



## 1. INTRODUCTION

Coconut commodity has a strategic value because it has an important role in the economy, society and culture of the Indonesian people. Coconut plants have great benefits that are often called multipurpose plants, the benefits are not only in the fruit which can be processed into coconut milk, copra and coconut oil (coconut oil), but also all parts of the plant including coco fibre and powder (coco fibre). coco peat.

According to the Ministry of Industry, Indonesia is the largest coconut producing country in the world above the Philippines, India, Sri Lanka and Brazil. The area of coconut trees reaches 3.65 million ha or 14.58% of the 25.05 million ha total plantation area in Indonesia, with a total production of 2.87 million tons. Meanwhile, based on data from the Asian and Pacific Coconut Community (2018), the number of farmers involved in coconut agribusiness is 5.09 million households. BPS data in 2017 showed that the export value of coconut fruit was US\$ 121.9 million, while the export value of coconut derivative products reached US\$ 1.2 billion consisting of coco fibre, copra, desiccated coconut, coconut cream, coconut shell, charcoal and coconut activated carbon.

Coconut husk is the skin from coconut fruit that has not been used optimally. Coconut coir is produced by farmers or coconut processing industries as waste. Many coconut farmers burn or dispose of coconut husks, resulting in piles of solid and liquid waste that cause odours and pollute the environment. On average every 8 coconuts can produce 1 kg of coconut coir. If the production of coconut fruit in Indonesia is 15 billion grains, then the total production of coconut coir is 1.875 billion kg or about 1.875 million tons of coconut coir per year. From the data above, the potential of coconut fibre to be used as a product that has a very large added value. These products include hardboard, paper and textile materials. Coconut coir in world trade is known as coco fibre. The actors in the supply chain of the coconut coir processing industry consist of coconut producing farmers, collectors, coconut fruit processing industries, coconut coir processing

industries, and consumers. Each actor has different interests. One of the interests that cause conflict in the supply chain of the coconut coir processing industry is added value. From the supplier side, they want the highest possible price, while from the customer side they want the lowest possible price. Actors who have a stronger bargaining position will dominate this price conflict. If this conflict is not controlled, both business actors will both lose, because their business cannot be sustainable. Because if the customer buys it at a low price, the supplier does not get a profit so that the supplier's business cannot be sustainable which in the end stops supplying. This condition will affect the continuity of supply to the customer which in the end the customer also cannot continue his business. For this reason, it is necessary to supply chain management or supply chain management that is mutually beneficial between suppliers and producers so that their business can be continuous and sustainable. One of the important activities in supply chain management is financial affairs.

Value added is the added value of a commodity due to the treatment given to the commodity in question. Calculation of added value in processing can be done by various methods, one of which is the Hayami method. The Hayami method explains the added value obtained from all the factors of production used. The success of the business needs to be known by analyzing its financial feasibility to find out whether the business is profitable or not (Tiwas et al, 2015). This study aims to produce a sustainable value-added model of the coconut coir processing industry with a systems approach. The model is designed by integrating the model base, database and interface subsystem into a single decision support system.

## 2. RESEARCH METHODS

The development of the coconut fibre processing industry requires a systems approach that is characterized by searching for elements and relationships between elements to obtain good solutions and making quantitative models to support rational decision making. The most important system elements in the development

of the coir processing industry are the suppliers of raw materials for coco coir and producers of coco fibre processing and the relationships between them. Because this relationship is very important to maintain its survival, these two elements must be mutually supportive and mutually beneficial. In order to ensure that the relationship between the two elements of business actors is mutually beneficial, it is necessary to develop a financial relationship model that can predict the level of business feasibility and a mutually beneficial price level.

Based on the framework, the research implementation went through the stages (1)

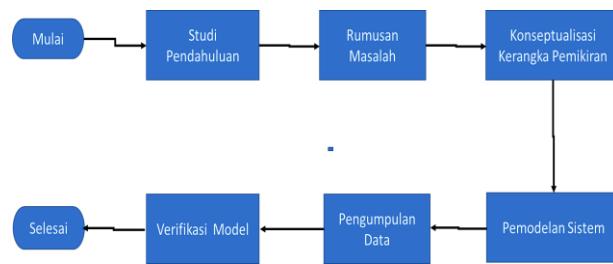


Figure 1. Research Methodology for the Coconut Coir Processing Industry

### 3. RESULT AND DISCUSSION

In line with the dynamics of the environment that is always changing with time, the sustainable financial feasibility model of the coconut coir processing industry is designed in the form of a computer-based decision support system software called DSS Coconut Coir. Coconut Coir SPK is intended to assist users in interactive decision-making

#### 3.1. Coconut Coir Processing Factory Business

This model is designed with the aim of assisting users in analyzing the feasibility and risks of the sustainable financial feasibility of the coconut coir processing industry. The sustainable financial feasibility model for the coconut coir processing industry is focused on analyzing the feasibility of processing coconut coir into coco fibre.

The business feasibility model of the Coconut Coir Processing Plant is designed with the aim of assisting users in analyzing the feasibility and risks of the Coir Coir Processing Plant. Input data in this model is divided into two groups, namely from the database stored in the data file of the cost structure of the refining business and input

Identification of system elements for the development of the coconut coir processing industry, (2) Modeling of inter-industry linkage systems, (3) Data collection, and (4) Designing computer-based decision support systems.

Identification of the elements of the development system is intended to obtain the important elements of the system used for designing the coconut industry development model. System modeling is used to formulate the relationship between inputs and outputs and predict possible outcomes. Data collection is intended to verify and validate the model.

processes with the aim of making decisions more quickly and accurately, in the event of environmental changes.

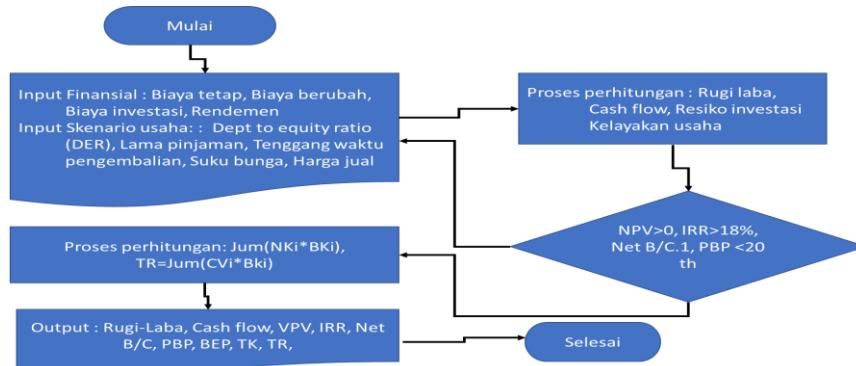
Coconut Coir SPK is designed with Microsoft Visual Basic Version 6.0 programming language. It consists of three main components, namely a model base management system, a database management system, and a dialogue management system

data directly from the user. The calculation process uses the formulation of feasibility criteria and business risk. Input scenarios include business scale, price, interest rate, and DER (comparison of debt with own funds).

The output of the model is the income statement, cash flow and the value of business feasibility criteria which include NPV, IRR, Net B/C, PBP, BEP and profit. A business is declared feasible if: NPV 0, IRR 18%, Net B/C 1, PBP 20 years, and profit 0. The level of eligibility (TK) is determined based on the number of values of the  $i$  criteria ( $NK_i$ ) times the weight of the criteria  $i$  ( $BK_i$ ). If  $0.0 \leq TK \leq 0.5$  the business is quite feasible;  $0.5 < TK \leq 0.8$  decent business; and  $TK \geq 0.8$  effort is very

feasible. Business risk is determined based on the coefficient of variation. The level of risk (TR) is the sum of the coefficients of variation of the  $i$ th criterion ( $CV_i$ ) times the weight of the  $i$ th criterion ( $BKi$ ). TR is stated if:  $TR < 0.5$  low

risk business;  $0.5 \leq TR < 0.8$  moderate risk; and  $TR \geq 0.8$  high risk. The flow chart of the sub-model of the business feasibility of a coconut coir processing plant is presented in the following figure.



**Figure 2.** Flowchart of the Feasibility Model of a Coconut Coir Processing Factory

In line with the dynamics of the environment that is always changing with time, the Coconut Coir Processing Factory Model is designed in the form of a computer-based decision support system (SPK) software called the Coconut Coir Industry Model. SPK-Coir Industry Model is intended to assist users in interactive decision-making processes to make decisions more quickly and accurately, in the event of environmental changes.

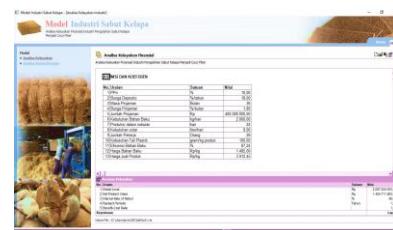
The results of the design of the SPK-Coconut Coir Industry Model consist of three main components, namely the model base management system, the database management system, and the dialogue management system. The front view of the SPK-Coconut Coir Industry Model is presented in Figure 3.



**Figure 3.** Front view of the Decision Support System for the Coconut Coir Processing Industry

Assumptions of technical parameters and prices used to determine business feasibility

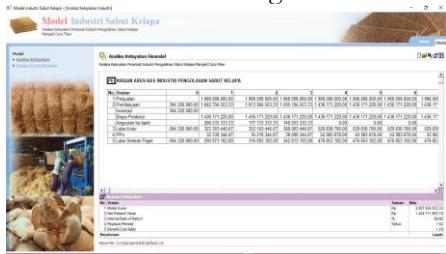
based on the results of a literature review are stated in default conditions. The assumption value can be changed interactively which includes: Source of funds from Conventional Banks with an interest rate of 18%. The loan period is 5 years with a repayment grace period of 1 year. 50% own investment capital and 50% loan capital ( $DER = 50 : 50$ ). The life of the industrial project is 20 years. 35% tax rate. The input data assumptions for the value of the other coconut coir processing plant business parameters are listed as shown in Figure 4 below.



**Figure 4.** Assumption of Input Data Value of Processing Factory Business Parameters Coconut Coir

Based on the assumption of input data on the value of the coconut coir processing plant business parameter, the estimated profit and loss and cash flow estimates are obtained. The assumed parameter coefficient for the factory business, in addition to the general assumptions

above, is the price of coconut coir raw materials of Rp. 1,485, land rent Rp. 16,500,000 and machine maintenance Rp. 6,600,000. The results of the profit and loss estimates and cash flow estimates are as shown in Figure 5 below.



**Figure 5.** Results of Profit and Loss Estimates and Cash Flow

Based on the cash flow calculation in Figure 5, it can be seen that the NPV is positive, namely 1,424,711,903, the IRR is greater than the loan interest rate (18%) which is 90.66, the Payback Period (PBP) is shorter than the project life (20 years) which is 1,52 yrs.; B/C is greater than 1 (one) namely 1.19; The results of the analysis show that the coconut coir processing factory is feasible. The sustainable value-added model is a mathematical model to find a price balance between the selling price of coconut coir raw materials and the selling price of coco fibre to share proportional profits to ensure a sustainable business. Model. The profit distributed is in the form of a percentage of the excess benefit-cost ratio (B/C) after the coir processing industry gets a break-even point position. The model will find the maximum purchase price of coco fibre and the minimum selling price of coco fibre with a limit of  $B/C = 1 + \text{share}(\%) \times (B/C - 1)$  so that the equilibrium price is obtained. This model can find the equilibrium price with changes in the selling price of coconut coir and coco fibre prices interactively to accommodate the dynamics of price changes.

Verification of the model based on the assumption of input data parameter values from coconut plantations and coconut coir processing factories produces a balanced price between the selling price of coco fibre and the purchase price of coco coir raw materials. At the selling price of coco fibre Rp.3.630/kg, the balance of the selling price of coco fibre is reached at Rp. 1.542/kg. The continuous value-added search process is shown in Figure 6 below.



**Figure 6.** Continuous Value Added Search Model

## 4. Conclusions and Suggestions

### 4.1. Conclusion

1. The Model of Sustainable Value Added Coconut Coir Processing Industry which is designed is called the Coconut Coir Industry Model. The model is designed in the form of computer-based Decision Support System software.
2. The Decision Support System is designed using an interactive dialogue system to accommodate the dynamics of changes in the value of business variables in predicting the level of the financial feasibility of a coconut fibre processing factory.
3. The business financial feasibility model obtained is a predictive model for business financial feasibility analysis and planning through the criteria of NPV, IRR, PBP, BCR with various scenarios of price changes, interest rates, and production scales.
4. The business balance model obtained is a predictive model that can be used to analyze the level of price gaps to plan a price level that will provide proportional benefits between coco coir business actors and coconut coir processing factories to produce a sustainable business.
5. Based on the results of model verification with input using the assumption of parameter values, it shows that the coconut fibre processing industry is feasible.

### 3.2. Suggestion

Further research that ensures the continuity of raw coco coir supply in the coco coir processing industry.

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