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Analysis of Comparative and Competitive Advantages of Arabica Coffee Farming in Kerinci Regency, Jambi Province Using the PAM (Policy Analysis Matrix) Method

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ABSTRACT

The purpose of this study is (1) to analyze the comparative and competitive advantages, and (2) to examine the impact of government policies on the competitiveness of Arabica coffee farming. The research was conducted in Kerinci Regency, Jambi Province, focusing on three Micro, Small, and Medium Enterprises (MSMEs): Koerintji Barokah Bersama, Alko, and Agro Tropic Nusantara. The duration of the study was eight months. The research objects include (1) private and social prices, revenues, incomes, and profits of the MSMEs; (2) the comparative and competitive advantages of Arabica coffee farming; and (3) the influence of government policy on the competitiveness of Arabica coffee farming. The data were collected from both primary and secondary sources. A total of 105 respondents were selected using simple random sampling. Data were analyzed descriptively and statistically using the Policy Analysis Matrix (PAM) method. The results showed that Arabica coffee farming in Kerinci Regency has both comparative and competitive advantages, with values of 0.21 and 0.24 respectively. The farm management system is highly profitable and efficient. However, the sustainability of Arabica coffee farming is not yet supported by government policies, particularly in terms of output prices, input prices, and input-output support. It is therefore recommended that government policies be established to protect prices in favor of farmers, improve access to agricultural credit, and facilitate the adoption of modern agricultural technologies.

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KEYWORDS: comparative advantage, *competitive*, *government policy, MSME, PAM.*

I. INTRODUCTION

Coffee, particularly Arabica coffee, is one of the backbone commodities of Indonesia's plantation sector, playing a strategic role in terms of exports, farmers' income, and the development of downstream industries such as Micro, Small, and Medium Enterprises (MSMEs) (Ministry of Agriculture, 2016). Indonesia ranks among the top four coffee-producing countries in the world, with Arabica coffee accounting for approximately 25 percent of the nation's total coffee exports (Ministry of Agriculture, 2025). Demand for Arabica coffee continues to rise, especially in global markets that value its distinct flavor profile, aroma, and superior quality compared to Robusta coffee. This growing demand presents significant opportunities for Arabica coffee farmers and MSMEs to expand their businesses—not only in upstream cultivation, but also in processing and marketing high-value end products. Moreover, Arabica coffee serves as a source of employment and income for farmers and other economic actors involved in cultivation, post-harvest processing, and distribution, contributing meaningfully to the coffee supply chain.

Arabica coffee is distinguished by its smooth flavor profile, high acidity, and aromatic complexity, making it the preferred variety across key international markets such as the United States, the European Union, Japan, and South Korea. Consumers in these regions increasingly prioritize quality and sensory experience, resulting in markedly higher demand for Arabica compared to Robusta. Recent data from the International Coffee Organization (ICO, 2025) indicate that global Arabica coffee exports reached approximately 86 million bags (with one bag equivalent to 60 kilograms) in the twelve months ending May 2025—an increase from

81.1 million bags recorded in the previous period. This upward trend reflects sustained growth in global Arabica demand. Concurrently, the United States Department of Agriculture (USDA, 2025), in its Coffee: World Markets and Trade report, projects worldwide coffee consumption for the 2024/2025 season to reach approximately 169.4 million bags. A substantial share of this growth is attributed to the premium coffee segment, particularly Arabica, which continues to exhibit rising consumption patterns in both developed and emerging economies.

The steadily rising demand for Arabica coffee over the years highlights its strategic position in the global market—not merely as a consumable commodity but as a high-value investment product in international trade. In recent years, major consumer countries such as the United States and European nations have continued to increase imports of Arabica coffee, particularly for specialty and third wave coffee markets. This preference is largely driven by Arabica's strong attributes in traceability, quality, and sustainable production practices, which are highly valued in premium coffee segments.

Given these conditions, the global market value for Arabica coffee beans continues to exhibit an expansive growth trend. According to a 2025 report from Coherent Market Insights, the total market value for coffee beans—including both Arabica and Robusta—is estimated at USD 58.5 billion, with Arabica accounting for approximately 69.3% of that figure. Market research firm Maximize Market Research (MMR) further projects that the coffee bean market will grow from USD 36.4 billion in 2024 to over USD 61.6 billion by 2032, reflecting an annual growth rate between 6% and 6.8%. This growth is largely driven by younger generations in Asian countries such as China, India, and Indonesia, who are increasingly embracing coffee consumption as part of an urban and modern lifestyle (Maximize Market Research, 2025).

Nevertheless, the rising demand for Arabica coffee presents notable challenges for producers, particularly within the upstream segment of the supply chain. Smallholder farmers continue to face barriers in productivity, climate change adaptation, price volatility, and limited access to advanced technologies and export markets. Furthermore, government policies aimed at Arabica coffee development remain insufficient, resulting in a disparity between the private price received by farmers and the social price that reflects the commodity's true economic value. This gap signals potential market distortions that may disadvantage producers, especially MSMEs with limited bargaining power. Consequently, there is a need for research that objectively measures the competitiveness of Arabica coffee, the impact of policy interventions, and the economic efficiency of coffee farming activities. Accordingly, this study aims to: (1) analyze the comparative and competitive advantages, and (2) evaluate the influence of government policies on the competitiveness of Arabica coffee.

II. METHODS

This research was conducted in Kerinci Regency, Jambi Province, involving three selected Micro, Small, and Medium Enterprises (MSMEs) engaged in Arabica coffee farming: (1) Koerintji Barokah Bersama; (2) Alko; and (3) Agro Tropic Nusantara. The study spanned eight months. The research objectives focused on: (1) privat cost, social cost, revenue, income, and profits of the MSMEs; (2) evaluating the comparative and competitive advantages of Arabica coffee farming; and (3) assessing the impact of government policies on farm-level competitiveness.

Data were sourced from both primary and secondary origins. Primary data were obtained through structured questionnaires, direct interviews, in-depth interviews, and Focus Group Discussions (FGDs). Secondary data were collected from official government reports, academic journals, and other relevant documentation. Data collection via questionnaires was conducted systematically from a purposively selected sample of respondents. Each MSME group contributed 35 members, totaling 105 respondents overall. The questionnaire method consisted of distributing written questions or statements to respondents to be answered independently. The analysis employed descriptive statistical techniques and the Policy Analysis Matrix (PAM) method (Monke & Pearson, 2005), which enabled evaluation of financial and economic performance and the effect of policy interventions on market efficiency and farm profitability.

Table 1. Policy Analysis Matrix (PAM) of the Comparative and Competitive Advantages of Arabica Coffee Farming in Kerinci Regency, 2024

Description	Revenue	Cost		Profit
		Input Tradable	Input non Tradable	
Privat Price	A	B	C	D
Social Price	E	F	G	H
Policy Impact	I	J	K	L

Source: Monke and Person (2005)

Notes:

Private Profit (D) = (A) – (B+C) Domestic Resource Cost Ratio (DRC) = G / (E - F)

Social Profit (H) = (E) - (F + G)
Output Transfer (I) = (A) - (E)
Input Transfer (J) = (B) - (F)
Factor Transfer (K) = (C) - (G)
Net Transfer (L) = (D) - (H) = I - (J + K)
Private Cost Ratio (PCR) = C / (A - B)
Nominal Protection Coefficient on Output (NPCO) = A / E
Nominal Protection Coefficient on Input (NPCI) = B / F
Effective Protection Coefficient (EPC) = (A - B) / (E - F)
Profitability Coefficient (PC) = D / H
Producer Subsidy Ratio (SRP) = L / E

III. RESULT AND DISCUSSION

Competitive and Komparative Advantage

The terms comparative advantage and competitive advantage are derived from the concept of competitiveness. Competitiveness refers to a product's ability to be produced at a more efficient cost compared to its competitors, or through unique features that provide higher added value in both domestic and international markets (Porter, M., 1985). The analysis of Arabica coffee farming in the research area examines domestic market competitiveness through the indicator of comparative advantage, known as the Domestic Resource Cost Ratio (DRCR). Furthermore, competitive advantage is analyzed using the private cost ratio, commonly referred to as the Private Cost Ratio (PCR).

The Domestic Resource Cost Ratio (DRCR) is a ratio that reflects the production system's capacity to finance domestic factors at their social prices. Economically, the DRCR value is used as a measure of efficiency and serves as an indicator of comparative advantage. The DRCR analysis is calculated by dividing the cost of non-tradable inputs at social prices by the difference between revenue and the cost of tradable inputs at social prices (Monke and Pearson, 2005).

The comparative advantage of Arabica coffee farming in Kerinci Regency can be observed through indicators such as the ratio of domestic resource utilization and profitability at social pricing. The total cost of non-tradable inputs was recorded at IDR 43,086,617, with a revenue margin of IDR 205,856,375 and tradable input costs amounting to IDR 2,232,190.15 (Table 2). The results of the Policy Analysis Matrix (PAM) indicate a DRCR value of less than one—specifically 0.21 (21%). This implies that Arabica coffee farming in Kerinci Regency is efficient in utilizing domestic resources and possesses a strong comparative advantage. In other words, the production activities rely on domestic factors effectively, making domestic Arabica coffee production more efficient than importing from abroad. Furthermore, the analysis revealed a positive social profit of IDR 160,537,567.85, indicating that Arabica coffee farmers in Kerinci Regency are able to generate profit without government intervention or policy support. These findings are consistent with previous studies conducted by Minh et al. (2016), Widhyapuri et al. (2018), Yusiska et al. (2019), and Handayani et al. (2020).

The Domestic Resource Cost Ratio (DRCR) value of 0.21 for Arabica coffee farming in the study area indicates that a sacrifice of 21 percent in non-tradable domestic resources is needed to enhance output value. This result reflects a significantly higher efficiency compared to the comparative advantage of the Java Preanger Arabica coffee commodity in Suntenjaya Village, Lembang Subdistrict, West Bandung Regency, which recorded a DRCR value of 0.49 (Poetra et al., 2022).

The PAM analysis (Table 2) indicates that the private revenue of Arabica coffee farming amounted to IDR 102,416,107, with a private profit of IDR 79,889,056. The competitive advantage of a system can be demonstrated by the ratio of total domestic factor costs (non-tradable) to the difference between revenue and tradable input costs. The private revenue of Arabica coffee farming was calculated by multiplying the production volume by the prevailing output price in the study area. The prices used in the competitive advantage analysis are actual prices or those that apply in the private market. The result of this PAM competitive advantage analysis is represented by the Private Cost Ratio (PCR), which stood at 0.24 (a value below one). This indicates that Arabica coffee farming in Kerinci Regency, as practiced by local farmers, possesses a competitive advantage and is financially efficient.

Table 2. Policy Analysis Matrix (PAM) Analysis of Arabica Coffee Farming in Kerinci Regency, 2024

Price Type	Revenue (Rp)	Cost (Rp)		Profit (Rp)
		Input Tradable	Input Non-Tradable	
Privat Price	102.416.107,00	1.900.697,17	24.427.748,17	79.889.056,00
Social Price	205.856.375,00	2.232.190,15	43.086.617,00	160.537.567,85
Policy Impact				-80.648.511,85

Based on the results of the Policy Analysis Matrix (PAM) calculation, Arabica coffee farming in Kerinci Regency demonstrates a Private Cost Ratio (PCR) of 0.24. This low PCR value reflects a high level of competitive advantage, indicating that farmers require only 24% of the output value to carry out production activities. Furthermore, the PAM analysis also reveals that the Private Profit

obtained by farmers is positive (greater than zero). This finding confirms that Arabica coffee cultivation in the region is financially viable, even under conditions where input and output prices are distorted due to government policies. In other words, Arabica coffee farming is not only competitive in the market but also provides direct economic benefits to local farming enterprises.

The findings of the Policy Analysis Matrix (PAM) analysis indicate that Arabica coffee cultivated in Kerinci Regency exhibits a higher level of comparative and competitive efficiency than that of other regions. For comparison, a study conducted by Yusiska et al. (2019) reported that Arabica coffee in Central Aceh had a Private Cost Ratio (PCR) of 0.77 and a Domestic Resource Cost Ratio (DRCR) of 0.66. These figures suggest that the competitiveness of coffee commodities in Central Aceh is relatively lower than in Kerinci Regency, both in terms of production cost efficiency and the utilization of domestic resources.

Poetra et al. (2022) stated that Arabica coffee of the Java Preanger variety cultivated in Suntenjaya Village, Lembang District, West Bandung Regency exhibited comparative and competitive advantage levels of 0.49 and 0.54, respectively. Meanwhile, the findings of a study by Rahmawaty et al. (2023) revealed that Arabica coffee produced in Buntu Batu, Bungin, and Baraka Districts—which are the main centers of Kalosi Arabica coffee commodities in Enrekang Regency, South Sulawesi Province—had a comparative advantage value of 0.37 and a competitive advantage value of 0.30.

A study conducted by Yuliati and Syamsurizaldi (2024) in Solok Regency indicated that Arabica coffee in the region had a Domestic Resource Cost Ratio (DRCR) of 0.48 and a Private Cost Ratio (PCR) of 0.41. Although both indicators remain below one, suggesting economic viability, their values are higher than those of Arabica coffee in Kerinci Regency, signaling pressure from input costs and output prices that hinder the optimalization of private economic gains. Setiawan et al. (2023) emphasized that several regions in Indonesia, despite exhibiting DRCR values below one—which reflect comparative advantage—still show PCR values above one, indicating a lack of competitive strength. This condition is typically attributed to price distortions or market inefficiencies.

These findings are consistent with the study by Minh et al. (2016) in Vietnam, where the regions of Dak Lak and Lam Ha continued to demonstrate comparative advantage (DRCR < 1) across various scenarios, despite being vulnerable to dynamics such as price fluctuations, domestic costs, the Real–USD exchange rate, and inflation (Lordemann et al., 2021). Furthermore, Amelia et al. (2025) emphasized that the success of MSMEs in competing within both domestic and international markets is strongly influenced by supply-side factors, particularly product quality and freshness, which serve as key competitive strengths.

The studies by Setiawan et al. (2023), Minh et al. (2016), Lordemann et al. (2021), and Amelia (2025) form the basis for the recommendations of Rahardja and Pangestu (2024), which highlight the need for a simultaneous analysis of DRCR and PCR indicators. Competitiveness studies in the context of digital market integration and e-commerce are increasingly relevant, as competitive advantage is influenced by developments in information technology and digital logistics. Market distortions and shifts in efficiency structures resulting from digital transformation further underscore the urgency of adopting an integrated approach to comprehensively understand commodity competitiveness.

The study by Amrina et al. (2024) on the evaluation of the Arabica coffee rejuvenation program in Garut Regency also revealed noteworthy results. Although the program has achieved efficiency, its PCR value remains below that of Arabica coffee in Kerinci Regency. Using the Policy Analysis Matrix (PAM) model, the program yielded a PCR of 0.36 and demonstrated considerable social profitability. These findings indicate that input support—such as superior seedlings, cultivation training, and price incentives—can enhance production efficiency and improve farmers' competitiveness. Nevertheless, the low value of the Nominal Protection Coefficient on Output (NPCO) suggests that output price policies have not sufficiently protected producers from market price pressures.

The final results of the Policy Analysis Matrix (PAM) analysis reveal a strong correlation between the Private Cost Ratio (PCR) and the Domestic Resource Cost Ratio (DRCR). A high level of competitive efficiency within the production system is reflected in a low PCR value, which correlates with high social economic efficiency as indicated by a low DRCR value. This evidence suggests that policies and production practices that enhance efficiency in actual (private) markets tend to represent efficiency from a social or national economic perspective. The strong correlation between these two indicators underscores the importance of simultaneously considering both private and social dimensions in competitiveness enhancement strategies. These dimensions are closely interconnected and mutually reinforcing. This observation is consistent with the studies conducted by Boto et al. (2021), Rahmawaty et al. (2023), and Aminudin et al. (2024).

The Impact of Government Policy

Government policies in the economic sector have the potential to generate both positive and negative effects. Positive effects arise when such policies successfully support domestic producers in enhancing profitability through access to export markets. Conversely, negative effects occur when the implemented policies become obstacles to the development of farming enterprises for specific commodities. The evaluation of policy impacts is conducted using three main indicators: output policy, input policy, and input-output policy. One example can be seen in the results of the Policy Analysis Matrix (PAM) related to output policy. The impact of policy on output is measured using the Transfer Output (TO) value and the Nominal Protection Coefficient on Output (NPCO). Based on the PAM analysis, the TO value was recorded at negative Rp103,440,268, and the NPCO was 0.50.

Private revenue refers to the income received by farmers in the study area, while social revenue represents the income derived from the shadow prices of inputs multiplied by the production output of Arabica coffee farming in the region. Transfer Output (TO) is the difference between private revenue and social revenue. The TO value for Arabica coffee farming, based on the PAM analysis, was found to be negative (TO < 0), amounting to Rp103,440,268. This indicates that the private price of Arabica coffee output is lower than its social price, implying the existence of an implicit tax on Arabica coffee farming in Kerinci Regency. This condition results in a transfer of incentives from producers to consumers, whereby consumers pay a price lower than what should be paid, and producers receive a price lower than what they should earn.

The Nominal Protection Coefficient on Output (NPCO) in the Policy Analysis Matrix (PAM) is derived by comparing revenue based on private prices with revenue based on social prices. For Arabica coffee farming in Kerinci Regency, the NPCO value was recorded at less than one (NPCO < 1), specifically 0.4975. This figure indicates that the private price received by farmers is significantly lower than the corresponding social price. Such a condition reflects the absence of government protection policies for Arabica coffee commodities produced in the region. With farmers receiving only 49.75% of the social price value, they are not provided with sufficient incentives to stimulate increased production. This situation also signifies the lack of output transfers from consumers to producers, resulting in producers receiving prices below the level they would obtain under an efficient market condition.

Government policy applies not only to output prices but also to input prices. Forms of government intervention in inputs include subsidies and taxes, which are implemented with the expectation that producers can optimize resource utilization and receive protection for domestic production. Indicators that can be used to assess government intervention in production inputs include the value of Transfer Input (TI), the Nominal Protection Coefficient on Input (NPCI), and the Transfer Factor (TF).

Transfer Input (TI) is an indicator that reflects the difference between the cost of tradable inputs based on private prices and social prices. A positive TI value (TI > 0) indicates that the social price of imported inputs is higher than the private price, meaning that producers pay a relatively higher cost for these inputs. In addition to TI, another indicator used to assess the presence of government subsidies on production inputs is the Nominal Protection Coefficient on Input (NPCI). NPCI is calculated as the ratio between the cost of tradable inputs based on private prices and the cost based on social prices. The NPCI value provides insight into the level of incentives granted by the government for tradable inputs in the production process.

Government policy can also be analyzed through the Transfer Factor (TF), which measures the extent of subsidies on non-tradable inputs. The TF value is obtained from the difference between the cost of non-tradable inputs based on private prices and social prices. A positive TF value (TF > 0) indicates a negative subsidy, meaning that producers pay more than the social cost. Conversely, a negative TF value (TF < 0) reflects a positive subsidy, whereby the government provides support for non-tradable inputs by reducing the cost borne by producers.

Based on the analysis using the Policy Analysis Matrix (PAM) approach, the Transfer Input (TI) value for Arabica coffee farming in Kerinci Regency was recorded at negative Rp331,492.98. This negative TI value indicates the presence of government subsidies for tradable inputs, meaning that farmers do not bear the full cost of purchasing these inputs. Although the amount of subsidy is relatively small, the policy still provides benefits to producers, particularly in the procurement of fertilizers such as Urea, TSP, SP36, NPK, and Phonska. Through these subsidies, farmers gain easier access to production inputs without incurring additional costs, ultimately enhancing the efficiency of farming operations.

One of the indicators used to assess the presence of government subsidies for Arabica coffee farming is the Nominal Protection Coefficient on Input (NPCI). Based on the analysis using the Policy Analysis Matrix (PAM) method, the NPCI value was found to be 851.49, which is significantly greater than one. This value indicates that government policy is not protective toward tradable inputs. Consequently, producers do not receive subsidies for tradable inputs and must purchase them at prices higher than their social value. This condition reflects that the subsidy mechanism for tradable inputs is either ineffective or poorly regulated. As a result, Arabica coffee farmers in Kerinci Regency face input prices that are higher than those that would prevail under an efficient market condition.

Another indicator of government policy analyzed through the Policy Analysis Matrix (PAM) approach is the Transfer Factor (TF). Based on the analysis, the TF value for Arabica coffee farming in Kerinci Regency was recorded at negative Rp18,658,689. This negative TF value indicates a positive subsidy from the government for non-tradable (domestic) inputs. In other words, the domestic input prices paid by farmers are lower than their social prices, reflecting government support in the form of subsidies for local production factors. These subsidies may include the provision of high-quality seedlings, agricultural equipment assistance, and other technical support that directly reduces the domestic cost burden borne by farmers.

This finding contrasts with the results of several previous studies, such as those reported by Kurniawan et al. (2021) and Tanjung et al. (2023), in which the TF value was found to be positive. This discrepancy highlights the variation in subsidy policy implementation across regions or time periods, as well as the potential misalignment in the execution of subsidy programs that may affect the effectiveness of support provided to farmers.

Finally, the impact of government policy on input-output can be assessed using indicators such as the Effective Protection Coefficient (EPC), Net Transfer (NT), Profitability Coefficient (PC), and the Producer Subsidy Ratio. The EPC value for Arabica

coffee farming in Kerinci Regency was recorded at 0.4936 (EPC < 1). This result indicates that government policies related to input and output subsidies have not been effectively implemented for Arabica coffee farming in the region. Furthermore, the Net Transfer (NT) value was negative (NT < 0), amounting to (-)Rp80,648,511.85. This suggests a reduction in producer surplus, implying that government policy does not provide sufficient incentives to increase production. The profit obtained under government intervention is Rp80,648,511.85/Ha lower than the profit that would be achieved in the absence of such intervention.

Another government policy indicator is the Profitability Coefficient (PC). The PC is the ratio between private net profit and social net profit, and it reflects the impact of government policy on the profits received by farmers. Based on the PAM analysis, the PC value was found to be 0.50 (PC < 1). This indicates that government policy does not provide sufficient incentives to producers, as the private profit received by farmers is lower than the corresponding social profit. Arabica coffee farmers in Kerinci Regency receive only 50% of the profit they should earn, effectively losing the remaining 50% due to policy distortions. The next indicator of policy impact on input-output is the Subsidy Ratio to Producers (SRP). The SRP value for Arabica coffee farming in Kerinci Regency was recorded at 0.39 and is negative (SRP < 0). This finding suggests that the prevailing government policy in Kerinci Regency causes Arabica coffee farmers to incur production costs that exceed the social cost of production—specifically, 39% higher than the socially efficient level.

IV. CONCLUSION DAN RECOMMENDATION

The PAM-based analysis reveals that Arabica coffee farming in Kerinci Regency demonstrates both comparative and competitive advantages, with respective values of 0.21 and 0.24. These figures indicate that the production system is not only profitable but also highly efficient—surpassing the efficiency levels observed in Arabica coffee farming in other regions.

However, government policy interventions have yet to yield positive impacts on farmers' profitability. This is evident from the indicators related to output policies, which show no significant benefit to producers. Similarly, input-related policy indicators—such as Input Transfer (TI), Nominal Protection Coefficient on Inputs (NPCI), and Factor Transfer (TF)—have not provided substantial advantages, with the exception of TF, which shows marginal benefit.

Furthermore, integrated input-output policy indicators—including the Effective Protection Coefficient (EPC), Net Transfer (NT), Profitability Coefficient (PC), and the Producer Subsidy Ratio (PSR)—suggest that current policy frameworks are not favorable to farmers. Recommendation: To enhance the competitiveness and sustainability of Arabica coffee farming in Kerinci, it is imperative to implement government policies that ensure price protection mechanisms favoring farmers, improve access to agricultural credit, and facilitate the adoption of modern agricultural technologies.

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