

COST MANAGEMENT AND SUSTAINABLE PROFIT PLANNING IN THAI SPECIALTY COFFEE ENTERPRISES*

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Abstract

This study investigates the production cost structures and profit-planning strategies of smallholder specialty coffee farmers in Mae on District, Chiang Mai, Thailand, to enhance enterprise sustainability. Employing a mixed methods approach, primary data were collected through quantitative cost analyses and qualitative semi-structured interviews with 30 farmers engaged in premium Arabica cultivation.

The empirical findings reveal that the average production cost of specialty-grade fresh coffee cherries is 78 THB per kilogram, with variable expenses such as organic fertilizers and harvesting labor accounting for much of the cost. By implementing an estimated cost accounting system alongside a strategic markup pricing model, farmers can achieve an optimal 35 percent net profit margin at an average market price of 120 THB per kilogram. Scenario simulations further demonstrate the financial viability of maintaining target profit

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margins at 25, 50, and 75 percent. Ultimately, integrating these financial management tools with Thailand's BCG economy framework and Sufficiency Economy Philosophy establishes robust development guidelines. This alignment fosters long-term resilience within the specialty coffee value chain.

Keywords: Production Cost Analysis, Profit Planning Strategies, Specialty Coffee Economics, Sustainable Value Creation, Markup Pricing Model

Introduction

Thailand has emerged as a significant contributor to the global coffee industry, ranking as the third-largest producer in Southeast Asia after Vietnam and Indonesia and nineteenth worldwide (Department of Business Development, 2025). Coffee cultivation in Thailand is primarily divided between two species: *Coffea canephora* (Robusta) and *Coffea arabica* (Arabica), each adapted to distinct agroecological zones. Robusta coffee is predominantly cultivated in the humid lowland regions of southern provinces, including Surat Thani, Chumphon, and Nakhon Si Thammarat, at elevations ranging from sea level to approximately 1,050 meters. These areas benefit from high temperatures and abundant rainfall, which support large-scale and commercially oriented production systems.

In contrast, Arabica coffee is cultivated in the cooler, mountainous regions of northern Thailand, particularly in Chiang Mai, Chiang Rai, and Nan Provinces, at elevations between 800 and 1,500 meters above sea level. These highland environments, characterized by fertile soils, moderate temperatures, and consistent precipitation, are highly conducive to producing premium-quality Arabica beans with desirable sensory attributes, including complex aroma, balanced acidity, and refined flavor profiles. According to the National Food Institute (2025), Thailand's total coffee cultivation area reached approximately 281,092 rai (44,975 hectares), with 259,449 rai under active production. The southern region accounted for 73.56% of total cultivated area, while the northern

region comprised 25.82% (72,570 rai). Despite its smaller cultivation area, the northern region demonstrated significantly higher productivity, averaging 151 kilograms per rai compared to 77 kilograms per rai in the South. This productivity differential can be attributed to favorable environmental conditions, improved farm management practices, and the increasing adoption of sustainable agricultural systems among northern smallholder farmers (Trade Policy and Strategy Office, 2023).

Over the past decade, Thailand's coffee industry has undergone a notable structural transformation from a volume-oriented production model toward a value-driven and sustainability-focused paradigm. Arabica coffee from the northern highlands, particularly Chiang Mai and Chiang Rai, has gained international recognition for its distinctive cup profiles and environmentally responsible production practices. Highland farmers, many of whom belong to ethnic minority communities, have increasingly adopted agroforestry systems, shade-grown cultivation, and organic farming techniques. These approaches not only enhance coffee quality but also contribute to biodiversity conservation, soil fertility improvement, and watershed protection. As a result, specialty coffee has emerged as a strategic pathway for improving rural livelihoods, strengthening ecological sustainability, and positioning Thailand as a producer of traceable, high-value agricultural commodities (Department of Business Development, 2025).

This transformation has been supported by coordinated efforts from government agencies and development organizations. The Department of Agricultural Extension (2024), in collaboration with the United Nations Development Programme (UNDP) and local cooperatives, has implemented initiatives aimed at enhancing sustainable cultivation practices, improving post-harvest processing, strengthening quality control systems, and expanding market access. These programs have facilitated compliance with Specialty Coffee

Association (SCA) standards, thereby improving product consistency and enabling producers to access premium international markets. Furthermore, capacity-building initiatives such as training in fermentation techniques, quality grading, and sensory evaluation have strengthened the technical competencies of smallholder farmers, allowing them to participate more effectively in high-value specialty markets (Department of Business Development, 2025).

Thailand's coffee sector now exhibits a dual structural configuration: large-scale Robusta production in the South and smallholder-based, high-quality Arabica cultivation in the North. While the southern industry primarily supplies raw materials for domestic consumption and industrial processing, the northern sector increasingly caters to the expanding specialty coffee market, where consumers prioritize traceability, ethical sourcing, and superior quality. This transformation reflects broader global consumption trends, particularly among younger and environmentally conscious consumers. The growth of boutique roasters, direct-trade relationships, and specialty café culture has further positioned northern Thailand as an emerging hub for specialty coffee in Asia (Trade Policy and Strategy Office, 2023).

Mae On District in Chiang Mai Province exemplifies this transition toward high-value and sustainable coffee production. Its unique combination of elevation, microclimatic conditions, and soil composition provides an optimal environment for cultivating specialty-grade Arabica coffee. Within this context, the Mae On Specialty Coffee Growers Group has emerged as a model cooperative that integrates traditional agricultural knowledge with modern post-harvest innovations, including controlled fermentation, honey and natural processing methods, and precision drying systems. These innovations have significantly enhanced both coffee quality and market competitiveness. In addition to primary production, the cooperative has diversified its economic activities through eco-tourism and agrotourism initiatives, aligning with Thailand's Bio-Circular-Green (BCG) Economic Model. This model emphasizes sustainable resource utilization,

environmental stewardship, and inclusive economic development. The Mae On group's integrated approach combining agriculture, tourism, and environmental conservation demonstrates how community-based enterprises can simultaneously achieve economic viability and ecological sustainability.

Despite these advancements, Thailand's specialty coffee sector continues to face several structural and operational challenges. Coffee production remains resource-intensive, with farmers exposed to rising input costs, climate variability, and limited access to premium export markets. These constraints underscore the critical need for systematic cost management and strategic profit planning to enhance financial performance and ensure long-term sustainability. Effective cost management enables producers to identify inefficiencies, optimize resource allocation, control expenditures, and determine break-even points capabilities that are essential for maintaining competitiveness in volatile global markets (Lanen et al., 2023).

Moreover, empirical research on production costs, profitability, and value-chain efficiency among smallholder coffee cooperatives in northern Thailand remains limited. Many farmers lack formal accounting systems and financial management frameworks, restricting their ability to monitor costs, evaluate efficiency, and make informed investment decisions. This gap in financial literacy and record-keeping undermines productivity and reduces resilience to market fluctuations. Addressing these limitations is essential for strengthening the competitiveness and sustainability of Thailand's specialty coffee sector (Rattanamanee et al., 2017).

In this context, the Mae On Specialty Coffee Growers Group provides a valuable case study for analyzing production efficiency and developing integrated management strategies that balance economic, environmental, and social objectives. The cooperative's participatory governance model offers important insights into how localized knowledge, cost management practices, and

sustainability principles can be effectively integrated to enhance community resilience and competitiveness. Furthermore, the application of Thailand's Sufficiency Economy Philosophy (SEP) provides a conceptual framework for promoting moderation, rational decision-making, and resilience—principles that closely align with long-term sustainable agricultural development (Khaw-ngern et al., 2021).

Objectives

To examine cost management practices and sustainable profit planning in Thai specialty coffee enterprises to enhance financial efficiency, strengthen long-term sustainability, and improve the competitiveness of smallholder coffee producers.

Literature Review

1) Concept of Production Costs. Production costs refer to the total expenditures incurred in the process of producing goods or services, encompassing all resources required to generate economic value, including materials, labor, capital, and overhead. According to Nuidod and Chanprasit (2021), production costs can be classified based on cost behavior into two primary categories: fixed costs and variable costs. Fixed costs are expenditures associated with long-term production inputs that remain constant regardless of output levels. In coffee production, these include the depreciation of machinery, drying facilities, storage infrastructure, and processing equipment. Fixed costs may be further divided into cash fixed costs, such as land rent and insurance premiums, and non-cash fixed costs, such as depreciation and the opportunity cost of owned assets. In contrast, variable costs fluctuate directly with production volume. These include expenses for coffee seedlings, organic fertilizers, agrochemicals, electricity, and labor. Similar to fixed costs, variable costs can be

categorized into cash variable costs, which involve direct monetary payments, and non-cash variable costs, such as the imputed value of family labor or the use of self-produced inputs. The relationship between these cost components can be expressed through the fundamental equation: $\text{Total Cost} = \text{Fixed Cost} + \text{Variable Cost}$. This conceptual framework provides the foundation for evaluating production efficiency and financial performance. A clear understanding of cost structures enables producers to identify inefficiencies, optimize resource allocation, and enhance profitability (Abbas & Fadilah, 2024; Nuidod & Chanprasit, 2021).

2) Concept of Production Cost Analysis. Production cost analysis is a critical tool for assessing operational efficiency and profitability. It involves the systematic evaluation of input costs, pricing strategies, break-even points, and profit margins to support informed managerial decision-making. In the context of this study, production cost analysis is applied to identify effective cost management strategies for the Premium Coffee Growers Group in Mae On District, Chiang Mai Province. As noted by Lanen et al. (2023), production cost analysis integrates quantitative accounting techniques with qualitative insights derived from interviews and participatory methods. This mixed-methods approach enables a comprehensive understanding of cost behavior and managerial practices. Key analytical models include the unit production cost formula, which aggregates direct materials, direct labor, and manufacturing overhead, and the break-even analysis, expressed as $\text{revenue} - \text{total cost} = \text{profit}$, or alternatively, $\text{revenue} - \text{variable costs} = \text{profit}$. Pricing strategies also play a central role in profit planning. The total cost pricing method determines selling prices by incorporating all production costs and applying a markup percentage to achieve a desired profit margin. This approach ensures cost recovery and financial stability, particularly for smallholder enterprises (Lanen et al., 2023; Stoenoiu & Cristea, 2018). Conversely, market-based pricing

focuses on external factors such as consumer demand, competition, and perceived value. This strategy enables producers to adjust prices dynamically and capture premium value for differentiated products. For specialty coffee producers, combining cost-based and market-based pricing enhances both flexibility and competitiveness (Abdullahi et al., 2017; Thongpracha & Vetchagool, 2022).

3) Concept of Enhancing Competitive Advantage through Value Creation. The concept of competitive advantage through value creation emphasizes the importance of increasing both the intrinsic and perceived value of products and services. In a knowledge-driven economy, success is increasingly determined by innovation, creativity, and intellectual capital rather than reliance on natural resources alone (Khaw-ngern et al., 2021). Value creation is achieved through product differentiation, quality enhancement, and the development of unique characteristics that distinguish an enterprise from its competitors. In the specialty coffee sector, value creation strategies include developing distinctive flavor profiles, adopting sustainable and environmentally friendly production methods, and ensuring traceability and transparency throughout the value chain. These practices enable producers to position themselves as price-setters rather than price-takers, thereby enhancing profitability and market resilience. Moreover, the Department of Business Development (2025) conceptualizes development as the expansion of human capabilities and quality of life, extending beyond purely economic measures. From this perspective, value creation contributes not only to financial performance but also to social well-being and environmental sustainability.

4) Concept of Applying the Sufficiency Economy Philosophy (SEP). The Sufficiency Economy Philosophy (SEP), initiated by His Majesty King Bhumibol Adulyadej, provides a holistic framework for sustainable development. It is grounded in three core principles: moderation, reasonableness, and self-immunity, which guide decision-making at individual, organizational, and

community levels (Khaw-ngern et al., 2021). SEP emphasizes prudent financial management, discouraging excessive risk-taking while promoting resilience through diversification and careful planning. Beyond economic considerations, SEP incorporates ethical, social, cultural, environmental, and technological dimensions. It promotes moral integrity, social responsibility, community cooperation, and the preservation of local knowledge and cultural identity. Environmentally, it advocates sustainable resource use and ecological balance, while technologically, it encourages the adoption of appropriate and context-specific innovations. When applied to agricultural enterprises such as the Mae On Specialty Coffee Growers Group, SEP provides a practical framework for integrating financial discipline, environmental stewardship, and social cohesion. This approach enhances resilience to market volatility, supports equitable development, and aligns with broader national and global sustainability agendas, including the United Nations Sustainable Development Goals (SDGs). Ultimately, SEP serves not only as an economic strategy but also as a guiding philosophy that balances profitability with social equity and environmental responsibility, ensuring long-term sustainability for rural communities and agricultural value chains.

Methodology

This study employed a semi-structured interview method as the primary tool for qualitative data collection. An extensive review informed the design of the interview questions, drawing on relevant academic literature to ensure both theoretical coherence and contextual applicability. Grounded in key concepts from management and accounting, the research team collaborated with subject-matter experts to identify essential themes and analytical variables aligned with the study's objectives. The interview protocol was intentionally open-ended, allowing flexibility for follow-up inquiries and deeper exploration of participants'

experiences. This structure enhanced both the richness and credibility of the qualitative data by encouraging respondents to share detailed reflections on their production practices and management strategies.

The interview covered the fundamental dimensions of production cost analysis, including revenue structure, total production costs, fixed and variable costs, profit margins, direct raw material expenses, direct labor costs, and other operating expenses. In addition, the questions examined strategies for sustainable development among specialty coffee farmers in Mae On District, Chiang Mai Province. Particular emphasis was placed on practices that enhance the quality and profitability of Arabica coffee, with attention to post-harvest management, production efficiency, and value chain integration from seed cultivation through processing and distribution.

To promote active engagement and knowledge exchange, interviews were conducted using a workshop-based format. This participatory approach fostered dialogue among coffee producers, enabling participants to share best practices, identify challenges, and collaboratively develop innovative solutions for sustainable coffee production. The interactive format also facilitated close collaboration between researchers and local stakeholders, ensuring that the findings accurately represented the lived experiences and practical insights of the farming communities.

The study population comprised specialty coffee farmers residing in Mae On District, Chiang Mai Province. The sample included farmers from three highland communities, Ban Pok, Ban Khun On, and Ban Mae Wong, selected for their established reputation in producing high-quality Arabica coffee under favorable ecological conditions. Participants were chosen through purposive sampling, ensuring that only individuals directly engaged in coffee production, processing, and marketing were included. This non-probability sampling strategy provided a focused, context-specific understanding of production systems, management practices, and sustainability initiatives in the region. By integrating

expert-informed design with participatory engagement, the methodological framework effectively supported the study's objective of identifying actionable strategies to strengthen the economic resilience and environmental sustainability of smallholder coffee producers in northern Thailand (Department of Business Development, 2025, Groeneweg, 2024).

This study was conducted in accordance with ethical research standards and approved by the Human Research Ethics Committee of Chiang Mai Rajabhat University (Certification No. IRBCMRU 2023/158.24.04), granted on May 18, 2023. The researchers extend their appreciation to the committee for their oversight and guidance in maintaining the integrity and ethical compliance of the research process.

Results

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Results

Analysis of Production Costs for Profit Planning of Specialty Fresh Coffee Beans. This study analyzes production costs and profit planning based on data collected from 30 specialty coffee farmers in Mae On District, Chiang Mai Province. The total cultivated area covered 172 rai, with approximately 51,700 coffee trees under production. During the 2023 cultivation cycle, the group produced 9,970 kilograms of specialty-grade fresh coffee beans. The total production cost amounted to 462,000 Baht, reflecting a comprehensive cost structure that includes both input and operational expenditures. Major cost components consisted of fertilizer (192,500 Baht), coffee processing (120,000 Baht), fuel (77,600 Baht), and harvesting labor (43,000 Baht), alongside smaller expenses such as agricultural equipment, seed procurement, transportation, and maintenance.

An analysis of average production data reveals that each farmer managed approximately 5.73 rai, with a planting density of 301 trees per rai. The average yield of fresh coffee cherries was 5.97 kilograms per rai. The mean production cost per farmer was 2,687 Baht, with fertilizer and processing representing the largest cost shares, followed by fuel and labor. These findings highlight the cost-intensive nature of specialty coffee production, particularly in relation to input use and post-harvest processing requirements.

To provide a more accurate estimation of total economic cost, additional indirect costs were incorporated. These include the opportunity cost of capital, calculated at an annual interest rate of 7% (56.84 Baht), equipment depreciation

(453.05 Baht), and the opportunity cost of equipment use (20.81 Baht). The inclusion of these non-cash costs offers a more comprehensive assessment of production efficiency and financial performance (Department of Business Development, 2025).

Production cost calculation for profit planning integrates all cost components, including direct materials, labor, and overhead, to determine the true cost of transforming fresh coffee cherries into specialty-grade products. The classification of costs into fixed and variable categories provides a critical framework for evaluating profitability, identifying inefficiencies, and supporting informed decision-making.

Overall, the findings demonstrate that systematic cost analysis is essential for improving financial planning and enhancing the economic resilience of smallholder coffee producers. By understanding cost structures and optimizing resource allocation, farmers and cooperatives can develop effective pricing strategies and strengthen their competitiveness within the specialty coffee market in northern Thailand (Department of Business Development, 2025).

Table 1 Calculation of the Average Cost of Specialty Raw Coffee Beans per Rai for the Group of Specialty Coffee Farmers in Mae On District, Chiang Mai.

Calculated Plot Average of the Group (1 Rai)	Unit	
1) Expenses		
1.1) Labor Costs	98.26	Baht
Soil preparation and cultivation maintenance for the coffee planting area	3.49	Baht
Replacement of old coffee trees with new coffee seedlings	61.05	Baht
Maintenance of coffee plantation	5.81	Baht
Harvesting and transportation	27.91	Baht

Calculated Plot Average of the Group (1 Rai)	Unit	
1.2) Material Costs	2,337.	Baht
	79	
Materials for planting specialty coffee	11.63	Baht
Fertilizers	1,119.	Baht
	19	
Pesticide and herbicide costs	58.14	Baht
Other materials (fuel, equipment repair, and processing costs	1,148.	Baht
	84	
1.3) Opportunity Cost of Investment*	56.84	Baht
1.4) Depreciation of Equipment**	453.0	Baht
	5	
1.5) Opportunity Cost of Equipment***	20.81	Baht
2) Expected Yield for Harvest from This Plot	57.97	Kilograms
3) Expected Selling Price	120.0	Baht per
	0	kilogram
4) Total Production Cost per Rai for Specialty Raw Coffee Producers	2,575.	Baht per rai
	54	

**The interest rate of 7% per year as of 2024 is applied to the labor costs and material costs, multiplied by the duration (4 months and 2 production cycles).*

*** The average values were calculated based on data reported by the Department of Business Development (2025), with a value of 79.02 Baht per rai, multiplied by the average cultivation area of the group in rai.*

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Pricing Determination Based on Estimated Cost Accounting Systems.

The selling price of specialty-grade coffee was determined using an estimated

cost accounting system supported by verifiable financial documentation, including cash bills, receipts, and transaction records. All financial activities were systematically recorded in an income journal within a management information system, with source data accessible via a web-based platform (www.smepil.com/ku) (Chaiyo et al., 2023). Revenue and expenditure entries were processed digitally, ensuring transparency, traceability, and real-time financial monitoring. This system enhances financial control and enables accurate cost assessment for both operational and strategic decision-making.

Pricing and profit planning were based on the cost structure of premium-grade raw coffee beans, incorporating both production and administrative expenses. The markup pricing method was applied to establish selling prices that ensure profitability while maintaining competitiveness in the specialty coffee market. The pricing framework follows standard cost-based principles, where the selling price is determined by adding a markup percentage to the total production cost. The markup rate reflects the desired profit margin combined with selling and administrative expenses relative to total cost.

This model was developed through a participatory case study involving specialty coffee farmers in Mae On District, Chiang Mai Province. Data were derived from semi-structured interviews and focus group discussions with members of the Mae On Specialty Coffee Growers Group, ensuring that pricing strategies reflect actual production conditions and collective decision-making processes. The model assumes profit margins calculated as percentages of total production costs, with target profit rates set at 25.00%, 50.00%, and 75.00%.

Empirical findings indicate that the average production cost of specialty grade raw coffee beans was 2,575.54 Baht per rai, or 44.43 Baht per kilogram. Raw material costs for premium-grade coffee averaged 53.06 Baht per rai, while selling and administrative expenses were approximately 500.00 Baht per rai, equivalent to 8.63 Baht per kilogram. These cost components were used to calculate

markup percentages and determine corresponding selling prices under different profit scenarios.

This pricing framework provides a practical and flexible financial management tool for smallholder coffee producers and cooperatives. By integrating estimated cost accounting with participatory data collection, it ensures that pricing decisions are grounded in empirical cost structures while aligning with profitability targets and market dynamics. Consequently, the approach supports sustainable income generation, enhances financial planning capacity, and strengthens competitiveness in the specialty coffee sector.

Table 2 Selling Price Determination for Premium-Grade Raw Coffee Beans per Kilogram

Item	Profit Margin		
	25.00%	50.00%	75.00%
Cost of Premium-Grade Coffee Beans (per Kg.)	44.43	44.43	44.43
Desired Profit (%)	14.49	28.99	57.97
Selling and Administrative Expenses	8.63	8.63	8.63
Mark Up (%)	16.89	41.03	83.27
Selling Price	84.44	123.08	194.30

Profit Estimation from Premium-Grade Coffee Bean Sales. When premium-grade coffee beans are sold at targeted profit margins of 25.00%, 50.00%, and 75.00%, the total sales revenue amounts to 14,492.50 Baht. The total production cost associated with these premium-grade beans is 4,894.43 Baht. Correspondingly, the operating profits generated under each profit margin scenario are 7,134.06 Baht, 9,598.07 Baht, and 11,262.77 Baht, respectively. After deducting selling and administrative expenses of 500.00 Baht, the resulting earnings before interest and taxes (EBIT) are 6,634.06 Baht, 9,098.07 Baht, and

10,762.77 Baht, respectively. These figures, summarized in Table 3, demonstrate how variations in profit margins directly influence the financial outcomes of specialty coffee production.

The results indicate that incremental increases in the profit margin substantially enhance the enterprise's revenue-generating capacity, assuming production efficiency and market conditions remain constant. This analysis provides a practical framework for smallholder coffee farmers and cooperatives to assess profitability under different market and cost structures. By aligning production costs with desired returns, the model facilitates evidence-based financial planning and supports sustainable enterprise growth within Thailand's specialty coffee industry (Department of Agricultural Extension, 2024).

Table 3 presents the Earnings Before Interest and Taxes (EBIT), profit per rai/kilogram, and the break-even production volume per rai/kilogram based on the desired selling price.

Item	Profit Margin		
	25.00%	50.00%	75.00%
Production Volume per Rai/Kilogram	57.97	57.97	57.97
Unit Price (Baht/Kilogram)	250.00	250.00	250.00
Total Sales Revenue	14,492.	14,492.	14,492.
	50	50	50
Less: Production Cost of Premium-Grade Coffee	4,894.4	4,894.4	4,894.4
Beans	3	3	3
Operating Profit	9,598.0	7,134.0	11,262.
	7	6	77
Less: Selling and Administrative Expenses	500.00	500.00	500.00
Earnings Before Interest and Taxes (EBIT)	9,098.0	6,634.0	10,762.
	7	6	77

Item	Profit Margin		
	25.00%	50.00%	75.00%
Profit per Rai/Kilogram (Baht)	191.96	142.68	225.26
Break-even Production Volume per Rai/Kilogram (Baht)	97.89	88.99	81.57

Discussion

Cost Analysis and Profit Planning. Evidence from the Mae On Specialty Coffee Farmers Group reinforces a growing body of Thai and Asian scholarship demonstrating that detailed cost accounting is essential for enabling smallholder participation in high-value agro-food value chains. The estimated full production cost of 2,575.54 THB per rai (44.43 THB/kg), together with a comprehensive breakdown of direct and indirect costs, highlights how partial or intuitive costing practices still prevalent among smallholders can obscure the true economic burden of production and weaken bargaining power in specialty markets. In such markets, price negotiation increasingly depends on transparent and accurate cost structures. These findings align with empirical studies showing that full-costing and true-cost accounting frameworks enhance pricing transparency, facilitate cost recovery, and provide a more reliable foundation for financial planning in rural enterprises (Department of Agricultural Extension, 2024; Barg & Swanson, 2004; Kittichotsatsawat et al., 2024).

Scenario simulations using profit margins of 25%, 50%, and 75% further demonstrate that cost-plus pricing serves not only as a pricing mechanism but also as a strategic financial tool. It enables farmers to design liquidity plans, anticipate risks, and stabilize cash flow under volatile market conditions. Regional research on coffee and other smallholder crops in Southeast Asia similarly indicates that producers equipped with precise cost and margin data are better able to respond to seasonal price fluctuations, rising input costs, and tightening

access to credit (Baharuddin et al., 2025; Lertwatanakiat, 2021). Within the broader Asian coffee economy characterized by competition from large-scale estates, fluctuating global prices, and increasingly stringent quality and sustainability standards robust cost accounting has emerged as a critical managerial capability underpinning long-term competitiveness and inclusion in upgraded value chains (Islam et al., 2022; Lertwatanakiat, 2021).

The findings from Mae On also reflect broader structural trends within Thailand's coffee sector. Although the sector has expanded in overall value, it continues to face profit compression due to labor shortages, rising production costs, and import pressures, with only a limited proportion of output meeting specialty-grade standards (Kittichotsatsawat et al., 2024). In this context, transparent cost management becomes indispensable for establishing consistent pricing strategies and maintaining economic viability in premium market segments. The Mae On case thus exemplifies a wider regional dynamic: smallholder cooperatives that adopt evidence-based cost accounting and profit planning tools are better positioned to sustain competitiveness within differentiated agro-food value chains (Islam et al., 2022; Baharuddin et al., 2025).

Sustainable Development and Regional Knowledge Integration. The sustainability framework applied by the Mae On cooperative aligns closely with Thailand's Bio-Circular-Green (BCG) Economic Model and reflects regional perspectives that conceptualize agriculture as an integrated socio-ecological system. The cooperative's four-dimensional approach People, Planet, Prosperity, and Partnership embodies the principles of the Sufficiency Economy Philosophy (SEP) while incorporating practical strategies related to human capital development, environmental conservation, financial literacy, and collaborative governance. This integrated model is consistent with national and ASEAN development priorities that emphasize balanced growth, climate resilience, and participatory rural transformation (Siles et al., 2022; Kittichotsatsawat et al., 2024).

At the regional level, recent studies on smallholder coffee systems and climate smart agriculture highlight the importance of climate-resilient practices, regenerative farming, watershed management, and multi-stakeholder partnerships as key drivers of rural resilience (Siles et al., 2022; Baharuddin et al., 2025; Lertwatanakiat, 2021). These priorities closely correspond with practices implemented in Mae On, including chemical-free cultivation, resource recycling, community-based branding, and cooperative knowledge-sharing. Such approaches not only reduce environmental vulnerability but also create new forms of economic value. Evidence from the region further suggests that these integrated strategies help mitigate climate-related risks and market volatility while strengthening livelihood security in coffee-growing communities undergoing rapid ecological and economic change (Islam et al., 2022; Baharuddin et al., 2025). Research on sustainable coffee systems and voluntary sustainability standards indicates that long-term success for smallholders depends on the simultaneous integration of economic, social, and environmental objectives rather than treating them as separate priorities (Islam et al., 2022; Lertwatanakiat, 2021). The Mae On experience reflects this integrated approach, where cost management, cooperative governance, and environmental stewardship function as interdependent components of a unified development strategy. By linking rigorous cost analysis with a multidimensional sustainability framework, this study demonstrates that economic resilience, social equity, and ecological sustainability can be mutually reinforcing. The Mae On Specialty Coffee Farmers Group thus provides a practical model for how smallholder cooperatives across Asia can localize national and regional development frameworks such as BCG, SEP, and the SDGs through transparent accounting systems, participatory decision-making, capacity building, and community-centered innovation (Department of Agricultural Extension, 2024; Kittichotsatsawat et al., 2024).

Recommendation

To enhance the efficiency and sustainability of specialty coffee production in the Mae On community, several strategic recommendations are proposed. First, farmers should adopt systematic cost management practices, including detailed record-keeping of production inputs, labor, and post-harvest processes, to improve financial planning and profitability. Training programs should be developed to strengthen farmers' competencies in cost analysis, value-added processing, and market-oriented production. Second, capacity-building initiatives should emphasize technical skills in post-harvest management, particularly in cherry selection, fermentation control, drying, and storage, to ensure consistent quality and reduce losses.

Furthermore, stakeholders, including government agencies and agricultural extension services, should support access to appropriate technologies, infrastructure, and financial resources to enhance production efficiency. The promotion of cooperative management within farmer groups is also essential to improve bargaining power, facilitate knowledge sharing, and strengthen market linkages. In addition, sustainability practices such as environmentally friendly processing methods, water conservation, and waste management should be integrated into the production system.

Finally, policymakers should develop supportive frameworks that encourage sustainable coffee production and provide continuous technical assistance. Future research should expand the sample size and incorporate longitudinal data to assess long-term impacts. Implementing these recommendations will contribute to improved farmer livelihoods, higher product quality, and sustainable development of the specialty coffee sector.

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