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# Feasibility Analysis Of Palm Cooking Oil Industry In West Kalimantan Province

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**Abstract.** Palm oil (olein) is one of the primary finished products produced from palm fruits in West Kalimantan Province. Olein or known as cooking oil was one of the primary downstream products produced from crude palm oil through refinery and fractionation process. The number of palm oil processing industries in West Kalimantan is still small, which is only 0.64% of the national palm oil processing industry population. This condition shows the need for encouragement from various parties to increase the growth of the palm oil processing industry in West Kalimantan Province, by providing industrial profile facilities that are able to attract new investors. This research aims to a feasibility study of investment in the palm oil industry, to encourage the growth of investment in the crude palm oil / CPO's downstream industries in West Kalimantan Province. It was expected to help decision makers include policy makers (central government and local oil palm producers), investors, traders, farmers, exporters and other interested parties in the development of Oil Palm industry in West Kalimantan Province. This research uses primary and secondary data. Feasibility analysis consist of raw material, production, market, environment, and financial aspects. Result of this research shown that oil palm industry in West Kalimantan Province was feasible with investment costRp. 365,384,209,972, NPV with discount factor of 20% of Rp. Rp. 383,563,088,150, IRR 47.70%, Net B / C Ratio 1,0424, Pay back period in 5,1085Years.

## 1. Introduction

As a province located on the equator and tropical climates and extensive topography, the development of plantation sector in West Kalimantan from year to year has a significant increase. In the scale of large plantations, the largest production in West Kalimantan was palm plantation. Almost a third of the area of West Kalimantan has been converted into palm plantations, which was reached 1.4 million hectares [1].

In West Kalimantan, palm productivity has reached 2.2 million tons of CPO, with contribution of Crude Palm Oil (CPO) has reached 11 percent at the national level. This plantation contributes to the economic development in West Kalimantan and was one of the livelihoods of communities in West Kalimantan [1]. In addition to the community, the CPO's company can also generate profits by selling plantation products through both domestic and global markets.

Olein or known as cooking oil was one of the primary downstream products produced from crude palm oil through refinery and fractionation process [2]. Ironically, the number of palm oil processing industries in West Kalimantan is still small, which was only 0.64% of the national palm oil processing industry population. West Kalimantan Integrated One-Stop Services Investment Board stated that until the issuance of investment realization in the first quarter of 2017, there had not been any investment stretching based on CPO removal even until the end of the year.

This condition shows the need for encouragement from various parties to increase the growth of the palm oil processing industry in West Kalimantan Province, by providing industrial profile facilities that are able to attract new investors.



This research aims to a feasibility study of investment in the palm oil industry, to encourage the growth of investment in the crude palm oil/CPO's downstream industries in West Kalimantan Province. It was expected to help decision makers include policy makers (central government and local oil palm producers), investors, traders, farmers, exporters and other interested parties in the development of Oil Palm industry in West Kalimantan Province

## 2. METHODOLOGY

This research used primary and secondary data. Primary data consisted of basic assumptions of financial aspect from palm oil company in West Kalimantan. Secondary data consisted of any information from related institutions. Feasibility analysis consist of raw material, production, market, environment, and financial aspects. To evaluate the financial feasibility of investment on oil palm industry, it used the capital budgeting techniques which were consisted of Net Present Value (NPV), *Net Benefit-Cost Ratio* (*Net B/C*), Internal Rate of Return (IRR) and Payback Period (PBP).

### *Net Present Value (NPV)*

NPV represents the discounted value of the net cash inflows to the project. In the present study, a discount factor of 15 per cent was used to discount the net cash inflows representing the opportunity cost of capital. It can be represented by

$$NPV = \sum_{t=0}^n \frac{B_t - C_t}{(1+i)^t}$$

where :

$B_t$  = Gross returns in years  $t$

$C_t$  = Costs increased in year  $t$

$t$  = Economic life of the project

$i$  = Initial investment (discount)

### Decision rule

- If  $NPV \geq 0$ , accept the project.
- If  $NPV < 0$ , reject the project.
- A positive NPV suggests that the project is expected to add value to the firm, and the project should improve shareholders' wealth.

Because the goal of financial management is to increase shareholders' wealth, NPV is a good measure of how well this project will meet this goal.

### *Benefit Cost Ratio*

This ratio measures the returns to a rupee of investment. It is calculated by dividing the present value of all benefits by the present value of all costs. It can be represented by

$$NetB/C = \frac{NPV(+)}{NPV(-)} = \frac{\sum_{t=1}^n \frac{B_t - C_t}{DF_t}}{\sum_{t=1}^n \frac{C_t - B_t}{DF_t}} \quad \text{where } B_t - C_t > 0$$

Where,

$B_n$  = Gross returns in years  $t$

$C_n$  = Costs increased in year  $t$

The decision rule

- accept a policy only if  $BCR > 1$ ; and
- in deciding between alternative policies, select the one with the highest BCR
- If the NPV calculation is obtained greater than zero or positive, then the project is expected to produce a profit rate, so it is feasible to continue. If the net result value is smaller than zero or negative, then the project will give a smaller result than the cost incurred or will lose (rejected).

*Internal Rate of Return (IRR)*

The rate of discount at which the NPV of the project is equal to zero is IRR of the project. The net cash inflows were discounted to determine the present worth following the interpolation technique. The method of interpolation followed is as under:

$$IRR = i + \frac{NPV}{NPV - NPV'}(i' - i)$$

**where:**

$i$  = discount rate yang menghasilkan NPV positif

$i'$  = discount rate yang menghasilkan NPV negatif

NPV = NPV yang bernilai positif

NPV' = NPV yang bernilai negatif

**Decision rule :**

If the IRR value is greater than the prevailing interest rate ( $IRR > i$ ), then a project plan is declared eligible to proceed, and vice versa if  $IRR < i$ , then the project is rejected.

*Pay Back Period (PBP)*

PBP represents the length of time required for the stream of cash proceeds produced by the investment to be equal to the original cash outlay, i.e., the time required for the project to pay for itself. In the present study, PBP was calculated by successively deducting the initial investment from the net returns until the initial investment is fully recovered. When net annual cash inflow is even (i.e., same cash flow every period), the payback period of the project can be computed by applying the simple formula given below:

$$\text{Payback period} = \frac{\text{Investment required}}{\text{Net annual cash inflow}^*}$$

\*The denominator of the formula becomes incremental cash flow if an old asset (e.g., machine or equipment) is replaced by a new one.

**Decision rule**

- An investment is accepted (rejected), if payback period  $<$  ( $>$ ) some specified number of time period. If the PBP value is greater than the project age, then the project is not feasible to be implemented, otherwise the project is feasible to be implemented.
- The cutoff is arbitrarily chosen by the manager or the entrepreneur.

### 3. RESULT AND DISCUSSION

*Raw Materials Aspect*

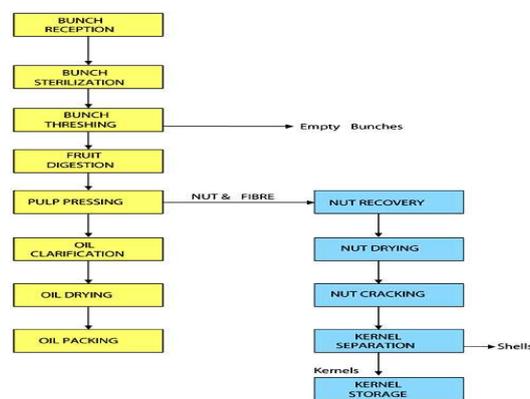
The main raw material in palm oil industry was Crude Palm Oil (CPO) extracted from the pulp of fresh fruit (mesocarp). Daily production capacity reaches 600 tons / day. This material was obtained from Palm Oil Factory (POF) owned by the company and several other POF in West Kalimantan area. According to Plantation Service of West Kalimantan Province, the palm plantation was able to produce 2.27 million tons of CPO per year or 56.97% of the total national production, and it was possible to

optimize CPO production up to 4 million tons per year. This means that West Kalimantan contributes very much to the total national CPO production both used for domestic consumption and exports.

Supporting materials in the production process of palm oil in West Kalimantan Province consist of Phosphat acid ( $H_3PO_4$ ) required at degumming stage was in the range of 0.06-1%. This material was obtained from Sumatera and Java and Bleaching Earth required at degumming stage is about 0.05%. This material was imported from China.

#### *Production Aspects*

The stages of processing Crude Palm Oil (CPO) to olein and stearin were consisted of the reception of fresh fruit bunches from the plantations, sterilizing and threshing of the bunches to free the palm fruit, mashing the fruit and pressing out the crude palm oil. The crude palm oil is further treated to purify and dry it for storage. In West Kalimantan, palm oil was sold in the form of polypec with 1 liter pack and bulk.



**Figure 1.** Palm Oil Processing

The potential energy that can be generated from the palm shell can be seen from the value of heat energy (calorific value). The energy value obtained from 150 tons of palm shells generates electricity of 2MW per day.

#### *Market Aspects*

Palm oil (olein) or cooking oil was a primary downstream products produced from oil palm fruits in West Kalimantan Province. The existing market of palm oil was in local market and Java Island especially Jakarta and West Java (Cirebon city). The economically valuable by product of palm oil was stearin as raw material of margarine. The existing market of this product was to East Java, especially to Gresik. Production capacity of West Kalimantan's palm oil industry was 600 tons/day with RPDPO 95% to > 78-80%. The cooking oil market is still very wide open considering the increased consumption of it.

#### *Environmental Aspects*

From the activities of the palm oil industry will be produced various types of solid or liquid waste. The required certificates related to the environmental management of the plant include ISO 14001: 2004 in waste handling, ISO 9001, ISO 22000 and OHSAS.

#### *Financial Aspects*

Evaluation process of the financial feasibility of investment on oil palm industry used the capital budgeting techniques consisted of Net Present Value (NPV), Benefit-Cost Ratio (BCR), Internal Rate of Return (IRR) and Payback Period (PBP). While estimating the future net cash flows, it was assumed that both input and output prices would increase by the same proportions. The results are presented in Table 1.

### a. Basic Assumptions

In the preparation of financial analysis, several basic assumptions are used that refer to the results of calculations that have been made on other aspects, plant construction standards and government regulations regarding it. The basic assumptions used in the assessment of the establishment of a 600 tonne Oil Palm factory of Crude Palm Oil (CPO) /day were:

1. The economic life of the project was 11 years. The first year was a period of land preparation and construction. The ten years were the period of production/operation in accordance with the economic life of machinery and equipment.  
Production capacity:
  - a. Capacity if: 600 tons Crude Palm Oil /day
  - b. Hours of operation: 24 hours per day
  - c. Day of operation: 30 days / month or 300 days /year
  - d. Final production: Oil Palm Bulk at Rp 12.000, - /liter
2. Sources and capital structure derived from own capital 100%.
3. The bank interest rate per year was assumed to be 20% for investment credit and 20% for working capital credit.
4. Financial calculation was done in rupiah currency with exchange rate of 1 US \$ = Rp 13.000,-.
5. The price of raw materials and final production was based on the price of 2015
6. The plant begins to operate in the 1st year with a capacity of 50%, the second year operates 75% and the 3rd year to the 10th the factory was fully operational (100%) and the 0th year was used for the preparation and construction period.
7. Depreciation expense was computed using the straight-line method adjusted to the economic life of each fixed capital.
8. The cost of fixed capital maintenance and maintenance with a range of 2.5 - 5% per year from the value of investment of goods.
9. Income tax was calculated based on decree of Minister of Finance RI. 598 / KMK.04 / 1994 Article 21 concerning Income Tax of Enterprises and Company, so that taxes were to be paid as: income suffers loss then not taxable, income per year less than Rp 25.000.000, - 10%, income between Rp 25.000.000, - to Rp 50.000.000, - it was subject to 10% tax from Rp 25.000.000, - plus 15% of the income has been reduced by Rp 25.000.000, - , then the tax was 10% of Rp 25.000.000, - plus 15% of Rp 25.000.000, - and added 30% of the income has been reduced by Rp 50.000.000,-

As with any other manufacturing industry, the establishment of palm oil industry requires substantial investment. This palm oil industry was calculated to require an investment of Rp.365,384,209,972, which would be allocated to cover pre-operational costs, fixed investment procurement costs such as land, major physical and supporting buildings, major machinery and equipment, and auxiliaries, office supplies) of transportation equipment and other fixed investments, as well as to cover the costs of contingencies (2.5% of total fixed investment outside working capital). In addition, the total investment cost would also be allocated to finance working capital up to the turn-over stage.

The feasibility criteria used include NPV, PBP, Net B / C and IRR which can illustrate whether the project was still attractive to be realized. Full calculation results of all components of the eligibility criteria.

#### 1. Net Present Value

The cash flows were discounted at the cost of capital. The net present value was Rp.383,563,088,150,- Oil palm industry's net present value was positive, it can be interpreted that the investment on oil palm industry was financially feasible.

#### 2. Benefit-Cost Ratio

B/C ratio criterion indicates the returns per rupiah invested on oil palm industry. The benefit cost ratio was 1.0424. As oil palm industry had a benefit cost ratio of more than unity, it can be interpreted that the investment on oil palm industry was financially feasible.

### 3. Internal Rate of Return(IRR)

IRR criterion measures the rate of returns that can be earned by investing on oil palm industry. It also considers the reinvestment opportunities which are absent in other techniques. The internal rate of return was 47.7 percent, which is much more remunerative when comparing to any agro industry standard. The investment on oil palm industry was found to be feasible.

### 4. Pay Back Period(PBP)

The time required to recover the initial capital investment made was explained by payback period in a project. It was found that the payback period for capacity production 600 ton CPO/day was 5 years and 1 month.

**Table 1. Financial feasibility of investment in oil palm Industry**

Parameter	Value
Interest Rate	20 %
NPV	Rp. 383,563,088,150
IRR	47.70 %
B/C Ratio	1.0424
Payback Period	5.1085 years
Investment cost	Rp. 365,384,209,972

## 4. CONCLUSION

The conclusion of this research were:

- The raw material availability aspect shows that West Kalimantan Province was a potential source of raw material to increase the growth of palm oil industry.
- Process technology was assessed to be applicable to the regional processing industry, supported by availability of energy source from palm shell..
- Market aspect shows that the market potential of processed palm oil was expected to meet market demand in the form of processed products, resulting in increased value-added in its value chain. Cooking oil market is still very wide open considering the increased consumption of it.
- Environmental aspects indicate the key determining priority in the development of palm oil industry was infrastructure. In addition, other considerations in the construction of palm oil mills were wastewater treatment units and working conditions. Industrial aspect shows the value chain, core industry, supporting and related that exist in oil palm industry
- Financial feasibility of Palm oil industry with 600 ton/day capacity of CPO need investment cost Rp. 365,384,209,972, NPV with Discount Factor of 20% of Rp. Rp. 383,563,088,150, IRR 47.70%, Net B / C Ratio 1.0424, Pay back periods 5.1085 Years.

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