International Journal of Multidisciplinary Research and Growth Evaluation.

Cost and Return of Growing Commercial Kratom: A Case Study in Thailand

Sutthida Rurob [1*], Kanokwan Meesook [2], Somnuk Aujirapongpan [3]
[1, 2, 3] Graduate study in Innovation Management and Business Development, School of Accountancy and Finance, Walailak University, Thailand

* Corresponding Author: **Sutthida Rurob**

Article Info
ISSN (online): 2582-7138
Volume: 06
Issue: 03
May-June 2025
Received: 10-04-2025
Accepted: 02-05-2025
Page No: 960-966

Abstract
This study aimed to examine the costs and returns of commercial kratom (*Mitragyna speciosa*) cultivation in the Kanchanadit District of Surat Thani Province, Thailand. It also sought to compare the cost-effectiveness and profitability between two varieties of kratom: the red-stemmed and green-stemmed strains. Data were collected from 39 households engaged in commercial kratom farming using structured interviews based on a questionnaire comprising both open-ended and close-ended questions. The questionnaire gathered detailed information regarding production costs and returns. The results revealed that the average total cost of kratom cultivation was 3,577.62 THB per rai. This included average material costs, equipment costs, labor costs, and other production-related expenses. The average fixed cost was 679.15 THB per rai, while the average variable cost was 2,227.19 THB per rai. The benefit-cost ratio was 49.61%, with a profit margin of 34.57%, a return on assets (ROA) of 32.27%, and a return on investment (ROI) of 9.59%. The breakeven yield was calculated at 660 kilograms per rai or 0.66 tons. The comparative analysis between red-stemmed and green-stemmed kratom varieties indicated that most farmers preferred cultivating the red-stemmed variety due to its higher market demand and perceived commercial viability.

Keywords: Commercial Kratom Cultivation, Cost Analysis, Return, Profitability, Investment Analysis

Introduction

Thailand's geographical features make it highly suitable for agricultural activities, and a significant proportion of the population is engaged in farming as their primary occupation. The country offers an environment conducive to harmonious coexistence with nature, enabling the agricultural sector to play a central role in the livelihoods of Thai people for generations. Although an increasing number of younger individuals are migrating to urban areas and pursuing alternative forms of employment, agriculture continues to serve as the backbone of national food production, providing sustenance not only for the local population but also for millions globally. In recent years, many Thai farmers have transitioned to integrated farming systems to enhance sustainability and economic resilience (Office of Agricultural Research and Development, 2021: online). Thailand's tropical climate supports rich biodiversity, particularly in medicinal plants. These plants have gained increasing importance due to pharmacological research that has confirmed their potential for use in disease treatment (Wichai & Phayom, 1977) [6]. Moreover, the global shift toward proactive health care—exacerbated by the COVID-19 pandemic—has created new opportunities for Thai herbal products to reach international markets. This trend presents significant potential for both farmers and related industries, as global and domestic markets for herbal products continue to expand.

Thai medicinal plants, including kratom (*Mitragyna speciosa*), are characterized by low production costs, minimal labor requirements, and relatively low vulnerability to environmental and climatic risks compared to other economic crops. These features make kratom suitable for intercropping or for use as a substitute crop during off-seasons when traditional crops cannot be cultivated, thereby ensuring continuous income for farmers even during drought or excessive rainfall periods. Surat Thani Province, in particular, possesses strong potential for kratom cultivation, with abundant high-quality production.

However, the region has also experienced challenges stemming from oversupply, with farmers producing several tons per day. In response, kratom is now being recognized as a promising new economic crop in southern Thailand, including Surat Thani. Prince of Songkla University, with its expertise in agricultural technology and its medical research and innovation institutes, is well-positioned to support the processing and application of kratom extracts for medicinal purposes. Such institutional support is expected to enhance the commercialization of kratom, ensuring product quality, market stability, and improved income and quality of life for local farmers.

Literature Review

This study on the costs and returns of commercial kratom (*Mitragyna speciosa*) cultivation in Kanchanadit District, Surat Thani Province, is grounded in a review of relevant books, scholarly articles, documents, and previous studies to establish an academic foundation and inform the development of the research framework. The literature review encompasses key theories and conceptual components related to the subject matter.

Concepts and theories related to production cost

Aujirapongpan (2020, p. 24) defines "cost" as a quantifiable business resource, expressed in monetary terms, that must be sacrificed to achieve a specific objective. Boonmathanakorn (2015) explains that production cost refers to all expenditures incurred during the process of producing goods or services, paid by the production unit. These costs are commonly classified into the following categories:

First, direct costs are cash expenditures on production inputs acquired from external parties. These are tangible and clearly measurable costs, often referred to in the literature as explicit costs or accounting costs. Examples include wages, machinery maintenance, raw materials, and fuel. Direct costs can be further subdivided into two types:

- Fixed costs, which are expenses associated with infrastructure or long-term assets essential to the production process and remain constant regardless of production volume—such as land, buildings, machinery, and production equipment.
- Variable costs, which fluctuate with the scale of production and include expenses such as labor wages, material costs, utility bills, and machinery repairs.

Second, indirect costs are those associated with the use of internally owned production factors, which are not recorded as direct financial transactions. These are also referred to as implicit costs or hidden costs. Examples include the imputed cost of the farmer's own labor or using a personal residence as a place of business. Although not typically recorded in formal accounting, these costs must be considered when analyzing total production costs. To do so, the opportunity cost concept is employed—evaluating the value that could have been earned had the resource been used for its next best alternative. For instance, the land used for cultivation could instead have been rented out, and the corresponding rental income would represent the opportunity cost of using that land for kratom farming.

Concepts and theories related to return on investment

According to Suphayom Najan (2019), return analysis involves examining the relationship between the cost of goods sold and net sales. Commonly used financial ratios to evaluate profitability include five primary measures. First, the gross profit margin, which indicates what percentage of net sales remains after deducting the cost of goods sold. A higher gross profit margin suggests effective cost control, efficient operations, and strategic pricing and procurement policies. Second, the net profit margin, which reflects the percentage of net sales retained as net income. A higher ratio implies sound financial management and operational efficiency. Third, the return on equity (ROE) measures how well the business utilizes shareholders' equity to generate profit, with higher values indicating more efficient use of owner funds. Fourth, the return on investment (ROI) compares net income to tangible assets, offering insights into how effectively the business has turned its investments into profits. A higher ROI indicates more efficient use of capital. Additionally, the profit-to-cost ratio is an important component of return analysis, assessing how much profit remains after deducting all expenses and taxes relative to total production cost—a higher ratio again indicates greater profitability. Fifth, the net profit-to-total cost ratio compares net profit (after all costs and taxes) to total production cost, providing a clear indicator of financial efficiency.

Naphaporn Nilapornkun *et al*. (2019) further emphasized return analysis in the context of investment projects by referencing the payback period, defined as the time required for cumulative net cash inflows to equal the initial investment outlay. This metric represents the number of years needed for a project to recover its startup costs through annual profits. Sukjai Donpanha (2019) explored the use of ROI as a critical performance evaluation metric. While performance can be measured using changes in sales, profits, or productivity, these measures may not always provide a complete picture. For example, increased sales might result from excessive discounts or price reductions, which negatively affect profitability. To address this, comparing net profit to the invested capital used to generate income is considered one of the most reliable and widely adopted performance metrics.

Lastly, Wanwisa Nuengsomsri (2014) studied the break-even point (BEP), which represents the sales volume at which total revenue equals total costs, resulting in zero net profit. At this point, the contribution margin precisely offsets fixed costs. BEP analysis is widely used as a managerial tool for planning and operational control, helping businesses avoid selling below breakeven, which would otherwise result in financial losses.

Concepts and theories related to investment feasibility

Evaluating the feasibility or worthiness of an investment project involves several key financial metrics. First, the Net Present Value (NPV) measures the present value of net returns from a project. A project is considered economically viable if the NPV is greater than zero (NPV > 0), indicating that the discounted value of benefits exceeds the costs, thus justifying the investment. Conversely, if the NPV is less than zero (NPV < 0), the project is not financially worthwhile, as it implies that the investment would yield a net loss. Second, the Internal Rate of Return (IRR) is the rate at which the present value of future cash flows equals the initial investment cost, or in other words, the discount rate that makes the NPV of a project equal to zero. The IRR serves as a benchmark to assess investment viability. A project is deemed economically feasible if the IRR exceeds the cost of capital. If the IRR equals the cost of capital, the investment is

considered marginally acceptable. However, if the IRR is lower than the cost of capital, the investment is considered unviable as it does not generate sufficient return relative to its cost.

Third, the Benefit-Cost Ratio (B/C Ratio) represents the ratio of the present value of total benefits to the present value of total costs. A B/C Ratio greater than 1 (B/C Ratio > 1) suggests that the project's benefits outweigh its costs, indicating financial feasibility. A ratio equal to 1 implies that the project breaks even, generating neither profit nor loss. A ratio less than 1 (B/C Ratio < 1) suggests that the investment is not worthwhile, as the costs exceed the expected benefits. (See Fig. 1)

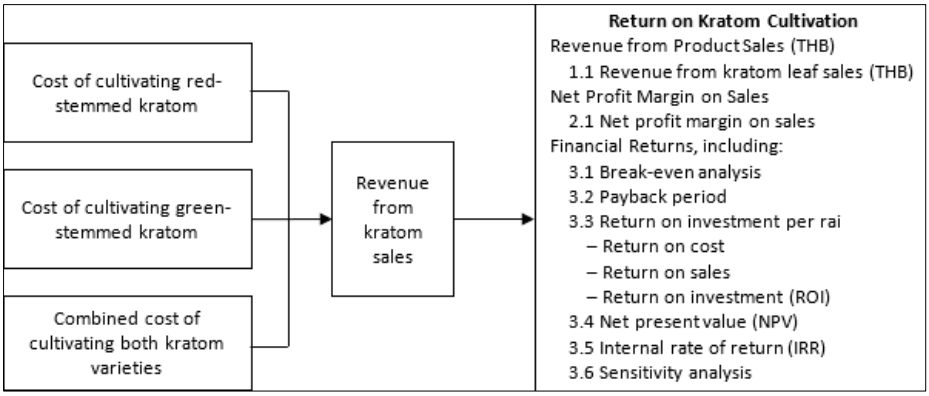

Fig 1: Conceptual Framework of the Study

Research Methodology

Population and Sample

- The population for this study comprised all registered agricultural households in Kanchanadit District, Surat Thani Province, Thailand, as recorded in the 2022 agricultural census, totaling 18,754 households.
- The sample consisted of 392 commercial kratom (*Mitragyna speciosa*) farming households in Kanchanadit District. The sample was drawn from 13 subdistricts using purposive sampling and in-depth interviews with farmers registered under the official agricultural registry. The desired level of precision was set at a 5% margin of error. The sample size was calculated using Yamane's formula, and 39 farmers from 13 households were ultimately selected for in-depth interviews.

Instrument of the study

The primary data collection instrument was a structured questionnaire administered through face-to-face interviews. The questionnaire was designed to gather detailed information on production costs and returns. It comprised both open-ended and close-ended questions and was divided into two sections:

Section 1 collected general demographic information of the respondents, including gender, age, marital status, education level, monthly income, household size, and labor availability for kratom cultivation. The questions in this section were predominantly close-ended.

Section 2 focused on the cost and return structure of commercial kratom farming. It included questions about fixed costs, variable costs, opportunity costs, revenue from kratom sales, and overall return on investment. The questions in this section were primarily open-ended to allow for detailed responses.

Data Collection

In this study, both primary and secondary data were collected and reviewed to examine the costs and returns associated with commercial kratom (*Mitragyna speciosa*) cultivation in Kanchanadit District, Surat Thani Province. The data collection process included the following:

Primary Data: Primary data were obtained through structured interviews conducted with 39 commercial kratom farmers residing in Pa Ron Subdistrict, Kanchanadit District. These interviews were designed to gather firsthand insights regarding production costs, revenues, and overall investment performance.

Secondary Data: Secondary data were compiled from academic textbooks, previous research studies, government documents, journal articles, and relevant online resources. This data provided a theoretical and contextual foundation to support and enrich the analysis.

Data Analysis

The data obtained from interviews were analyzed to describe the following aspects:

- **General demographic information:** Demographic characteristics of the respondents—including gender, age, marital status, education level, monthly income, household size, and labor availability for kratom cultivation—were analyzed using descriptive statistics such as frequency, percentage, and mean.
- **Production Costs:** Data related to production costs were analyzed to calculate investment expenditures and operational costs incurred during the cultivation process.
- **Returns and Revenues:** Data concerning revenues, product sales, and returns from kratom cultivation were analyzed using profitability assessment methods and investment evaluation techniques.

Results

General information of respondents

The demographic characteristics of the respondents were categorized based on gender, age, marital status, education level, monthly income, number of household members, household labor involved in kratom farming, sources of capital, cultivation area, initial investment amount, annual yield, selling price, and form of product distribution. These characteristics were presented using frequency and percentage distributions, as shown in Table 1.

Table 1: Number and Percentage of Households Classified by Demographic Characteristics

Category	Sub-category	n	%
Gender	Male	22	56.41
	Female	17	43.59
Age Group (years)	20–29	4	10.26
	30–39	11	28.20
	40–49	16	41.03
	50 and above	8	20.51
Marital Status	Single	7	17.95
	Married/Cohabiting	30	76.92
	Widowed/Divorced/Separated	2	5.13
Education Level	Primary School	16	41.02
	Secondary School	11	28.20
	Vocational Certificate	9	23.08
	Bachelor's Degree	3	7.70
Monthly Income (THB)	5,001–10,000	7	17.95
	10,001–20,000	19	48.72
	20,001–30,000	11	28.20
	More than 30,000	2	5.13
Household Size (persons)	1–2	5	12.82
	3–4	17	43.59
	4–5	12	30.77
	5–6	4	10.26
	More than 6	1	2.56
Labor for Kratom Cultivation	1–2 persons	28	71.80
	3–4 persons	6	15.38
	5–6 persons	4	10.26
	More than 6 persons	1	2.56
Funding Source	Personal capital	36	92.31
	Others	3	7.69
Farming Experience (years)	1–2	5	12.82
	2–3	13	33.33
	3–4	14	35.90
	More than 4	7	17.95
Cultivation Area (rai)	≤1	5	12.82
	1–2	12	30.77
	2–3	11	28.20
	3–4	7	17.95
	>4	4	10.26
Product Form Sold	Fresh leaves	33	84.61
	Boiled extract	4	10.26
	Others	2	5.13
Total		39	100

According to Table 1, the demographic characteristics of the respondents revealed that the majority were male (56.41%), followed by female respondents (43.59%). In terms of age, most respondents were between 40–49 years old (41.03%), followed by those aged 30–39 years (28.20%), over 50 years (20.51%), and 20–29 years (10.26%). Regarding marital status, most were married or cohabiting (76.92%), followed by single (17.95%), and widowed/divorced/separated (5.13%). The largest proportion of respondents had completed primary education (41.02%), followed by secondary education (28.20%), vocational certificates (23.08%), and bachelor's degrees (7.70%). In terms of monthly income, the highest proportion earned between 10,001–20,000 THB (48.72%), followed by 20,001–30,000 THB (28.20%), 5,001–10,000 THB (17.95%), and over 30,000 THB (5.13%). Household size ranged mostly from 3–4 members (43.59%), followed by 4–5 members (30.77%), 1–2 members (12.82%), 5–6 members (10.26%), and more than 6 members (2.56%). The number of household laborers involved in kratom cultivation was primarily 1–2 persons (71.80%), followed by 3–4 persons (15.38%), 5–6 persons (5.13%), and more than 6 persons (2.56%). Most respondents relied on personal funding (92.31%), with a smaller proportion using other funding sources (7.69%). Regarding farming experience, most had 3–4 years of experience (35.90%), followed by 2–3 years (33.33%), more than 4 years (17.95%), and 1–2 years (12.82%). The most common cultivation area was 1–2 rai (30.77%), followed by 2–3 rai (28.20%), 3–4 rai (17.95%), less than 1 rai (12.82%), and more than 4 rai (10.26%). In terms of the form of kratom products sold, the majority sold fresh kratom leaves (84.61%), followed by boiled kratom leaf extract (10.26%), and other forms (5.13%).

Cost and return analysis of commercial kratom cultivation

This section presents data related to the fixed costs, variable costs, opportunity costs of production, revenue from kratom sales, and overall return on investment for commercial kratom (*Mitragyna speciosa*) cultivation. The purpose of this cost-return analysis is twofold: (1) to examine the economic viability of commercial kratom cultivation in Kanchanadit District, Surat Thani Province, and (2) to compare the cost and return structures between red-stemmed and green-

stemmed kratom varieties. Data were collected from 39 farmer households, and the analysis is summarized as follows.

The cost-return analysis focused on both direct and variable costs. Particular attention was given to the cost of seedlings, which represents the core component of raw material investment in Year 0—the establishment phase of commercial kratom cultivation. Table 2. summarizes the distribution of seedling costs across the 39 sampled households in Kanchanadit District, Surat Thani Province, using cost intervals to reflect the general investment trend.

Table 2: Distribution of Kratom Seedling Costs per Household (n = 39)

Seedling Cost Range (THB)	No. of Households	Percentage (%)
≤ 5,000	22	56.41
5,001 – 10,000	11	28.21
10,001 – 15,000	4	10.26
> 15,000	2	5.13
Total	39	100.00
Total Cost (THB)		250,000

According to Table 2, the majority of farmers (56.41%) invested no more than 5,000 THB in seedling purchases, while 28.21% spent between 5,001 and 10,000 THB. Only a small proportion of households (15.39%) invested more than 10,000 THB, with the highest single-household cost reported at 20,000 THB. These findings confirm that seedling acquisition was the most substantial initial expense in Year 0 of kratom cultivation. The total seedling cost for all participating households was 250,000 THB, highlighting the significance of this early-stage investment in the overall cost structure.

Table 3. summarizes the major production cost components in commercial kratom (*Mitragyna speciosa*) cultivation, focusing on materials and equipment, labor, fertilizers, fuel, and pesticides. These costs include initial investments such as tools (e.g., hoes, shovels, water pumps, sprayers) and subsequent operating expenses including land preparation labor, fertilizer application, and crop protection. The presented summary reflects average, minimum, and maximum expenditures per household, offering an overview of the financial structure from Year 0 onward.

Table 3: Summary of Production Cost Components for Kratom Cultivation (n = 39)

Cost Category	Total (THB)	Average per Household (THB)	Min–Max (THB)
Materials & Equipment	930,000	23,846	10,000 – 45,000
Labor	131,000	3,359	1,500 – 8,500
Fertilizer	156,500	4,013	1,500 – 15,000
Fuel	12,000	308	100 – 1,200
Pesticides	56,700	1,454	500 – 10,000
Land Rental	0	0	0
Land Tax	0	0	0
Total	1,286,200	32,933	

According to Table 3, materials and equipment accounted for the largest share of production costs, totaling 930,000 THB, with an average household expenditure of 23,846 THB. Fertilizer costs followed, totaling 156,500 THB, averaging 4,013 THB per household. Labor costs, fuel, and pesticides represented moderate components of total expenditures. Notably, no household reported land rental or land tax expenses, indicating widespread use of self-owned land. Most material and equipment investments were made in Year 0, underscoring the significance of initial capital inputs in establishing kratom plantations.

Table 4 provides a summarized overview of post-harvest costs in commercial kratom (*Mitragyna speciosa*) cultivation, covering three key components: harvesting, transportation, and packaging. Harvesting costs include labor for leaf picking, fuel, and meals for workers. Transportation costs involve hired vehicles or local logistics fees, while packaging expenses relate to bags, bottles, and containers used for product preparation. These costs are central to the commercialization phase of kratom farming, particularly starting from Year 3, which marks the onset of harvestable yields.

Table 4. Summary of Post-Harvest Costs in Commercial Kratom Cultivation (n = 39)

Cost Component	Total (THB)	Average per Household (THB)	Min–Max (THB)
Harvesting	145,300	3,725	0 – 10,000
Transportation	41,400	1,062	0 – 5,000
Packaging	46,400	1,189	0 – 3,000
Total	233,100	5,976	

According to Table 4, harvesting costs accounted for the largest share of post-harvest expenses, with a total of 145,300 THB and an average of 3,725 THB per household. This was followed by packaging costs (46,400 THB) and transportation (41,400 THB). These figures emphasize the economic weight of post-harvest activities in the production cycle. The concentration of these expenditures from Year 3 onwards aligns with the typical maturation phase of kratom, when leaves become harvestable and marketable, thus initiating recurring commercialization costs across the plant's productive lifespan.

Table 5 provides a summary of the total production yield and

income generated from the sale of kratom (*Mitragyna speciosa*) leaves among 39 farming households in Kanchanadit District, Surat Thani Province. As kratom plants do not reach maturity until the third year, no revenue was recorded in Years 0 to 2. The reported income reflects sales from Year 3 onwards, representing the active commercial phase of kratom cultivation.

Table 5: Summary of Production Yield and Revenue from Kratom Cultivation (n = 39)

Item	Value
Total Yield (kg)	109,300
Total Revenue (THB)	5,665,000
Average Yield per Household (kg)	2,801
Average Revenue per Household	145,256
Minimum Yield	0
Maximum Yield	12,000
Minimum Revenue	0
Maximum Revenue	600,000

According to Table 4.5, a total of 109,300 kilograms of kratom leaves were harvested, generating an aggregate income of 5,665,000 THB across 39 households. The average income per household was 145,256 THB, with yields and revenue varying significantly among farmers. Interviews confirmed that the majority of respondents cultivated red-stemmed kratom, which is preferred in the market for its higher commercial value. These findings illustrate the economic potential of red-stemmed kratom cultivation as a viable source of income for smallholder farmers in the region.

Table 6: Summary of Cost Structure, Returns, and Financial Ratios from Commercial Kratom Cultivation (Unit: THB/rai)

Indicator	Value	Formula & Interpretation
Average fixed cost	679.15	Direct cost not dependent on output volume
Average variable cost	2,227.19	Operational costs that vary with production
Total average cost	3,557.62	Sum of fixed and variable costs
Gross profit per rai	1,775	Revenue – Total cost
Benefit–Cost Ratio	49.61%	(1,775 ÷ 3,577.62) × 100
Net Profit Margin	34.57%	(1,775 ÷ 5,135.11) × 100
Return on Assets (ROA)	32.27%	(1,775 ÷ 5,500.33) × 100
Return on Investment (ROI)	9.59%	(1,775 ÷ 18,500) × 100
Break-even yield	660 kg/rai or 0.66 tons/rai	679.15 ÷ (3,248.75 – 2,227.19)

The analysis indicates that the average total production cost was 3,557.62 THB per rai, comprising 679.15 THB in fixed costs and 2,227.19 THB in variable costs. Farmers achieved a gross profit of 1,775 THB per rai, resulting in a benefit–cost ratio of 49.61%, a net profit margin of 34.57%, and a return on assets (ROA) of 32.27%. The return on investment (ROI) stood at 9.59%. The break-even yield was calculated at 660 kilograms per rai, or 0.66 tons per rai. Notably, the cost-benefit comparison between kratom varieties indicated that red-stemmed kratom offers superior profitability. This variety is preferred by farmers due to its higher market demand and better income-generating potential relative to the green-stemmed variety.

Discussion

The total average production cost of commercial kratom (*Mitragyna speciosa*) cultivation in Kanchanadit District, Surat Thani Province, was 3,577.62 THB per rai. This total included expenditures on raw materials, agricultural tools and equipment, labor, and other operational costs. Among the surveyed households, the majority of production expenses were concentrated in input costs, followed by fertilizer expenditures. Households with larger cultivation areas tended to incur higher overall production costs.

In terms of returns on investment, the average yield was found to be 361.70 kilograms per rai, which is considered relatively low in comparison to the cost of production. This may be attributed to limited knowledge among farmers regarding modern agricultural practices that could enhance productivity. Additionally, external challenges such as natural disasters (e.g., fires, floods), pest outbreaks, and plant diseases negatively affected yield performance. Households with smaller cultivated areas were observed to have lower returns, possibly due to economies of scale and resource limitations.

Financial performance analysis revealed a benefit–cost ratio of 49.61%, a net profit margin of 34.57%, a return on assets (ROA) of 32.27%, and a return on investment (ROI) of 9.59%. The break-even yield was calculated at 0.66 tons per rai or 660 kilograms per rai. These results suggest that commercial kratom cultivation, particularly on plots ranging from 1 to 5 rai, generates modest returns. However, the relatively low break-even point implies that once farmers surpass this threshold, any additional yield translates directly into profit. This finding is particularly significant for smallholder farmers, as it indicates that kratom cultivation can become financially sustainable and profitable once the basic cost threshold is exceeded.

Recommendations for future research

Future studies should explore cost and return analysis of commercial kratom (*Mitragyna speciosa*) cultivation using samples from different geographic areas, such as farmers in other districts within Surat Thani Province or from other provinces in Thailand. Such comparative studies could yield insights into regional differences in profitability and production practices.

Further research should also consider applying alternative theoretical frameworks to the analysis of costs and returns from kratom cultivation. Comparative evaluation using

diverse conceptual approaches could enhance the robustness and generalizability of findings.

The integration of artificial intelligence (AI) into agricultural planning is a promising direction for future research. For instance, developing a ChatGPT-based advisory platform could assist farmers in identifying optimal planting periods based on climatic and market data. AI tools may also be employed to analyze online market price trends and suggest appropriate sales volumes per production cycle. Moreover, implementing real-time cost tracking via mobile applications—with AI-driven recommendations for cost reduction (e.g., labor, fertilizer, or pesticide inputs based on region and season)—could significantly improve operational efficiency and profitability for kratom farmers.

Future studies could also extend into the fields of pharmaceutical science and herbal medicine by exploring the potential of kratom as a raw material for the development of therapeutic drugs or new health-related products. Such interdisciplinary research would contribute to the medicinal and commercial value-added applications of kratom in both domestic and global contexts.

References

1. Chaiyasuwan A, Mangkita W, Loetkanjanaphon S, Sapsiri S, Chakkarngern T. [Cost and return of herbal cultivation by farmers in Ban Nong Suwan, Ban Klang Subdistrict, Song District, Phrae Province]. J Lib Arts Maejo Univ. 2017.
2. Chaopinta J. [Financial cost and return analysis of herbal agricultural products: A case study of plai balm]. North Bangkok Univ Acad J. 2021.
3. Nguadchai W, Chaisawat P, Penlawat K, Wongbunnun W, Ploken K. [Cost and return analysis of shallot cultivation in Yang Chum Noi District, Sisaket Province]. Rajabhat Sisaket Univ Acad J. 2019.
4. Saenphakdi P. [Cost and return of jasmine rice cultivation by farmers in Sam Chuk District, Suphanburi Province]. Ratchaphruek J. 2021.
5. Singkha S, Sajjawathee T. [Cost and return of economic crop cultivation by farmers in Hua Mueang Subdistrict, Mueang Pan District, Lampang Province]. J Agric Res Acad Promot. 2019;37(3):103-17.
6. Yawichai P, Wongkaew J, Songkham T, Sajjawathee T. [Cost and return of KD15 rice cultivation by farmers in Pong Si Nakorn Village, Rong Chang Subdistrict, Pa Daet District, Chiang Rai Province]. Payap Univ Acad J. 2018.
7. Boonchuai N. [Cost and return of cultivating banana in Tha Yang District, Phetchaburi Province]. Independent Study. Silpakorn University; 2017.
8. Mangmoon P. [Cost and return of processing products from Chiang Da vegetables by San Mahaphon Organic Herbal Enterprise, Mae Taeng District, Chiang Mai Province]. Independent Study. Chiang Mai University; 2015.
9. Pattanee P. [Cost and return of investing in organic black pepper cultivation for commercial purposes in Chanthaburi Province]. Master's thesis. Krirk University; 2019.
10. Petchkaew P. [Comparative investment efficiency of intercropping during the first year of new durian plantations: A case study of corn and watermelon]. Master's thesis. Prince of Songkla University; 2019.
11. Phrommool T. [Cost and return analysis of pineapple cultivation: A case study of smallholder farmers in Huai Sai Nuea Subdistrict, Cha-am District, Phetchaburi Province]. Master's thesis. Rajamangala University of Technology Rattanakosin; 2016.
12. Sawaengkij N. [Cost and return of intercropping durian cultivation: A case study of Moo 4, Trok Nong Subdistrict, Khlung District, Chanthaburi Province]. Independent Study. Kasetsart University; 2019.
13. Srisomphan O, Songsirot N, Sinsiri N. [Cost and return of rubber tree cultivation with major economic crops in Maha Sarakham Province]. Independent Study. Kasetsart University; 2016.