inputs at the right time. Diseases in pineapple and Arabica coffee can significantly reduce both yield and quality at harvest. Therefore, it is crucial for agricultural research institutes and universities in Indonesia, particularly in the study area, to develop and release high-yielding, disease-resistant varieties. A limitation of this study is the relatively small sample size due to insufficient population data from villages or provincial institutions. Future research should involve a larger sample size and an updated population of respondents documented in local agricultural institutions.

Conflict of interest

The authors declare no conflict of interest.

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Table 6. Arabica coffee's profit margins and profit share across marketing channels.

Channel I	Players	Cost production (IDR)	Commerce cost (IDR)	Full cost (IDR)	Sale price (IDR)	Margin (IDR)	Share (%)
Channel I	Farmers	1067	700	1767	8500	6733	79.2
	Cooperative	66,173	5000	71,173	80000	8,827	11.0

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