Economic Potential and Business Development Strategy of Oil Palm Frond Waste Utilization in Rokan Hilir Regency, Indonesia

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This study evaluates the economic potential and strategic options for utilizing oil palm frond waste as an additional source of income for farmers and communities living around the plantation. The research was conducted from June to August 2026 at the Sei Meranti Estate of PT Perkebunan Nusantara IV, Meranti Makmur Village, Rokan Hilir Regency, Riau Province. A descriptive mixed-methods design was employed. The study involved 65 respondents, selected using the Slovin formula and proportionate stratified random sampling, together with eight key informants chosen through purposive sampling. Data were collected through observation, questionnaires, interviews, documentation, and a literature review. The analytical procedures included descriptive analysis, cost and revenue analysis, income analysis, the revenue–cost ratio, income contribution analysis, and SWOT analysis using the IFAS and EFAS matrices. The findings indicate that 60% of respondents reported that oil palm fronds were still arranged between planting rows and had not yet been processed into commercial products. Fermented animal feed emerged as the most promising alternative, generating a net income of IDR 4,500,000 per month, an R/C ratio of 1.75, and an income contribution of 8.57%. The SWOT analysis positioned the business development strategy in Quadrant I. The priority strategies include establishing a group-based business unit, providing processing training, procuring shredding machinery, standardizing production processes, conducting market trials, and strengthening collaboration among the company, the Village-Owned Enterprise (BUMDes), the village government, and local livestock farmers.
Keywords: Oil palm frond waste; fermented animal feed; additional income; circular economy; SWOT analysis.

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1. Introduction

Oil palm is one of Indonesia's major plantation commodities and plays a crucial role in the national economy through agricultural production, processing industries, exports, employment generation, and increased community income (Fahrizi & Saputra, 2023). In 2024, Indonesia's oil palm plantations covered 16,013,039 hectares and produced 45,436,197 tons of crude palm oil (CPO). This area comprised 6,876,022 hectares of smallholder plantations, 8,577,445 hectares of private estates, and 559,572 hectares of state-owned estates (Daryono et al., 2025). The extensive plantation area and high production volume indicate that the oil palm industry generates not only fresh fruit bunches and palm oil but also substantial quantities of plantation biomass that could be converted into economically valuable products (BPS Provinsi Riau, 2026).

Riau Province has the largest oil palm plantation area in Indonesia. In 2024, oil palm plantations in the province covered 3,371,424 hectares, accounting for approximately 21.05% of Indonesia's total oil palm plantation area. Riau produced 9,136,101 tons of palm oil, equivalent to approximately 20.11% of national production. Oil palm cultivation in the province was dominated by smallholder plantations covering 2,296,796 hectares, followed by private estates covering 999,766 hectares and state-owned estates covering 74,862 hectares (BPS Provinsi Riau, 2026).

The large scale of oil palm cultivation also generates increasing amounts of biomass from routine crop maintenance and harvesting activities (Siagian et al., 2024). One of the most consistently available biomass resources is oil palm fronds, which are removed during crop maintenance and fresh fruit bunch harvesting. These fronds are generally arranged between planting rows and left to decompose naturally (Singh et al., 2025). However, the continuous accumulation of fronds may interfere with maintenance and harvesting operations when they are not properly arranged. Their limited utilization also indicates that a potentially value-adding resource continues to be treated merely as a plantation by-product (Ayompe et al., 2025).

During the 2020–2024 period, both the oil palm plantation area and CPO production in Riau Province changed from year to year. The plantation area remained relatively stable between 2020 and 2022, increased substantially in 2023, and declined slightly in 2024. Palm oil production also exhibited a fluctuating pattern. The development of oil palm plantation area and production in Riau Province is presented in Table 1.

Table 1. Development of Oil Palm Plantation Area and CPO Production in Riau Province, 2020–2024

Year	Plantation area (ha)	CPO production (tons)	Development pattern
2020	2,862,132	8,863,931	Base year of observation
2021	2,858,173	8,961,940	Area decreased slightly, while production increased
2022	2,868,103	8,739,131	Area increased, while production declined
2023	3,401,607	9,222,465	Both area and production increased
2024	3,371,424	9,136,101	Both area and production declined slightly

Source: BPS Provinsi Riau (2026)

As shown in Table 1, the oil palm plantation area in Riau declined from 2,862,132 hectares in 2020 to 2,858,173 hectares in 2021, before increasing to 2,868,103 hectares in 2022. A substantial expansion occurred in 2023, when the plantation area reached 3,401,607 hectares, followed by a decrease to 3,371,424 hectares in 2024. CPO production rose from 8,863,931 tons in 2020 to 8,961,940 tons in 2021, but subsequently declined to 8,739,131 tons in 2022. Production increased again to 9,222,465 tons in 2023 before decreasing slightly to 9,136,101 tons in 2024. These figures demonstrate that the scale of oil palm production in Riau continuously generates a substantial and renewable supply of plantation biomass, including oil palm fronds.

Rokan Hilir Regency is one of the major oil palm plantation areas in Riau Province. In 2024, smallholder oil palm plantations in the regency covered approximately 197.4 thousand hectares. The presence of the Sei Meranti Estate, operated by PT Perkebunan Nusantara IV in Meranti Makmur Village, further reinforces the area's economic dependence on oil palm cultivation. Routine maintenance and harvesting activities within the estate continuously generate oil palm fronds, most of which remain within the plantation area and have not yet been systematically utilized as a source of additional income.

Oil palm fronds can be processed into various products, including animal feed, compost, organic fertilizer, biochar, briquettes, fiber-based materials, growing media, and handicrafts. (Setyawan et al., 2025) demonstrated that oil palm fronds could be converted into biochar containing 50.18% organic carbon, with a pH of 7.96 and measurable nitrogen, phosphorus, and potassium contents, indicating its potential as a soil amendment. (Wahyudi et al., 2026) found that a combination of oil palm fronds and sugarcane bagasse produced briquettes with a calorific value of 6,232.67 calories per gram and met several quality requirements stipulated in the Indonesian National Standard SNI 01-6235-2000. These findings suggest that oil palm fronds can be developed into economically valuable agricultural and energy products.

The utilization of oil palm fronds also supports the implementation of a circular economy because plantation biomass is no longer regarded solely as waste but is reused as a raw material for new products. (Alam et al., 2025) explained that circular-economy practices in the oil palm industry can improve resource efficiency, reduce waste generation, promote product diversification, and create new income sources (Zhafira et al., 2026). Nevertheless, their implementation continues to face technological, investment, logistical, labor-skill, institutional, and market-acceptance constraints (Yacob & Sears, 2026). These limitations indicate that oil palm frond utilization should not be assessed solely from a technical processing perspective. Its costs, revenues, profitability, financial feasibility, and development strategies must also be evaluated.

The principal issue addressed in this study is that the substantial availability of oil palm fronds within plantation areas has not been accompanied by organized utilization capable of generating additional income for farmers and surrounding communities. (Sihombing & Purwoko, 2025) found that plantation companies and farmers had not optimally converted oil palm waste into economically valuable products, although financial calculations indicated positive economic potential (Abdan Sifa et al., 2024). The development of oil palm waste-based enterprises also requires cooperation among plantation companies, farmers, local communities, and Village-Owned Enterprises to ensure that production and marketing activities can be sustained.

Previous studies (Afrino et al., 2026; Hasnah et al., 2025; Siegel & Varkkey, 2025; Yadollahi et al., 2026) has largely focused on the technical characteristics of biochar, briquette quality, animal-feed applications, or the testing of oil palm frond-based materials. Studies that simultaneously examine current frond-management practices, identify commercially promising products, analyze costs and income, calculate the revenue–cost ratio and income contribution, and assess internal and external factors within a corporate plantation setting remain limited. The novelty of this study lies in integrating economic analysis with SWOT analysis to formulate oil palm frond waste utilization strategies that reflect the characteristics of the Sei Meranti Estate and the community of Meranti Makmur Village.

This study aims to analyze current oil palm frond waste-management practices, identify alternative products with economic value, calculate costs, revenues, income, the revenue–cost ratio, and contributions to additional income, and assess the relevant internal and external factors. The findings are used to formulate strategies for utilizing oil palm frond waste as an additional income source for farmers and communities surrounding the Sei Meranti Estate of PT Perkebunan Nusantara IV, Meranti Makmur Village, Rokan Hilir Regency, Riau Province.

2. Method

This study employed a mixed-methods approach with a descriptive design to assess the economic potential and formulate strategies for utilizing oil palm fronds (Gupta & Gupta, 2020). The research was conducted from June to August 2026 at the Sei Meranti Estate of PT Perkebunan Nusantara IV, Meranti Makmur Village, Rokan Hilir Regency, Riau Province. The study population was estimated at 180 individuals, from which 65 respondents were selected using the Slovin formula and proportionate stratified random sampling (Walliman, 2021). In addition, eight key informants were selected purposively. Data were collected through observation, questionnaires, interviews, documentation, and a literature review. The data were analyzed descriptively, followed by calculations of production costs, revenue, income, the revenue–cost ratio, and income contribution. SWOT analysis using the IFAS and EFAS matrices was then applied to formulate appropriate development strategies (Snyder, 2019).

3. Results And Discussion

Results

Respondent Characteristics

The Respondents Comprised Individuals Involved In Plantation Activities Who Possessed Relevant Knowledge Of Oil Palm Frond Management.

Table 2. Distribution of Research Respondents

Respondent Group	Number	Percentage
Plantation maintenance and frond-pruning workers	20	30.77%
Harvesting workers	15	23.08%
Collection and transportation workers	8	12.31%
Field supervisors or foremen	7	10.77%
Administrative staff and estate management personnel	5	7.69%
Farmers or residents living around the estate	10	15.38%
Total	65	100.00%

As presented in Table 2, plantation maintenance and frond-pruning workers constituted the largest respondent group, comprising 20 individuals or 30.77% of the total sample. Harvesting workers accounted for 15 respondents or 23.08%, while farmers and residents living around the estate represented 10 respondents or 15.38%. This distribution indicates that most respondents were directly involved in activities associated with the generation and handling of oil palm fronds.

Current Oil Palm Frond Management Practices

The findings indicate that oil palm frond management at the Sei Meranti Estate remains dominated by the placement of fronds between planting rows, where they are left to decompose naturally.

Table 3. Current Oil Palm Frond Management Practices

Management Practice	Number of Respondents	Percentage
Arranged between planting rows	39	60.00%
Used directly as animal feed	10	15.38%
Shredded and used as mulch	7	10.77%
Processed into simple compost	5	7.69%
Not utilized or removed from the plantation area	4	6.16%
Total	65	100.00%

Source: Data processed by the authors, 2026.

Table 3 shows that 39 respondents, or 60.00%, reported that oil palm fronds were merely arranged between planting rows. Ten respondents, or 15.38%, indicated that the fronds were used directly as animal feed, while five respondents, or 7.69%, reported processing them into simple compost. These findings demonstrate that the commercial utilization of oil palm fronds as an income-generating product remains relatively limited.

Alternative Uses Of Oil Palm Fronds

The alternative products were assessed using a five-point scale based on raw material availability, technological simplicity, capital requirements, required skills, and market potential.

Table 4. Assessment of Alternative Oil Palm Frond Products

Alternative Product	Mean Score	Category	Rank
Fermented animal feed	4.46	Highly promising	1

Alternative Product	Mean Score	Category	Rank
Compost or organic fertilizer	4.18	Promising	2
Biochar	3.83	Promising	3
Briquettes	3.42	Promising	4
Fiber-based products or handicrafts	2.95	Moderately promising	5

Fermented animal feed obtained the highest mean score of 4.46. This product was considered the most promising alternative because its production process is relatively straightforward, raw materials are readily available, and livestock farmers are present in the surrounding plantation area. Compost ranked second with a mean score of 4.18. Biochar and briquettes also demonstrated economic potential, although their production requires more advanced technology, specialized skills, and higher processing costs.

Processing Cost Analysis

The economic analysis was based on a simulated fermented animal feed business unit managed by a group of 10 farmers or residents living around the plantation. The production capacity was set at 10,000 kilograms per month.

Table 5. Monthly Processing Costs of Fermented Animal Feed

Cost Component	Amount
Fixed costs	
Depreciation of shredding machine	IDR 350,000
Depreciation of fermentation containers	IDR 150,000
Depreciation of weighing scales and other equipment	IDR 125,000
Rental of production facilities	IDR 125,000
Total fixed costs	IDR 750,000
Variable costs	
Labor	IDR 2,400,000
Molasses	IDR 800,000
Bioactivator	IDR 400,000
Packaging	IDR 450,000
Fuel and electricity	IDR 350,000
Transportation	IDR 600,000
Other supporting costs	IDR 250,000
Total variable costs	IDR 5,250,000
Total production costs	IDR 6,000,000

As shown in Table 5, the estimated monthly production cost of fermented animal feed was IDR 6,000,000. This amount comprised IDR 750,000 in fixed costs and IDR 5,250,000 in variable costs. Labor represented the largest cost component because the collection, shredding, mixing, fermentation, packaging, and distribution processes continued to rely heavily on manual labor.

Revenue And Income

Table 6. Business Revenue and Income Analysis

Item	Value
Production volume	10,000 kg
Selling price	IDR 1,050/kg
Total revenue	IDR 10,500,000
Fixed costs	IDR 750,000
Variable costs	IDR 5,250,000

Item	Value
Total costs	IDR 6,000,000
Net income	IDR 4,500,000
R/C ratio	1.75
Main income of 10 group members	IDR 48,000,000
Total income after the additional business activity	IDR 52,500,000
Additional income contribution	8.57%

Table 6 indicates that producing 10,000 kilograms of fermented animal feed at a selling price of IDR 1,050 per kilogram generated monthly revenue of IDR 10,500,000. After deducting total production costs of IDR 6,000,000, the business generated a net monthly income of IDR 4,500,000. The R/C ratio of 1.75 indicates that every IDR 1.00 spent on production generated IDR 1.75 in revenue. The business was therefore considered financially feasible because its R/C ratio exceeded 1.00. If the income were distributed equally among 10 group members, each member would receive approximately IDR 450,000 per month. The additional business contributed 8.57% to the group's total income, indicating that it was more appropriately positioned as a supplementary rather than primary income source.

Internal Factor Analysis

Table 7. IFAS Matrix for Oil Palm Frond Utilization

Internal Factor	Weight	Rating	Weighted Score
Strengths			
Continuous availability of oil palm fronds	0.18	4	0.72
Relatively low raw material costs	0.14	4	0.56
Availability of labor	0.10	3	0.30
Access to and support from the plantation company	0.10	3	0.30
Strength subtotal	0.52		1.88
Weaknesses			
Limited processing skills	0.14	2	0.28
Inadequate processing equipment	0.12	2	0.24
Limited business capital	0.12	2	0.24
Unorganized marketing system	0.10	2	0.20
Weakness subtotal	0.48		0.96
Total	1.00		2.84

The total IFAS score of 2.84 indicates that the internal capacity to develop oil palm frond utilization was relatively strong. The principal strengths were the continuous availability of raw materials and their comparatively low cost. The main weaknesses involved limited processing skills, inadequate equipment, restricted access to capital, and the absence of an organized marketing system.

External Factor Analysis

Table 8. EFAS Matrix for Oil Palm Frond Utilization

External Factor	Weight	Rating	Weighted Score
Opportunities			
Local demand for animal feed	0.18	4	0.72
Potential support through company programs	0.15	3	0.45
Partnerships with Village-Owned Enterprises or business groups	0.12	3	0.36
Development of circular-economy programs	0.10	3	0.30
Opportunity subtotal	0.55		1.83
Threats			

External Factor	Weight	Rating	Weighted Score
Difficulty in maintaining product quality and continuity	0.13	2	0.26
Fluctuations in product selling prices	0.12	2	0.24
Storage and transportation costs	0.10	2	0.20
Competition from commercial animal feed	0.10	2	0.20
Threat subtotal	0.45		0.90
Total	1.00		2.73

The total EFAS score of 2.73 indicates that the external environment offered considerable development opportunities. The main opportunities arose from local demand for animal feed and the possibility of support from the plantation company. Threats requiring attention included inconsistent product quality, distribution costs, price fluctuations, and competition from commercially manufactured animal feed. The difference between the strength and weakness scores was 0.92, while the difference between the opportunity and threat scores was 0.93. As both coordinates were positive, the business development position was located in Quadrant I, indicating an aggressive or growth-oriented strategy.

Oil Palm Frond Utilization Strategies

Figure 1. SWOT Matrix for Oil Palm Frond Utilization

The principal strategy recommended is the establishment of a jointly managed business unit specializing in fermented animal feed production. This strategy should be supported by technical training, the procurement of shredding equipment, the development of standardized production procedures, and the establishment of marketing partnerships with livestock farmers, the plantation company, and the Village-Owned Enterprise (BUMDes).

Discussion

Current Utilization Of Oil Palm Fronds

The findings indicate that 60% of respondents reported that oil palm fronds were still arranged between planting rows and had not yet been processed into commercial products. This result suggests that frond management at the Sei Meranti Estate remains primarily focused on biomass arrangement and the return of organic matter to the soil. The utilization of oil palm fronds as a business input capable of generating additional income for farmers and surrounding communities has not yet been developed optimally (Azzi et al., 2024). Oil palm fronds placed within plantation areas serve important agronomic functions, including

maintaining soil moisture and returning organic matter to the soil. Nevertheless, not all available fronds need to remain economically unutilized. A portion of the biomass may be allocated as raw material for commercial activities, provided that crop requirements and plantation management regulations are carefully considered. Previous studies have demonstrated that oil palm frond biomass can be converted into animal feed, biochar, energy products, fiber-based materials, and other value-added commodities.

At the Sei Meranti Estate, frond utilization requires a clear allocation system distinguishing between fronds retained to support soil fertility and those permitted for commercial processing. Frond collection should follow pruning schedules, designated collection points, and approval procedures established by estate management so that harvesting and crop maintenance activities are not disrupted. Farmers and local residents also require practical knowledge of frond collection, shredding, storage, and processing techniques.

These findings are consistent with studies (Altıkat et al., 2024; Amalina et al., 2022; Ayaz et al., 2021)on oil palm biomass utilization, which have shown that raw material availability is not always accompanied by adequate local processing capacity. Effective frond utilization requires appropriate technology, affordable investment, skilled labor, and institutional support. Research on the preparedness of oil palm farmers has further demonstrated that group-based training and a supportive institutional ecosystem can strengthen community readiness to adopt green-economy practices and biomass utilization.

The managerial implication is that the management of the Sei Meranti Estate should establish operational guidelines governing the quantity of fronds that may be collected, collection locations, transportation schedules, and the parties responsible for implementation and supervision. PT Perkebunan Nusantara IV should also map the availability of oil palm fronds and develop a formal partnership mechanism with local community groups. Such policies would enable economic utilization without compromising the agronomic role of fronds in plantation maintenance.

Economic Potential Of Fermented Animal Feed

The findings show that fermented animal feed received the highest assessment score among the alternative uses of oil palm fronds. This product was considered more promising than biochar, briquettes, compost, and composite materials because its production process is relatively simple and its potential market is geographically accessible through livestock farmers located near the study area. The business analysis generated an estimated net income of IDR 4,500,000 per month and an R/C ratio of 1.75. An R/C ratio of 1.75 indicates that every IDR 1.00 spent on production generates IDR 1.75 in revenue. Because the ratio exceeds 1.00, processing oil palm fronds into fermented animal feed is considered financially feasible. This feasibility is supported by the continuous availability of raw materials, relatively low input costs, and the applicability of the required technology at the group-enterprise level.

Oil palm fronds contain high levels of structural fiber, which limits their direct use as animal feed because of relatively low digestibility (Azzi et al., 2024). Fermentation can improve feed quality by modifying fiber structure and enhancing fermentation characteristics. Santoso et al. reported that fermentation treatment of oil palm biomass improved fermentation performance and nutrient digestibility under *in vitro* conditions. Similarly (Bagheri Novair et al., 2023; Chávez-García et al., 2020; Chi et al., 2024) demonstrated that ensiling oil palm fronds with selected additives could enhance their use in ruminant feeding systems.

At the Sei Meranti Estate, fermented feed production could be managed collectively by farmers, plantation workers, and residents of Meranti Makmur Village. The production process would involve collecting the fronds, shredding them, mixing them with molasses and a bioactivator, fermenting the material, packaging the final product, and marketing it to livestock farmers. Production should initially be implemented on a limited scale to evaluate product quality, animal acceptance, labor capacity, and market certainty.

The additional income contribution of 8.57% indicates that the business would not yet replace the group members' primary income. Nevertheless, an estimated additional income of approximately IDR 450,000 per member per month could help support household expenditure. Other potential benefits include the availability of alternative feed, reduced dependence on feed supplied from outside the area, and the creation of new local economic activities. Training programs on oil palm frond fermentation have also been reported to improve livestock farmers' knowledge and processing skills while reducing feed costs, although the magnitude of these benefits depends on production scale and local circumstances.

Biochar, briquettes, and composite materials may still be considered as future product alternatives. However, their development requires more advanced technology, greater investment, stricter quality control, and broader market access. Studies on the circular-economy development of oil palm biomass have shown that technology selection must account for raw material availability, processing costs, production capacity, product value, and market networks.

The managerial implication is that the proposed business unit should begin fermented feed production through a pilot project. Management should establish production targets, raw material requirements, fermentation standards, cost structures, selling prices, profit-sharing arrangements, and production schedules. Before expanding capacity, the group should secure regular buyers or establish simple supply agreements with local livestock farmers. Monthly evaluations of costs and revenues are also required to anticipate increases in the prices of additives, labor, and transportation.

Development Strategies For Oil Palm Frond Utilization

The SWOT analysis positioned the development of oil palm frond utilization in Quadrant I. This position indicates that the proposed enterprise possesses internal strengths and external opportunities that can be leveraged through a growth-oriented strategy. Its principal strengths include the continuous availability of fronds, relatively low raw material costs, available labor, and proximity to the production site. The main opportunities are local demand for animal feed, potential support from the plantation company, possible partnerships with the Village-Owned Enterprise, and the growing adoption of circular-economy practices.

The SO strategy focuses on establishing a fermented animal feed business unit by utilizing the available frond supply and local livestock demand (Yadollahi et al., 2026). The WO strategy emphasizes technical training, the procurement of shredding machinery, and the use of support provided by the company and the Village-Owned Enterprise. The ST strategy involves establishing standards for raw materials, fermentation procedures, packaging, and storage. The WT strategy recommends beginning production on a small scale, conducting market trials, and avoiding substantial investment before a stable market has been secured.

Strategy implementation may begin with the formation of a community business group and a pilot production program. PT Perkebunan Nusantara IV could provide access to raw materials, designate collection points, and support equipment procurement through its corporate social responsibility program. The Meranti Makmur Village Government and the Village-Owned Enterprise could assist with group legality, financial record-keeping, financing, and marketing. Universities and agricultural extension officers could contribute training in feed formulation, fermentation, packaging, and product quality testing.

These strategies are consistent with the circular-economy approach, which converts plantation biomass into economically valuable products (Afrino et al., 2026; Siegel & Varkkey, 2025; Sihombing & Purwoko, 2025; Yacob & Sears, 2026). Studies on oil palm biomass optimization have shown that successful waste-to-wealth development requires integration among raw material sources, processing technologies, business actors, and markets. Research on stakeholder perceptions has also emphasized the importance of

low investment costs, alignment with local resource potential, and the capacity to generate alternative income for surrounding communities.

Business development should be implemented gradually. In the short term, activities should focus on training, raw material mapping, business-group formation, and product trials. Medium-term activities should include the procurement of shredding machinery, product standardization, and the establishment of marketing networks. In the long term, the enterprise could be developed into a permanent business unit connected to the Village-Owned Enterprise, the plantation company, livestock farmers, and markets beyond Meranti Makmur Village.

The managerial implication is that responsibilities should be clearly allocated among the relevant stakeholders. PT Perkebunan Nusantara IV should oversee raw material allocation and program support, the community business group should manage production, the Village-Owned Enterprise should assist with institutional development and marketing, and livestock farmers should act as primary product users. Management should also establish performance indicators, including production volume, number of regular customers, product spoilage rates, cost per kilogram, net income, the R/C ratio, and increases in members' income. Periodic evaluations are necessary to ensure that the strategy remains aligned with production capacity and changes in market demand.

4. Conclusion

This study concludes that the utilization of oil palm fronds at the Sei Meranti Estate remains suboptimal because most fronds are merely arranged between planting rows and have not yet been processed into commercial products. Based on the assessment of alternative products, fermented animal feed emerged as the most promising option due to the ready availability of raw materials, the relatively simple processing requirements, and the presence of potential markets near the study area. The proposed enterprise generated an estimated net income of IDR 4,500,000 per month and an R/C ratio of 1.75, indicating that it is financially feasible for further development. Its contribution of 8.57% to group income suggests that the business can serve as a supplementary income source, although it is not yet sufficient to replace the members' primary earnings. The SWOT analysis positioned the proposed business development in Quadrant I, indicating that a growth-oriented strategy can be pursued by leveraging raw material availability, labor resources, company support, and market opportunities. The recommended strategies include establishing a fermented animal feed business unit, providing processing training, procuring shredding machinery, developing production standards, conducting market trials, and strengthening collaboration among PT Perkebunan Nusantara IV, community business groups, the Village-Owned Enterprise, the village government, and local livestock farmers.

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