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Analysis of Crude Palm Oil Processing toward environmental impact at PT. Bersama Oesaha Saragih Sejahtera

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Abstract: This research aims to identify internal (Opportunities and Threats) in palm oil development strategies, formulate alternative development strategies in palm oil processing. The research result show that the strength factors of the development strategy in palm oil processing in the research area are due to the quality of CPO and availability of palm fruit, while the weakness factors are due to the quality of human resources, company conditions, environmental strategies in palm oil processing in the research area due todemand for CPO and information technology, while the threat factors are competition for CPO, price fluctuations. With the weighting results of the SWOT analysis results with IFAS and EFAS, SO = 3,93, ST = 3.47, WO = 2.66, WT = 2.25. And the results of the QSPM strategy 1 matrix improve the quality of CPO to meet the increasing demand for market share and utilize the availability of palm fruit and infrastructure to increase production with the highest Total Attractive Score (TAS) value, namely 7.310 among other alternative TAS values, strategy 2 with a Total Attractive Score (TAS value of 6,240 and strategy 4 with a Total Attractive Score (TAS) value of 4,480.

Keywords: Development Strategy; Palm Oil Processing; SWOT and QSPM

Introduction

Palm oil processing is an economically very important industrial process, but it also has significant environmental impacts (Cheah et al., 2023; Omran et al., 2021; Syahza & Irianti, 2021). This process involves several stages such as sterilization, threshing, pressing, clarification, and drying, which produce solid, liquid, and gaseous wastes, including palm oil effluent (POME), fiber, shells, and empty fruit bunches, which can pollute soil and water if not managed properly (Akhbari et al., 2019; Izah et al., 2016; Moreno-Sader et al., 2020). The expansion of oil palm plantations, especially in Southeast Asia, has contributed to deforestation, biodiversity loss, greenhouse gas emissions, and peatland degradation, even though oil palm produces more oil per hectare than other oil crops (Meijaard et al., 2020; Purnama et al., 2025). In addition, the use of palm oil waste as fuel or compost can reduce the carbon footprint, but this practice has not been widely adopted 47. Effective waste management, such as anaerobic POME treatment and biomass utilization, is essential to reduce environmental impacts (Akhbari et al., 2019; Anyaoha & Zhang, 2022). Other challenges include the risk of fires and explosions in mills due to dust and combustible materials 2. Efforts towards sustainability include the adoption of environmentally friendly technologies, certifications such as RSPO and ISPO, and collaboration between government, industry, and communities (Alhaji et al., 2024; Purnama et al., 2025). With the global demand for vegetable oils continuing to increase, it is important to balance economic, social, and environmental needs in the oil industry palm oil (Leng et al., 2024; Meijaard et al., 2020).

The origin of the oil palm plant (eleais guinessis jack) is not yet known for certain. It is strongly suspected

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that this plant comes from two places, namely South America and Africa (Guinea). The Elaeis melanococca or elaeis oleivera species is thought to originate from South America and the Elaeis guineensis species originates from Africa (Guinia). This oil palm plant with CPO yield is indeed not a native plant of Indonesia. This plant was first introduced to Indonesia from Africa in 1848 (Kumar et al., 2023), which was planted as a central plasma nutfah in the Bogor plantation. Commercial planting on plantations was first carried out in 1911 in the Tanah Itam Ulu plantation. The morphology of oil palm is included in the palmae family, the species Elais guineensis jaxq and its varieties are quite numerous, which are clarified by differences in fruit type, external shape, shell thickness as a single homozygte factor, namely dura with a thick shell when mated with a thin-shelled physifera will produce a tenera variety that has a shell thickness between the two, in this tenera variety plant that is planted because it produces higher oil (Nair, 2021).

There are several internal factors (CPO quality, availability of oil palm fruit, location, infrastructure and facilities, partnerships with farmers, company conditions, human resource quality, environmental impacts, climate change) in the palm oil development strategy at PT. Bersama Oesaha Saragih Sejahtera.

There are several external factors (Technology and information, increasing palm oil production, demand for CPO, establishing cooperation, Competition, price fluctuations, government policies, community consumption patterns) in the palm oil development strategy at PT. Bersama Oesaha Saragih Sejahtera.

Method

SWOT analysis is used to identify and analyze strategic development factors in CPO palm oil processing (Prabaswari & Sandika, 2023; Usapein et al., 2022), both internal (strengths and weaknesses and external (opportunities and threats) internal environment is analyzed by including: CPO quality, availability of palm oil fruit, location, infrastructure and facilities, positive impact of palm oil mills on the community, company conditions, HR quality, environmental impact, production process constraints.

External factors will be able to identify opportunities and threats to the development strategy in CPO Palm Oil processing through identification. The external environment observed is: Technology and information, palm oil production, CPO demand, establishing cooperation, competition, price fluctuations, government policies, community consumption patterns.

SWOT analysis is a method widely used to identify and analyze strategic factors in the development of the crude palm oil (CPO) processing industry. By identifying strengths, weaknesses, opportunities, and threats, companies can formulate appropriate strategies to increase competitiveness and business growth. Internal factors such as product quality, employee loyalty, marketing networks, and ownership of core and plasma plantations are the main strengths, while weaknesses are generally related to promotions, product innovation, and obsolete production equipment. External opportunities include large market potential, population growth, government policy support, and developments in information technology, while threats come from tight competition, substitute products, and environmental issues (Lubis et al., 2024; Septiani, 2017).

The results of the SWOT analysis are usually presented in a matrix to produce various alternative strategies, such as the SO (Strength-Opportunity) strategy which emphasizes expansion and utilization of opportunities with existing strengths (Nurzam & Wijaya, 2020). Determining strategic priorities can be done using the QSPM method to choose the most effective steps (Dahniar & Stiadi, 2018). In addition, the development of downstream industries and the utilization of innovative technology are also key to strengthening Indonesia's position in the global market and encouraging sustainable economic growth 2108. This approach is not only relevant for companies, but also for the formulation of national policies and the management of sustainable palm oil plantation funds (Fitriyah et al., 2024).

Result and Discussion

Identifying internal factors of the CPO palm oil development strategy in the research area consists of strength and weakness factors originating from the CPO palm oil development strategy resulting from the identification of internal factors in the CPO palm oil development strategy (Fajarika et al., 2023).

Based on internal factors, strengths and weaknesses can be identified. The internal factors can be described as follows. The quality of CPO produced by PT. Bersama Oesaha Saragih Sejahtera, Silau Kahean District, Simalungun has very good quality with high production, where this company faces very tight competition. The availability of oil palm fruit at PT. Bersama Oesaha Saragih Sejahtera, Silau Kahean District, Simalungun is classified as good and can support increased palm oil production (Ayompe et al., 2021; Chew et al., 2021).

The location of PT. Bersama Oesaha Saragih Sejahtera, Silau Kahean District, Simalungun is very

good, which is close to farmers' oil palm land, which is a strength that must be optimized, so that farmers do not need a long time to come and sell their oil palm harvest to the palm oil processing factory.

Table 1. Results of Identification of Internal Factors of Development Strategy in CPO Palm Oil Processing

Internal	Strength			Weakness		
	Factors	Small	Big	Factors	Small	Big
1	CPO Quality		√	Company Conditions		√
2	Availability of oil palm fruit		√	Quality of human resources		√
3	Location		√	Environmental impact		√
4	Infrastructure and Facilities		√	Production process constraints		√
5	Positive Impact of Palm Oil Mills on the Community		√			

The infrastructure and facilities at PT. Bersama Oesaha Saragih Sejahtera, Silau Kahean District, Simalungun that are available are the main strength in the manufacture of palm oil, where the palm oil processing plant (PKS) is a place where oil palm fruit is processed into CPO using the extraction process, a storage warehouse for production results, a large seller of production results, increased production of CPO, quality FFB (Murphy et al., 2021).

PT. Bersama Oesaha Saragih Sejahtera, Silau Kahean District, Simalungun has a positive impact on the community. Positive impacts can help the community in overcoming problems faced such as providing job vacancies, and free ambulances.

PT. Bersama Oesaha Saragih Sejahtera Kec. Silau Kahean Kab, Simalungun has a company condition that is similar to other CPO companies. PT. Bersama Oesaha Saragih Sejahtera Kec. Silau Kahean Kab, Simalungun has a workforce competition where many CPO companies operating can give rise to tight competition in recruiting and retaining quality employees.

PT. Bersama Oesaha Saragih Sejahtera Kec. Silau Kahean Kab, Simalungun has a very significant environmental impact which pollutes the air environment due to the evaporation of boiled crude palm oil. Constraints on the production process at the palm oil factory at PT. Bersama Oesaha Saragih Sejahtera Kec. Silau Kahean Kab, Simalungunthe occurrence of PLN blackouts, boiled buttons, problems with machines, cracks in buttons, are very disruptive and can result in strikes.

Table 2. Results of External Factor Identification of Development Strategies in CPO Palm Oil Processing

Internal	Opportunities			Treats		
	Factors	Small	Big	Factors	Small	Big
1	Technology and information		√	CPO Competition		√
2	Increase in CPO production		√	Price fluctuations		√
3	CPO demand increases		√	Government policy		√
4	Establish cooperation		√	Community consumption patterns		√

Based on external factors, opportunities and threats to the development strategy in CPO palm oil processing can be identified. The external factors are as follows.

The development of technology and information that has quite a large opportunity makes the delivery of information about CPO palm oil fast and strengthens relationships with customers (Limaho et al., 2022). To increase CPO production is classified as good in the acceptance of fresh fruit bunches (FFB) and quality to support the increase (Falgenti & Hambali, 2022) in CPO palm oil production at PT. Bersama Oesaha Saragih Sejahtera. The demand for CPO is increasing in market needs is very large because consumers are currently aware of the health of natural products.

PT. Bersama Oesaha Saragih Sejahtera collaborates with other producers such as: PT. PHPO, PT. SMART, PT. WILMAR, PT. ABLE, PT. ALFIHE, in order to accelerate demand for market needs. PT. Bersama Oesaha Saragih Sejahtera, Silau Kahean District, Simalungun has Price Fluctuations

Uncertain price fluctuations that occur at PT. Bersama Oesaha Saragih Sejahtera, Silau Kahean District, Simalungun. Where palm oil production decreases or experiences problems such as pest attacks on farmers' oil palm fruit, palm oil suppliers cause price increases. Changes in government policy where instability in PT. Bersama Oesaha Saragih Sejahtera due to riots in an area can affect operational performance.

Conclusion

The strength factor of the development strategy in palm oil processing in the research area is due to the availability of oil palm fruit and the positive impact of the palm oil factory on the community, while the weakness factors are the condition of the company, quality of human resources, environmental impacts, constraints on the production process. Opportunity factors for development strategies in palm oil processing in the research area due to increasing demand for CPO and establishing cooperation with other CPO companies, while threat factors include CPO competition with other producers and price fluctuations.

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