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Financial Feasibility of Cocoa Farming in Andomesinggo Village Besulutu Sub-District of Konawe District

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Abstract

This study aimed to determine the financial feasibility of cocoa farming in Andomesinggo Village Besulutu Sub-district Konawe District. Sampling method was Stratified Random Sampling. The financial analysis criteria used were Net Present Value, Net Benefit Cost Ratio, Internal Rate of Return, Pay Back Period, and Sensitivity Analysis. The results showed that cocoa farming in Andomesinggo village was financially feasible to be cultivated. Based on the result of the investment feasibility assessment at 18% DF, it was obtained that NPV was Rp 20,500,335, NBCR of 3.59%, IRR of 55.42% and PBP value of 4.54 which identified that the cocoa farming in Andomesinggo village returned the investment in the early of fifth year. Based on sensitivity analysis, the condition of cocoa farming is still feasible to be cultivated even though fertilizer price was up to 15%, cocoa price decreased to 10%, cocoa production decreased to 20%.

Keywords: Finansial Feasibility, NPV, NBCR, IRR, PBP, Sensitivity Analysis, Cocoa

A. Background

Indonesia's agricultural economy policy stipulated in the National Development Program states that agricultural activities including food crops, plantation crops, fisheries, livestock and forestry are directed to the development of advanced agriculture, efficiency and resilience. Agricultural development aims to improve yields and quality of production, to increase income and livelihood of farmers, to expand employment and business opportunities, to support industrial activities and increase export commodities.

One of the export commodities developed by the government is cocoa commodity. This plant is an export commodity that is widely needed by the industrial countries that perform processing of cocoa products such as cocoa powder and chocolate ready for consumption. In Southeast Sulawesi, the plantation sub-sector is one of the sources of farmers' livelihoods in order to increase income and meet family welfare and provide sufficient input to state and local revenue. Cocoa plant is one of the prima donna (prime) plants in Southeast Sulawesi other than coconut, pepper, cotton, coffee, and cloves.

Konawe District has a plantation crop area of 56,416 ha consists of several types of plant. Development of cocoa production is increasing during the last five years. Besulutu Sub-district is one of the potential areas for the development of plantation sub-sector, particularly cocoa. This is supported by climate factor and its human resources, where the area of planting of cocoa plant is 2.175 ha with production reaches 308.2 ton with the number of farmer is 1.344 head of family from 7.732 residents (BPS, 2015). Based on the description above, cocoa commodity is placed as the most cultivated plantation in Besulutu Sub-district, with contribution of planting area of 13.77% and 4.97% for production sector.

The cocoa plant which is developed in Besulutu Sub-district, particularly in Andomesinggo Village belongs to smallholder plantation, which is one of the important sources of farmers' income in their efforts to improve their livelihoods, in which the farming is a long-term business that requires large capital or investment in its exploitation and operational costs in its management. Therefore, farmers are required to have sufficient knowledge and skills on cocoa farming. The problems faced by farmers are no less important is the issue of capital, pests and plant diseases that affect the decline in production and quality of cocoa, thus affecting the income level of farmers. If it is prolonged, it will affect the financial feasibility of cocoa farming.

Based on the previous description, the objective to be achieved in the research is to know the financial feasibility of cocoa farming in Andomesinggo Village Besulutu Sub-district Konawe District.

B. Method

1. Sample Determination Technique

Based on the survey, the number of farmers in Andomesinggo village were 238 cocoa farmers, divided into 13 stratum based on age of plantation. Each respondent representing the age stratum of the plant was chosen randomly as many as four respondents, thus the total respondents in this study were 52 respondents.

2. Data Analysis

Financial feasibility in cocoa farming can be determined by using this following method:

a. Net Present Method (NPV) is used to determine the present value of net revenue obtained from an investment activity, formulated as follows:

$$NPV = \sum_{t=0}^{n} \frac{Bt - Ct}{(1+i)^2}$$

Where:

Bt = Total of income measured in rupiah per year.
Ct = Total cost measured in rupiah per year.
I = Discount factor from interest rate (%)
n = Age of cocoa
t = Year of Investment

Criteria:

- If NPV is positive (+), then cocoa farming is profitable and feasible to be developed
- If NPV is negative (-), then cocoa farming is unprofitable and unfeasible to be developed

b. The NBCR (Net Benefit Cost Ratio) method is the ratio between positive NPV and negative NPV, formulated as follows:

$$NBCR = \frac{\sum_{t=0}^{n} \frac{Bt - Ct}{(1-i)^t} \text{ [for } Bt - Ct > 0\text{]positive}}{\frac{Bt - Ct}{(1-i)^t} \text{ [for } Bt - Ct < 0\text{]negative}}$$

Or NBCR is :

$$NBCR = \frac{NPV^+}{NPV^-}$$

Where:

NBCR = Net Benefit Cost Ratio (Rp)
NPV^+ = Positive NPV (Rp)
NPV^- = Negative NPV (Rp)

Criteria:

NBCR > 1: Cocoa farming is feasible to be developed
NBCR = 1: Cocoa farming is not profitable and not harmful
NBCR <1: Cocoa farming is not feasible to be developed

c. The Internal Rate of Return (IRR) method, which is used to determine the interest rate to be the present value of net revenue is equal to the present value of capital expenditure or NPV = 0, formulated as:

$$IRR = Df^{+} + \frac{NPV^{+}}{NPV^{+} - NPV^{-}} (Df^{-} - Df^{+})$$

Where:
Df = Discount factor (%)
Df^{-} = Discount factor which results NPV^{-} (%)
Df^{+} = Discount factor which results NPV^{+} (%)
IRR = Internal rate of Return of Farming Cacao (%)
Criteria:
- If the IRR is greater than the prevailing interest rate, then the cocoa farming is able to return the services of a number of invested capital and gain the profit
- If the IRR is equal to the applicable interest rate that the cocoa farming is able to return the services of a certain amount of invested capital but no profit
- If the IRR is less than the prevailing interest rate, the cocoa can not afford to return the services of a certain amount of invested capital and incur losses

d. Pay Back Period (PBP)
Payback Period (PBP) is used to find out how long cocoa farming that is cultivated can return the invested capital. It is formulated as follows:

$$PBP = T_{p-1} + \frac{\sum_{i=1} I_i - \sum_{i=1} B_{icp-1}}{Bp}$$

Where:
PBP = Pay Back Period (year)
T_{p-1} = Previous year before PBP (year)
I_I = Amount of investment that has been discounted (Rp)
B_p = Amount of benefit at the Pay Back Period (Rp)
B_{icp-1} = Amount of benefit that has been discounted before the Pay Back Period (Rp)

e. Sensitivity Analysis
Sensitivity analysis is used to determine the sensitivity of cocoa farming to the variable changes. The observed variables are the changes in the price of urea fertilizer, cocoa price, and cocoa production. If the three conditions occur simultaneously, it can be formulated as follows:
- Fertilizer price increases by 15% obtained based on facts the field that it has increased by 15% or even exceed of 15%.
- Cocoa price decreases by 10% obtained based in the field that it tends to decrease at level of 10%.
- Cocoa production decreases by 20% obtained based on facts in the field that it is caused by pests and plant diseases.
- If the three conditions above occur simultaneously.

C. Results and Discussion

1. Analisis of Net Present Value (NPV)

The NVP data of cocoa farming used were the data about benefit and cost in year of 0 to year of 12. Based on the calculation of NPV, it showed that the present net value (NPV) at discount factor (Df) of 18% was Rp 20,500,335 until the cocoa farming runs for 12 years. This figure shows that cocoa farming is financially feasible, because the NPV obtained is positive or greater than zero.

The production result is relatively variable from year of 0 to year of 12. In marketing the production results, farmers generally sell the dried cocoa beans to merchants. This is due to the lack of adequate infrastructure in Andomesinggo Village for direct sale to interinsuler traders or exporters at the provincial level.

2. Analysis of Net Benefit Cost Ratio (NBCR)

NBCR is the ratio between positive NPV and negative NPV. Net Benefit Cost Ratio is used to find out the comparison between current benefit value and current cost value at the prevailing interest rate of 18%. Based on the analysis result at the discount factor of 18%, it was obtained NBCR = 3.59 which means that cocoa farming is feasible to be developed because the value obtained is bigger than 1. The NBCR values showed that cost incurred of Rp. 1 will result in net profit of Rp 3.59.

3. Analysis of Internal Rate of Return (IRR)

The result of analysis obtained by Internal Rate of Return (IRR) value that was 55,42%. This shows that cocoa farming will be able to survive until the interest rate is valid until 55.42%. Thus, based on the criteria of IRR, cacao farming in Andomesinggo village is feasible to be developed because the rate of return on capital obtained is higher than the prevailing interest rate of 18%. By looking at the value of IRR obtained, the banks can consider the distribution of agricultural credit to cocoa farmers in Andomesinggo Village Besulutu Sub-district Konawe District.

4. Analysis of Pay Back Period (PBP)

PBP is used to find out how long this cocoa farm can return the investment. In the PBP analysis, the value obtained was 4.54. This indicates investment in the early of the fifth year. According to Ibrahim (2003), a rapid return of investment costs will affect to the more smoothly turnover of capital and more easily in the replacement of new assets.

5. Sensitivity Analysis

The most important thing in the sensitivity analysis is to know the principal parameters and select the fair values as the boundary value in the sensitivity analysis (Gray, *et al*., 1997). The sensitivity analysis used in this study was to increase the price of fertilizer by 15%, to reduce the price of cocoa by 10% with other assumptions fixed and the decrease of production as much as 20% with other assumptions fixed as well as if three conditions occur simultaneously (fertilizer price increased by 15%, Cocoa price decreased by 10% and production decreased by 20%). Figures of 15% of sensitivity analysis showed that the price of urea fertilizer increased and even exceed 15%.

The figure of 10% of the sensitivity analysis showed that if cocoa price decreased by 10%. Based on the fact in the field, it is known that the cocoa price has decreased by 10%, however, the cocoa price decreased from Rp. 20,800 to Rp. 19,500 to Rp. 18,000. The figure of 20% of the sensitivity analysis showed that production of cocoa decreased y 20%. This may be caused by disease attack. Result of analysis showed that urea fertilizer price increased by 15% as presented in Table 1.

Table 1. Result of Sensitivity Analysis of Cocoa Farming in Andomesinggo Village by Increasing Fertilizer Price of 15% can be seen in the Table 1.

Investment Criteria	Value	Predicate
NPV	Rp 20,297,923	Feasible
NBCR	3,50	Feasible
IRR	5,79 %	Feasible

Table 1 shows that at a discount factor of 18%, it was obtained NPV of Rp. 20,297,923. This means that cocoa farming is profitable and financially feasible because the NPV value is more than 0. The value of NBCR obtained was 3.50 and it shows that the cost incurred of Rp. 1 will result in net revenue of Rp. 3.50 as well as it is to be developed because the value of NBCR is more than 1. The value of IRR obtained was 55.79%, this means that the rate of return on capital invested in cocoa farming is very large although the cost of production is increased to 15% of the prevailing interest rate by 18%. Sensitivity analysis on cocoa farming by reducing the price of cocoa by 10% can be seen in Table 2.

Table 2. Result of Sensitivity Analysis of Cocoa Farming in Andomesinggo Village by Decreasing Cocoa Production of 15% can be seen in the Table 2.

Investment Criteria	Value	Predicate
NPV	Rp. 17,659,505	Feasible
NBCR	3.23	Feasible
IRR	57.09 %	Feasible

Table 2 shows that at a discount factor of 18%, it was obtained NPV of Rp. 17,659,505. This means that cocoa farming is feasible to be developed because the value is NPV > 0. The NBCR value obtained was 3,23 which indicates that cost incurred of Rp. 1 will result in net revenue of Rp. 3.23 and IRR value obtained was 57,09%. This means that cocoa farming is feasible to be developed because the IRR value > prevailing interest rate that was 18%. Sensitivity analysis on cocoa farming by reducing cocoa production of 20% can be seen in Table 3.

Table 3. Result of Sensitivity Analysis of Cocoa Farming in Andomesinggo Village by Decreasing Cocoa Production of 20% can be seen in the Table 3.

Investment Criteria	Value	Predicate
NPV	Rp. 14,818.675	Feasible
NBCR	2.87	Feasible
IRR	59.41 %	Feasible

Table 3 shows that at a discount factor of 18%, it was obtained NPV value of Rp 14,818,675. This means that cocoa farming is feasible to be developed because NPV value is > 0. The NBCR value obtained was 2.87 which suggested that IRR value is greater than prevailing interest rate that was 18%. Sensitivity analysis on cocoa farming by increasing fertilizer price of 15%, reducing the cocoa price of 10%, and decreasing cocoa production by 20%. The details can be seen in Table 4.

Table 4. Result of Sensitivity Analysis of Farming Farming in Andomesinggo Village by Increasing the Price of Urea Fertilizer of 15% can be seen in the Table 4.

Investment Criteria	Value	Predicate
NPV	Rp. 12,343,601	Feasible
NBCR	2.52	Feasible
IRR	62.74 %	Feasible

Table 4 shows that cocoa farming is still financially feasible if there is an increase of 15% in urea fertilizer price, a decrease of 10% in cocoa price and a decrease of 20% in cocoa production. This is because the NPV value obtained was Rp. 12,343,601, in which this value is greater than 0 (NPV> 0). The NBCR value obtained was 2.52 which suggested that NBCR value is greater 1. This indicates that a cost incurred of Rp. 1 by farmers will result in net income of Rp 2.52, thus, the farmers gain a profit of Rp 1.52.

The IRR value obtained was 62.74%, which indicates that the IRR value obtained is greater than the prevailing bank interest rate (IRR > 18%), thus, with the increase of 15% in production cost that occurs in the price increase of urea fertilizer and followed by the decrease of cocoa price by 10% and the production decrease by 20%, then the farmers can still return the capital invested at the prevailing bank interest rate that was 18%. Thus, cocoa farming gains profit.

D. Conclusion

Based on the result analysis of financial feasibility of cocoa farming, it can be concluded that:

1. Finansially, cocoa farming in Andomesinggo Village Besulutu Sub-district of Konawe District is feasible.
2. Amount of Investment of cocoa farming in Andomesinggo Village Besulutu Sub-district of Konawe District is approximately Rp. 4,645,000, in which the return rate of investment occurs in the early of the fifth year.
3. The increase of the price of urea fertilizer is 15%, the decrease of cocoa price is 10%, the decrease of cocoa production of 10% and simultaneously, urea fertilizer price decreases by 15%, cocoa price decreases by 10%, and cocoa production decreases by 20%, this indicates that cocoa farming is feasible to be developed because it is influenced by high production and price.

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