# Feasibility Analysis of VCO Conventional Production Process

## A. Anwardi*, Hafiz Abdillah, Ismu Kusumanto, H. Harpito

Industrial Engineering Departement, Science and Technology Faculty,
Universitas Islam Negeri Sultan Syarif Kasim Riau, Jl. HR. Soebrantas Km. 15 No. 155 Panam,
Pekanbaru, Indonesia
*Corresponding author: A. Anwardi, Email: anwardi@uin-suska.ac.id

## ABSTRACT

The economic uncertainty of the Inhil community is influenced by the fluctuating coconut price, which is the main source of income. This uncertainty necessitates derivative products that can be made and processed easily, such as Virgin Coconut Oil (VCO). Many types of VCO have been marketed, and produced from different raw materials. Therefore, this study aimed to analyze the feasibility of conventional VCO production businesses and examine sensitive indicators from each aspect. Business feasibility analysis parameters include market and marketing, technical, management and human resources (HR), legal, and financial aspects. Feasibility index was calculated using the Multi-Dimensional Scaling (MDS) method and all aspects were declared feasible. The feasibility index for each aspect showed a score of 53.28%, 60.91%, 65%, 40%, and 74.83% for technical, manager, HR, legal, and financial aspects, respectively, with a general score of 83.50%.

Keywords: Business feasibility analysis; conventional process; VCO

## INTRODUCTION

According to Central Bureau of Statistics of Indonesia in 2018, Indragiri Hilir Regency recorded a coconut plantation area of 295,380.24 hectares, with a total of 731,396 people working as farmers. Despite considering coconut as a strategic commodity with social and cultural benefits, the 2021 BPS data showed a significant decrease in the plantation area to 261,690 hectares. This reduction is due to several factors, such as conversion, deterioration of coconut plantations, and price instability. Currently, coconut is no longer a primary commodity due to reduced plantation area,

unstable prices (IDR 800-1300/kg), and insufficient income for workers. Farmers have now diversified the processing, such as producing Virgin Coconut Oil (VCO), white copra, or selling young coconuts. Among these three opportunities, processing coconuts into VCO was considered the easiest and most profitable. This is due to the presence of entrepreneurs and VCO communities using conventional methods to achieve explicit results compared to the traditional methods commonly used by the community.

According to Rindengan & Novarianto (2004), VCO is a processed coconut oil that contains high quality, low moisture content, low levels of free

fatty acids, clear color, and a pleasant aroma, which can last for up to 12 months. VCO does not contain cholesterol, and the soluble fatty acids are converted into monolaurin, resulting in the possession of antiviral properties.

The processing of coconut into VCO still uses affordable and readily available technology, such as materials and equipment in every household. The products of VCO have several benefits and are priced high, ranging around IDR 55,000 per 250 mL (Retno et al., 2016). This business is attractive and has good prospects for development. However, the processing of coconut into VCO is still relatively limited and requires attention from the government to enhance the welfare of farmers.

Based on the issues, a feasibility study on the production of VCO using conventional methods is required. This study is expected to have an impact on the development of the coconut commodity industry, employment generation, and the improvement of farmer's welfare. Furthermore, a feasible study needs to be conducted to establish a VCO production business, covering market, technical, management, and human resources (HR), legal considerations, as well as financial aspects.

This study aimed to analyze the feasibility of conventional VCO production, focusing on several aspects, namely market and marketing, technical, management and HR, legal considerations, and finance. The analysis includes Rapfish and Leverage analysis to determine indicators contributing to the feasibility index for each aspect. According to Pitcher and Preikshot (Soejarwo et al., 2019), MSD is the evaluation of business sustainability based on certain factors and examining economic, institutional, and technological sectors.

## METHODS

The research stages consisted of two steps *i.e.* conducting a feasibility analysis of conventional coconut oil production and determining the indicators that influence each related aspect (Figure 1). The first step included a literature review to understand the availability of raw materials, obtained from the data of Central Bureau of Statistics of Indonesia for Indragiri Hilir Regency. Subsequently, direct observations and interviews were conducted with VCO producers operating in the area. The results served as the basis for setting the study objectives, requiring a literature review and analytical methods to provide input and proposals as considerations for conventional VCO processing efforts.

Market and marketing aspect covered market segmentation and target audience, product demand and sales, specifications and quality, pricing methods, and promotional strategies. The technical aspect covered the location positioning and layout arrangement. The management and HR aspect discussed organizational structure, job descriptions, wage determination, and workforce development. Similarly, the legal aspect examined organizational laws and licensing while the financial covered the preparation of working capital and investment.

According to Sucipto (2011), the criteria and methods to evaluate the feasibility of a business from a financial perspective include payback period (PP), average rate of return (ARR), Net Present Value (NPV), Internal Rate of Return (IRR), and Profitability Index (PI). The calculation steps for each criterion are as follows. Payback Period (PP), and calculation stages (PP) are shown in Equation 1.

$$Payback\ Period = \frac{Total\ of\ Investment}{Cash\ flow/}\ Year \times 1\ Year \qquad (1)$$
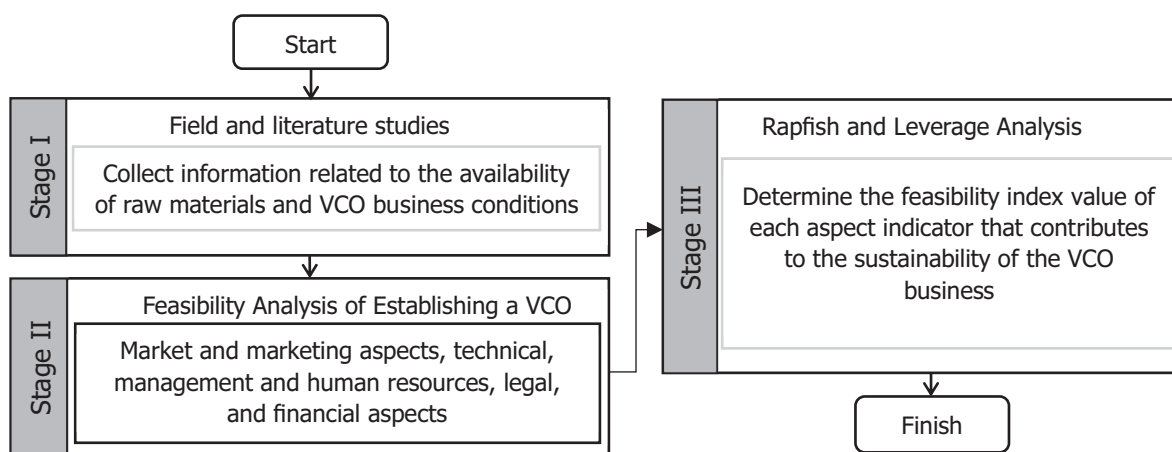


Figure 1. Research stages

The assessment criteria for the payback period are less than time period. When the PP value is lower than the specified time period, the business proposal was considered to meet the feasibility criteria. However, when the PP value is higher than time period provisions, the proposal does not meet the eligibility criteria.

Average Rate of Return (ARR), and Calculation Stages (ARR) are shown in in Equation 2.

$$ARR = \frac{Average\ Earning\ After\ Tax}{Average\ Investment} \times 100\% \qquad (2)$$

The assessment criteria for the average rate of return include ARR should be higher than return to meet the eligibility criteria. When ARR is lower than the return, the eligibility criteria are not satisfied.

Net Present Value (NPV), and NPV Calculation Stages are shown in Equation 3.

$$NPV = -A_0 \sum_{t=0}^{n} \frac{A_t}{(1-r)^t} \qquad (3)$$

According to Sucipto (2011), when the Net Present Value assessment criteria are greater than zero (NPV> 0), then the investment proposal can be accepted, and vice versa.

Internal Rate of Return (IRR), and Calculation Stages (IRR) are shown in Equation 4.

$$IRR = i_1 + \frac{NPV_1}{(NPV_1 - NPV_2)} \times (i_1 - i_2) \qquad (4)$$

When the IIRR value is higher Capital Cost, the proposed investment was considered feasible. In a case where the IRR value is higher than Capital Cost, the proposed investment is not feasible.

Profitability Index (PI), and Calculation Stages (PI) are shown in Equation 5.

$$PI = \frac{\sum PV\ Kas\ Bersih}{\sum PV\ Investasi} \times 100\% \qquad (5)$$

When the PI value is ≥ 1, the proposed business is considered feasible, and vice versa.

Benefit Cost Ratio (BCR), and Calculation Stages (BCR) are shown in Equation 6.

$$BCR = \frac{\sum Benefit}{\sum Cost} \qquad (6)$$

A BCR value ≥ 1 showed that the business proposal is feasible and vice versa.

Profitability Ratio (PR), and Calculation Stages (PR) are shown in Equation 7.

$$TC = TFC + TVC,\ TR = Q \times P,\ dan\ л = TR - TC \qquad (7)$$

According to Pasau et al. (2015) ,when the average rate of return is higher than 1, the business proposal is feasible. In a situation, where R/C = 1, the business is in a break-even position, If R/C lower than 1, it is not feasible.

Break Event Point (BEP), Consists of Production Unit BEP (Q) and Rupiah Unit BEP (Rp). The BEP (Q) calculation stages are shown in Equation 8.

$$BEP\ (Q) = TFC\ /\ (P/Unit - VC/Unit) \qquad (8)$$

BEP Unit Rupiah (IDR), and BEP Calculation Stages (IDR) are shown in Equation 9.

$$BEP\ (Rp) = TFC\ /1 - (VC/P) \qquad (9)$$

A VCO production that exceeds the break-even point showed that the industry makes a profit.

After all aspects have been analyzed, a multidisciplinary sustainability evaluation was conducted using Multi-Dimensional Scaling (MDS), with attributes covering ecological, economic, social, institutional, technological, and other relevant aspects to the study object (Wigiani et al., 2019). The stages in the MDS method, according to (Soejarwo et al., 2019), include identifying and assigning scores to each indicator through discussions with experts. Scored were assigned on an ordinal scale with a range of values between 0 (low or poor) to 2 (high or good). In this step, the positions of the good and bad points were determined by considering the distances on the Euclidean distance values (Eunike et al., 2018). The formula from Syarifuddin et al. (2016) was used to calculate the Euclidean distance, as shown in Equation 10.

$$d_{xy} = \sqrt{(X_1 - X_2)^2 + (Y_1 - Y_2)^2} \qquad (10)$$

Description: $d_{xy}$ = distance from point 1 to 2 X, Y = Attribute

The results of the ordination of an attribute in MDS were regressed on the Euclidean distance (dij) from point i to j with the origin (Dij). Furthermore, the results of attribute ordination in MDS were regressed on the Euclidean distance (dij) from point i to j with the origin (Dij), as expressed in Equation 11 (Ristianingrum et al., 2016).

$$d_{ij} = a + bD_{ij} + e \qquad (11)$$

Where: a = Intercept, b = Slope, and e = Error

The ALSCAL algorithm is a regression technique used to make iterations to obtain the smallest possible e (error) and intercept value = 0 (a=0). The next step was to determine the m attribute, which showed the stress value, using the formulation shown in Equation 12 (Ristianingrum et al., 2016).

$$Stress = \sqrt{\frac{1}{m} \sum_{k-1}^{m} \left[ \frac{\sum_i \sum_i \left( D_{ijk}^2 - d_{ijk}^2 \right)^2}{\sum_i \sum_j d_{ijk}^2} \right]} \qquad (12)$$

Accuracy measurement of the point configuration that could reflect the original data in the MSD was shown in the Stress value, indicating the goodness of fit. Meanwhile, a low-stress value indicates a good fit and vice versa. When the S (stress) value is > 0.25, then the model is classified as good (Wahyudin et al., 2019a).

Leverage analysis was conducted to determine indicators influencing the stability of the feasibility index. This was followed by a Monte Carlo analysis to evaluate the random error results from MDS ordination in Rapfish

(Ristianingrum et al., 2016). Based on the identification results, 24 indicators served as feasibility parameters for the Integrated Nyiur Community (KNT) business.

## RESULTS AND DISCUSSION

### General Description of Integrated Nyiur Community Business

Integrated Nyiur Community (KNT), located in the Indragiri Hilir Regency, specifically in Kuala Indragiri-Sapat, focuses on agro-industry, particularly in the production of VCO. The majority of the production processes use conventional methods, except for the pressing and grating stages which include machinery. This community has a promising outlook due to the abundant and affordable availability of coconut raw materials. Despite operating on a small scale, KNT is capable of producing VCO 15 times each month, with an average production of 5 liters per session. A total of 50-60 mature coconuts are required as raw materials to produce 5 liters of VCO and packaged in 250 mL and 500 mL plastic bottles.

Table 1. Parameters and indicators for assessing the VCO feasibility index

| Feasibility aspect indicators | Good | Bad | Scale |
| --- | --- | --- | --- |
| Marketing Aspect | | | |
| Form of Product Export | 2 | 0 | No export = 0, from second person=1, from first person=2 |
| Marketing Area Coverage | 2 | 0 | Local market=0, National Market=1, Global market=2 |
| Request Conditions | 2 | 0 | Decreased=0, Stagnant=1, Increased=2 |
| Promotion (P) | 2 | 0 | None=0, Sometimes=1, Often=2 |
| Technical Aspects | | | |
| Origin of Raw Materials | 2 | 0 | There is only one source=0, 2-3 sources=1, >3 Sources=2 |
| Nature of Supply Row Material | 2 | 0 | Intermittent=0, Occasionally intermittent=1, Current=2 |
| Type of Technology and Machines used | 2 | 0 | Manual=0, Mix of machines and humans=1, All machines=2 |
| Process Standardization Conditions | 2 | 0 | Not yet implementing standardization=0, still in development stage=1, already implementing standardization=2 |
| Product Standardization | 2 | 0 | Not yet implementing standardization=0, still in development stage=1, already implementing standardization=2 |
| HRM aspects | | | |
| The number of workers | 2 | 0 | Poor=0, Fair=1, Very satisfactory=2 |
| Existence of Work Arrangements | 2 | 0 | Not yet available=0, Still in development stage=1, already exists and implemented=2 |
| The existence of a Business Association | 2 | 0 | There are no associations=0, There are only 1=1, >1 Association=2 |
| Linkages with other MSMEs | 2 | 0 | Not closely=0, Quite closely=1, Very closely=2 |

| Feasibility aspect indicators | Good | Bad | Scale |
|---|---|---|---|
| **Legal Aspects** | | | |
| There is permission from the Department of Health (IDI) | 2 | 0 | Do not have permission=0, already have permission=2 |
| Existence of an industrial business permit (IUI) | 2 | 0 | Not yet available=1, In progress=1, Already available=2 |
| There is a Business Extension Institute (LPU) | 2 | 0 | No LPU yet=0, LPU present but not working=1, Available and working=2 |
| Participate in an extension agency (KLP) | 2 | 0 | Didn't participate=0, participated but didn't walk=1, participated and walked=2 |
| **Financial Aspect** | | | |
| NPV value | 2 | 0 | Small NPV from 0=0, large NPV from 0=2 |
| IRR value | 2 | 0 | Smaller IRR MARR=0, larger IRR MARR=2 |
| Gross B/C Value | 2 | 0 | Gross B/C < 1=0, Gross B/C = 1=1, Gross B/C > 1=2 |
| Homework value | 2 | 0 | Profitability ratio < 1=0, Profitability ratio = 1=1, Profitability ratio > 1=2 |
| **Financial and economic** | | | |
| Origin of Capital Sources | 2 | 0 | (0) Bank loans<br>(1) Interest on Bank Loans and Own Capital<br>(2) Own capital |
| Business Profit Position | 2 | 0 | Loss=0, Return on capital=1, Profit=2 |
| Basis for Determining Salaries | 2 | 0 | Below regional minimum wage=0, Equal to regional minimum wage=1, Above regional minimum wage=2 |

## Analysis of Market and Marketing Aspects

In the analysis of market and marketing aspects, market growth was evaluated through increased demand and the extent of a product's share. The result of calculations using forecasting methods showed that the demand for VCO products is estimated to continue increasing. The projection of demand outcomes is shown in Table 2.

The calculations are consistent with the results of interviews, which documented VCO demand from Pekanbaru, Batam, Pelalawan, Dumai, Kediri, and Ponorogo. Subsequently, the KNT business has successfully marketed VCO to Malaysia, but its primary market remains in Riau and the surrounding areas, with an average annual sales volume of 800-1,200 L.

The quality of KNT VCO products is a key factor in increasing demand. This is consistent with the results of (Gotomo & Wahyudi, 2017) who showed a significant impact of product quality on purchase decisions. Experimental results showed that KNT VCO can endure for 12-15 months without experiencing changes in color and aroma. Furthermore, the clarification process using suliki stones, cotton, and tissues in the final stage ensured a colorless and non-rancid quality of VCO. The selection of raw material includes coconuts aged 6-10 months, and freshly harvested to maintain VCO quality.

The selling price was set at IDR 120,000 per liter, as the business entity had not conducted a detailed calculation. A methods for determining the selling price is the Cost-based Price method. Table 3 showed the calculation results that considered fixed and variable costs, with the obtained profit percentage being 0.47%.

According to Ramadhan & Setyowati (2023), the selling price of a product should cover the production cost along with a reasonable profit, as shown in Table 3 with a profit percentage of 0.47%. VCO products with a size of 259 mL are recommended to be sold at a price

Table 2. Estimated product demand/year

| Year | Request (L) |
|---|---|
| 2019 | 1,534 |
| 2020 | 2,058 |
| 2021 | 2,581 |
| 2022 | 3,105 |

Table 3. Profit Data

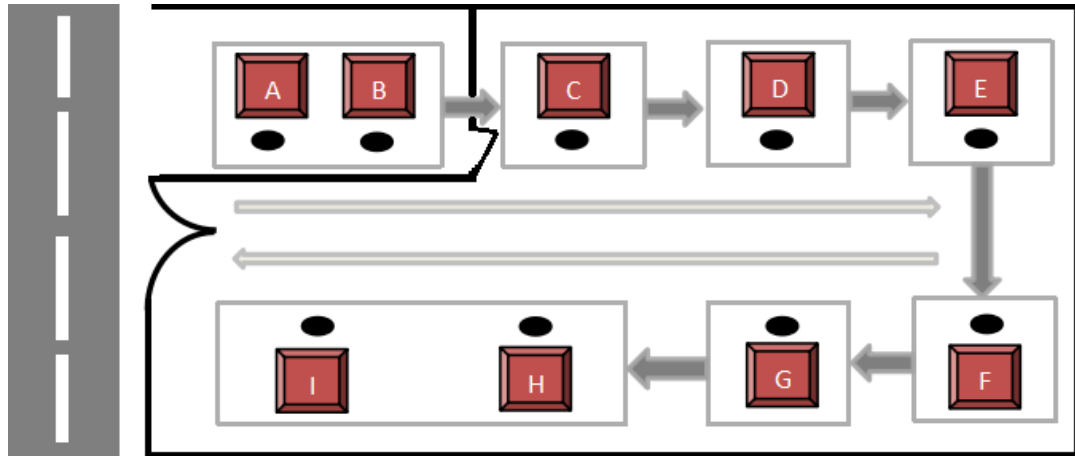| Year | Income (IDR) | Variable costs | Fixed cost | Total cost | Profit/month |
|------|-------------|----------------|------------|------------|--------------|
| 2018 | 13,500,000 | IDR 227,500 | IDR 2,015,291 | IDR 4,292,791 | IDR 9,207,209 |
| | | Total | | | IDR 9,207,209 |



Figure 2. KNT VCO production layout

between IDR 35,000 to IDR 40,000 per bottle. Similarly, the 500 mL size could be sold at a price between IDR 65,000 to IDR 70,000 per bottle. This recommendation suggests that the selling price should be equivalent to the production costs with a markup to achieve a reasonable profit.

According to Pasaribu & Kusnawan (2022), promotion plays a vital role in the marketing mix of a company to inform, persuade, and remind consumers about the product. KNT engaged in promotions through direct marketing, supermarkets in Tembilahan, collaboration with Mitra Insani Pekanbaru, and social media. In addition, the company maintains and maintains a presence at Bank Syariah Mandiri as part of the market strategy. In an effort for global expansion, KNT planned to promote through the web and leverage social media platforms. Data analysis showed that KNT markets and marketing aspects are worthy of further development.

**Technical Aspect Analysis**

The technical aspects include determining the business location, raw materials, and the technology used in the production process. KNT has a strategic location because the raw material is very close and abundant, obtainable from local farmers in the region. The technology needed in the VCO production process is still conventional, facilitating easy operation. KNT

packages VCO products in plastic bottles of 250 mL and 500 mL.

The accessibility of raw materials significantly impacts the production process, facilitating straightforward operation, including the use of equipment and machinery. Similarly, the packaging of VCO also maintains high quality, making the technical and technological aspects of the business worthy of further development. The layout of the KNT VCO production process can be seen in Figure 2.

The production layout of KNT VCO used a U-shaped configuration, where the entrance and exit points for materials and finished products are in the same location. This is aimed at providing flexibility in adjusting the workforce, either by increasing or reducing the number of workers, in response to changes in demand. The condition of this layout is capable of handling unpredictable demand based on data. According to (Safitri et al., 2018), a well-coordinated layout arrangement could support the smoothness of the production process, enhance efficiency, and contribute to business sustainability.

Processes A and B include the separation of coconut meat from the shell through peeling, splitting, and scooping using simple tools, such as peelers and splitters. Process C Includes grating the coconut meat using a machine, which is then pressed into coconut milk (D). The separation of the kernel from the water
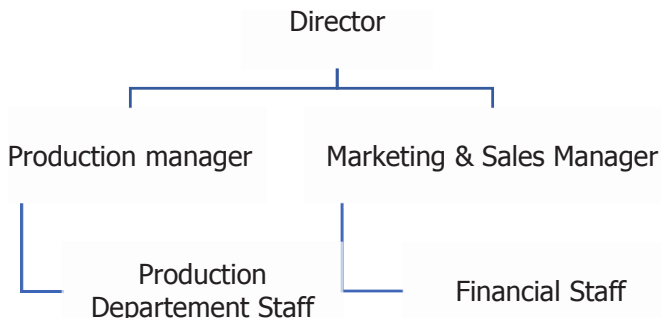
Figure 3. Integrated nyiur community organizational structure plan

(E) was carried out manually with a specialized tool. Coconut Virgin Oil (CVO) the sedimentation (F) of VCO was carried out in a basin for 6-10 hours, followed by filtration (G) using a self-designed tool to reduce water and color content. The final processes include manual packaging, labeling (H), and storage (I).

**Analysis Based on Management and HR Aspects**

KNT business was managed at a household level with a small scale and an organizational structure, was not clearly defined. The analysis of human resource (HR) management was conducted to evaluate workforce readiness, including the type, quality, and quantity needed. Business management was entirely handled by the owner, from raw material procurement to marketing. Although the payroll system was not yet professional, the VCO production process ran smoothly, showing the potential for business development. Furthermore, the development of a more systematic organizational structure was necessary to define the roles of entity

members optimally and achieve business objectives. The proposed organizational structure plan for KNT business is shown in Figure 3.

The development of KNT's business required a planned organizational structure for systematic task distribution. Workforce planning became crucial, ensuring that the job descriptions for each position were executed effectively. HR quality needs to be consistent with technological advancements. Therefore, recruitment must meet the needs, both in terms of quantity and quality, to achieve a competitive advantage (Harianja, 2010).

**Analysis of Legal Aspects**

The completeness of administrative requirements related to licensing in a business was discussed in the legal aspect. KNT has obtained production permit indicates that the KNT business conducts production activities legally. The legality of this production showed that the VCO products of the KNT business could be marketed both domestically and internationally.

KNT Business is currently in the development process of applying for an Industrial Business License (IUI). This is regulated in the Minister of Industry Regulation No. 15 of 2019 concerning the Issuance of Industrial Business Permits and Expansion Permits. Based on the statement in the documents owned by KNT that the business can produce its products legally, the KNT business is legally suitable for development.

**Financial Aspect Analysis**

Financial and economic analysis was used to evaluate business performance by calculating investment criteria. KNT initiated the business with IDR

Table 4. Duties and functions of each position

| Position | Job description | Responsibility | Total |
|---|---|---|---|
| Leader | Coordinating all business resources and managing manager performance | Responsible for the policies that have been taken | 1 |
| Production manager | a. Organize and check production activities<br>b. Create production results reports<br>c. Plan every purchase of raw materials and adjust to production targets | Responsible for the smooth running of production activities | 1 |
| Marketing and sales manager | a. Marketing the production results<br>b. Check sales results reports<br>c. Check and prepare financial reports and business debts | Responsible for the accuracy of marketing and sales reports | 1 |
| Production staff | Run and supervise the course of production activities | Responsible for determining production standards | 1 |
| Financial staff | Make financial reports to the Manager | Responsible for incoming and outgoing money | 1 |

Table 5. Details of fixed costs

| No | Item | Cost/month | | Cost/year | |
|----|------|-----------|---|----------|---|
| 1 | Labor | IDR | 1,800,000 | IDR | 21,600,000 |
| 2 | property tax | IDR | 4,333 | IDR | 52,000 |
| 3 | Electricity | IDR | 120,000 | IDR | 1,440,000 |
| 4 | Call | IDR | 100,000 | IDR | 1,200,000 |
| 5 | Tool Depreciation | IDR | 90,958 | IDR | 1,091,500 |
| | Total | IDR | 2,115,292 | IDR | 25,383,500 |

Table 6. Details of variable costs

| No | Item | Variable costs/year | | | |
|----|------|------|------|------|------|
| | | 2019 | 2020 | 2021 | 2022 |
| 1 | Raw material | IDR 18,408,000 | IDR 24,696,000 | IDR 30,972,000 | IDR 37,260,000 |
| 2 | Fuel | IDR 6,442,800 | IDR 8,643,600 | IDR 10,840,200 | IDR 13,041,000 |
| 3 | Packaging | IDR 4,717,050 | IDR 6,328,350 | IDR 7,936,575 | IDR 9,547,875 |
| 4 | Marketing | IDR 4,200,000 | IDR 4,200,000 | IDR 4,200.000 | IDR 4,200,000 |
| | Total | IDR 33,767,850 | IDR 43,867,950 | IDR 53,948,775 | IDR 64,048,875 |

Table 7. Projected income from virgin coconut oil (VCO)

| Year | Request (L) | Price/L | Income | Expenditure | Net cash |
|------|------------|---------|--------|-------------|----------|
| 2019 | 1,534 | IDR 130,000 | IDR 199,420,000 | IDR 59,151,350 | IDR 140,268,650 |
| 2020 | 2,058 | IDR 130,000 | IDR 267,540,000 | IDR 69,251,450 | IDR 198,288,550 |
| 2021 | 2,581 | IDR 130,000 | IDR 335,530,000 | IDR 79,332,275 | IDR 256,197,725 |
| 2022 | 3,105 | IDR 130,000 | IDR 403,650,000 | IDR 89,432,375 | IDR 314,217,625 |

115,000,000, including building and working capital, as well as production equipment. The total investment value reached IDR 182,983,000, obtained through a loan with a 12% interest rate. Additionally, KNT also incurs fixed and variable costs, and the details are shown in Table 5.

The fixed costs that must be incurred to run a KNT VCO production business is IDR 25,383,500/year. This consists of labor costs for 1 employee and depreciation costs for the equipment used.

Based on the estimated demand and the occurrence of price increases in the materials, variable costs experience differences in amount every year. The income calculation based on the data in Table 2 results in the presentation of the revenue from the production of Virgin Coconut Oil (VCO).

The investment evaluation criteria used to assess the feasibility of the KNT business in terms of financial aspects are Net Present Value (NPV), Internal Rate of Return (IRR), Gross Benefit Cost Ratio (Gross B/C), Profitability Ratio (PR), Payback Period ( PP) and Break Even Point (BEP). Table 8 showed the assessment results of investment criteria in financial and economic aspects.

Based on the analysis results, the financial and economic aspects of the KNT VCO business were declared very suitable for development. This is because all the investment criteria met the requirements.

**Feasibility Index Assessment**

The feasibility index assessment used Rapfish analysis and Leverage, which generates a status diagram. Furthermore, leverage analysis was used to identify the sensitivity of indicators from each aspect influencing feasibility. The final feasibility index assessment for the five aspects is shown in Figure 4.

Table 8. Results of feasibility analysis for financial and economic aspects

| No | Investment criteria | Analysis results | Condition | Description |
|----|---------------------|------------------|-----------|-------------|
| 1 | NPV: Net Present Value | IDR 482,378,746 | NPV>0 | Feasible |
| 2 | IRR: Internal Rate of Return | 93.88% | IRR>MARR (12%) | Feasible |
| 3 | Gross (B/C): Gross Benefit Cost Ratio | 2.193 | Gross B/C>1 | Feasible |
| 4 | PR: Profitability Ratio | 3.64 | PR>1 | Feasible |
| 5 | PP: Payback Period | 1 year 8 days | PP< Capital Payback Period | Feasible |
| 6 | BEP: Break Even Point | 2 Years 15 Days | BEP< Payback Period | Feasible |
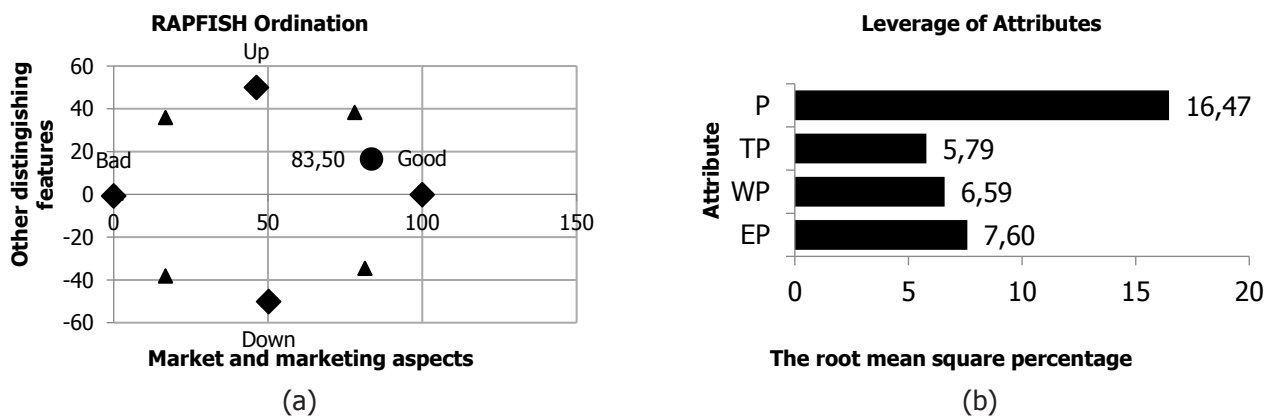


Figure 4. (a) index of market and marketing aspects, (b) sensitive factors that influence the feasibility of market and marketing aspects
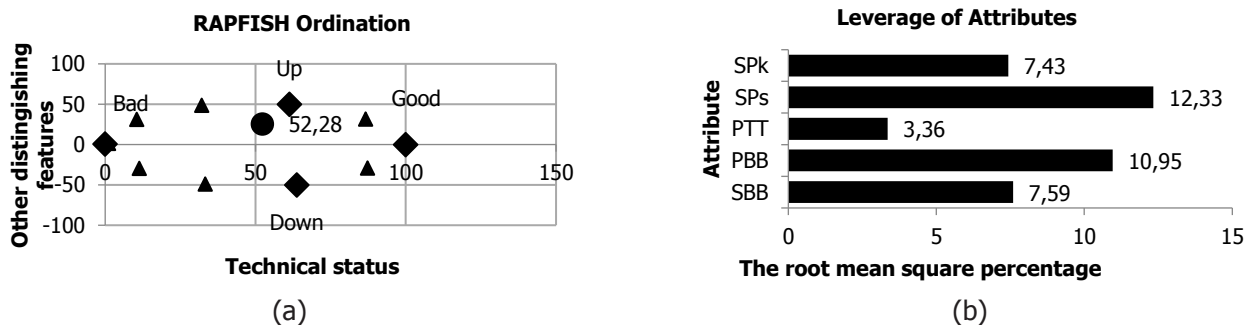


Figure 5. (a) technical aspect index, (b) sensitive factors that influence the feasibility of technical aspects

Based on the Multi-Dimensional Scaling (MDS) analysis results in Figure 6, the sustainability value of the market and marketing dimensions is 83.50%. This value showed that the market and marketing dimensions are in a good category, signifying a high potential for sustainability, given the index value falls within the range of 76 to 100. (Wigiani et al., 2019). Meanwhile, the results of the Leverage Analysis showed that the most sensitive attribute to influencing the sustainability of the KNT Business was promotion with a

value of 16.47. This result showed that appropriate and sustainable promotion methods are needed to increase the KNT VCO business.

The sustainability of the technical and technological dimension is 52.28%, suggesting that the technical and technological dimension was in the fair category or had moderate sustainability potential (on a scale of 0 to 100) when the index value is between 51 - 75 (Wigiani et al., 2019). Furthermore, the results of the Leverage Analysis showed that the most sensitive
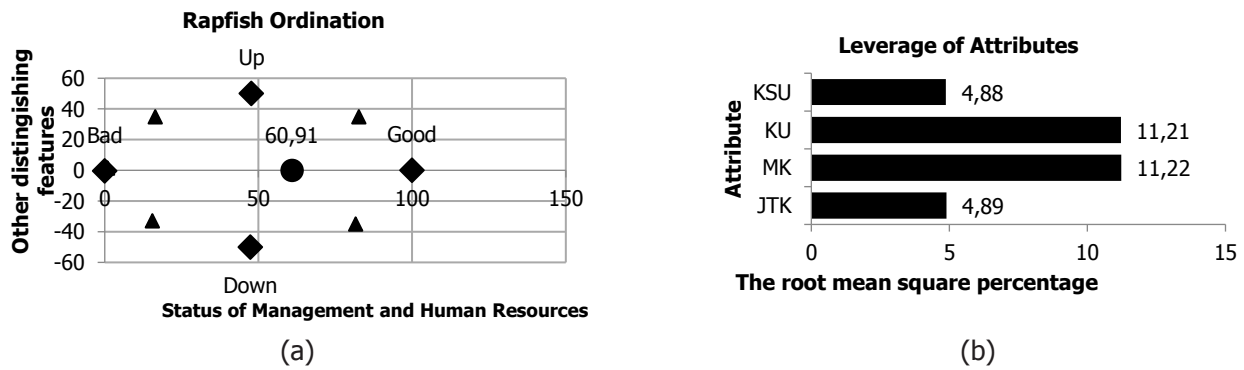
Figure 6. (a) index of management and HR aspects, (b) sensitive factors that influence the feasibility of management and HR aspects
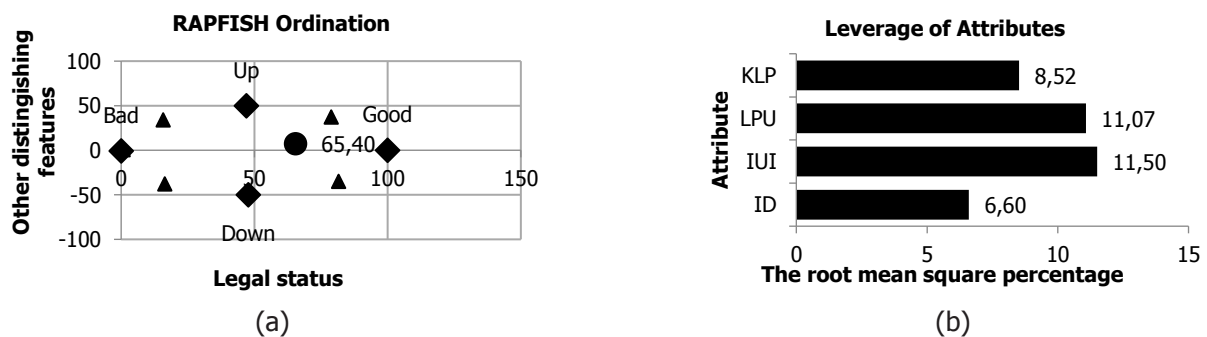


Figure 7. (a) legal aspect index, (b) sensitive factors that influence legal feasibility

attribute influencing the sustainability of KNT business was process standardization with a value of 12.33. This suggests that standardization is required for every processing stage. The raw material attribute was also important for consideration with a value of 10.92.

The MDS analysis results showed that the sustainability value of the management and HR dimensions was 60.91%. This implies that the management and HR dimensions are in the sufficient category (scale 0 to 100) when the index value ranges from 51 to 75 (Wigiani et al., 2019). Meanwhile, the results of the Leverage Analysis showed that the most sensitive attributes that influence VCO business sustainability are work management and business community with 11.22 and 11.21, respectively.

The results of the MDS analysis showed that the legal dimension and legality of KNT Business reached 65.40%, categorized as sufficient (51-75) (Wigiani et al., 2019). Furthermore, leverage analysis showed the Industrial Business License (IUI) and Business Extension Institution (LPU) attributes as the most sensitive, with 11.50 and 11.07, respectively. This result suggested that business sustainability was greatly influenced by operational permits from the

government and educational support from business institutions.

The MDS analysis in Figure 10 showed that the sustainability value of the financial and economic dimensions was 74.83%, categorized as fair or even close to good (51-75) (Wigiani et al., 2019). Leverage analysis highlights the Capital Source (SM) attribute as the most sensitive, with a value of 16.39. This result suggests that the sustainability of VCO businesses needs to pay attention to capital sources, both the amount and form of investment in the business.

**Feasibility Status of VCO Manufacturing Business**

The assessment of the feasibility index for conventional VCO-making business in Indragiri Hilir Regency was carried out on five aspects. Figure 9 showed the feasibility status of the KNT business, which produces VCO conventionally in Inhil Regency.

Based on Figure 6, the percentage of the feasibility status of KNT business in VCO production, consisting of five aspects is determinable. The aspect with the highest and lowest feasibility scores was market and technical, with 83.50% and 52.28%, respectively. The basis for determining the status of the VCO production business
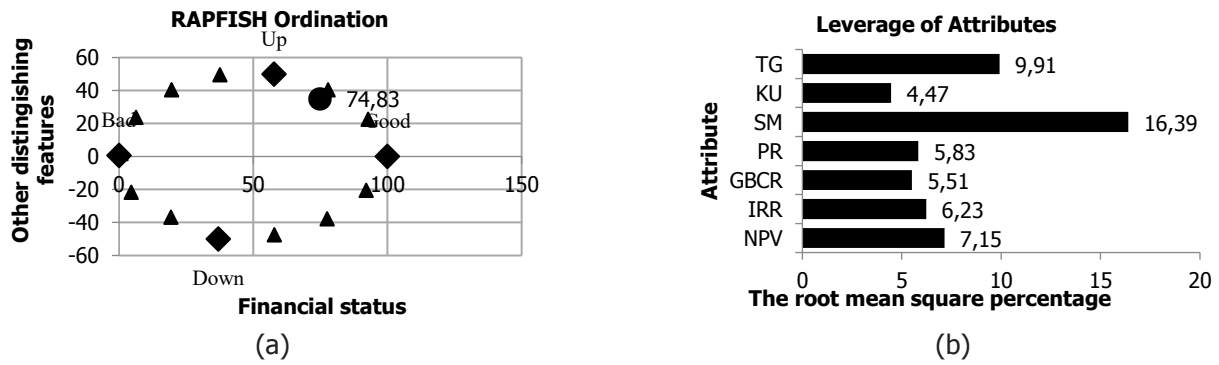
Figure 8. (a) financial aspect index, (b) sensitive factors that influence financial feasibility
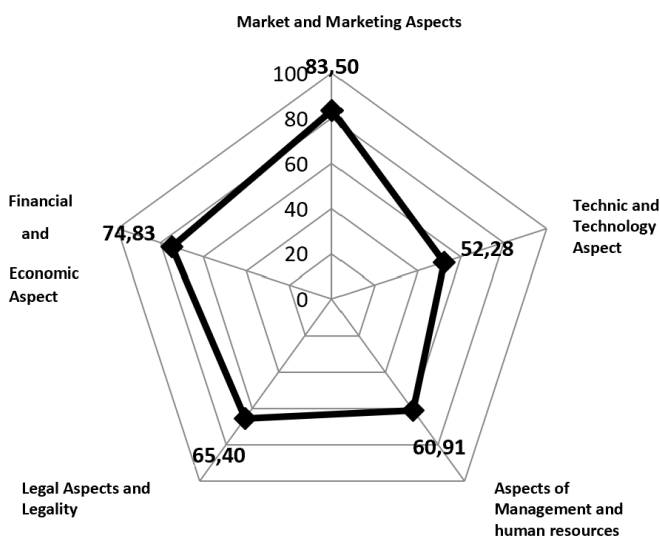


Figure 9. Flyover diagram of VCO business feasibility status

Table 7. Validation of stress values and $r^2$ values

| Feasibility aspect | Error | R^2 | Description |
|---|---|---|---|
| Markets and marketing | 0.15 | 0.94 | Valid |
| Technical | 0.15 | 0.94 | Valid |
| Management and HR | 0.16 | 0.92 | Valid |
| Law | 0.16 | 0.93 | Valid |
| Financial | 0.14 | 0.94 | Valid |

conventional methods obtained an average score of 67.38%, which was deemed feasible.

**Validation of Feasibility Index Results**

The results of the feasibility index using the MDS Method were subjected to a validation stage. The validation of the assessment results against the feasibility index was determined based on stress and $R^2$ values, showing how well the values reflect the actual data. When the stress value is less than 0.25 and the $R^2$ value is more than 0.80, it showed that the results of the feasibility index evaluation are valid. Table 7 showed the stress and $R^2$ values for the five measured aspects.

According to Wahyudin et al. (2019b), a stress value less than 0.25 (S < 0.25) showed a good model.

was based on the average feasibility index of the five assessed aspects. The system could be considered sustainable when the sustainability value was ≥50% and declared unsustainable at <50% (Syarifuddin, Andayani, Novianti, et al., 2016). The evaluation of the five aspects of KNT business producing VCO using

Table 8. Feasibility comparison with Monte Carlo simulation results

| Feasibility aspect | Feasibility index | | Error | Description |
|---|---|---|---|---|
| | Rating result | Simulation results | | |
| Markets and marketing | 83.50 | 80.83 | 2.67 | Valid |
| Technical | 52.28 | 51.51 | 0.77 | Valid |
| Management and HR | 60.91 | 59.19 | 1.72 | Valid |
| Law | 65.39 | 63.66 | 1.73 | Valid |
| Financial and economic | 74.83 | 73.21 | 1.62 | Valid |

The validation results showed that all five aspects have stress values < 0.25 and $R^2$ > 0.80. This result suggests that the feasibility index of the five aspects can explain the real conditions. The second validation, which is the difference between the feasibility index and the results of the Monte Carlo simulation, ensures validity by comparing the difference in index values with the simulation analysis results, which should be less than 5%. Table 8 showed the simulation results and the difference in feasibility index values.

All five aspects had an error value > 5%, showing that the feasibility index was considered valid. Another assessment could be conducted using index value criteria with different categories, such as bad, poor, fair, and good when the index value is 0 - 25, 26 - 50, 51 - 75, and 76 - 100, respectively (Wigiani et al., 2019). The assessment results showed that the market and marketing aspects had a good sustainability index value, while others were in the moderate category. This condition showed that the sustainability of KNT VCO business was valid.

## CONCLUSION

In conclusion, the result of the feasibility analysis showed great potential for the development of the KNT VCO business. Furthermore, the market and marketing aspect showed stable demand growth with market penetration reaching Malaysia, suggesting that the business development was very feasible in terms of market and marketing. In terms of technical and technological aspects, standardization constraints were still in development, but the availability of raw materials and manually operated technical equipment showed reasonably good technical feasibility. Human resource (HR) management was proven to be highly feasible but continued to experience development. The legal and legality aspect was also recognized as feasible with the presence of a business license, and financially, the indicators showed a high level of feasibility, especially with NPV, IRR, and other indicators supporting business sustainability. Although the average feasibility index value was around 67.38%, the market and marketing indicators were the most influential factors for the sustainability of KNT VCO business, with a significant value of 83.50%. Therefore, it was concluded that the business was feasible for development and had positive growth potential.

## CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest from any parties.

## REFERENCES

Eunike, A., Hardiningtyas, D., Kartika, S. I., & Andronicus, A. (2018). Sustainability analysis of beach and mangrove tourism in Clungup, Malang Regency of East Java. *Economic and Social Fisheries and Marine*, *6*(1), 1–13. https://doi.org/10.21776/ub.ecsofim.2018.006.01.01

Gotomo, E. & Wahyudi, A. (2017). Pengaruh kualitas produk dan harga terhadap keputusan pembelian di Pochette. *PERFORMA: Jurnal Manajemen dan Start-Up Bisnis*, 2(2).

Harianja, M. T. E. (2010). *Manajemen Sumber Daya Manusia*. Grasindo, Jakarta.

Pasaribu, F. T. & Kusnawan, A. (2022). Pengaruh pemasaran secara digital, harga, dan promosi summer sale di platform steam pada terhadap keputusan pembelian steam e-wallet. *Prosiding: Ekonomi dan Bisnis*, *2*(2).

Pasau, B., Antara, M., Damayanti, L. & A. M. (2015). Analisis pendapatan dan kelayakan usaha keripik ubikayu pada industri Pundi Masdi kota Palu. *J. Agrotekbis*, *3*(3), 402-408.

Ramadhan, R. W. & Setyowati, L. (2023). Analisis perhitungan harga pokok dan harga jual pada UD. Barokah Kesamben. *Jurnal Riset Ilmu Manajemen dan Kewirausahaan*, *1*(4), 278–294. https://doi.org/10.61132/maeswara.v1i4.109

Retno, R. S., Pujiati, P., & Utami, S. Pelatihan pembuatan virgin coconut oil (VCO) secara fermentasi di Desa Belotan, Bendo, Magetan. *Jurnal Terapan Abdimas*, *1*(1). http://doi.org/10.25273/jta.v1i1.340

Rindengan, B. & Novarianto, H. (2004). *Minyak Kelapa Murni: Pembuatan dan Pemanfatannya.* Penebar Swadaya, Jakarta.

Ristianingrum, A., Chozin, M. A., Machfud, M., Sugiyanta, S., & Mulatsih, S. (2016). Optimalisasi keberlanjutan pengembangan usaha padi organik di Kabupaten Cianjur, Jawa Barat. *Jurnal Manajemen dan Agribisnis*, *13*(1), 37–49. https://doi.org/10.17358/jma.13.1.37

Safitri, N. D., Ilmi, Z., & Kadafi, M. A. (2018). Analisis perancangan tataletak fasilitas produksi menggunakan metode activity relationship chart (ARC). *Jurnal Manajemen*, *9*(1), 38–47.

Soejarwo, P. A., Yusuf, R., Zulham, A. (2019). Analisis keberlanjutan usaha budi daya rumput laut di Sumba Timur, Nusa Tenggara Timur. *J. Sosek KP*, *14*(1), 37-46.

Syarifuddin, H., Andayani, J., & Novianti, S. (2016). Analisis karakteristik keberlanjutan Mentok Rimba (*Cairina scutulata*) di Taman Nasional Berbak Jambi. *Jurnal Ilmu-Ilmu Peternakan*, *19*(2): 83–94. https://doi.org/10.22437/jiiip.v19i2.4507

Wahyudin, I., Kamal, M. M., Fahrudin, A., & Boer, M. (2019). Analisis keberlanjutan perikanan Elasmobranch di

Tanjung Luar Kabupaten Lombok Timur. *Jurnal Ilmu dan Teknologi Kelautan Tropis*, *11*(1), 103–116. https://doi.org/10.29244/jitkt.v11i1.23412

Wigiani, D. P., Widigdo, B., Soewardi, K., & Taryono. (2019). Status Keberlanjutan Kawasan Pesisir Berbasis Budidaya Udang Vaname Di Kecamatan Indramayu. *JFMR-Journal of Fisheries and Marine Research*, *3*(2), 145–146. https://doi.org/10.21776/ub.jfmr.2019.003.02.3