



Identification of Leading Plantation Commodities and Financial Feasibility of Farming in Kaur Regency

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Abstract

Background: The plantation sector has a strategic role in driving regional economic growth and improving community welfare, particularly in areas whose economic structure is dominated by agriculture. Kaur Regency is one of the regions where the agricultural and plantation sectors contribute significantly to the Regional Gross Domestic Product (GRDP). However, the development of plantation farming still faces obstacles such as production costs, price fluctuations, and capital limitations.

Objective: This study aims to identify leading plantation commodities and analyze their financial feasibility.

Methods: The determination of leading commodities was carried out using the Location Quotient (LQ) and Shift Share Analysis (SSA) methods based on secondary data (BPS Kaur Regency 2019 and 2024) and primary field survey data. Financial feasibility analysis used indicators including Net Present Value (NPV), Benefit-Cost Ratio (B/C), and Internal Rate of Return (IRR). A total of 45 farmers were selected as respondents through purposive sampling: 18 oil palm farmers, 15 coconut farmers, and 12 rubber farmers from three leading commodity sub-districts in Kaur Regency.

Results: The analysis results show that oil palm, coconut, and rubber are leading commodities with comparative and competitive advantages in Kaur Regency. Financially, oil palm recorded the highest NPV (IDR 361,514,078; B/C ratio 9.21; IRR 59.9%), followed by coconut (NPV IDR 260,159,827; B/C ratio 5.52; IRR 34.57%), and rubber (NPV IDR 111,185,336; B/C ratio 4.21; IRR 44.73%). All three commodities remain feasible under sensitivity scenarios of a 10% cost increase and a 10% revenue decrease.

Conclusion: Thus, the development of these three commodities has the potential to increase farmers' income and strengthen the regional economy.

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INTRODUCTION

The dominance of the plantation sector in a region has a strategic role; the contribution of the agricultural and plantation sectors can spur regional economic growth and community welfare (Hannan et al. 2024). In Indonesia, most plantation commodities such as oil palm, rubber, cocoa, and coffee are managed by smallholder plantations (Aznur et al. 2020). The sustainability of plantation farming heavily depends on farmers' ability to manage resources effectively and efficiently (Rahman et al. 2017).

Leading commodities are products or resources with high economic value that contribute

significantly to economic improvement. According to Jusni (2020), leading commodities are mainstay commodities with strategic potential based on regional conditions, including climate, soil conditions, socioeconomics, institutions, technology, human resources, socioculture, and infrastructure. Meanwhile, the criteria according to Radetzki (2020) are as follows: (a) must be able to become the main driver of economic development, meaning the leading commodity contributes significantly to increased production, income, and expenditure; (b) must be able to compete with similar products from other regions, both in national and international markets, in terms of output prices, production costs, and services; (c) development must be supported by various aspects such as security, socioculture, market opportunities, information, institutions, and others.

Recent empirical studies reinforce the importance of systematic commodity analysis for regional agricultural development. Nurlaela (2025) demonstrated that the LQ and Shift Share Analysis (SSA) methods effectively identify leading agricultural commodities and their competitive dynamics in South Sulawesi, while Putra (2023) confirmed the combined applicability of these methods for plantation sub-sector analysis in West Sumatra. In terms of financial assessment, Maulah (2024) showed that NPV, B/C ratio, and IRR analyses provide reliable investment viability signals for smallholder farming systems in Indonesia, and Putri (2025) confirmed that rubber plantation farming can generate positive NPV even under adverse sensitivity conditions. These recent findings underscore the analytical relevance of the integrated LQ-SSA-financial feasibility framework applied in the present study.

Kaur Regency is one of the regions with potential for developing leading plantation commodities. Smallholder plantation commodities in Kaur Regency are the main pillar of the regional economy. The GRDP of Kaur Regency over the last five years has been dominated by the agriculture, fisheries, and plantation sectors. In 2021, it contributed 50.03%; in 2022, 50.75%; in 2023, 50.74%; and in 2024, it contributed 51.40%, far exceeding other sectors, which only contributed 0–10% to the GRDP of Kaur Regency. However, high production costs, price fluctuations, and farmers' limited access to capital are the main obstacles to developing plantation commodities. According to Kusmiati (2015), a plantation farming activity may be technically feasible but not necessarily financially feasible when viewed from an investment feasibility perspective.

Financial analysis approaches are generally used to assess the feasibility of a farming activity by considering all cost and profit components over the economic life of the business (Spicka et al. 2019). According to Liana (2022), several indicators are used to measure farming feasibility, namely Net Present Value (NPV), Benefit-Cost Ratio (B/C), Internal Rate of Return (IRR), and Payback Period (PP), to measure the level of profit and risk in plantation farming. Several previous studies show that most plantation farming activities for leading commodities are feasible to develop but have a high level of sensitivity to changes in investment costs and interest rates (Tozer et al. 2009).

Despite growing literature on leading commodities and financial feasibility separately, very few studies simultaneously integrate LQ analysis, Shift Share Analysis (SSA), and multi-indicator financial feasibility assessment (NPV, B/C, IRR, sensitivity analysis) within a single sub-district-level plantation study. Existing research tends to apply either spatial analysis or financial analysis independently, leaving a methodological gap in integrated commodity development planning, particularly for plantation-based regions such as Kaur Regency, Bengkulu Province.

This study fills the identified gap by constructing an integrated analytical framework that simultaneously applies Location Quotient (LQ) for comparative advantage identification, Shift Share Analysis (SSA) for competitive dynamics (Differential Shift), and comprehensive financial feasibility analysis (NPV, B/C ratio, IRR) with sensitivity testing, applied specifically to smallholder plantation commodities across all 15 sub-districts of Kaur Regency. This integrated approach at the sub-district level has not been previously documented in the Bengkulu plantation literature.

Based on the description above, research to identify and analyze the financial feasibility of farming leading plantation commodities is essential to determine which leading commodities are feasible to cultivate. Thus, this research can be useful for policymakers and local farmers to improve the regional economy and farmers' welfare.

METHOD

This research was conducted in Kaur Regency, Bengkulu Province. The location was determined purposively by considering the region’s potential and the fact that most of the population engages in farming, particularly plantation commodities. This research is part of a thesis entitled “Identification of Leading Plantation Commodities and Financial Feasibility of Farming in Kaur Regency” under the broader theme “Regional Development Strategy Based on Leading Plantation Commodities.” The research was conducted from January to February 2026. The data used consist of primary and secondary data. Primary data are data obtained directly from the field through interviews, questionnaires, and observations (Sulung & Muspai, 2024). Secondary data are data obtained from existing official sources, such as scientific publications, government agency reports, books, or other relevant documents that support the research (Putri, 2023).

The determination of leading plantation commodities in this study used plantation commodity production data from 2019 and 2024 sourced from the Central Bureau of Statistics (BPS) of Kaur Regency. The method used to identify leading plantation commodities was the Location Quotient (LQ) analysis. This analysis is used to determine which plantation commodities can be exported outside the region, thereby identifying base and non-base commodities. According to Rustiadi (2013), the LQ formula is as follows:

$$LQ_{ij} = \frac{x_{ij}/x_i}{x_{.j}/x_{..}} \tag{1}$$

Where

- LQ_{ij} : Location Quotient at sub-district i for commodity j
- x_{ij} : Production of each sector in sub-district i
- x_i : Total production of commodities in sub-district i
- $x_{.j}$: Total production of sector j in Kaur Regency
- $x_{..}$: Total value of all commodities in Kaur Regency

If $LQ > 1$, it indicates a base sector, meaning commodity i has a comparative advantage. If $LQ = 1$, it indicates a non-base sector, meaning commodity i has no comparative advantage because its production only meets local demand. If $LQ < 1$, it indicates a non-base sector, meaning commodity i has no comparative advantage, and its production cannot meet local demand, thus requiring imports from other regions.

Shift Share Analysis (SSA) is used to identify changes in a region’s economic structure relative to the broader administrative region’s economic structure, thereby revealing the competitive advantage of production in that region. If $SSA > 0$, it indicates positive growth of the commodity in that region. According to Rustiadi (2011), this indicator describes the extent of a commodity’s competitiveness compared with the total production growth rate of the same commodity in a region. The SSA equation is as follows:

$$SSA = \underbrace{\left(\frac{X_{..}(t1)}{X_{..}(t0)} - 1\right)}_{(a)} + \underbrace{\left(\frac{X_{.j}(t1)}{X_{.j}(t0)} - \frac{X_{..}(t1)}{X_{..}(t0)}\right)}_{(b)} + \underbrace{\left(\frac{X_{ij}(t1)}{X_{ij}(t0)} - \frac{X_{.j}(t1)}{X_{.j}(t0)}\right)}_{(c)} \tag{2}$$

Where

- a : Regional Share (RS) component
- b : Proportional Shift (PS) component
- c : Differential Shift (DS) component
- $X_{..}$: Total production value of leading commodities in Kaur Regency
- $X_{.j}$: Total production value of leading commodity i in Kaur Regency
- X_{ij} : Production value of the agricultural, plantation, and agricultural sector i in sub-district unit j
- t^1 : End year time point
- t^0 : Start year time point

Determination of leading commodities was carried out through matrix analysis that integrates several criteria: if the Location Quotient (LQ) value > 1 and the Differential Shift (DS) value > 0, then the commodity is classified as a leading commodity.

Financial analysis was conducted to assess whether leading plantation commodities are feasible to cultivate. Interviews using questionnaires were conducted to analyze the financial feasibility of farming the leading plantation commodities cultivated by farmers. The questionnaire included questions for farmers regarding investment costs (equipment), variable costs (seeds, pesticides, fertilizers, labor wages, and transportation), selling prices, productivity, capital sources, and other information related to the cultivation of leading plantation commodities. The sampling technique used was purposive sampling (judgment sampling), by selecting farmers whose primary income comes from cultivating the designated leading commodities and who have a minimum land area of one hectare.

A total of 45 farmers were selected as respondents: 18 oil palm farmers from Luas, Muara Sahung, and Semidang Gumay subdistricts; 15 coconut farmers from Kinal, Kelam Tengah, and Kaur Utara subdistricts; and 12 rubber farmers from Nasal, Maje, and Kaur Selatan subdistricts. Secondary data were obtained from BPS Kaur Regency (2019, 2024), while primary data were collected through structured interviews and direct field observations conducted from January to February 2026. Several indicators were used in the financial analysis assessment: Net Present Value (NPV), Benefit-Cost Ratio (BCR), and Internal Rate of Return (IRR). The NPV reflects whether the cultivation activity of a commodity generates profit or loss. Meanwhile, the BCR shows the ratio between additional benefits and each additional unit of cost incurred. A business is considered feasible if the NPV is positive (>0) and the BCR is equal to or greater than one. NPV is calculated by subtracting the present value of total costs from the present value of total benefits, according to the specified formula.

Net Present Value (NPV)

$$NPV = \sum_{t=1}^n \frac{Benefit_t - Cost_t}{(1+i)^t} \tag{3}$$

Where

Benefit_t : Benefit obtained in connection with the cultivation activity in year t.

Cost_t : Cost incurred in connection with the cultivation activity in year t (regardless of whether the cost is considered capital).

I : Relevant interest rate.

T : Period (1,2,3,...n).

To measure the value of a business:

NPV > 0 : Business is feasible.

NPV = 0 : Benefits are only sufficient to cover costs and investment over the business's technical economic life.

NPV < 0 : Business is not feasible.

Net Benefit Cost Ratio (BCR)

The Benefit Cost Ratio (BCR) represents the extent to which the benefits obtained are comparable to the costs incurred, or in other words, shows the multiple of benefits for each unit of cost invested. This indicator is calculated by comparing the total Net Present Value of positive benefits with the total present value of negative costs, which is then formulated in the following mathematical equation.

$$Net \frac{B}{C} = (\sum_{t=1}^n (Benefit_t - Cost_t)) / (1 + i)^t \tag{4}$$

To measure the value of a business:

- Net BCR > 1 atau BCR > 1 : Business is feasible.
- Net BCR = 1 atau BCR = 0 : Marginal (neither profit nor loss)
- Net BCR < 1 atau BCR < 0 : Business is not feasible.

Internal Rate of Return (IRR)

The Internal Rate of Return (IRR) is the discount rate at which the Net Present Value (NPV) of an investment equals zero, representing a break-even condition. IRR can also be interpreted as the effective annual rate of return generated by a business, expressed as a percentage. If the calculated IRR is higher than the prevailing interest rate or discount rate, then the farming activity is considered financially feasible. Conversely, if the IRR is lower than the discount rate used, the business is not feasible. The IRR calculation is performed using the following formula:

$$IRR = (i' + (i'' - i') \frac{NPV'}{NPV' - NPV''}) \tag{5}$$

- Where :
- i' : Discount rate at which NPV is positive.
- i'' : Discount rate at which NPV is negative.
- NPV' : Positive NPV value.
- NPV'' : Negative NPV value.

Sensitivity Test

Sensitivity analysis is conducted to evaluate the impact of changes or inaccuracies in cost or benefit estimates on the results of project feasibility analysis. In this study, sensitivity analysis includes three scenarios, which are reviewed separately to illustrate various possible changes that could affect business feasibility, as follows:

- a. Related to a 10% increase in investment costs with constant revenue.
- b. Related to a 10% decrease in revenue with constant investment costs.
- c. Related to a 10% increase in investment costs and a 10% decrease in revenue.

A leading commodity is declared feasible for development if it meets financial feasibility criteria, including an R/C ratio > 1, NPV > 0 (positive), BCR > 1, and a high IRR, indicating significant economic profit. The higher the IRR value, the greater the business’s capacity to cover costs and utilize resources efficiently.

RESULTS AND DISCUSSION

Results

Identification of Leading Plantation Commodities

The results of LQ and DS analysis on five plantation commodities in Kaur Regency, using 2024 production data, show that all sub-districts have leading commodities based on production-based criteria (LQ > 1). More complete details are presented in Table 1. An LQ value greater than 1 indicates that the sub-district specializes in that commodity relative to the regency as a whole, signifying a comparative advantage and an exportable surplus. The highest LQ values were recorded for cocoa in Nasal (6.44) and coffee in Nasal (6.57), while rubber dominated in Lungkang Kule (5.94) and Kaur Tengah (4.62). Oil palm showed a moderate but consistent comparative advantage across several sub-districts, including Semindang Gumay (1.13), Tanjung Kemuning (1.12), and Luas (1.10). Coconut showed a strong comparative advantage in Kaur Tengah (4.49) and Maje (4.44).

Table 1. LQ Values of Plantation Commodities per Sub-district in Kaur Regency

No	Sub-district	Oil Palm	Coconut	Rubber	Cocoa	Coffee
1	Nasal	0.58	1.78	1.57	6.44	6.57
2	Maje	0.59	4.44	1.66	5.82	3.89
3	Kaur Selatan	1.00	3.96	1.30	0.02	0.11
4	Tetap	0.92	1.49	1.16	2.04	0.28
5	Kaur Tengah	0.76	4.49	4.62	0.04	0.25

6	Luas	1.10	0.41	0.46	0.22	0.27
7	Muara Sahung	1.02	0.09	0.51	1.77	1.39
8	Kinal	0.98	2.29	0.40	1.68	0.71
9	Semindang Gumay	1.13	0.00	0.24	0.03	0.35
10	Tanjung Kemuning	1.12	0.48	0.31	0.04	0.11
11	Kelam Tengah	0.92	1.05	2.96	0.21	0.11
12	Kaur Utara	0.92	1.60	2.64	0.37	0.24
13	Padang Guci Hilir	1.06	0.27	0.69	0.35	2.16
14	Lungkang Kule	0.60	2.90	5.94	1.40	1.32
15	Padang Guci Hulu	1.01	0.46	0.77	1.23	1.47

The results of SSA analysis using $DS > 0$ (positive) to identify leading plantation commodities using production data from 2019 and 2024 are presented in Table 2. Negative DS values ($DS < 0$) indicate that a commodity in that subdistrict experienced a decline in competitiveness relative to the regional average growth rate between 2019 and 2024. Economically, this signals structural weaknesses, such as aging plantation stock, declining productivity, price instability (especially for cocoa and coffee), and insufficient post-harvest infrastructure. Subdistricts with predominantly negative DS values—such as Nasal (oil palm $DS = -0.58$) and Lungkang Kule (oil palm $DS = -0.75$)—require priority interventions through replanting programs, input subsidies, and improved market access to restore competitive positions (Rustiadi et al., 2011).

Table 2. DS Values of Plantation Commodities per Sub-district in Kaur Regency

No	Sub-district	Oil Palm	Coconut	Rubber	Cocoa	Coffee
1	Nasal	-0.58	-0.61	-0.19	0.00	0.00
2	Maje	-0.49	-0.02	7.75	8.61	0.00
3	Kaur Selatan	-0.19	-0.49	0.01	0.11	-0.03
4	Tetap	5.75	-0.45	0.01	4.83	-0.37
5	Kaur Tengah	1.46	0.00	9.29	-0.64	-0.03
6	Luas	4.21	0.50	0.00	-0.48	-0.25
7	Muara Sahung	1.47	-0.50	0.01	0.00	0.00
8	Kinal	6.12	3.08	-0.07	0.80	-0.67
9	Semindang Gumay	1.27	-1.00	0.00	-0.69	-0.04
10	Tanjung Kemuning	3.43	0.01	0.00	0.00	0.00
11	Kelam Tengah	1.47	1.17	0.00	-0.84	-0.03
12	Kaur Utara	0.13	2.67	-0.01	-0.55	-0.15
13	Padang Guci Hilir	1.47	-0.76	0.00	-0.70	-0.01
14	Lungkang Kule	-0.75	0.06	-0.07	-0.45	-0.23
15	Padang Guci Hulu	2.60	0.02	0.01	-0.01	-0.04

The results of LQ and SSA analyses for plantation commodities in Tables 1 and 2 reveal the leading plantation commodities for each area. The leading plantation commodities in each sub-district are presented in Table 3 and Figure 1. A clear spatial pattern emerges: rubber dominates the northern and central sub-districts (Nasal, Maje, Kaur Selatan, Tetap, Kaur Tengah); oil palm prevails in the southern and western inland sub-districts (Luas, Muara Sahung, Semindang Gumay, Tanjung Kemuning, Padang Guci Hilir, Padang Guci Hulu); and coconut is concentrated in the eastern coastal sub-districts (Kinal, Kelam Tengah, Kaur Utara, Lungkang Kule). These spatial patterns provide a direct basis for differentiated agricultural policy: rubber sub-districts require latex processing facilities and price stabilization mechanisms; oil palm sub-districts require improved smallholder certification and mill access; and coconut sub-districts would benefit from downstream product development such as virgin coconut oil and copra processing.

Table 3. Leading Plantation Commodities Resulting from Compilation of LQ and DS

No	Sub-district	LQ (Criteria >1)	DS (Criteria >0)	Leading Commodity
1	Nasal	Coconut, Rubber, Cocoa, Coffee	Rubber	Rubber
2	Maje	Coconut, Rubber, Cocoa, Coffee	Rubber, Cocoa	Rubber
3	Kaur Selatan	Coconut, Rubber	Rubber	Rubber
4	Tetap	Coconut, Rubber, Coffee	Oil Palm, Rubber	Rubber
5	Kaur Tengah	Coconut, Rubber	Oil Palm, Rubber	Rubber
6	Luas	Oil Palm	Oil Palm, Coconut	Oil Palm
7	Muara Sahung	Oil Palm, Coffee, Cocoa	Oil Palm, Rubber, Cocoa	Oil Palm
8	Kinal	Coconut, Coffee	Oil Palm, Coconut	Coconut
9	Semidang Gumay	Oil Palm	Oil Palm	Oil Palm
10	Tanjung Kemuning	Oil Palm	Oil Palm, Coconut	Oil Palm
11	Kelam Tengah	Coconut, Rubber	Oil Palm, Coconut	Coconut
12	Kaur Utara	Coconut, Rubber	Oil Palm, Coconut	Coconut
13	Padang Guci Hilir	Oil Palm, Coffee	Oil Palm	Oil Palm
14	Lungkang Kule	Coconut, Rubber, Coffee, Cocoa	Coconut, Cocoa	Coconut
15	Padang Guci Hulu	Oil Palm, Coffee, Cocoa	Oil Palm, Coconut, Rubber	Oil Palm

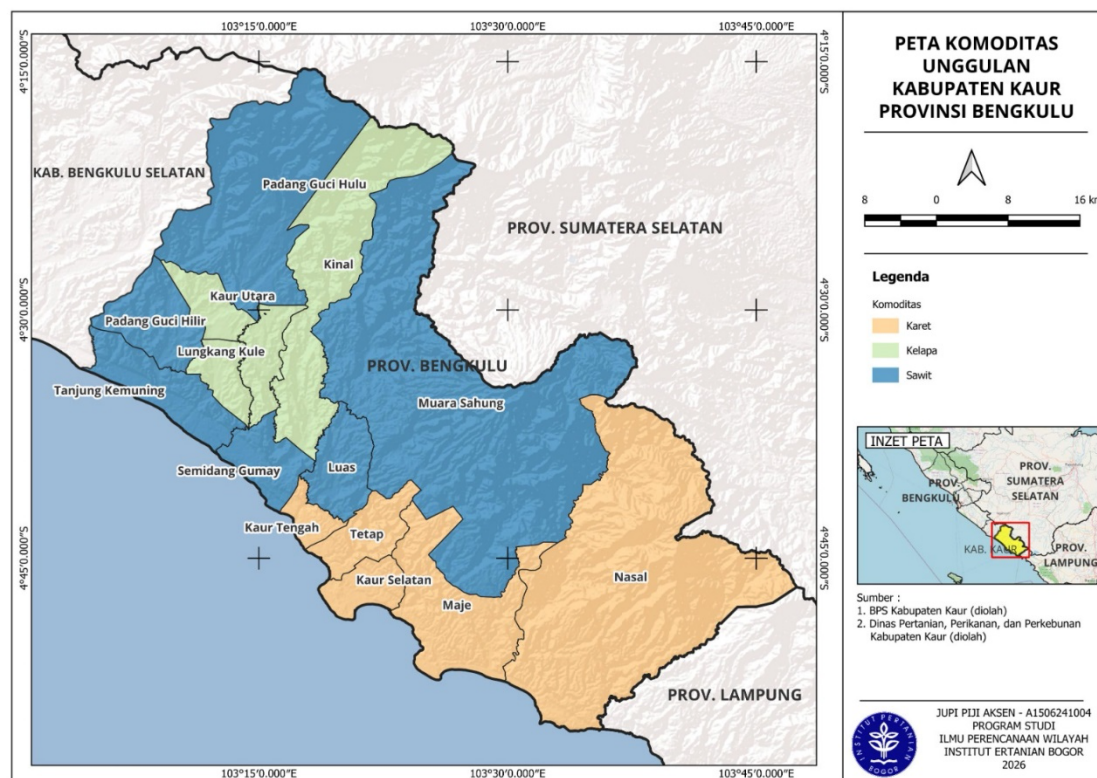


Figure 1. Map of leading plantation commodities in Kaur Regency

Financial Analysis

The financial analysis in this study was conducted on a plantation scale of one hectare, with sampling criteria for farmers whose primary income comes from cultivating the leading

commodity and who own a minimum land area of one hectare. The purposive sampling technique was applied from the investment stage until the plantation business generated a positive NPV. The farming feasibility analysis in this study was conducted for the period from year 0 to year 25 of maintenance using a financial analysis approach. A business is declared feasible if it generates a positive NPV, a B/C ratio greater than one, and an IRR exceeding the reference interest rate. In this study, the discount rate applied was 10%. The calculation results are presented in Table 4. A comparative summary of the three leading commodities shows that oil palm is the financially superior commodity with the highest NPV (IDR 361,514,078), B/C ratio (9.21), and IRR (59.9%), followed by coconut (NPV IDR 260,159,827; B/C 5.52; IRR 34.57%), and rubber (NPV IDR 111,185,336; B/C 4.21; IRR 44.73%). All three commodities meet the feasibility criteria of NPV > 0, B/C > 1, and IRR exceeding the 10% discount rate.

Table 4. Results of the financial feasibility analysis of leading plantation commodities farming

No	Commodity	NPV (IDR)	B/C Ratio	IRR (%)	Feasibility
1	Oil Palm	361,514,078	9.21	59.9%	Feasible
2	Coconut	260,159,827	5.52	34.57%	Feasible
3	Rubber	111,185,336	4.21	44.73%	Feasible

Sensitivity Test

Sensitivity analysis in this study was used to assess the feasibility of farming under three changing conditions applied to the leading commodities of oil palm, coconut, and rubber. The results of the sensitivity analysis are presented in Table 5.

Table 5. Results of the sensitivity test for leading plantation commodities farming in Kaur Regency

Condition	NPV (IDR)	B/C Ratio	IRR (%)	Feasibility
Oil Palm Commodity				
Normal	361,514,078	9.21	59.9%	Feasible
10% increase in investment costs	355,418,088	8.33	59.7%	Feasible
10% decrease in revenue	319,231,235	8.24	54.9%	Feasible
10% increase in costs and 10% decrease in revenue	312,780,786	7.45	54.7%	Feasible
Coconut Commodity				
Normal	260,159,827	5.52	39.49%	Feasible
10% increase in investment costs	251,720,485	4.97	34.8%	Feasible
10% decrease in revenue	225,696,793	4.91	34.77%	Feasible
10% increase in costs and 10% decrease in revenue	217,180,352	4.42	34.47%	Feasible
Rubber Commodity				
Normal	117,065,336	4.69	44.73%	Feasible
10% increase in investment costs	112,333,934	4.22	44.34%	Feasible
10% decrease in revenue	100,624,087	4.17	44.29%	Feasible
10% increase in costs and 10% decrease in revenue	95,859,552	3.75	39.61%	Feasible

Discussion

Kaur Regency has five plantation commodities spread across 15 sub-districts. These commodities are generally managed by local farmers, and each sub-district has different characteristics and potential for producing leading commodities. The findings of this study are broadly consistent with comparable research from other Indonesian regions. Bangun (2020) similarly found rubber and coconut as leading smallholder commodities in North Karo Regency using LQ analysis, while Nurlaela (2025) confirmed the effectiveness of the combined LQ-SSA approach for identifying leading agricultural commodities in South Sulawesi. In terms of financial performance, the NPV and IRR values obtained in this study are markedly higher than those

reported by Putri (2025) for rubber in Pasaman Regency (NPV IDR 107,861,527; IRR 22%) and by Purnama (2019) for oil palm in West Aceh (NPV IDR 169,496,260; IRR 31.30%), indicating that Kaur Regency's plantation sector possesses stronger intrinsic financial viability under current market and agro-ecological conditions. The determination of leading commodities in this study analyzed five plantation commodities: oil palm, coconut, rubber, cocoa, and coffee.

The LQ results for Nasal, Maje, and Lungkang Kule sub-districts showed the greatest number of commodities, including coconut, rubber, cocoa, and coffee, while Luas, Muara Sahung, Semindang Gumay, and Padang Guci Hilir sub-districts had the fewest commodities, with only one commodity each. Then, SSA analysis based on DS values showed that Tetap and Kinal sub-districts had the highest number of commodities, with three commodities each: oil palm, rubber, and coconut. Subsequently, the compilation of LQ and DS values identified leading plantation commodities spread across all sub-districts in Kaur Regency, namely oil palm, coconut, and rubber, indicating that these commodities have both competitive and comparative advantages (Supriono & Nur, 2023). Oil palm, coconut, and rubber are the most dominant commodities in Kaur Regency, spread across all sub-districts based on planted area: 9,579 ha for oil palm, 2,179 ha for coconut, and 5,892 ha for rubber.

The financial analysis of leading plantation commodities was conducted based on farming activities over a 25-year period for each commodity. The oil palm commodity obtained an NPV showing a profit of IDR 361,514,078, with the highest B/C ratio of 9.21 and an IRR of 59.9%, indicating that oil palm farming is feasible up to an interest rate of 59.9%. The notably high IRR values across all three commodities can be explained by several factors: (1) oil palm generates high Fresh Fruit Bunch (FFB) productivity of 18–25 tonnes/ha/year, with strong crude palm oil (CPO) market demand from food and biofuel industries and a productive lifespan exceeding 25 years; (2) coconut benefits from year-round harvesting cycles and diversified product markets (copra, coconut oil, fresh fruit); and (3) rubber enjoys sustained latex export demand and relatively stable price levels in Bengkulu Province. Combined, these factors generate cumulative investment returns far exceeding the 10% discount rate applied in this study (Aznur et al., 2020; Purnama et al., 2019). This research aligns with Purnama (2019), who found that the NPV criterion for oil palm farming on a 1 ha area was IDR 169,496,260, indicating that oil palm farming is feasible because the value is greater than zero (positive), with a B/C ratio of 6.24 and an IRR of 31.30%.

The coconut commodity has an NPV of IDR 260,159,827, a B/C ratio of 5.52, and an IRR of 34.57%, indicating that coconut farming is feasible to develop up to an interest rate of 34.57%. The rubber commodity yielded an NPV of IDR 111,185,336, with a B/C ratio of 4.21 and an IRR of 34.57%, indicating that rubber cultivation is also feasible and can be developed up to an interest rate of 34.57%.

The oil palm commodity, under a 10% increase in production costs and a 10% decrease in revenue, showed no significant sensitivity changes, meaning that oil palm farming remains feasible under these conditions (Purnama et al., 2019). Meanwhile, coconut farming under the three tested conditions was also not significantly affected and therefore remains feasible. Under a 10% increase in investment costs with constant revenue, an NPV of IDR 251,720,485 was obtained with a B/C ratio of 4.97 and an IRR of 34.85%.

Under a 10% decrease in revenue with constant investment costs, an NPV of IDR 225,696,793 was obtained with a B/C ratio of 4.91 and an IRR of 34.77%. Under a simultaneous 10% increase in investment costs and a 10% decrease in revenue, an NPV of IDR 217,180,352 was obtained with a B/C ratio of 4.42 and an IRR of 34.47%. This indicates that under all three scenarios, coconut farming on one hectare of land in Kaur Regency remains feasible and provides relatively high returns for farmers. This aligns with Syuhada (2024), whose research on the financial feasibility of coconut milk processing found that sensitivity analysis with a 10% increase in costs and a 10% decrease in revenue still produced positive NPV values across all respondents, indicating continued financial feasibility.

The sensitivity test for rubber farming in Table 4 also showed no significant impact across the three scenarios, indicating that rubber cultivation remains feasible. Under a 10% increase in investment costs, the NPV obtained was IDR 112,333,934, with a B/C ratio of 4.22 and an IRR of 44.34%. Under a 10% decrease in revenue, the NPV was IDR 100,624,087, with a B/C ratio of 4.17

and an IRR of 44.29%. Conversely, under a 10% increase in investment costs combined with a 10% decrease in revenue, the NPV was IDR 95,859,552, with a B/C ratio of 3.75 and an IRR of 39.61%. This aligns with Putri (2025) regarding the feasibility of rubber farming in Pasaman Regency, where sensitivity analysis produced an NPV of IDR 107,861,527, a B/C ratio of 1.5, and an IRR of 22%.

CONCLUSION

The results of the Location Quotient (LQ) and Differential Shift (DS) analysis of the five plantation commodities studied in Kaur Regency indicate comparative and competitive advantages across various sub-districts. The LQ approach ($LQ > 1$), based on 2024 production data, indicates that every sub-district has at least one leading commodity, with Nasal, Maje, and Lungkang Kule sub-districts having the highest diversity of leading commodities, while Luas, Muara Sahung, Semidang Gumay, and Padang Guci Hilir sub-districts have the fewest leading commodities. Meanwhile, the results of the Shift-Share analysis through the Differential Shift ($DS > 0$) component show that oil palm, coconut, and rubber are the most dominant commodities in Kaur Regency, distributed across all sub-districts.

Based on the financial feasibility analysis over a 25-year farming period, oil palm, coconut, and rubber are proven to be economically feasible for development in Kaur Regency. Oil palm achieved the highest financial performance (NPV IDR 361,514,078; B/C ratio = 9.21; IRR = 59.9%), followed by coconut (NPV IDR 260,159,827; B/C ratio = 5.52; IRR = 34.57%) and rubber (NPV IDR 111,185,336; B/C ratio = 4.21; IRR = 44.73%). All three commodities remain feasible under sensitivity scenarios of a 10% cost increase and a 10% revenue decrease, confirming the financial resilience of smallholder plantation farming in the region. For farmers, these results provide a strong evidence base for investing in oil palm, coconut, and rubber cultivation, particularly for landholdings of one hectare or more, as all three commodities generate returns well above the 10% discount rate even under adverse conditions.

For policymakers, the spatially differentiated distribution of leading commodities across sub-districts offers actionable guidance: rubber-dominant northern and central sub-districts should receive priority support for replanting programs and latex processing infrastructure; oil palm sub-districts require improved smallholder certification and mill access; and coconut sub-districts would benefit from downstream product development investments. Future research should expand the scope to include social dimensions such as labor absorption and community welfare impacts to provide a more holistic evaluation of plantation commodity development in Kaur Regency.

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AUTHOR CONTRIBUTION STATEMENT

All authors contributed to this research. The first author was responsible for conceptualization, field data collection, LQ and SSA analysis, and manuscript drafting. The second author contributed to financial feasibility methodology design, data analysis (NPV, B/C, IRR, sensitivity), and manuscript revision. All authors read and approved the final version of the manuscript.

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