

Business Strategy for Oil Refinery Company in Facing Challenges in The Crude Oil Refining Industry

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ABSTRACT

The development of the energy industry in a developing country in Asia is undergoing a transition process from oil and gas energy to electrical energy and renewable energy. Based on Government data, the share of oil and gas will decrease from the current 32% to 20% in 2050, this is in line with the increase in penetration of electrification and other energy diversification. However, the demand for oil and gas will continue to increase significantly due to the increase in population.

PTM, an energy company in a developing country, one of its refineries supplied 26% of domestic fuel demand by the end of 2021. The company is facing several challenges that affect its business, especially in one of its domestic oil refineries. Domestic crude production (upstream) is predicted to decline by up to 40% in the next 10 years so to meet the need for crude as raw material for refineries, it must be met through imports. Most of the imported crude is sour crude (high Sulfur), while the existing refinery is designed to process sweet crude (low Sulfur) which is more expensive than sour crude, so it will reduce the company's profit in the future. The demand for fuel and petrochemical products in the country is currently still high, where the country still imports 40% of fuel products and 40% of petrochemical products. Besides, the company is faced with the fact that Most refineries use old technology, Lower complexity than international competitors, and Lower conversion rate results in low profit. Therefore, the company requires a business strategy to face the above business challenges in order to generate better profits and become more competitive in the future. This study aims to find the appropriate business strategy for the company.

This study uses VRIO Analysis and Business Model Canvas to determine the company's internal business environment, using PESTLE and Porter's Five Forces to determine the company's external business environment. Then summarized through SWOT Analysis and using a business strategy formulation through 3 stages: Stage 1 (Input) consisting of Internal Factor Evaluation (IFE) Matrix and External Factor Evaluation (EFE) matrix, stage 2 (Matching) consisting of SWOT Matrix and Internal-External (IE), Stage 3 (Decision) using Quantitative Strategic Planning Matrix (QSPM).

Finally, the result of The Quantitative Strategic Planning Matrix (QSPM) is Market Development. Market Development is the appropriate strategy for the company and was chosen as the first priority strategy, namely increase crude processing capacity & flexibility, and upgrade refinery technology. With these strategies, the company is expected to be more competitive and generate better profits in the future.

Keywords: Refinery, Crude Oil, Fuel, Petrochemical.

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I. INTRODUCTION

The development of the national energy industry is undergoing a transition process from oil and gas energy to electrical energy and renewable energy. Based on the National Energy Grand Strategy prepared by the Government, the share of oil and gas will decrease from the current 32% to 20% in 2050, this is in line with the increase in penetration of electrification and other energy diversification. However, the demand for oil and gas will

continue to increase significantly, due to the increase in population so that the volume of oil and gas demand will increase by five times in 2050. Energy demand is estimated to increase to 3.2 million BOE (Barrels Oil Equivalent) in 2035, including from oil and gas. However, this growth is faced with the challenges of an energy transition.

PTM, an energy company in a developing country, one of its refineries has strategic location to supply fuel needs to the eastern part of the country, and is supported by a good distribution network, including distribution pipes, tankers, as

well as land transportation.

The company has 26% contribution of domestic fuel demand, and 99% of its products are marketed for the domestic market and 1% for the export market.

In carrying out its business processes, the company receives crude oil from tankers and stores it in crude oil storage tanks. The crude oil is then processed in integrated refineries in one area in the region. The products produced from processing at the refinery are then distributed to MINYAK (subsidiary), which performs sales and marketing activities to end customers.

The company's refinery is designed to process domestic crude. However, with the decline in domestic crude production on the upstream side, currently, the refinery is operated using a combination of imported crude oil and domestic crude oil. The demand for petroleum products and petrochemical products in the country is currently increasing. In addition, there is a threat of fuel substitution from the massive development of electric vehicles. In the next few years many car manufacturers are likely to shift their products to electric vehicles. The government plans to abolish oil-fueled vehicles by 2050 so that the need for fuel oil for the transportation sector will be significantly reduced. These conditions can threaten the sustainability of the company's business in the future.

To overcome this problem, it is necessary to answer several research questions such as what is the company's external and internal environment? what is the appropriate strategy formulation to use? and finally what is the appropriate business strategy to implement?

II. BUSINESS ISSUE

The company is facing several challenges that affect its business. Domestic crude production (upstream) is predicted to decline by up to 40% in the next 10 years so to meet the need for crude as raw material for refineries, it must be met through imports. Most of the imported crude is sour crude (high Sulfur), while the existing refinery is designed to process sweet crude (low Sulfur) which is more expensive than sour crude, so it will reduce the company's profit in the future.

The demand for fuel products and petrochemical products in the country is currently still high, where the country still imports 40% fuel products and 40% petrochemical products. Besides, the company is faced with the fact that its refinery uses old technology, Lower complexity than international competitors, Lower conversion rate results in low profit.

The demands of the world and the government for environmentally friendly fuels have caused the government to make regulations for the quality of fossil fuels that are more environmentally friendly, namely domestic fuel must have a minimum standard of Euro 4, while currently the company is only able to produce fuel with Euro 2 standards.

Therefore, this research purpose is to find the appropriate business strategy for the company in facing the business challenges above to be more competitive and generate better profits in the future.

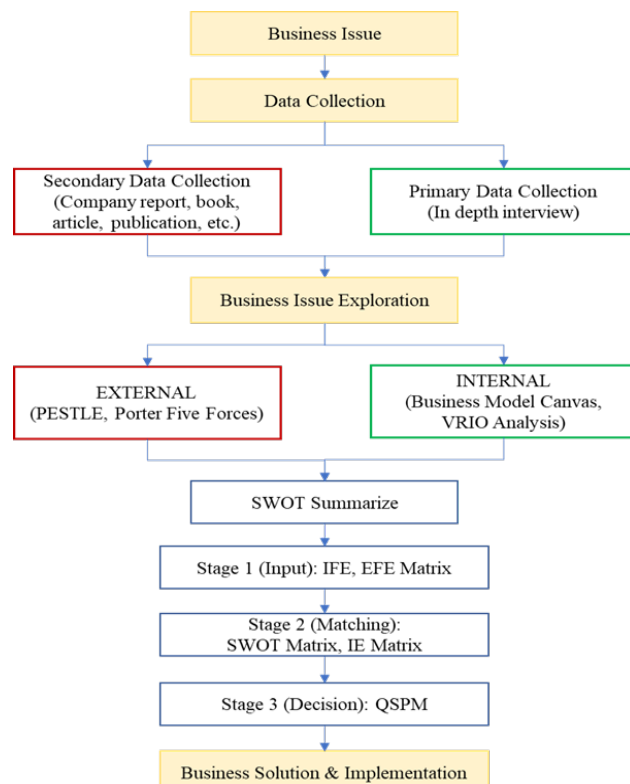


Fig. 1. Research Methodology (Source: Author, 2022).

III. METHODOLOGY

This study uses quantitative and qualitative research methodologies to find out where the company's current position is in facing challenges in the oil refinery industry. This research will start with data collection for internal and external business environment analysis. The author has interviewed the internal management team as the primary data source. The author uses data from reference books, internal company data, websites, articles, and other media as secondary data.

This study uses VRIO Analysis and Business Model Canvas to determine the company's internal business environment, using Porter's Five Forces and PESTLE Analysis to determine the company's external business environment, then summarized using SWOT Analysis.

The strategic formulation used by the author to find the appropriate business strategy refers to the book *Strategic Management, A Competitive Advantage Approach, Concepts and Cases* (David & David, 2017). The method used consists of three stages as follows:

- Stage 1 (Input) consists of the Internal Factor Evaluation (IFE) Matrix and the External Factor Evaluation (EFE) Matrix. In strategy formulation, this stage summarizes the basic input information needed prior to the matching stage.
- Stage 2 (Matching) consists of the SWOT Matrix and the Internal-External (IE) Matrix. In strategy formulation, this stage aligns internal and external factors to produce several alternative strategies.
- Stage 3 (Decision) uses the Quantitative Strategic Planning Matrix (QSPM). Key information from stage 1 is used to evaluate several alternative strategies that have been identified in stage 2. At this stage, several alternative

strategies will be compared objectively by giving each Attractiveness Scores so that a ranking is obtained as a basis for choosing the appropriate strategy that has the highest score.

IV. BUSINESS ISSUE EXPLORATION AND RESULT

After collecting primary and secondary data, the next step is to conduct internal and external analysis to find strengths, weaknesses, opportunities, and threats.

Analysis of the company's external environment using PESTLE and Porter Five Forces shows that there are several challenges for the company in competing in the crude oil refining industry. The decline in domestic crude oil production, especially sweet crude (low %S) will increase the company's dependence on imported crude, the majority of which are sour crude (high %S), while the existing refinery design is only for processing sweet crude. These conditions and coupled with dynamic and volatile crude oil prices can reduce the company's profits and competitiveness. In addition, currently the company's Refinery is only able to produce products with the Euro 2 standard, where technology upgrades must be carried out to reach the Euro 4 standard (minimum) according to the Government's demands. The Government's role in setting the price of subsidized fuel and special fuel assignments causes the company unable to be flexible in deciding the selling price of these products. One of the threats is an increase in the production and sales of electric vehicles in domestic market which could reduce the demand for fuel products for motorized vehicles in the future. To overcome the above problems, one of which is required to upgrade technology at the refinery, but this requires a large investment cost. However, there are several opportunities for the company. The availability of sour crude in the world is quite abundant at a lower price than sweet crude. The company can increase company profits if it is able to maximize sour crude processing. Efforts to market fuel products have not encountered significant obstacles because the company has dominated the market share of fuel products in domestic market. The increase in Fuel & Petrochemical Demand in domestic market is an opportunity for company to

increase profits. In addition, the company needs to take advantage of support from the Government in carrying out refinery development.

Analysis of the company's internal environment using the VRIO Analysis and the Business Model Canvas, shows several strengths that can be utilized by the company to face challenges in the crude oil refining industry. The company has complete and integrated facilities and infrastructure from upstream to downstream which can be leveraged to strengthen the company's competitiveness. The company has a strong financial condition, 100% government share (NOC) and a good brand image & reputation, which can be used to find investors to upgrade refineries and increase market share. In terms of sales & marketing, the company can cooperate with MINYAK (subsidiary) in distributing and marketing products to end consumers. Currently, the company has dominated the production of fuel for eastern region. The company can use internal strengths to seize attractive opportunities and minimize the impact of external threats. Unfortunately, there are some internal weaknesses. The company relies heavily on imported crude and most of the imported crude is sour crude (high %S), while the existing refinery can only process sweet crude (low %S). This will reduce the company's profit because it must process sweet crude at a relatively high price. In addition, the company has an old refinery technology with low complexity so that it will produce a low conversion rate and have an impact on low profits. Until now, the company still produces excess LSWR (Low Sulfur Waxy Residue) which is a low valuable intermediate product. This is one of the causes of the company's low profit.

Table I shows the SWOT analysis results based on an analysis of the company's internal and external environment.

Based on the SWOT analysis table, the company has internal strengths and weaknesses which, if managed properly, can be utilized to seize business opportunities, and prevent external threats so that there is potential for the company to increase the company's growth in the future and increase competitiveness in facing business challenges in the crude oil refining industry.

TABLE I: SWOT ANALYSIS

Strength	Weakness
Monopoly on the production of fuel products for eastern region.	Relies heavily on imported crude as feedstock. Existing refinery can only process sweet crude while most of imported crude is sour crude.
Having very complete & operable facilities and integrated infrastructures.	Having old technology, lower complexity & conversion rate.
Strong financial and 100% government ownership.	Insufficient of Crude & Product Storage Tanks for upgrading refinery capacity.
Strong brand image.	Excess LSWR (Low Sulfur Waxy Residue), Low valuable intermediate product.
Sales & marketing are carried out by MINYAK.	The quality product is Euro 2 standard (high emission).
Opportunities	Threats
Sour crude (high %S) is cheaper than sweet crude.	Decline in domestic sweet crude production led to dependence on imported sour crude.
Domination of the market share of fuel products in domestic region.	Crude oil prices are very dynamic and volatile.
Increasing of Domestic Fuel & Petrochemical Demand.	Refinery upgrading requires large investment funds.
The government supports the company to conduct refinery development project.	The government instruct the company to produce fuel with standard of Euro 4.
Gas sources are abundant and controlled by the company.	Subsidized fuel price is determined by Government.
Few domestic petrochemical competitors.	Increasing the number of Electric Vehicles in domestic region.
	The company has 6 competitors in the retail gas station sector.

(Source: Author, 2022).

The next step is Stage 1 (Input) of the strategy-formulation framework. In strategy formulation, this stage summarizes the basic input information needed prior to the matching stage. An IFE and EFE Matrix allow strategists to summarize and evaluate the company's internal and external

environmental. The following Table II is the IFE Matrix Result of the company while Table III is the EFE Matrix Result. Both are conducted based on an in-depth interview with top management.

TABLE II: INTERNAL FACTOR EVALUATION

No.	Strengths	Weight	Rating	Weight Score
S1	Monopoly on domestic fuel production for eastern country	0.12	4	0.48
S2	Having very complete and operable facilities and integrated infrastructures.	0.12	4	0.48
S3	Strong financial and 100% government ownership	0.11	4	0.44
S4	Strong brand image	0.07	4	0.28
S5	Sales & marketing are carried out by MINYAK (subsidiary)	0.07	3	0.21
No.	Weaknesses	Weight	Rating	Weight Score
W1	Relies on imported crude as feedstock. Existing refinery can only process sweet crude while most of imported crude is sour crude.	0.13	1	0.13
W2	Having old technology, lower complexity & conversion rate	0.12	1	0.12
W3	Insufficient of Crude & Product Storage Tanks	0.09	2	0.18
W4	Excess Low valuable intermediate product (LSWR)	0.09	2	0.18
W5	The quality product is Euro 2 standard (high emission)	0.08	2	0.16
Total Score		1.00		2.66

(Source: Author, 2022).

TABLE III: EXTERNAL FACTOR EVALUATION

No.	Opportunities	Weight	Rating	Weight Score
O1	Sour crude (high %S) is cheaper than sweet crude.	0.10	4	0.40
O2	Domination of the market share of fuel products in the country	0.09	3	0.27
O3	Increasing of Fuel & Petrochemical Demand in the country	0.09	4	0.36
O4	Government supports to conduct refinery development project	0.09	4	0.36
O5	Gas sources are abundant and controlled by the company	0.07	4	0.28
O6	Few domestic petrochemical competitors	0.04	3	0.12
No.	Treats	Weight	Rating	Weight Score
T1	Decline in domestic sweet crude production led to dependence on imported sour crude.	0.11	4	0.44
T2	Crude oil prices are very dynamic and volatile	0.10	3	0.30
T3	Refinery upgrading requires large investment funds	0.09	2	0.18
T4	The government instruction to produce fuel Euro 4 standard	0.07	4	0.28
T5	Subsidized fuel price is determined by the Government	0.06	2	0.12
T6	Increasing the number of Electric Vehicles in domestic region.	0.05	2	0.10
T7	The company has 6 competitors in the retail gas station sector	0.04	2	0.08
Total Score		1.00		3.29

(Source: Author, 2022).

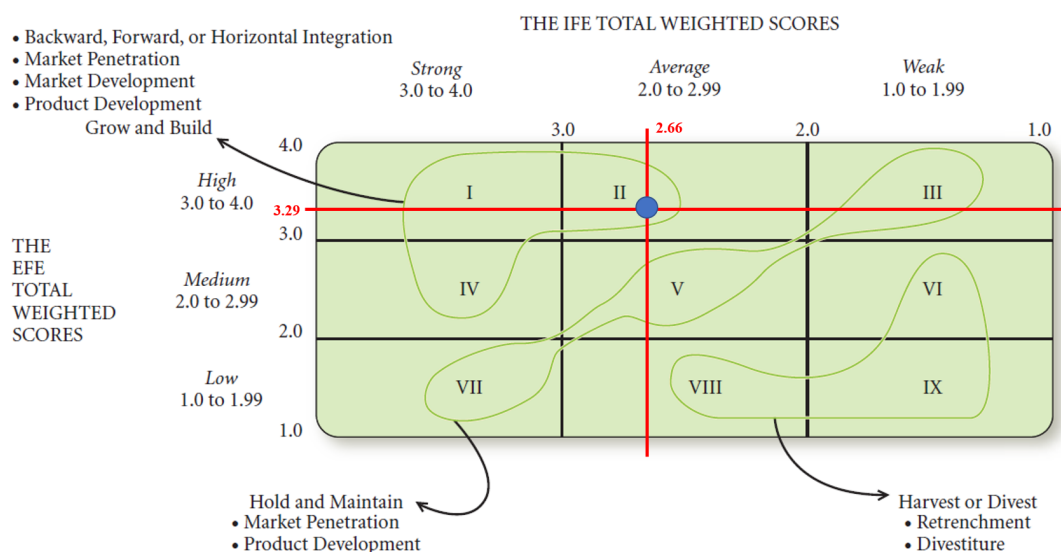


Fig. 2. Internal External (IE) Matrix (Source: Author, 2022).

The total score for the IFE Matrix is 2.66, this value is the y-axis of the IE Matrix. While the total score for the EFE Matrix is 3.29, this value is the x-axis in the IE Matrix. If this value is placed in the IE Matrix, the intersection point is in cell II or is included in region 1 (Fig.2). The appropriate strategy choice for the company is an intensive strategy (market penetration, market development, and product development) or an integrative strategy (backward integration, forward integration, and horizontal integration). Then, based on the results of in-depth interviews with top management, an intensive strategy was chosen.

In the intensive strategy, there are still several choices of sub-strategies, so to decide the appropriate strategy, it is done using the QSPM Matrix technique as Stage 3 (Decision).

The QSPM provides a ranking of several alternative strategy options. The rankings are ordered from the highest to the lowest from the Total Attractiveness Score (TAS), while the TAS is the product of the AS and the weights for each AS factor (Attractiveness Score).

The strategy that obtains the highest score will be the main priority to be implemented, while for the lower score it will be the next priority. The results of the QSPM analysis are shown in Table IV.

Based on Table IV, the highest score is 7.72, namely Market Development Strategy. This strategy should be the company's top priority to be implemented. However, Product Development gave the second rank score of 6.77, so we can choose it as the second priority.

Market Development involves introducing a current product or service into a new geographic area. Product development is a strategy that seeks to increase sales by improving or modifying existing products or services. Based on the results of the QSPM, the author chose Market Development as the top priority and Product Development as the second priority.

Refers to SWOT Matrix, several strategies related to Market Development (first priority) were selected as follows:

- 1) Increase Crude Processing Capacity
- 2) Increase The Flexibility of Sour Crude Processing
- 3) Upgrade Refinery Technology to Increase Complexity
- 4) Project Financing and Other Facilities from the Government

Then several strategies related to Product Development (second priority) were selected as follows:

- 5) Product Quality Improvement
- 6) New Petrochemical Product Development

TABLE IV: THE QSPM RESULT

No	Alternative Strategy	TAS
1	Market Development	7.72
2	Product Development	6.77
3	Market Penetration	4.43

(Source: Author, 2022).

V. CONCLUSION AND SOLUTION

In the internal environment condition, the company is still heavily on imported crude to meet current needs. Besides, most of the company's refinery units use old technology so that the complexity is lower than international competitors, results in low profit.

In the external environment condition, domestic crude production is predicted to decline in the future so that to meet the need for crude as raw material for refineries, it must be met through imports. Most of the imported crude are sour crude (high Sulfur), while the existing refinery is designed to process sweet crude (low Sulfur). The demand for fuel and petrochemical products in the country is currently still high. The company can only produce fuel with quality standard Euro 2. In addition, there is a threat of fuel substitution from the massive development of electric vehicles.

The business formulation is carried out through 3 stages, namely the input stage, the matching stage, and the decision stage. The matching stage results in intensive strategy options (market penetration, product development and market development). However, the intensive strategy is still broad, so it is necessary to decide by using QSPM. The result of the QSPM is the selection of Market Development as a top priority strategy with the following recommendations:

A. Increase Crude Processing Capacity:

- 1) Modify on existing equipment to increase the capacity. Modify and increase the number of supporting infrastructure such as crude storage tanks, product storage tanks and jetty.
- 2) Take advantage of the abundant gas sources in the region that belong to the company's group to meet gas needs due to increased capacity.
- 3) Sales, marketing, and distribution activities to end customers, both retail and corporate, are carried out by utilizing the resources owned by MINYAK (subsidiary). MINYAK needs to add supporting facilities and infrastructure for Marketing & Distribution to offset the increase of the company's Refinery capacity.
- 4) By increasing the capacity of the Refinery, it is expected to increase the volume of fuel products sold in the domestic market so as to reduce imports. With reduced imports, it means that fuel products from the Refinery can reach more areas in the country, which previously still enjoyed imported fuel products. Furthermore, with the increasing capacity of the refinery, it is expected that non-fuel and petrochemical products can be sold domestic and abroad, especially to the Southeast Asia, India, and China markets.

B. Increase The Flexibility of Sour Crude Processing:

- 1) Modify and upgrade material quality on existing equipment to increase the capacity & flexibility. Add some new equipment to complete the stages of the production process flow. Upgrade the quality of the catalyst to be able to process sour crude. Add several new production units that can treat Naphtha and Diesel (NHT & DHT). Upgrade the crude oil receiving facility.
- 2) Take advantage of strengths; complete and operable facilities and integrated infrastructures, the monopoly dominance on the production of several fuel products, financial strength, and government support).
- 3) Looking for cheap imported crude oil sources with economical transportation costs.

C. Upgrade Refinery Technology to Increase Complexity:

- 1) Add New RFCC Unit (Residual Fluid Catalytic Cracking) to process excess LSWR which is low

valuable into valuable products such as gasoline.

- 2) Increase NCI (Nelson Complexity Index) by adding several new production units.
- 3) New organizational structure changes that can make the organization more agile, effective, productive & efficient

D. Project Financing and Other Facilities:

- 1) Take advantage of various benefits and privileges provided by the government such as relevant regulations, Expedited Licensing, and Tax Incentives in carrying out refinery development projects.
- 2) Utilizing a strong brand image to find sources of financing from domestic and foreign investors. If it doesn't work, then the option can be in debt to the government and the private sector. The investment offered can be for the development stage or the operational stage.

Based on the result of QSPM, Product Development is a second priority that needs to be considered in addition to market development. The author places the product development strategies as a second priority with the following recommendations:

E. Product Quality Improvement:

- 1) Upgrade refinery technology to produce Euro 5 products and high conversion rates.
- 2) Operating efficiency and cheap crude processing (imported sour crude) to provide competitive fuel prices.

F. New Petrochemical Product Development:

- 1) Develop petrochemical products, so that the company's focus in the future is not only on fuel products but also focuses on producing Petrochemical products.
- 2) Upgrade several existing facilities and infrastructure to support the production of the Petrochemical products. Take advantage of government support & strong brand image to dominate the domestic petrochemical market and enter the international market. Addition of supporting facilities and infrastructure for Marketing carried out by MINYAK (subsidiary).
- 3) Some interesting Petrochemical Units to build are New Propylene Unit, New Polyethylene Unit and New Paraxylene & Benzene Unit because their demand tends to increase by ~5% per year by utilizing abundant gas sources in the region.
- 4) Plan for the construction of the New Paraxylene & Benzene Production Unit in the future to prepare itself for the massive development of electric vehicles which will cause a decrease in demand for fuel, especially gasoline (naphtha).

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