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Oil palm FFB supply chain for wetland and dryland plantations: Case Study in Banyuasin Regency

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Abstract

This research aims to identify the optimal marketing supply chain strategy for palm oil FFB in Banyuasin Regency using the SWOT method. It evaluates strengths, weaknesses, opportunities, and threats in the supply chain, prioritizing the best strategies. Data was collected through questionnaires and interviews, combining quantitative and qualitative insights. The findings place the smallholder palm oil industry in Quadrant 1 of the IFAS (3.28) and EFAS (2.69) matrix, indicating strong internal strengths and external opportunities. The proposed Strength-Opportunity (SO) strategy includes production efficiency, continuous training, adoption of best practices and technologies, and leveraging regulatory support such as subsidies and incentives. This approach aims to optimize distribution, improve FFB quality, and enhance the competitiveness of the smallholder palm oil industry in Banyuasin Regency.

Keywords: FFB; Optimizing; Strategy; Supply Chain; SWOT

1. Introduction

Palm oil commodities in Indonesia have a significant impact on the national economy [1]. The production of Fresh Fruit Bunches (FFB) is more than 60 million tons per year[2]. The contribution of the palm oil sector to national Gross Domestic Income (GDP) reaches 2-3% [3].

Palm oil productivity per hectare is high, reaching an average of 20-25 tons of FFB per year [4]. Challenges include inconsistent raw material supplies, fluctuating prices, non-uniform quality, and low selling value [5]. Palm oil is one of the main commodities in Banyuasin Regency, with a harvest area of 27,536 hectares and production reaching 52,641 tons in 2022 [6].

The economic potential of oil palm in this area is very significant, considering the large plantation land area and the high demand for FFB [7]. The problem facing oil palm farmers in Banyuasin is how to optimize production and income. The relationship between the supply chain and the price of Fresh Fruit Bunches (FFB) is influenced by various factors, including the role of the government, private sector, community and Non-Government Organization (NGO). Government price regulation contributes to FFB price stability, while private companies influence prices through operational efficiency and innovation [8].

Effective FFB supply chain management requires cooperation between all parties to achieve common goals in sustainable development [9]. The average price of FFB in Banyuasin Regency over the past five years has fluctuated,

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with prices ranging from IDR 1,200-IDR 2,000 per kilogram. In 2019, the average price of FFB was IDR 1,500 per kilogram, rising to IDR 1,700 per kilogram in 2020, and reaching IDR 2,000 per kilogram in 2022 before falling to IDR 1,800 per kilogram in 2023 [6].

2. Material and methods

2.1. SWOT Analysis

2.1.1. Identifying Internal and External Factors

The first step in a SWOT analysis is to identify internal and external factors affecting the smallholder palm oil industry [10] in Banyuasin. These factors, both positive and negative, help formulate strategies to optimize the supply chain for fresh fruit bunch (FFB) marketing [11], reduce quality issues and minimize the length of the supply chain [12]. This identification is based on literature reviews and surveys conducted in six districts in Banyuasin.

2.1.2. Questionnaire Development

Once the factors have been identified, a questionnaire is collect the respondents' rating [13]. The evaluation consist of two parts:

- Performance rating using a 1–9 scale, where 1 means very poor and 9 means excellent.
- Urgency rating using a scale from "a" (very important) to "d" (not important).

2.1.3. Respondent Selection

Respondents are selected based on their expertise and relevance to the study [14]. Each district will provide three respondents, divided into two groups:

- Government representatives: Two from the Plantation and Livestock Office, and six from Agricultural Extension Offices across six districts.
- Farmers: Twelve farmers (two per district).

2.1.4. Data Analysis

The responses are analyzed to categorize the factors into strengths, weaknesses, opportunities, and threats (SWOT) [15]. An IFAS-EFAS weighting system is used, to adjust average scores based on a neutral benchmark of 5. Weights are calculated for prioritization using weighted scores derived from factor weights and urgency ratings (a=4, b=3, c=2, d=1) [16].

2.2. Strategy Formulation

To determine priorities and the interrelationships between strategies based on the IFAS-EFAS scores results from the SWOT questionnaire for each indicator, an interactive combination of strategies is performed [17]. This includes an internal-external combination consisting of

- Strength-Opportunity Strategy (SO): This strategy focuses on leveraging strengths to take advantages of opportunities.
- Strength-Threat Strategy (ST): This strategy uses strengths to counter threats.
- Weakness-Opportunity Strategy (WO): This strategy aims to reduce weaknesses in order to take advantage of opportunities.
- Weakness-Threat Strategy (WT): This strategy seeks to minimize weaknesses in order to mitigate threats

3. Results and discussion

3.1. Internal Factors

Based on the results of the calculations carried out, it is known that the average or benchmark value of all the internal factors analyzed is 7.01. These internal factors are then classified into two groups. The first group consists of factors that have an average value higher than the value benchmark, which is categorized as strength, because these factors are considered to make a positive contribution to the performance or condition analyzed. Meanwhile, the second group

includes factors whose average value is below the benchmark value categorized as a weakness, because these factors are considered to have a negative impact or obstacle. The following is a summary of the results of evaluating internal factors:

3.2. External Factors

The average value (benchmark) for external factors is determined at 6.7. External factors that have an average score higher than benchmark are classified as opportunities, because these factors are considered to provide positive opportunities or benefits that can be exploited. On the other hand, external factors with average score below the benchmark are classified as threats, because these factors are considered to have the potential to provide risks or negative impacts that need to be anticipated. The following is a summary of the evaluation of external factors from the result of the questionnaire.

3.3. Assessment Internal Factor Analysis System (IFAS) dan External Factor Analysis System (EFAS)

After the internal factors have been grouped into strengths and weaknesses, and the external factors have been grouped into opportunities and threats, the next step is to evaluate the IFAS – EFAS with the results shown in Table 1.

Table 1 Assessment IFAS-EFAS SWOT (SW)

		Mean	**Average Value Adjustment**	**Value (%) (b/Xsi)*bs**	**Urgency (rating)**	**Value x rating**
STRENGHTS	1	8,40	3,40	11,18	3,30	0,37
	2	8,00	3,00	9,87	3,25	0,32
	3	8,70	3,70	12,17	3,40	0,41
	5	7,30	2,30	7,57	3,00	0,23
	11	7,40	2,40	7,89	3,20	0,25
	12	8,00	3,00	9,87	3,25	0,32
	14	7,50	2,50	8,22	3,35	0,28
	15	8,20	3,20	10,53	3,30	0,35
		Total S (Xsi)	23,5			2,53
WEAKNESS	4	6,80	1,80	5,92	3,10	0,18
	6	6,05	1,05	3,45	3,45	0,12
	7	6,00	1,00	3,29	3,45	0,11
	8	6,25	1,25	4,11	3,30	0,14
	9	5,20	0,20	0,66	3,50	0,02
	10	5,80	0,80	2,63	3,40	0,09
	13	5,80	0,80	2,63	3,75	0,10
		Total W(Xwi)	6,90			0,76
		Xi=(Xsi+Xwi)	30,40			
		Bs= (Xsi/si)*100%	77,30			
		Bw=(Xwi/wi)*100%	22,70			

Explanation:
S (Xsi) = total value of the strength identified during the internal analysis.
W (Xwi) = total value of the weaknesses identified during the internal analysis.
Xi = total value of internal factors.
Bs = percentage contribution of strengths
Bw = the percentage contribution of weaknesses

Table 2 Assessment of IFAS-EFAS SWOT (OT)

		Mean	**Average Value Adjustment**	**Value (%) (b/Xsi)*bs**	**Urgency (rating)**	**Value x rating**
OPPORTUNITY	1	8,20	3,20	10,53	3,20	0,34
	2	8,05	3,05	10,03	3,25	0,33
	3	7,20	2,20	7,24	3,65	0,26
	4	7,10	2,10	6,91	3,10	0,21
	5	7,30	2,30	7,57	3,10	0,23
	6	6,65	1,65	5,43	3,05	0,17
	7	6,70	1,70	5,59	3,20	0,18
	13	6,85	1,85	6,09	3,35	0,20
	15	7,85	2,85	9,38	3,20	0,30
		Total O (Xoi)	20,9			2,22
THREAT	4	6,40	1,40	4,61	2,95	0,14
	6	6,60	1,60	5,26	3,20	0,17
	7	6,00	1,00	3,29	3,15	0,10
	8	5,15	0,15	0,49	3,20	0,02
	9	5,10	0,10	0,33	3,40	0,01
	10	5,40	0,40	1,32	2,95	0,04
		Total T(Xti)	4,65			0,47
		Xi=(Xoi+Xti)	25,55			
		Bo= (Xoi/oi)*100%	81,80			
		Bt=(Xti/ti)*100%	18,20			

Source: Data Processing Result

Explanation:
O (Xoi) = total value of the opportunities identified during the external analysis.
T (Xti) = total value of the threats identified during the external analysis.
Xe = total value of external factors.
Bo = percentage contribution of opportunity
Bt = percentage contribution of threat

Table 3. shows the organization of alternative strategies according to their priority rankings, which were established through the Evaluation of the SWOT interaction matrix.

Table 3 Evaluation of SWOT Questionnaire Results

	S = 2,52	**W = 0.76**
O = 2.22	SO = 4,74	WO = 2.96
T = 0,47	ST =3,00	WT = 1,23

Source: Data Processing Results

Strategic priorities are established by ranking the combinations of strategies from highest to lowest value, based on the results of the questionnaire Evaluation.

Table 4 Sequence of SWOT Strategy Alternatives

Priority	Strategy	Value
I	Strength – Opportunity (SO)	4,74
II	Strength – Threat (ST)	3,00
III	Weakness – Opportunity (WO)	2,96
IV	Weakness – Threat (WT)	1,23

Source: IFAS-EFAS Interaction Matrix

3.4. Matrix Analysis SWOT

The SWOT quadrant matrix are shown in Figure 1.

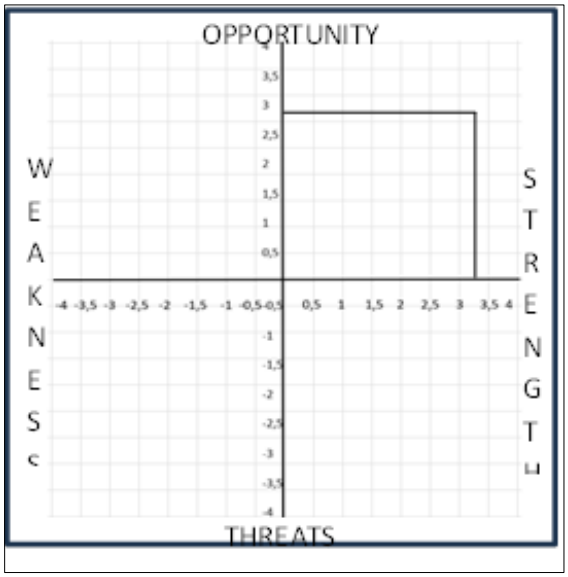

Figure 1 SWOT Quadrant Matrix

Based on Figure 2, it can be seen that the total IFAS matrix is 3.28 and the total EFAS matrix is 2.69. The supply chain optimization strategy for the smallholder palm oil industry in Banyuasin Regency is in a position between the Opportunity and Strength axes, namely Quadrant 1. This means that the Smallholder Palm Oil Industry in Banyuasin Regency is advised to carry out a progressive strategy by utilizing the industry's internal strengths to gain benefits from opportunities externally to achieve marketing supply chain optimization.

4. Conclusion

The research results conclude that based on the. total matrix IFAS 3,28 and total matrix EFAS is 2,69. The supply chain optimization strategy for the smallholder palm oil industry in Banyuasin Regency is in Quadrant 1, namely in the position between the Opportunity and Strength axes. This position indicates that the smallholder palm oil industry has significant internal strengths and external opportunities that can be leveraged to improve its supply chain performance. The strategy with the highest value is SO with the strategy offered, namely efficiency in the production process, as well as continuous training for farmers and workers, the smallholder palm oil industry can ensure a stable and high quality supply of FFB supported by government regulations and policies, such as subsidies and incentives, which can accelerate the adoption of best practices and new technologies in the supply chain, thereby shortening the distribution chain and improving the quality of FFB in Banyuasin Regency.

Compliance with ethical standards

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Disclosure of conflict of interest

No conflict of interest to be disclosed.

References

[1] L. M. Ayompe, M. Schaafsma, and B. N. Egoh, "Towards sustainable palm oil production: The positive and negative impacts on ecosystem services and human wellbeing," Jan. 01, 2021, Elsevier Ltd. doi: 10.1016/j.jclepro.2020.123914.

[2] D. Magalhães, A. A. Vilas-Boas, P. Teixeira, and M. Pintado, "Functional Ingredients and Additives from Lemon by-Products and Their Applications in Food Preservation: A Review," Mar. 01, 2023, MDPI. doi: 10.3390/foods12051095.

[3] M. A. S. S. Anuar and N. S. Ali, "Significant Oil Palm Diseases Impeding Global Industry: A Review," Sains Malays, vol. 51, no. 3, pp. 707–721, Mar. 2022, doi: 10.17576/jsm-2022-5103-06.

[4] P. Gandhi and T. Fumie, "Differences in Organization Structure and the Supply Chain of Private with State-Owned Palm Oil Mills in North Sumatra, Indonesia," E3S Web of Conferences, vol. 454, pp. 1–12, Nov. 2023, doi: 10.1051/e3sconf/202345402025.

[5] S. K. Paul, P. Chowdhury, M. A. Moktadir, and K. H. Lau, "Supply Chain Recovery Challenges in The Wake of COVID-19 Pandemic," J Bus Res, vol. 136, pp. 316–329, Nov. 2021, doi: 10.1016/j.jbusres.2021.07.056.

[6] BPS Kabupaten Banyuasin, Badan Pusat Statistik Kabupaten Banyuasin Bps-Statistics of Banyuasin Regency Kabupaten Banyuasin Dalam Angka. 2021.

[7] K. Suresh and R. K. Mathur, "Sustainable Oil Palm Production in India-Challenges and Opportunities," Oil Palm Research and Review, vol. 2, no. 1, pp. 1–6, 2021, doi: 10.29165/oprr.v2i1.14.

[8] M. Liu, B. Dan, S. Zhang, and S. Ma, "Information Sharing in An E-Tailing Supply Chain for Fresh Produce With Freshness-Keeping Effort and Value-Added Service," Eur J Oper Res, vol. 290, no. 2, pp. 572–584, Apr. 2021, doi: 10.1016/j.ejor.2020.08.026.

[9] A. Soltanmohammadi, D. Andalib Ardakani, P. A. Dion, and B. D. Hettiarachchi, "Employing Total Quality Practices In Sustainable Supply Chain Management," Sustain Prod Consum, vol. 28, pp. 953–968, Oct. 2021, doi: 10.1016/j.spc.2021.07.013.

[10] N. H. K. Quan, H. Singh, T. H. T. Khanh, and P. Rajagopal, "A SWOT Analysis With a Digital Transformation: A Case Study for Hospitals in the Pharmaceutical Supply Chain," Journal of Informatics and Web Engineering, vol. 2, no. 1, pp. 38–48, 2023, doi: 10.33093/jiwe.2023.2.1.4.

[11] S. Kumar C.R and P. K.B, "SWOT Analysis," Int J Adv Res (Indore), vol. 11, no. 09, pp. 744–748, Sep. 2023, doi: 10.21474/IJAR01/17584.

[12] R. Wang, K. E. Lee, M. Mokhtar, and T. L. Goh, "The Challenges of Palm Oil Sustainable Consumption and Production in China: An Institutional Theory Perspective," Sustainability (Switzerland), vol. 14, no. 8, pp. 1–16, Apr. 2022, doi: 10.3390/su14084856.

[13] F. Brandão, G. Schoneveld, P. Pacheco, I. Vieira, M. Piraux, and D. Mota, "The Challenge of Reconciling Conservation and Development in The Tropics: Lessons From Brazil's Oil Palm Governance Model," World Dev, vol. 139, Mar. 2021, doi: 10.1016/j.worlddev.2020.105268.

[14] I. E. Pratiwi, "The Predictors of Indonesia's Palm Oil Export Competitiveness: A Gravity Model Approach," Journal of International Studies, vol. 14, no. 3, pp. 250–262, 2021, doi: 10.14254/2071-8330.2021/14-3/16.

[15] B. Azhar et al., "Time to Revisit Oil Palm-Livestock Integration in the Wake of United Nations Sustainable Development Goals (SDGs)," Front Sustain Food Syst, vol. 5, pp. 1–7, Sep. 2021, doi: 10.3389/fsufs.2021.640285.

[16] P. Usapein, N. Tuntiwiwattanapun, P. Polburee, P. Veerakul, C. Seekao, and O. Chavalparit, "Transition Pathway Palm Oil Research Framework Toward a Bio-Circular-Green Economy Model Using SWOT Analysis: A Case Study of Thailand," Front Environ Sci, vol. 10, Jul. 2022, doi: 10.3389/fenvs.2022.877329.

[17] A. Pramana, Y. Zamaya, and Y. Zalfiatri, "Analysis of Supply Chain Crude Palm Oil (CPO) in Kuantan Singingi District," Agrointek : Jurnal Teknologi Industri Pertanian, vol. 15, no. 3, pp. 833–838, Aug. 2021, doi: 10.21107/agrointek.v15i3.10427