

BUSINESS DEVELOPMENT STRATEGY FOR THE MANAGEMENT OF USED COOKING OIL AS A RAW MATERIAL FOR BIODIESEL

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ABSTRACT

This study examines the business development strategy of *PT XYZ*, a company that manages Used Cooking Oil (UCO) as a raw material for biodiesel located in Jakarta. The research background is the increasing need for biodiesel in line with the mandatory B35 program, the great potential of UCO as an alternative raw material that is more economical and environmentally friendly, as well as the business challenges faced by *PT XYZ* after the 2022 UCO export restriction policy through the Domestic Market Obligation (DMO) mechanism which led to a decrease in export volume of more than 300% and the temporary closure of three branches outside Jakarta. The research uses a qualitative-quantitative approach with the analysis of Business Model Canvas (BMC), VRIO, PESTEL, Porter's Five Forces, IFE-EFE matrix, IE matrix, SWOT, and Analytical Hierarchy Process (AHP) for strategic prioritization. The results of the study show that *PT XYZ* has the main strengths in the form of an in-house UCO QC laboratory, a good reputation, and a strategic location in Greater Jakarta, but has weaknesses in the absence of ISCC certification and the limitations of digital systems. Based on the IE matrix, *PT XYZ* is in Quadrant I (growing and developing). The four recommended strategic priorities are: (1) medium-term contracts with buyers, (2) development of UCO collection networks, (3) operational cost efficiency, and (4) market expansion. The proposed new BMC model integrates the digitization of business processes, diversification of market segments, and the gradual development towards self-exporting.

Keywords: biodiesel; business model canvas; business strategy; uco; swot; ahp.

INTRODUCTION

Indonesia is a country with abundant natural resource reserves, including fossil fuels, petroleum. As the economy grows rapidly and industrializes, the national energy needs continue to increase from various sectors. Based on Indonesia's Energy Outlook in 2014, in the period 2003-2013 there was an average increase in domestic energy consumption of 5.5% per year, and 96% of the energy was still sourced from fossil energy, namely 48% petroleum, 18% natural gas, and 30% coal (Sugiyono, 2015). This condition of high dependence on fossil energy poses various risks, ranging from long-term energy security, fluctuations in global oil prices, to environmental impacts in the form of significant greenhouse gas emissions.

Realizing this urgency, the Indonesian government has begun to pay special attention to increasing the production, availability, and use of New and Renewable Energy (NRE). This is realized through various strategic regulations, including Presidential Regulation Number 5 of 2006 concerning National Energy Policy, which sets a renewable energy mix target within Indonesia's long-term energy management framework. The tangible manifestation of this commitment can also be seen from the implementation of the mandatory biodiesel program starting from B15, gradually upgraded to B20, B30, until it is set to B35 in 2023. The mandatory B35 program requires that all diesel fuel used in Indonesia must contain at least 35% organic components (biodiesel), which will continue to be evaluated for improvement as the government's strategic step in accelerating the energy transition.

This mandatory policy has a direct impact on the massive surge in demand for biodiesel. APROBI data (2022) shows that domestic biodiesel consumption has increased very significantly from 119 thousand kiloliters in 2009 to 10.42 million kiloliters in 2022. The proportion of domestic biodiesel consumption to total production also continues to increase, even reaching 98% in 2020. On the export side, Indonesia's biodiesel export volume also grew from 70 thousand kiloliters in 2009 to 419 thousand kiloliters in 2022. However, this huge demand growth has not been fully met, because based on data from the Indonesian Palm Oil

Association (IPOA), Indonesia's biodiesel export demand in 2017 was only met by 100 tons of the total demand of 1,800 tons, and the condition of this supply-demand inequality will continue until 2023.

One of the main factors that causes the need for biodiesel to be unmet is the dependence on palm oil (CPO) as the main raw material, the availability of which is still limited and contested by various other industries. LPEM UI data (2022) shows that the proportion of CPO use for the food industry has always been greater than for biodiesel since 2019. This creates structural pressure on the supply side of biodiesel feedstocks and encourages the need for more sustainable feedstock diversification.

On the other hand, Indonesia is also the country with the largest level of cooking oil consumption in the world, reaching 15.4 million tons throughout 2021 (IndexMundi, 2021). This massive consumption of cooking oil, which comes from household activities, restaurants, hotels, catering, and the large-scale food industry, produces a very large volume of waste used frying oil or Used Cooking Oil (UCO). Based on research by the Traction Energy Asia institution in the household and micro business segments, the Greater Jakarta area alone is the largest contributor with an estimated potential for UCO reaching 154,000 kiloliters or the equivalent of 151,536 tons per year (Databoks, 2022). Vanessa's research (2017) strengthens this finding, where the UCO produced by the people of Greater Jakarta every week is estimated to reach 1,889,506 tons, but most of it has not been utilized and is even directly disposed of into waterways.

The problem of UCO management is not only economic, but also has a serious impact on public health and the environment. From a health aspect, used cooking oil that is repeatedly used undergoes chemical degradation which produces harmful compounds such as free radicals, polymers, and aldehydes that are carcinogenic and can trigger narrowing of blood vessels, coronary heart, stroke, and hypertension (Firina, 2010). From an environmental aspect, UCO that is littered into waterways or soil can cause drainage blockages, water body pollution, and damage soil fertility and structure. A study by DLH DKI & LEMTEK UI (2025) noted that the main source of river pollution in Jakarta is domestic waste containing residual cooking oil or FOG (Fat, Oil, and Grease), where 95% of grey water waste has not been treated and is directly discharged into major rivers such as Ciliwung, Cipinang, and Sunter.

This condition is exacerbated by the lack of a structured UCO management and disposal system in Indonesia, in contrast to developed countries that already have strict regulations related to cooking oil waste management. Although in Jakarta there is a Jakarta Governor Regulation Number 167 of 2016 concerning Cooking Oil Waste Management which requires business actors to manage UCO waste correctly, its implementation in the field is still uneven and needs more intensive supervision. This condition of helplessness actually opens up business opportunities for parties who are able to provide UCO management solutions in a professional, structured, and economically valuable manner.

In this context, UCO emerged as a strategic solution that answered two problems at once: overcoming the scarcity and competition of using CPO as a raw material for biodiesel, as well as solving the problem of cooking oil waste management. Technically, UCO contains fatty acids that can be converted into biodiesel through the transesterification process, with product quality that meets industry standards if Free Fatty Acid (FFA) levels can be managed within the required limits.

From an economic perspective, the use of UCO as a biodiesel raw material has proven to be more cost-efficient. Widodo et al. (2011) stated that raw materials account for 60–70% of the total cost of biodiesel production, so the use of UCO that is economically not high value and available in abundance is an effective strategy to reduce production costs. Research by Setiadi et al. (2023) quantified this advantage, where the production price of UCO-based biodiesel is IDR 6,000 per liter, significantly lower than that of CPO-based which reaches IDR

8,000 per liter. This is in line with the findings of the 2007 Biodiesel Industry By-Utilization Conference, which emphasized the need for cheaper alternatives to biodiesel feedstocks such as UCO to prevent industrial failures due to the surge in olein and methanol prices.

From an environmental sustainability perspective, a life-cycle assessment (LCA) study proves that UCO-based biodiesel has a lower greenhouse gas emission intensity than biodiesel from virgin vegetable oil (Srikumar, 2024; Osipova et al., 2023), making it a superior feedstock choice within the framework of the circular economy and sustainability. The IEA Bioenergy report (2022) also confirms that waste-based bioenergy such as UCO has the potential to play an important role in the global energy transition if developed with proper governance. This condition places UCO's management business not only as a purely economic activity, but also as a real contribution to national energy security and responsible environmental management.

One of the pioneers who responded to the business opportunity of managing UCO as a biodiesel raw material is *PT XYZ*, which is located in Jakarta and has been established since 2016. *PT XYZ* performs the function of an aggregator and UCO manager, connecting suppliers (restaurants, hotels, food factories, and households) with buyers (international exporters and domestic biodiesel industry). The business process includes the management of UCO collection from suppliers, weighing, transporting, filtration, quality testing through FFA level measurement in in-house laboratories, to delivery to exporter partners. At the peak of its operations, *PT XYZ* was able to export UCO directly to Europe reaching more than 60 tons per week through four operational branches spread across Jakarta, Lampung, Surabaya, and Balikpapan.

However, since 2022, *PT XYZ* has faced very significant business turbulence. The policy of restricting UCO exports through the Domestic Market Obligation (DMO) mechanism set by the government in 2022 has a direct and dramatic impact on the company's operations. Based on the results of the pre-research through an interview with the Manager of *PT XYZ*, the company's export capacity has decreased drastically from above 60 tons per week to only 8-16 tons per week. Furthermore, three branches outside Jakarta, namely Surabaya (East Java), Balikpapan (East Kalimantan), and Lampung, were forced to close temporarily. The cumulative impact is enormous: the decline in UCO earnings between 2022 and 2024 reached more than 300%, which has serious implications for the company's financial condition, liquidity, and operational sustainability.

The challenges faced by *PT XYZ* are multidimensional. From the external side, the uncertainty of government policies related to UCO exports and price fluctuations in the international market is a systemic risk that is difficult to control. On the competitive side, the number of competitors, both formal and informal, (collectors) continues to grow, increasing the competition for UCO supplies from suppliers. Purchase prices at UCO suppliers, especially in Jakarta, tend to be higher due to competitive pressures, while selling prices in export markets are still fluctuating. Internally, *PT XYZ* does not have International Sustainability and Carbon Certification (ISCC) which is a mandatory requirement for direct exports to the European market, as well as the limitations of digital systems in operational management that hinder efficiency and scalability.

This situation is exacerbated by the condition that until 2023–2024, even though the condition of industrial UCO exports has begun to improve and the potential of UCO in Greater Jakarta continues to increase, *PT XYZ* is still operating with only one fleet at the East Jakarta headquarters, without restoring branches or expanding new collection areas. In fact, the price margin of UCO's direct exports to Europe is much higher than exports through the Tanjung Priok Port point which is the current business pattern. This condition of stagnation reflects the need for a more comprehensive business strategy reform, adaptive to external dynamics, and oriented towards sustainable long-term growth.

David (2009) defines strategic management as the art and knowledge of formulating, implementing, and evaluating cross-functional decisions that enable an organization to achieve its goals. Hunger and Wheelen (2012) reinforce this concept by stating that the strategic management process includes four basic elements: environmental observation, strategy formulation, strategy implementation, and evaluation and control. In the context of business development, strategy is the main instrument for creating and maintaining a sustainable competitive advantage.

According to Rahim and Radjab (2017), traditionally aspects of the internal environment of business can be seen through management functions which include planning, organizing, leadership, and control. External factors are the environment that is outside the organization and needs to be analyzed to determine opportunities and threats that require a strategic response. Rangkuti (2014) emphasized that strategy is an important tool used to achieve competitive advantage, which is basically a long-term plan for how an organization will win the competition in its environment. In a dynamic UCO management business that is influenced by many external factors, the ability to formulate and execute an adaptive strategy is the key to business continuity.

Used cooking oil or Used Cooking Oil (UCO) is an oil that has undergone a chemical degradation process due to repeated heating. Cooking oil can generally be used up to 3-4 times (Kapitan, 2013), but repeated use causes fatty acids to become more saturated and produce harmful compounds. Prolonged heating produces peroxide compounds which are toxic free radicals, with the number of peroxides in used cooking oil generally reaching 20–40 mEq/kg, far exceeding the safe limit of 10 mEq/kg applicable for human consumption (Thadeus, 2012). From an environmental health aspect, the discharge of UCO into waterways causes serious pollution due to the fat content that is difficult to decompose naturally in a short period of time.

From the perspective of the energy industry, UCO has a fatty acid content that can be converted into Fatty Acid Methyl Ester (FAME) or biodiesel through a transesterification process with an alkaline or acid catalyst. The main quality parameters of UCO that determine its suitability as a raw material for biodiesel are Free Fatty Acid (FFA) content, moisture content, and contaminant content. UCOs with FFA levels above a certain limit (generally above 2%) require acid esterification pre-treatment before transesterification, while UCOs with low FFA levels can be processed immediately. Based on ESDM data (2022), Indonesia's biodiesel demand continues to increase from 2,571,569 kilo liters in 2017 to 9,287,115 kilo liters in 2021, and projected consumption in 2025 will reach 14,898,433 tons, far exceeding the projected production of 14,785,554 tons, indicating a supply gap that continues to open up opportunities for UCO business players.

The Business Model Canvas (BMC) developed by Osterwalder and Pigneur (2017) is a strategic analysis framework that visualizes the business model through nine key elements that interact with each other. These elements are: (1) Customer Segments, which are groups of customers who want to be reached and served; (2) Value Propositions, which are a collection of products and services that create value for certain customer segments; (3) Channels, which is the way the company communicates and reaches its customers; (4) Customer Relationships, which is the type of relationship built with each customer segment; (5) Revenue Streams, which are the sources of revenue generated from each segment; (6) Key Resources, which are essential assets needed for the business model to function; (7) Key Activities, which are the most important things that must be done by the company; (8) Key Partnerships, which are networks of suppliers and partners that make the business model work; and (9) Cost Structure, which is all costs incurred in the operationalization of the business model.

BMC has been widely applied in various industrial fields because of its ability to comprehensively integrate internal and external perspectives in one easy-to-understand canvas (Wardhanie and Kumalawati, 2018). Tamika et al. (2017) proved the effectiveness of BMC in

identifying weaknesses in the value proposition elements and formulating recommendations for service innovation in the service business. Sutandyo (2017) also applies it in the context of the culinary industry to identify innovation opportunities, finding that the success of competition is highly determined by the ability to innovate in the value proposition element so that customers do not easily switch to competitors. Rainaldo et al. (2017) emphasized that BMC has the advantage of describing the company's condition in a simple but comprehensive manner from the aspects of market segmentation, bargaining value, customer relations, and revenue streams.

The VRIO (Value, Rarity, Imitability, Organization) framework developed by Barney and Hesterly (2020) is used to identify the company's resources and capabilities that have the potential to be a source of sustained competitive advantage. Resources are considered valuable if they are able to exploit opportunities or neutralize environmental threats; Rare if not owned by many current or potential competitors; Inimitable if it requires high cost, long time, or certain historical conditions that cannot be replicated carelessly; and organized (Organized) if the company has policies, procedures, structures, and systems that support the optimal exploitation of these resources (Damayanti and Adiwibowo, 2021).

A valuable but not scarce resource only provides competitive parity. Valuable and scarce resources provide a temporary competitive advantage. Valuable, scarce, and hard-to-replicate resources provide a more durable competitive advantage. Meanwhile, resources that meet the four VRIO criteria provide a sustainable competitive advantage that is the foundation of a long-term strategy. The implementation of VRIO on *PT XYZ* allows the identification of which resources should be maintained and developed as the mainstay of the strategy, as well as which weaknesses should be corrected immediately.

PESTEL (Political, Economic, Social, Technological, Environmental, Legal) analysis provides a systematic framework to map macroeconomic factors and business environment that affect company performance. The political dimension includes government policies, regulatory stability, and state intervention in the industry. The economic dimension includes economic growth, inflation, exchange rates, and financial market conditions. The social dimension includes demographic trends, consumer behavior, and relevant social issues. The technology dimension includes the development of innovation, digitalization, and adoption of new technologies. The environmental dimension includes environmental regulations, sustainability trends, and the impacts of climate change. The legal dimension includes industry regulatory frameworks, intellectual property rights protection, and compliance standards.

Meanwhile, Porter's Five Forces framework (Porter, 1980) analyzes the competitive dynamics of industry through the five forces that collectively determine the intensity of competition and the level of profitability of the industry. The five strengths are: (1) rivalry among competitors; (2) threat of new entrants; (3) threat of substitutes; (4) the bargaining power of suppliers; and (5) the bargaining power of buyers. The combination of PESTEL and Porter's Five Forces analysis provides a comprehensive understanding of the external environment at both the macro and industrial levels simultaneously, which forms the foundation for the preparation of the EFE matrix.

The Internal Factor Evaluation (IFE) matrix is constructed by identifying the most significant internal strength and weakness factors, assigning relative weights based on their importance to the industry, and assigning ratings based on the effectiveness of the company's response to those factors. The External Factor Evaluation (EFE) matrix uses a similar approach to external factors in the form of opportunities and threats. The total weighted scores of IFE and EFE were then mapped on an Internal-External (IE) Matrix consisting of nine cells, where cells I-III recommended growth and development strategies, cells IV-VI recommended maintenance and guard strategies, and cells VII-IX recommended harvest or divestment strategies.

The SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis further integrates the internal and external factors that have been identified to produce four groups of alternative strategies. The SO (Strengths-Opportunities) strategy leverages internal strengths to seize external opportunities. The WO (Weaknesses-Opportunities) strategy seeks to improve internal weaknesses by utilizing external opportunities. The ST (Strengths-Threats) strategy uses internal forces to avoid or minimize the impact of external threats. The WT (Weaknesses-Threats) strategy is defensive and seeks to minimize weaknesses while avoiding threats. The SWOT matrix is not just an identification tool, but also a matching tool that systematically connects internal and external conditions to produce relevant and specific alternative strategies.

The Analytical Hierarchy Process (AHP) developed by Saaty (1990) is a multi-criteria decision-making method that arranges decision factors hierarchically and quantifies expert assessments through pairwise comparison. The structure of the AHP hierarchy generally consists of three levels: the main goal at the top level, the criteria at the middle level, and the alternative options at the bottom level. Each element on one level is compared in pairs against other elements on the same level based on its contribution to the element at the top level, using a standardized comparison scale of 1–9.

The advantage of AHP is its ability to integrate qualitative and quantitative considerations systematically, as well as produce a Consistency Ratio (CR) that verifies the consistency of respondents' assessments with a CR value of ≤ 0.10 considered consistent and acceptable (Hardiyansyah et al., 2015). Dijana's (2012) research demonstrated the effectiveness of the SWOT-AHP combination in the development of tourism strategies in Croatia, while Gorener (2012) proved the advantages of this approach in the formulation of long-term business strategies for manufacturing companies. Febtyanisa (2013) and Saifullah (2022) also applied the SWOT-AHP combination in the context of agribusiness business in Indonesia with results that confirmed the reliability of this method in producing strategy priorities that can be implemented. The many applications of this SWOT-AHP combination reflect its ability to minimize subjectivity in determining strategy priorities.

The purpose of this study is to formulate a business development strategy for *PT XYZ*'s used cooking oil management as a raw material for biodiesel. The specific objectives are to: (1) map *PT XYZ*'s existing business model using BMC; (2) analyze internal factors using VRIO and IFE matrix; (3) analyze external factors using PESTEL, Porter's Five Forces, and EFE matrix; (4) determine *PT XYZ*'s strategic position using the IE matrix; (5) formulate alternative strategies using the SWOT matrix; (6) determine strategic priorities using AHP; and (7) develop a new BMC model based on the prioritized strategies. The contribution of this research is threefold: (1) it provides a comprehensive strategic framework for UCO management companies in Indonesia; (2) it offers empirical evidence on the impact of government DMO policy on the UCO export sector; and (3) it demonstrates the effective integration of multiple strategic analysis tools in a single case study. The benefits of this research include actionable strategic recommendations for *PT XYZ*'s management, insights for other UCO management companies facing similar challenges, and policy implications for government regulation of the UCO export sector.

METHODS

Location, Timing, and Research Approach

The research was carried out at *PT XYZ* headquartered in Cakung, East Jakarta, which is the company's main operational area as well as being located in an industrial area with strategic access to UCO's network of suppliers and transportation logistics. Data collection takes place in the period 2024–2025. This study uses a mixed-methods approach that integrates qualitative methods for in-depth data mining through interviews and field observations, with quantitative methods for weighting and scoring in strategic matrix analysis and AHP.

Data Types and Sources

Primary data was obtained through: (1) semi-structured in-depth interviews with *PT XYZ*'s leadership and management regarding business conditions, operational models, strategic factors, and company development vision; and (2) weighting questionnaires given to expert respondents (expert judgement) for weighting purposes in IFE, EFE, and AHP analysis. Secondary data is sourced from biodiesel and UCO industry reports, scientific publications, government regulations, statistical data from BPS, APROBI, LPEM UI reports, and various other reliable sources.

Sampling Methods and Respondents

The determination of respondents used purposive sampling techniques with the criteria of having direct and comprehensive knowledge of the UCO management business and the biodiesel industry. Respondents consisted of *PT XYZ*'s leadership (Director), operational managers, financial managers, and senior staff, as well as external experts from academia and relevant industry practitioners. The number of respondents was determined based on information saturation, considering the nature of in-depth case study research on one company.

Stages and Flow of Analysis

The analysis is carried out in stages and integrated in seven successive stages. The first stage is the mapping of the existing business model using BMC through in-depth interviews and field observations of *PT XYZ*'s operational processes, resulting in a comprehensive description of the nine elements of BMC today and the interconnectedness between them. The second stage is the identification of internal factors through VRIO's analysis of the company's resources and capabilities, the results of which are summarized and weighted in the IFE matrix. The third stage is the identification of external factors through the analysis of PESTEL and Porter's Five Forces, which are weighted in the EFE matrix based on the importance and rating of the company's response.

The fourth stage is the determination of the company's strategic position through mapping the total scores of IFE and EFE on the Internal-External (IE) Matrix, resulting in recommendations for general strategy types. The fifth stage is the formulation of specific strategy alternatives through a SWOT matrix by bringing together the most significant internal and external factors to produce four strategy groups (SO, WO, ST, WT). The sixth stage is the determination of priorities among alternative strategies using AHP with paired comparative assessments by expert respondents, processed to produce priority vectors and Consistency Ratio values that verify the consistency of assessments. The seventh stage is the development of a new BMC model as a form of operationalization of priority strategies that have been identified, along with the preparation of managerial implications that are concrete and can be implemented.

Table 1 Data on Biodiesel Needs in Indonesia in 2017–2021

Year	Biodiesel Consumption (Kilo Liters)
2017	2.571.569
2018	3.750.066
2019	6.396.397
2020	8.400.491
2021	9.287.115
2025 (Projection)	16,930,037 (equivalent to ~14.9 million tons)

Source: Ministry of Energy and Mineral Resources (2022); Note: 1 kilo liter of biodiesel = 0.88 tons

RESULTS AND DISCUSSION

Business Model Canvas (BMC) Existing *PT XYZ*

The mapping of the existing BMC *PT XYZ* identifies nine interconnected elements of the business model. In terms of Customer Segments, *PT XYZ* serves two main groups: UCO suppliers (HORECA, food industry, households in Greater Jakarta) as a source of raw materials, and UCO buyers (local exporters to the European market, and domestic biodiesel industry) as a source of income. The value propositions offered to suppliers include the convenience of on-site pick-up services, direct cash payments, and contributions to responsible waste management. To buyers, the main value proposition is the assurance of UCO quality verified through laboratory testing and continuity of supply.

Channels are still dominated by face-to-face communication and direct calls between field teams and suppliers. Customer relationships are built on personal trust and speed of response, without a structured customer management system. Revenue Streams are derived from the margin between the purchase price of UCO from suppliers and the selling price to buyers, which is heavily influenced by fluctuations in international market prices. Key Resources includes a fleet of transport vehicles, QC laboratory equipment, working capital, and experienced field human resources. Key Activities include collecting, handling, QC, treatment, and delivery. Key Partnerships are established with UCO suppliers on the one hand and exporters/buyers on the other. The cost structure is dominated by the cost of purchasing UCO from suppliers, vehicle operating costs, and field labor costs.

An evaluation of the existing BMC reveals several structural limitations that need to be overcome. First, dependence on one group of buyers (local exporters in Tanjung Priok) creates a risk of high-income concentration. When such buyers face obstacles such as changes in export regulations or financial problems, *PT XYZ* does not have an alternative channel ready. Second, the absence of a structured supplier retention system makes *PT XYZ* vulnerable to supplier shifts to competitors who offer better prices or services. Third, the absence of an integrated information system makes real-time performance monitoring difficult, so operational and strategic decision-making is often reactive rather than proactive. The identification of these limitations is the basis for the formulation of a new BMC model that is more robust and adaptive.

Internal Factor Analysis: VRIO and IFE Matrix

VRIO's analysis identified a number of *PT XYZ*'s resources that are a source of competitive advantage. In-house QC laboratories for FFA level testing are an ongoing competitive advantage that meets all four of VRIO's criteria: high-value because it ensures product quality meets export standards, rare because not all competitors have it, difficult to replicate because it requires an investment in equipment and operator expertise that is not cheap, and well-organized in standard QC procedures. *PT XYZ*'s reputation in the eyes of international buyers, built on a track record of direct exports to Europe over several years, is also a valuable resource and difficult to replicate in the short term. Its strategic location in the East Jakarta industrial estate which is close to the HORECA supplier network and access to the Port of Tanjung Priok is a valuable physical resource. In addition, the supplier network that has been built up over eight years of operation is also a relational resource that has high value and takes a long time to be replicated by new competitors.

Table 2 Summary of VRIO Analysis of *PT XYZ*'s Main Internal Factors

Resources/Capabilities	Value (V)	Rare (R)	Difficult to imitate (I)	Organized (O)	Competitive Implications
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In-house QC laboratory (FFA testing)	Yes	Yes	Yes	Yes	Continuous excellence
Reputation of exports to the European market	Yes	Yes	Yes	Partial	Continuous excellence
Strategic location in East Jakarta	Yes	No	No	Yes	Competitive parity
Built-in supplier network (8 years)	Yes	Yes	Partial	Yes	Temporary advantages
Fleet of transport vehicles	Yes	No	No	Yes	Competitive parity
ISCC certification (not yet possessed)	Yes	Yes	No	No	Critical weaknesses
Digital systems / information technology	Yes	No	No	No	Disadvantages

Source: Results of research analysis (2024)

On the weak side, several critical findings were identified: (1) the lack of ISCC (International Sustainability and Carbon Certification) certification, which is a mandatory requirement for direct exports to the European market on many transactions and provides a significant price premium value; (2) the monitoring and operational management system that is still carried out manually, starting from picking up records, stock tracking, to payment administration; (3) limitations in the development of digital technology that hinder business scalability and operational efficiency; and (4) reliance on a single sales channel through local exporters in Tanjung Priok which limits profit margins. The results of the IFE matrix weighting showed a total score above average (>2.5), indicating a relatively strong internal position although there are still weaknesses that need to be addressed immediately to improve overall competitiveness.

External Factor Analysis: PESTEL, Porter's Five Forces, and the EFE Matrix

The PESTEL analysis uncovers the opportunities and threats of the six dimensions of the macro environment. From the political aspect, the mandatory B35 program and Biofuel (BBN) development regulations through the Minister of Energy and Mineral Resources Regulation Number 32 of 2008 provide long-term demand certainty, but inconsistent export tariff and DMO policies are a major threat. From the economic aspect, Indonesia's stable economic growth (5.05% in 2023, BPS) and a decrease in inflation from 5.51% (2022) to 2.61% (2023) create a more conducive business climate. From the social aspect, increasing public awareness of the environment and health encourages the demand for more responsible UCO waste management. From a technological aspect, the advancement of IoT and the massive penetration of social media (36.2% of consumers know new products through social media, Slice.id, 2024) open up digital marketing opportunities that *PT XYZ* has not yet utilized. From an environmental aspect, the high level of UCO pollution in Greater Jakarta that has not been systematically implemented is a very large market opportunity. From a legal aspect, Jakarta Governor Regulation Number 167/2016 which requires the correct management of UCO waste supports *PT XYZ*'s business.

Porter's Five Forces analysis shows complex competitive dynamics. The bargaining power of UCO suppliers is rated moderate-high as they can compare offers from a wide range of companies and a growing number of informal collectors. The bargaining power of buyers (exporters) is relatively high because *PT XYZ* is still dependent on a small number of buyer partners. The threat of newcomers is moderate because the barrier to entry is not too high, but the need for large working capital and QC competence is a natural barrier. The threat of substitution products is low in the medium term considering that there is no alternative

feedstock that is more economical than UCO for biodiesel. Competition between existing competitors is quite intensive, especially from informal collectors who operate without regulatory fees.

The results of the EFE matrix show a total opportunity weight score of 3.656, much higher than the total threat score of 0.976, with a total overall EFE score of 4.632. This figure indicates that *PT XYZ* is in an external environment that is very rich in opportunities and is generally responding well to these opportunities, although there is still a need to strengthen mitigation against government policy threats that are a major vulnerability. The huge difference between the opportunity and threat scores (3.656 vs 0.976) reflects that the growth potential of UCO's management business far exceeds existing barriers, and that targeted strategic measures can significantly accelerate the company's growth. This also implies that investments to take advantage of opportunities (such as digitalization and ISCC certification) will provide a much greater return than the costs incurred, making it a highly scalable strategic investment priority.

Strategic Position: IE Matrix

Based on the integration of IFE and EFE matrix scores, *PT XYZ* 's position in the Internal-External Matrix (IE) is in Quadrant I, namely the "Grow and Build" zone. A total IFE score above 2.5 indicates a strong internal position, while a very high total EFE score (4,632) reflects a very conducive external environment. The position of Quadrant I recommends the implementation of intensive growth strategies such as market penetration, market development, and product development; as well as integrative growth strategies such as vertical integration upstream (development and expansion of UCO supplier network) or downstream (independent biodiesel processing as a long-term vision). This position of Quadrant I confirms that even though *PT XYZ* is facing a post-2022 operational crisis, its business fundamentals and external environment are still very conducive to a planned aggressive growth strategy.

These results are consistent with the findings of the PESTEL and Porter's Five Forces analysis which both indicate the many opportunities that *PT XYZ* can exploit. The greatest opportunities with the highest score in the EFE matrix are: (1) the price sensitivity of UCO suppliers to competitive offers (score of 0.095); (2) high environmental UCO pollution that has not been systematized (score 0.094); (3) disposal of UCOs that still do not have a system (score 0.094); and (4) the rampant adoption of sustainability practices (score 0.075). Meanwhile, the biggest threats that received the highest EFE score were: export tariff policy (score 0.085) and DMO policy (score 0.085), as well as the bargaining power of suppliers in comparing prices from competitors (score 0.078). This configuration of opportunities and threats directly informs the formulation of strategies on the SWOT matrix and the determination of priorities through the AHP.

SWOT Matrix and Alternative Strategies

Based on the integration of internal and external analysis, the SWOT *PT XYZ* matrix produces four groups of alternative strategies. Each strategy group is designed to respond to a specific combination of internal conditions and external dynamics that the company is facing. Table 4 presents a summary of the SWOT *PT XYZ* matrix and the resulting alternative strategies.

Table 3 SWOT Matrix and Alternative Strategy of *PT XYZ*

	OPPORTUNITY (O): B35 mandatory program, unsystematic UCO pollution, supplier price sensitivity, sustainability trends, IoT advancements	THREAT (T): Uncertain export policy/DMO, competition from informal collectors, fluctuations in international UCO prices, high buyer bargaining power
STRENGTH(S): In-house QC lab,	SO Strategy: (1) Expand the network of premium UCO suppliers in Greater	ST Strategy: (1) Develop a 6–24-month medium-term contract with the buyer for

European export reputation, strategic location, established supplier network	Jakarta based on QC quality reputation; (2) Build new exporter strategic partnerships based on verified quality excellence	income stabilization; (2) Diversification of sales channels to domestic biodiesel and AFAL industry
DISADVANTAGES (W): No ISCC certification yet, manual system, dependence on one sales channel, limited working capital	WO Strategy: (1) Accelerate ISCC certification for direct export to Europe at premium prices; (2) Digitization of operational systems (pick-up applications, stock tracking, payment)	WT Strategy: (1) Optimization of cost efficiency through improvement of routes and digital systems; (2) Develop a core-plasma partnership model for capacity expansion without large investment

Source: Results of research analysis (2024)

The SO strategy leverages *PT XYZ*'s QC laboratory and export reputation to expand its network of premium UCO suppliers in Greater Jakarta, while building strategic partnerships with exporters or new buyers who value verified quality excellence. The WO strategy encourages the acceleration of ISCC certification to reopen direct export access to Europe at a premium price, as well as the digitalization of operational systems that include pick-up applications, real-time stock tracking, and integrated payment systems to improve business efficiency and scalability. ST's strategy develops medium-term contracts (6–24 months) with buyers to mitigate the risk of fluctuations in export policy and prices, as well as diversify sales channels to the domestic market of biodiesel and the AFAL (Animal Fat and Like) industry as a buffer against export policy risks. WT's strategy optimizes operational cost efficiency through digital mapping-based pick-up route improvements and a core-plasma partnership model that enables significant capacity expansion without major infrastructure investment amid working capital limitations.

Strategy Priorities through AHP

The prioritization of strategies using AHP involves two stages of assessment by expert respondents. The first stage is the weighting of assessment criteria consisting of: the level of urgency of implementation, the magnitude of the impact on revenue, the level of feasibility of implementation, risk mitigation capabilities, and alignment with the long-term vision. The second stage is a paired comparison assessment of the four alternative strategies based on each of these criteria. The Consistency Ratio (CR) value of all assessments was below 0.10, which confirmed the consistency and reliability of expert respondents' assessments. Table 1 presents the four main strategic priorities and their priority levels.

Table 5 Alternative Priorities for UCO *PT XYZ* Management Business Strategy

Rank	Alternative Strategies	Priorities	Categories
1	Medium-term contracts with UCO buyers (local & export)	Highest	ST – Risk Mitigation
2	Development of UCO collection networks (expansion of partners, nucleus-plasma, new areas)	Height	SO – Growth
3	Operational cost efficiency (routes, digitalization, management systems)	Medium-High	WT – Efficiency
4	Market expansion (new branches, segment diversification, ISCC acceleration)	Medium	WO – Development

The first priority strategy, the medium-term contract with the buyer, is the most urgent strategic response to the key risks that have proven to be very detrimental to *PT XYZ*. Medium-term contracts (6–24 months) will provide certainty of sales volume and prices, so that working

capital and operational planning can be done better. Diversification of buyer partners, including direct exporters to Europe as well as the domestic biodiesel industry, is also part of this strategy to reduce risk concentration in a single sales channel. Its operational implications include improving the negotiation process, drafting standard contract templates, and strengthening product quality track record.

The second strategy, the development of the collection network, focuses on expanding UCO's supplier base through two parallel approaches: organic expansion into the HORECA segment and the unreached food industry in Greater Jakarta, as well as the development of a core-plasma partnership model where *PT XYZ* trains and nurtures UCO collection partners in certain regions which then deposits UCO to *PT XYZ*. This core-plasma model allows for significant capacity expansion without the large cost of infrastructure investment. The third strategy, operational cost efficiency, includes the digitization of pick-up management systems, real-time stock tracking, and integrated payment systems, along with transportation route optimization using mapping tools to minimize fuel costs and operational time per kilogram of UCO collected. The fourth strategy, market expansion, is to reopen branches outside Jakarta after the certainty of buyer contracts and financial readiness are assured, accompanied by accelerating the ISCC certification process and developing towards an independent biodiesel processing unit as a long-term vision.

Managerial Implications

Based on the findings of the research, there are five critical managerial implications that need to be implemented immediately by *PT XYZ* in a structured and measurable manner. These implications are sorted based on urgency and the magnitude of the impact that can be produced on the company's business performance.

First, the acceleration of ISCC (International Sustainability and Carbon Certification) certification must be made a short-term priority program (target for the next 6-12 months). This certification is not just an administrative document, but a strategic key that opens access to the European export market directly without the intermediary of local exporters. The margin difference between direct exports to Europe vs exports through the Port of Tanjung Priok point is estimated to range from 10–20% per ton of UCO. With a potential export volume of 40–60 tonnes per week post-recovery, this difference represents a very substantial increase in revenue. Concrete steps that need to be taken include: appointment of an internal person in charge of the certification process, consultation with accredited ISCC certification bodies, audit of the internal supply chain management system, and special budget allocation for the entire certification process.

Second, operational digitalization is a strategic investment that cannot be postponed any longer. A system that is still manual is currently the main obstacle to efficiency and scalability. The development of an integrated management information system based on mobile or web applications needs to include four core modules: (a) a pick-up management module that allows for automatic scheduling and real-time confirmation; (b) a stock tracking module that records the entry and exit of UCO digitally; (c) supplier management modules that store contract data, transaction history, and supplier analytics; and (d) a financial administration module that integrates bookkeeping with cash flow. This investment in digitalization will provide long-term returns through reduced administrative labor costs, accelerated operating cycles, and data-driven decision-making capabilities.

Third, strengthening the working capital structure must be a strategic financial priority. UCO collection business is very labor-intensive because payments to suppliers are made immediately after pick-up (even some with a down payment) mechanism, while receipts from buyers take longer. To overcome this liquidity pressure, *PT XYZ* needs to explore access to working capital financing facilities from banks (revolving working capital loans), People's Business Loans (KUR) government programs, supply chain financing from exporter partners,

as well as partnerships with financial institutions that focus on the renewable energy sector and circular economy.

Fourth, supplier loyalty and retention programs need to be structured more formally. Losing suppliers to competitors is the biggest operational risk in the UCO collection business. Recommended programs include: a transparent and competitive UCO purchase price system with a regular adjustment mechanism according to market prices; the mechanism of providing DP (down payment) for suppliers with consistent volumes or long-term contracts; appreciation programs (volume bonuses, merchandise, or loyalty incentives) for suppliers who have been partnered for more than one year; and a fast complaint response and pick-up system with measurable service standards (SLAs).

Fifth, the development of *PT XYZ*'s brand identity as a circular economy-based green business needs to be done systematically. The issues of environmental sustainability, circular economy, and renewable energy are increasingly becoming the main concern of various stakeholders, from consumers, business people, to investors. *PT XYZ* has a very strong business narrative: turning hazardous waste into clean fuel, while reducing environmental pollution. This narrative needs to be communicated consistently through social media, corporate websites, participation in renewable energy industry exhibitions, and involvement in national environmental and biodiesel policy forums.

Proposed New BMC Model

Based on the integration of all strategic analysis results, *PT XYZ*'s proposed new Business Model Canvas (BMC) model presents comprehensive changes to the nine elements of the canvas. Table 5 presents a comparison between the existing BMC and the new recommended BMC.

Table 6 Comparison of Existing BMC and New BMC of *PT XYZ*

BMC Elements	BMC Existing	New BMC (Recommended)
Customer Segments	HORECA, food industry, Greater Jakarta household (supplier); Local Exporters & Domestic Biodiesel (buyers)	Plus: AFAL industry, renewable energy players, core-plasma partners, circular economy investors
Value Proposals	Easy pickup, cash payment, lab verified quality	Plus: scheduled digital platforms, ISCC certifications, green business partners, DP for loyal suppliers
Channels	Offline communication (face-to-face, phone)	Multi-channel: digital platforms, social media, digital partner management systems
Customer Relationships	Personal trust, manual response	Data-driven loyalty programs, structured SLAs, digital feedback, supplier appreciation
Revenue Streams	UCO buy–sell price margin (single channel)	Plus: premium ISCC direct export, circular economy program cooperation, potential for independent biodiesel processing
Key Resources	Vehicle fleet, QC lab, working capital, field HR	Plus: operational digital platform, ISCC certification, core-plasma partner network, access to financing facilities
Key Activities	Collecting, handling, QC, treatment, delivery	Plus: IT system development & maintenance, certification management, plasma-core development, digital branding
Key Partnerships	UCO supplier (upstream), exporter/buyer (downstream)	Plus: financial institutions, technology platforms, biodiesel associations, certification bodies, core-plasma partners

Cost Structure	UCO purchase, vehicle operations, manpower	Plus: digital system investment, ISCC certification fee, core-plasma development cost (offset long-term efficiency)
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Source: Results of research analysis (2024)

The new BMC model is designed to meet two main objectives simultaneously: increasing business resilience to external risks (especially export policy and price fluctuations), and unlocking opportunities for greater and sustainable revenue growth. The biggest transformation occurred in the Revenue Streams element, from a single margin-based revenue model to a multiple revenue model that includes ISCC-certified direct exports, circular economy partnerships, and gradually towards self-sustaining biodiesel processing units. The transformation of the Channels element from a purely offline model to a digital multi-channel model is projected to significantly increase the acquisition capacity of new suppliers without a proportionate increase in labor costs. The new BMC model integrates environmental and social sustainability dimensions as a cornerstone of long-term competitive differentiation, which is increasingly relevant in the context of growing global awareness of the urgency of the energy transition and circular economy.

CONCLUSION

PT XYZ's current business model as a used cooking oil (UCO) aggregator centered on a collect–handle–QC–deliver process remains economically relevant amid rising national biodiesel demand, yet is constrained by limited digitalization, reliance on personal relationships, and vulnerability to policy and market disruptions. Internal analysis highlights the company's QC laboratory, export reputation, and strategic location as key strengths, while the absence of ISCC certification and inadequate digital systems represent critical gaps; externally, the high volume of unsystematized UCO in Greater Jakarta and competitive supplier pricing present strong opportunities, with an EFE score of 4.632 and IE matrix positioning in Quadrant I collectively pointing toward an intensive growth strategy. AHP-based prioritization identifies four strategic actions in sequence securing medium-term buyer contracts, expanding UCO collection networks through organic growth and core-plasma partnerships, digitizing operations and optimizing logistics costs, and pursuing market expansion alongside ISCC certification reflecting expert consensus that revenue-side stabilization must precede capacity scaling. The proposed revised Business Model Canvas integrates multi-channel digitalization, customer segment diversification, and a long-term vision toward self-exporting and biodiesel processing, positioning PT XYZ to capitalize on the B35 mandatory program and global circular economy trends. For future research, it is recommended that scholars apply quantitative financial modelling or system dynamics simulations to assess the viability and sequencing of these strategic transformations, as well as conduct comparative studies across similar UCO aggregator firms in other Indonesian cities to evaluate the scalability and replicability of the proposed business model under varying regulatory and market conditions.

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