Factors influencing coffee farmers' choice of purchasing partners in the Central Highlands of Vietnam

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ABSTRACT

This study aims to analyze the current state of coffee production and the factors influencing coffee farmers' decisions in selecting purchasing partners in the Central Highlands of Vietnam. The Random Utility Theory and Transaction Cost Economics, combined with the Multinomial Logit regression method, are used to analyze the factors affecting farmers' choices, based on data collected from 584 coffee households. Most farmers have small-scale production (01 - 02 hectares) and mainly sell to local traders or purchasing agents, rather than processing/exporting companies, even though the latter channel offers higher returns. The results show that age and market distance from the household to the nearest business facility have a positive influence on farmers' decisions to choose local traders and purchasing agents instead of processing/export companies, while gender, education level, experience, farm size, payment time, agricultural extension services, specialization, and access to market information have a negative impact. Farmers and purchasing partners in the supply chain often lack binding commitments to carry out transactions. Enhancing agricultural extension services and providing market information can improve farmers' market access, thereby strengthening their position in the supply chain. Financial support programs and incentives for cooperation between farmers and enterprises will create favorable conditions for the sustainable development of the coffee sector.

1. Introduction

Vietnam is an agricultural country, with nearly 26.5% of its labor force employed in agriculture (General Statistics Office, 2024). Agriculture is a vital pillar supporting economic growth, contributing more than 13.5% of GDP and providing livelihoods for approximately 13.7 million rural people (Ministry of Agriculture and Rural Development of Vietnam [MARD], 2024). Vietnam's agricultural exports ranked second and third in the world for several key items, including rice, coffee, pepper, cashews, and rubber. Coffee is one of the primary export items, currently present in nearly 80 countries worldwide, and is ranked second in terms of export value, after rice (AgroInfo, 2024). In 2022, Vietnam exported more than 1.77 million tons of coffee, generating revenue of over $ 4.05 billion - the highest coffee export turnover in recent years (VietnamBiz, 2022). The coffee-growing area expanded from 20,000 hectares in the early 1980s to over 700,000 hectares, producing more than 1.5 million tons annually, with the Central Highlands accounting for more than 90% of the national coffee-producing area (MARD, 2024).

Although Vietnam is one of the leading coffee producers, the sector remains modest and fragmented. Cultivation techniques are often inappropriate, while domestic consumption and export capacity remain limited. A significant constraint faced by farmers is the volatility of the global coffee market, which can significantly affect their income (Nguyen, 2022; Singhal & Tarp, 2025). Coffee farmers also often face the challenges of climate change, making it difficult for them to maintain production (Girma, 2023; Tran, 2025). Farmers' ability to make timely sales decisions is also constrained by limited access to market information (Irmayani, 2024; Pham & Huynh, 2020; Walia & Kaur, 2023). Moreover, competition from other coffee-producing countries, such as Brazil and Colombia, also puts pressure on coffee prices and export markets. The development of sustainable marketing channels (processing/export companies) will not only help farmers increase their income but also contribute to the sustainable development of Vietnam's coffee industry.

In the context of agricultural product sales, farmers often face the decision of selecting suitable purchasing partners for their products (Mehdi et al., 2019; Navid & Amine, 2024; Xaba & Masuku, 2013). So far, the linkage mechanism between farmers and purchasing partners remains limited and ineffective. As a result, farmers often face unfavorable pricing conditions and are vulnerable to downward price pressures in their transactions with buyers (Do & Le, 2017; Mushi et al., 2025). Purchasing partners play a pivotal role in achieving common goals related to sustainable agriculture, particularly for small-scale farmers in emerging economies (Mushi et al., 2025; Siddique et al., 2018; Thamthanakoon et al., 2022). Previously, when the road infrastructure was limited, local traders were the primary marketing channel. In recent years, when the infrastructure has been improved, it has facilitated farmers transition to selecting other marketing channels like purchasing agents, cooperatives, and processing/export companies (Nguyen, 2024; Pham et al., 2019). The choice of buying partners is a vital element in ensuring the marketability of coffee (Mmbando et al., 2016; Safi et al., 2018), which is essential for developing distribution channels and increasing farmers' income, especially for smallholder farmers (Irmayani, 2024; Naik & Mohan, 2025; Soe et al., 2015; Zhang et al., 2017; Zeleke, 2018). Most studies on farmers' purchasing partners are empirical research, focusing on transition economies in Asia and Africa (Abasimel, 2020; Degaga & Alamerie, 2020; Mgale & Yunxian, 2020; Thamthanakoon, 2019). Previous research has shown that farmers choose different purchasing partners depending on the specific agricultural products (Safi et al., 2018; Soe et al., 2015; Xaba & Masuku, 2013). At the same time, most farmers in the Central Highlands are involved in coffee production, but studies on their choice of coffee purchasing partners are still quite limited. Therefore, the purpose of this study is to provide a comprehensive understanding of the coffee production situation and the factors influencing coffee farmers' decisions when selecting purchasing partners. It also proposes policies to promote stronger linkages between farmers and purchasing partners, aiming to foster sustainable development in the coffee sector.

2. Theoretical basis

Purchasing partners are characterized by different costs and benefits (Safi et al., 2018; Sharma, 2022; Thakur et al., 2023). Investigating the variables that determine the choice of purchasing partners is essential for developing effective marketing channels, increasing farm income, and attracting investment (Issah et al., 2022; Zeleke, 2018; Zhang et al., 2017). Farmers can choose from various purchasing partners, including consumers, collectors, retailers, cooperatives, wholesalers, local traders, purchasing agents, processing facilities, and export companies. Farmers can sell products directly to consumers without intermediaries (Zeleke, 2018). Most farmers sell products to retailers, wholesalers, cooperatives, brokers, and processing companies (Degaga & Alamerie, 2020; Kiprop et al., 2020; Thakur et al., 2023; Zhu et al., 2022). Studies are primarily based on the theory of Transaction Cost Economics (TCE) to analyze farmers' choice decisions (Degaga & Alamerie, 2020; Kiprop et al., 2020; Pham et al., 2019). Additionally, many studies analyze farmers' decisions based on utility theory (Abasimel, 2020; Issah et al., 2022; Sharma, 2022; Thakur et al., 2023). A few other studies use the theory of efficiency based on cost-benefit analysis (Mehdi et al., 2019; Mgale & Yunxian, 2020; Safi et al., 2018). Cost-benefit analysis is used to evaluate and compare purchasing partners, providing information for decision-making on efficient resource allocation based on a comprehensive reflection of actual benefits and costs. Furthermore, behavior theory is also utilized in analyzing the decision-making process of selecting purchasing partners (Thamthanakoon, 2019). Behavioral theory focuses on studying the psychological and behavioral factors that influence farmers' decisions regarding purchasing partners for agricultural products.

Regarding the analysis method, most studies use the Multinomial Logit (MNL) regression model to investigate farmers' decisions in selecting purchasing partners for agricultural products or choosing market outlet channels (Abasimel, 2020; Mgale & Yunxian, 2020; Thakur et al., 2023). Additionally, the multivariate probit model is also commonly used in studies (Dlamini-Mazibuko et al., 2019; Degaga & Alamerie, 2020; Tura & Hamo, 2018). The MNL model is often utilized to examine the elements that shape the decision in choosing particular purchasing partners. Furthermore, probit regression models (Nkwasibwe et al., 2015; Shiimi et al., 2012), logit models (Tsourgiannis et al., 2008), and Tobit models (Fikre & Niguse, 2023) are also utilized in empirical studies. The binary logit and probit models are appropriate only for situations where the choice is between two distinct states. Only a few studies employ the Seemingly Unrelated Regression (SUR) model (Nguyen & Bokelmann, 2019) and the Partial Least Squares (PLS) method for Structural Equation Modeling (SEM) analysis, specifically PLS-SEM (Thamthanakoon, 2019).

This study examines coffee farmers' decisions in selecting purchasing partners through the integrated lens of Transaction Cost Economics (TCE) and Random Utility Theory (RUT). TCE provides the foundation for identifying and categorizing the key determinants influencing farmers' choice by emphasizing the role of transaction costs, including information search costs, negotiation costs, and monitoring/enforcement costs, which vary across different types of purchasing partners. Concurrently, RUT offers the behavioral framework to model farmers' decision-making as a utility-maximizing process, where each purchasing partner represents a discrete choice alternative with associated perceived benefits and costs. To empirically operationalize this integrated theoretical approach, the study employs the Multinomial Logit (MNL) model, which is especially suited for analyzing discrete choice behavior as conceptualized in RUT. The explanatory variables in the model, such as age, education, farm size, market distance, access to information, and payment terms, are directly derived from the dimensions of transaction costs outlined in TCE. Thus, the research model not only quantifies the influence of these variables on farmers' partner selection but also strongly reflects the dual theoretical foundation by linking economic rationality (via TCE) and decision behavior (via RUT) within a coherent empirical framework.

3. Methodology

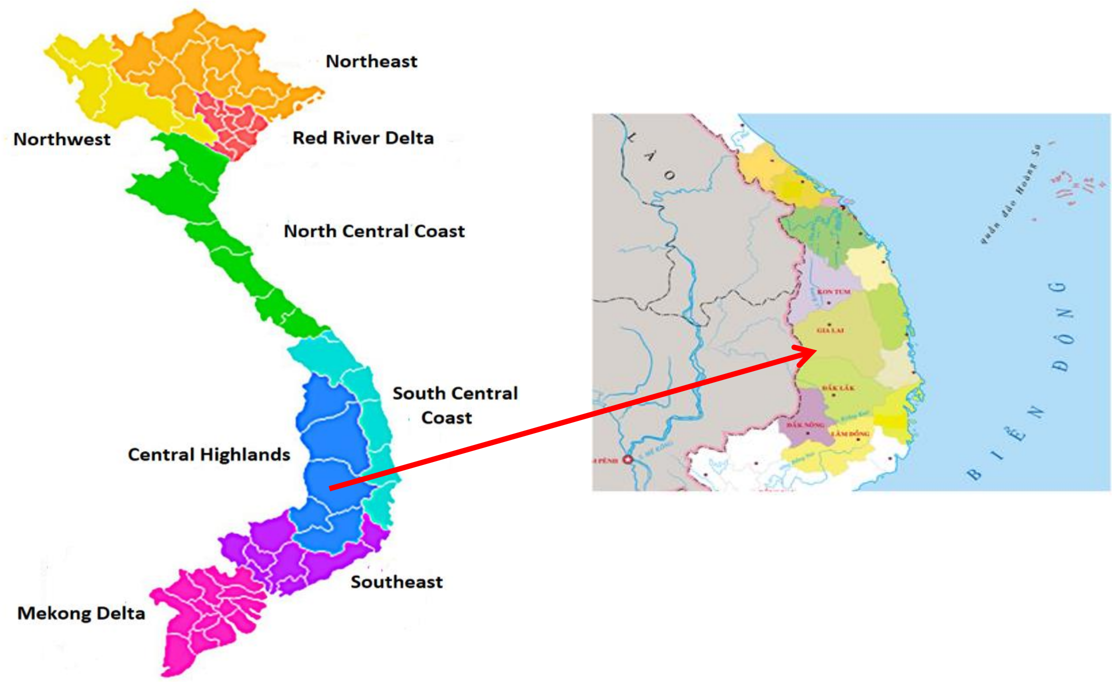
3.1. Study area

The Central Highlands lies west of the Truong Son mountain range and shares borders with several provinces, including Quang Nam, Quang Ngai, Binh Dinh, Phu Yen, Khanh Hoa, Ninh Thuan, Binh Thuan, Dong Nai, and Binh Phuoc. Kon Tum, Dak Lak, Gia Lai, Dak Nong, and Lam Dong are the five provinces comprising the Central Highlands (Figure 1). It spans an area of approximately 54,508.3 square kilometers (as of 2024). The highland and mountainous terrain are the most characteristic features of the region, facilitating the development of the agricultural and forestry sectors. The Central Highlands features several adjacent plateaus, including Kon Tum, Buon Ma Thuot, Mo Nong, Kon Plong, M'Drak, Lam Vien, and Di Linh.

The Central Highlands has red basalt soil, which is very suitable for growing coffee, cocoa, cashew, pepper, mulberry, and rubber. Coffee serves as a key agricultural crop and a primary source of income for local communities. Currently, the Central Highlands cultivates over 700,000 hectares of coffee, making up 91.5% of Vietnam's total coffee-growing area. In particular, Dak Lak ranks first in terms of coffee cultivation area (196,500 hectares), followed by Lam Dong (183,000 hectares), Gia Lai (118,600 hectares), Dak Nong (101,000 hectares), and Kon Tum (14,100 hectares) (Infodata, 2020).

Figure 1

Map of the Central Highlands



Note. Vietnam Surveying and Mapping Data Information Center

The Central Highlands plays a significant protective role. However, the destruction of forests and the unsustainable use of forest resources have increased the risk of depletion, resulting in droughts and floods. In the Central Highlands, the climate exhibits a distinct division between a rainy season (May to October) and a dry season (November to April). Additionally, basalt soil is degraded by up to 71.7%, with heavily degraded land accounting for up to 20% (MOIT, 2021). The key products of this area include coffee, rubber, pepper, cashew nuts, sugarcane, cocoa, and other fruits and vegetables.

3.2. Data collection

The non-probability sampling method does not require the strict procedures that are in place for random sampling; instead, the selection of observations may depend on factors such as availability, accessibility, and cost-efficiency (Bernard, 2013; Moser, 1952). To ensure that the selected sample accurately reflects the characteristics of the study area, two main criteria were applied when selecting surveyed households: (1) the size of the coffee cultivation area and (2) the household's primary income being derived from coffee production.

Three representative provinces in the Central Highlands - Dak Lak (Cu M'Gar and Krong Pak Districts), Lam Dong (Di Linh and Lam Ha Districts), and Gia Lai (Chu Se and Dak Doa Districts) - were purposively selected due to their large-scale coffee farming and economic dependence on this crop. These areas collectively account for a significant portion of Vietnam's coffee-growing landscape.

Data collection was conducted via face-to-face interviews at farmers' residences or at community gathering points arranged in advance. A structured questionnaire was used to ensure consistency across interviews. A total of 600 farming households were approached, and 584 valid responses were retained after cleaning the dataset. The list of coffee-growing households was obtained from commune-level agricultural officers to enhance the relevance and validity of the sample. This approach, while non-random, aimed to capture the diversity of production conditions and farmer profiles across the region.

3.3. Research model

The Multinomial Logit (MNL) model is applied to identify the determinants affecting the choice of different partners by coffee farmers in the Central Highlands. In the MNL model, the estimated probabilities are considered linear in their parameters, ensuring that an increase in the magnitude of an independent variable will increase or decrease the likelihood of choosing any option. The MNL model specifies the relationship between the choice probability Yi and the set of explanatory variables Xi with b as the base outcome/control group (Greene, 2019), as follows:

$$\Pr(Y = j|X_i) = \frac{e^{X_i\beta_{j|b}}}{1 + \sum_{j=1}^{J} e^{X_i\beta_{j|b}}}, \qquad j = 1, 2, 3 \tag{1}$$

In particular, Y is the choice j of farmer i^{th}, with j ranging from 1 to 3, where 1 represents the local trader, 2 represents the purchasing agent, and 3 represents the processing/export company. X_i is an independent variable, and β_j is the coefficient vector for each X_i. At that time, Pr_{ij} is the probability that the farmer i^{th} chooses j, calculated according to the following formula:

$$\mathrm{Pr_{i1}} = \frac{1}{1 + exp(\beta_{12} + \beta_{22}X_i) + exp(\beta_{13} + \beta_{23}X_i)}, \ j = 1 \tag{2}$$

$$\mathrm{Pr_{i2}} = \frac{exp(\beta_{12} + \beta_{22}X_i)}{1 + exp(\beta_{12} + \beta_{22}X_i) + exp(\beta_{13} + \beta_{23}X_i)}, \ j = 2 \tag{3}$$

$$\mathrm{Pr_{i3}} = \frac{exp(\beta_{13} + \beta_{23}X_i)}{1 + exp(\beta_{12} + \beta_{22}X_i) + exp(\beta_{13} + \beta_{23}X_i)}, \ j = 3 \tag{4}$$

The MNL model is the best approach for choices based on the attributes of the decision-maker rather than the choice itself. The explanatory variables in the MNL model are presented in Table 1. Dependent variables (Y) are the choices of farmers selling to different purchasing partners, including processing/export companies, local traders, and purchasing agents. In which the base status (base outcome) is coffee processing/export companies.

Age, gender, and educational level are mentioned in the TCE theory regarding the cost of information searching. Senior farmers tend to possess deeper insights into the requirements, expenses, and potential risks associated with agricultural activities (Kareska, 2025; Melese et al., 2018; Xaba & Masuku, 2013). The choice of partners between male and female farmers also differs due to the gender difference in awareness levels between males and females (Carla et al., 2024; Degaga & Alamerie, 2020; Pham et al., 2019). In addition, education level promotes the ability to select more stable purchasing partners (purchasing agents and processing/export companies). Education helps reduce the costs associated with information search (Kareska, 2025; Tura & Hamo, 2018).

Similarly, access to market information is essential for farmers to make informed decisions based on prevailing market conditions (Degaga & Alamerie, 2020; Irmayani, 2024; Soe et al., 2015). The level of market information access is used to explain the ability to choose partners, which reduces search costs and uncertainty (Mehdi et al., 2019; Mgale & Yunxian, 2020; Safi et al., 2018). Access to credit enhances the capacity of smallholder producers and facilitates farmers' participation in production and search for appropriate partners (Dessie et al., 2018; Kenyanya & Ndegwa, 2024; Melese et al., 2018).

Additionally, production risk and market risk are also factors that affect the costs of monitoring and executing transactions. Production risk and market risk are common risks that farmers frequently face with their crops. The level of risk awareness depends on the characteristics of each farmer (Kuwornu et al., 2018; Mgale & Yunxian, 2020; Navid & Amin, 2024).

At the same time, payment time is also a factor affecting the costs of monitoring and enforcing transactions (Ishaq et al., 2017; Nguyen & Bokelmann, 2019). Lack of transparency and delays in payments are also important factors contributing to uncertainty in TCE theory (Nkwasibwe et al., 2015; Shiimi et al., 2012). Farmers often believe that processing/export companies will pay quickly for transactions at each harvest.

Table 1

Description of the Variables in the Multinomial Logit Model

Variables	Description of the variables	Expected signs
Dependent variable		
Purchasing partners	1 = Local trader, 2 = Purchasing agent, 3 = Processing/exporting company (base outcome)	
Independent variables		
Factors related to information search costs		
Age	Age of the household head (years)	-
Gender	Gender of the household head: 1 = Male, 0 = Female	-

Variables	Description of the variables	Expected signs
Educational level	Number of years of schooling of the household head (years)	-
Access to credit	1 = Yes, 0 = No	-
Access to market information	1 = No access, 5 = Very frequent access	-
Factors related to enforcement monitoring costs		
Production risk	1 = No impact, 5 = Very serious impact	+
Market risk	1 = No impact, 5 = Very serious impact	+
Payment period	1 = On-time payment, 0 = Late payment	-
Factors related to negotiation costs		
Experience	Number of years for growing coffee (years)	-
Area	Coffee cultivation area (ha)	-
Agricultural extension	1 = Not participating, 5 = Very frequently participating	-
Market distance	Distance from household to the nearest business facility (km)	+
Specialization	Coffee income share (%)	-

Note. The author's suggestion

Farm size, extension services, and market distance are factors representing the aspect of negotiation costs. Larger-scale farmers have more advantages and greater bargaining power (Rajanna et al., 2017). Furthermore, numerous studies have highlighted that involvement in agricultural extension services enhances farmers' capacity to choose long-term partners (Ishaq et al., 2017; Zeleke, 2018). On the other hand, the distance between purchasing partners and farmers is seen as a factor influencing their selection decisions (Kiprop et al., 2020; Tura & Hamo, 2018). Farmers prefer to conduct transactions with geographically close partners to minimize costs (Dessie et al., 2018; Kiprop et al., 2020; Nguyen & Nguyen, 2022).

Similarly, asset specificity is reflected through specialization, which is measured by the proportion of the household's income derived from coffee production. High specialization enables farmers to gain more experience, thereby increasing their ability to select reliable partners (Abasimel, 2020; Trejo-Pech et al., 2023; Tura & Hamo, 2018). Households that have been producing coffee for many years will have experience in both coffee production and consumption, which helps reduce negotiation costs.

4. Result and discussion

4.1. Socio-economic characteristics of coffee farmers in the Central Highlands

The average age of households is relatively high, about 44.38 years. Among them, the most common age group is between 35 and 45 years (31.2%), followed by those between 45 and 55 years (29.1%), and those between 25 and 35 years (22.4%). According to the survey data, the heads of households range in age from 23 to 68 years old. This suggests that farmers of various ages are involved in coffee production in this area. Among the surveyed households, 70.5% are headed by males who are directly involved in coffee production, indicating that men play a dominant role in managing coffee farming activities in the Central Highlands. The education level of household heads is relatively low (an average of 8.23 years). Notably, the percentage of household heads with secondary education is relatively high (32.7%), while those with a high school education account for 30.1%, and those with primary education make up 23.0%.

Most farmers have acquired coffee cultivation techniques, but they primarily rely on family experience and their existing knowledge of production. The survey results indicate that the average number of years of coffee-growing experience is 14.74 years. The highest proportion of household heads has less than 10 years of experience (33.9%), followed by those with 10 to 20 years (32.0%), those with 20 to 30 years (32.5%), and those with over 30 years (1.6%). Most households primarily use family labor for coffee production. The number of households employing one to two workers accounts for the majority (34.8%), and those with three to four workers also represent a significant proportion (34.4%).

Additionally, the scale of coffee cultivation contributes to reducing costs and achieving higher efficiency because larger farms can benefit from economies of scale. These farms are better positioned to invest in more efficient technologies, mechanized equipment, and improved farming techniques, which can lower unit production costs. They can also purchase inputs in bulk at discounted prices, reducing input costs per hectare. The average coffee area per household is estimated at approximately 1.22 hectares. Coffee households with less than 0.5 hectares account for 12.1%. In comparison, those with an area between 0.5 and 02 hectares make up the majority, at 74.5% of the total surveyed households, and only 13.4% of households have more than 02 hectares. The small scale of production hinders the adoption of advanced technologies and mechanization in both production and processing, while also limiting business linkages and access to market and technical information.

4.2. Coffee production in the Central Highlands

Robusta coffee is the predominant variety among the surveyed farmers, comprising 90% of the total coffee cultivated in the area. The age of the coffee trees is distributed into 15 to 25 years old (45.5%), 05 to 15 years old (39.6%), over 25 years old (11.0%), and under 05 years old (3.9%). Farmers typically harvest coffee by hand, using either selective picking, where only ripe cherries are collected, or complete picking, where both ripe and unripe cherries are harvested together. Among the surveyed households, 40.9% wait until at least 80% of the cherries are ripe before harvesting, while 37.0% gradually pick ripe cherries over multiple rounds. Meanwhile, 14.0% of the harvest occurs when only about 50% of the cherries are ripe, and 8.1% of households pick coffee while many cherries are still green. Typically, households harvest three rounds per crop: the first round involves selecting ripe trees to harvest, the second round is mass picking while leaving the green ones, and the third round is complete picking. This division into three rounds is done to enhance the quality and yield of the coffee beans. Coffee is usually sun-dried on a large surface. Farmers in the Central Highlands commonly use this method due to its lower cost. The most popular preprocessing method among farmers is drying on cement surfaces (40.0%) and natural sun drying with husking (28.1%). The area of cement drying surfaces is insufficient for the harvested coffee yield, with 15.9% of households drying on tarps and 7.9% drying on the ground. In general, the coffee beans are not uniform (varied in size, color, shape, or moisture).

The transactions between traders and farming households are mostly verbal agreements (95.5%) without formal purchase contracts, and prices are determined at the time of sale. Therefore, if coffee prices drop at the time of purchase, the farmers will incur losses. Farmers often have limited bargaining power and tend to accept the prices set by buyers without negotiation. Among the 584 surveyed farming households, only 128 participated in agricultural extension programs (organized mainly by fertilizer companies, with very few workshops conducted by extension organizations), accounting for 21.9%. The majority, comprising 456 households, did not participate in agricultural extension, accounting for 78.1% of the surveyed households. Regarding payment timing, the group of farmers selling to processing/export companies receives payments on time more than the other groups of farmers. The income of farming households is relatively high, accounting for approximately 68.91% of total revenue for farmers selling to processing/export companies, 42.58% for those selling to purchasing agents, and 37.34% for those selling to local traders.

Table 2 presents the differences in profit-to-cost and profit-to-revenue ratios among households selling to various purchasing partners. The results indicate that farmers selling to processing/export companies achieve higher financial efficiency compared to those selling to local traders or purchasing agents. Specifically, these farmers achieve an average profit-to-cost ratio of 0.61 and a profit-to-revenue ratio of 0.37, both of which are the highest among the three groups. In contrast, the profit-to-cost ratio for those selling to purchasing agents is 0.56, and for local traders, it is 0.51. The corresponding profit-to-revenue ratios are 0.36 and 0.36, respectively. This superior efficiency is partly attributed to the lower average total production cost per hectare (63.39 million VND) and higher average revenue (104.76 million VND/ha) among farmers selling to processing/export companies. These farmers tend to apply more efficient production techniques and meet stricter input requirements, which enhances both productivity and profitability. The profit/cost ratios calculated for each group of farmers range from 0.51 to 0.61, reflecting the competitiveness of the purchasing partners. At the same time, the results also show that farmers selling to processing/export companies achieve higher yields, selling prices, and profits, while their production costs are lower than those of other groups due to the application of efficient production techniques. Small-scale farmers selling coffee to processors receive the highest prices but often struggle to trade with large companies due to substantial transaction-related costs. Moreover, most farmers operate in fragmented, small-scale conditions and are geographically distant. Farmers usually choose to transact with nearby traders and purchasing agents because they can better meet transportation needs and cover other incidental costs when selling through this channel. In contrast, processing/export companies are characterized by higher quality requirements and transportation costs. Given their financial constraints and lack of transport facilities, many farmers are discouraged from accessing far-off markets due to the prohibitive cost of transportation.

Table 2

Production Outcomes and Financial Efficiency among the Farmer Groups

Indicators	Farmers sell coffee to purchasing partners			P-value
	Local Traders (n = 201)	**Agents (n = 212)**	**Processors /exporters (n = 171)**	
Production indicators				
Yield (tons/ha)	2.89	2.92	3.02	0.001
Selling price (1,000 VND/kg)	34.97	34.98	35.08	0.564
Seed cost (1,000 VND/ha)	1,495.92	1,323.63	1,368.60	0.008
Fertilizer cost (1,000 VND/ha)	34,411.69	29,007.78	29,055.85	0.001
Pesticide cost (1,000 VND/ha)	6,568.40	8,531.60	6,848.89	0.000
Irrigation cost (1,000 VND/ha)	7,074.37	8,440.80	8,322.22	0.003
Labor cost (1,000 VND/ha)	17,379.10	15,733.21	15,696.49	0.191
Other costs (1,000 VND/ha)	2,664.5	2,125.05	2,285.99	0.000
Total cost (1,000 VND/ha)	69,580.75	65,021.75	63,390.88	0.008
Revenue (1,000 VND/ha)	100,292.51	101,189.021	104,756.98	0.001
Profit (1,000 VND/ha)	35,797.78	36,598.08	38,355.96	0.085
Efficiency indicators				
Profit/Cost ratio (Times)	0.51	0.56	0.61	0.094
Profit/Revenue ratio (Times)	0.36	0.36	0.37	0.078

Note. Comparison of the mean differences in production outcomes and financial efficiency between groups of farmers selling to local traders, purchasing agents, and processing/export companies. Survey data

4.3. Factors affecting farmers' decisions on choosing purchasing partners

Partner choice is a significant decision for farmers due to the varying features, profit margins, and transaction costs linked with each option. The results show that older farmers are more likely to sell to local traders and purchasing agents than to processing/export companies (Table 3). A one-unit increase in age leads to a 0.4% increase in the probability of choosing local traders, a 0.7% increase in the probability of choosing purchasing agents, and a 1.1% decrease in the likelihood of selecting processing/export companies. This finding suggests that older farmers tend to be hesitant to engage with companies due to their unfamiliarity with contracting procedures and formal transaction processes. Similar to Issah et al. (2022), this study reveals that older producers are more inclined to sell their goods through geographically nearby consumption channels. In contrast, Melese et al. (2018) suggest that older farmers may make better market output decisions at higher prices more easily than younger farmers.

According to the results, male household heads have a higher tendency to sell coffee to processing and export firms compared to female heads. Male household heads reduce the probability of choosing local traders by 5.3%, reduce the likelihood of selecting purchasing agents by 2.3%, and increase the probability of choosing processing/export companies by 7.5%.

Female household heads may find it easier to communicate and negotiate with local traders and purchasing agents than to deal with processing/export companies. This finding aligns with research by Carla et al. (2024), which suggests that male-headed households tend to accept risks; thus, they are more likely to seek out partners that provide higher returns. Likewise, education equips farmers with up-to-date knowledge about market supply, demand, and pricing, empowering them to make better choices when selecting business partners. An additional year of schooling for the household leads to a 0.6% decrease in the probability of choosing local traders, a 2.9% decrease in the probability of selecting purchasing agents, and a 3.6% increase in the likelihood of choosing coffee processing/export companies. The findings indicate that farmers with higher education levels are more likely to seek out better market channels, particularly favoring processing and export companies as preferred partners. This finding is consistent with studies by Melese et al. (2018), Safi et al. (2018), and Zeleke (2018), which suggest that education has a significant influence on the choice of processing companies. Likewise, the research by Tura and Hamo (2018) on tomatoes in Ethiopia found that education hurt the choice of traditional consumption channels. The impact of experience was found to have an inverse relationship with the ability to choose local traders and purchasing agents. With each additional year of experience, the probability of selecting local traders decreases by 0.5%, and the likelihood of choosing purchasing agents drops by 0.7%.

In comparison, the chance of selecting processing/export companies rises by 1.2%. This suggests that more experienced farmers have lower negotiation costs compared to less experienced partners due to their knowledge and experience. Similar to the findings of Safi et al. (2018), this study shows that an increase in farmers' experience leads to a higher probability of selecting processing companies.

Table 3

Marginal Effects of Factors Influencing the Decision to Choose Purchasing Partners

Variables	Traders (n = 201)	Agents (n = 212)	Processors/exporters (n = 171)
Age	0.004	0.007	-0.011
Gender	-0.053	-0.023	0.075
Education level	-0.006	-0.029	0.035
Experience	-0.005	-0.007	0.012
Farm size	-0.068	-0.036	0.104
Production risk	0.033	0.030	-0.063
Market risk	0.079	-0.027	-0.052
Payment time	-0.043	-0.032	0.075
Access to credit	-0.010	-.0.187	0.198
Agricultural extension	-0.044	-0.057	0.100
Market distance	0.002	0.030	-0.032
Specialization	-0.003	-0.001	0.004
Access to market information	-0.027	-0.040	0.067

Note. Survey data

Larger farmers tend to reduce their ability to choose local traders and purchasing agents. At the same time, farmers with large farming areas are also the group prioritized by processing/export companies for signing transactions. This finding is similar to that of Dlamini-Mazibuko et al. (2019), who suggest that farmers with more cultivated land have fewer options for traditional channels of support. Similarly, Kiprop et al. (2020) highlight that larger farmers are less likely to sell their products to nearby agents compared to smaller farmers. Farmers who engage in agricultural extension activities and learn new production techniques to minimize and cope with risks tend to choose to sell to coffee processing/export companies. These farmers aim to mitigate production and market risks by entering into contracts with coffee trading companies. This finding aligns with the research of Mgale and Yunxian (2020), which suggests that farmers with higher risk awareness are more likely to sell to partners at the farm gate than through other channels.

Timely payments reduce monitoring costs in transactions with purchasing partners. The group of farmers who receive payment immediately after selling their coffee is typically those who choose to work with processing/export companies. This can be attributed to the advantages that farmers derive from selling to these partners, such as quicker processing, larger purchases, and immediate payments. This finding is consistent with the research of Nguyen and Bokelmann (2019), which concludes that delayed payments of varying durations will affect farmers' choice of marketing channels. Additionally, access to credit decreases the probability of farmers choosing local traders by 1%, decreases the probability of selecting purchasing agents by 18.7%, and increases the likelihood of choosing processing/export companies by 19.8%.

Furthermore, access to credit facilitates farmers' ability to sell coffee to processing/export companies, but hinders their ability to sell coffee to local traders and purchase agents. This implies that it is necessary to strengthen the financial system to meet farmers' credit needs and support smallholder farmers in choosing better market outlets. In line with Melese et al. (2018), this study indicates that farmers with access to credit tend to sell their products to processing facilities more frequently.

Moreover, participation in training and agricultural extension programs increases farmers' likelihood of engaging in agricultural contracts. The probability of choosing local traders and purchasing agents decreases by 4.4% and 5.7%, respectively. In comparison, the likelihood of selecting processing/export companies increases by 10.0% with a one-unit increase in the level of agricultural extension participation. Consequently, policymakers and other key stakeholders should focus on investing in effective extension services, better marketing information systems, and infrastructure improvements to aid smallholder farmers. In line with the studies by Melese et al. (2018) and Zeleke (2018), this result indicates that extension services play a crucial role in enhancing farmers' production capabilities and access to market information, thereby increasing output and enabling them to select purchasing partners offering the best prices. The greater the market distance, the higher the likelihood of choosing local traders and buying agents. As the distance increases, the choice to sell to traders and purchasing agents becomes more favorable because these traders and agents are familiar with the area and can source coffee more easily. This finding aligns with the research of Teame and Yacob (2023) and Thakur et al. (2023), which indicates that as market distance increases, farmers are more likely to sell products at the farm gate.

The study also reveals that farmers who are highly specialized in coffee production are more inclined to sell their coffee to processing/export companies rather than local traders or purchasing agents. A 1% increase in coffee production specialization leads to a 0.3% decrease in the probability of selling to local traders and a 0.1% decrease in the probability of purchasing from agents, while increasing the likelihood of choosing processing/export companies by 0.4%. This finding is consistent with Zeleke's (2018) study, which suggests that households with higher incomes tend to sell their products to processors. The findings also indicate that having access to reliable market information can reduce transaction costs associated with identifying purchasing partners and finalizing farming contracts. This finding is comparable to the research of Mabuza et al. (2014) and Pham et al. (2019), which shows that producers who struggle to access price information are more likely to sell their products to partners near the farm gate.

The empirical findings provide robust evidence on how a combination of socio-economic and transaction cost-related factors significantly influences coffee farmers' choice of purchasing partners in the Central Highlands of Vietnam. These insights are critical for understanding the dynamics of coffee marketing in smallholder-dominated agricultural systems.

First, the age of the household head was found to have a positive influence on the likelihood of selling to local traders and purchasing agents. This may reflect the reluctance of older farmers to engage in formal contracting or distant transactions, possibly due to risk aversion or limited digital and logistical competencies. In contrast, younger farmers may be more adaptive and better equipped to work with processing/export companies, especially in contexts where digital traceability, quality standards, and formal agreements are required.

Education level emerged as one of the strongest predictors for selecting higher-value partners. Educated farmers are better positioned to access, interpret, and respond to market information, which supports their engagement with processing/export companies that offer better prices but demand higher product quality and consistency. This finding aligns with the Random Utility Theory, which posits that utility-maximizing farmers with better information and knowledge are more likely to make optimal decisions.

Experience in coffee production also positively influenced decision-making, reducing the likelihood of engaging with informal buyers. Experienced farmers may better understand the risks and long-term benefits of formal partnerships, including timely payments and support services from exporters and processors. Similarly, farm size showed a positive correlation with the choice of processing/export companies, indicating that larger-scale farmers are more attractive to these buyers due to their higher and more consistent output.

Access to credit and timely payment were both critical factors in transaction costs. Farmers who have access to finance are less dependent on immediate cash from local traders and are thus more likely to align with structured value chains that offer better returns. In particular, processing/export companies tend to provide more formalized transaction conditions, including prompt payments, which reduce enforcement costs and uncertainty.

Notably, participation in agricultural extension and access to market information were significant in promoting the selection of more profitable partners. These services help farmers improve production techniques and understand the requirements of formal markets. Moreover, specialization in coffee production was linked with a greater likelihood of choosing processing/export partners, suggesting that farmers who rely heavily on coffee for income are more likely to prioritize stable and higher-value buyers.

However, market distance remains a barrier to accessing processing/export companies. Farmers located far from central markets or industrial zones often incur high transportation and opportunity costs, which discourage them from engaging with formal buyers. This indicates the need for investment in rural infrastructure and local collection systems to bridge the geographic gap.

Overall, the results confirm that improving farmers' access to services (finance, extension, information), reducing transaction costs, and promoting specialization can significantly shift their partner preferences toward more formal and profitable marketing channels. These shifts are crucial for enhancing the incomes of smallholders and the sustainability of the coffee value chain in Vietnam.

5. Conclusions and recommendations

Coffee is Vietnam's most significant agricultural export product, making a substantial contribution to the economic and social development of the Central Highlands region. Currently, there are no policies in place to support farmers in consuming their own output, resulting in low efficiency in coffee production. The results provide empirical evidence on how socio-economic factors and transaction costs influence the decision-making process in selecting coffee purchasing partners. The factors of age and market distance have a positive impact on the choice of traders and purchasing agents. In contrast, the aspects of gender, experience, education level, farm size, payment time, extension service, specialization, access to credit, and access to market information have a negative impact. The level of awareness of production and market risks increases the probability of choosing local traders, implying that these farmers will face higher risks.

The lack of policy support also means that farmers must find markets for their products independently, resulting in unstable income. Therefore, the development of training and technical support programs for farmers helps improve management skills and promotes the marketing of agricultural products. Additionally, the formation of cooperatives or farmer groups can create leverage in negotiations with purchasing partners. The study also suggests that improving transportation and information infrastructure will facilitate easier access to markets for farmers. Policies are needed to strengthen the linkages between farmers and businesses, enhancing the productivity of coffee farming. This study focuses solely on the producers' perspective; thus, future research should consider the views of both buyers and sellers. Other studies should also analyze the opportunities and challenges faced by purchasing partners and their role in the coffee supply chain. Furthermore, research on the role of technology applications in connecting farmers with markets and purchasing partners will also be an essential direction for improving transparency and minimizing transaction costs.

SCIENTIFIC CONTRIBUTION

The manuscript clearly identifies a research gap; the manuscript extends or refines existing theories; the manuscript proposes a new theoretical or analytical model; the manuscript opens new directions for further research.

AUTHOR CONTRIBUTIONS

CRediT: **Ha Thi Thu Hoa**: Conceptualization, Methodology, Data Curation, Formal Analysis, Writing - Original Draft; **Nguyen Thuy Dung**: Investigation, Data Collection, Software, Validation, Writing - Review & Editing; **Le Thi Thanh Nha**: Supervision, Visualization, Validation, Writing - Review & Editing.

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All authors declare that they have no conflict of interest.

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