

## Feasibility Study of Coffee Monoculture Farming and Jackfruit Intercropping In Emera District of East Timor

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**Abstract:** This study aims to: 1) describe the pattern of coffee planting conducted by farmers in the research area; 2) evaluate the feasibility level of coffee monoculture and jackfruit seedlings based on NPV, IRR, Net B / C and payback period and 3) analyze the sensitivity of coffee monoculture farming and intercropping of jackfruit to changes in production costs and changes in production prices. The result of the research shows that: (1) the community in the research area which the majority of the people are farmers certainly expects the central and local government to be able play a role in the framework of fostering to increase knowledge and expertise of the community about coffee farming management. (2) The average production cost of the coffee monoculture system is US \$ 592.45 and the production cost of intercropping of jackfruit is US \$ 620.25 ha / year; reception of coffee monoculture farming is the average of US \$ 1311.49 and the average of intercropping farms is US \$ 1243.06 ha / year; the average income earned by monoculture farmers is US \$ 719.04 ha / year; and the average income earned by jackfruit farmers is US \$ 622.81 ha / year. With the bank interest rate of 12%, it is possible to develop a coffee monoculture and intercropping system, with a NPV value of US \$ 2781.73, and NPV of US \$ 2298.02, IRR of 30% and 29%; Net B / C of 3.79 and 3:00; payback period of monoculture farming of coffee for four years should be developed as a shorter payback period and the intercropping farming for 11 years and 3 months is not worth developing, because the payback period is longer, therefore the project was rejected. (3) the comparison of sensitivity analysis with the 65% increase of production costs resulted in change of NPV value of US \$ -57.51; and US \$ -343.93, IRR of 11% and 5%; Net B / C of 0.96 and 0.85; and payback period -1.12 and -0.91, it shows that the business is not worth developing. With the decrease in the production price, 40% of coffee monoculture and intercropping systems are not feasible to develop, with an NPV value of US \$ -78.19 and US \$ -258.77; IRR of 10% and by 3%; Net B / C of 0.91 and 0.82; and payback period from -1.47 years and -1.81 years. These results indicate that coffee monoculture and jackfruit intercropping systems are feasible if production costs fall by 60% and production prices fall by 35%.

**Keywords:** Coffee monoculture, jackfruit intercropping, cost, revenue, income, financial feasibility, sensitivity analysis

### INTRODUCTION

Coffee farming activity is a commodity that provides income to the community or the family on daily basis based on revenues of the product, especially for the coffee farming community. Since the Portuguese colonialism era, coffee commodity is still considered as a valuable economic commodity and is able to provide benefits for the farmers. As a main commodity that provides income for farmers, it is necessary for the farmers to keep up with modern agribusiness by replacing the traditional methods with the modern ones. The farmers are expected to provide great products and benefits to the community, especially those who are experts in coffee farming.

The Timorese government has a target to increase production and the quality of the coffee to become the major producer of coffee of the world and to give contributions for foreign exchange. Through the ministry of agriculture and fisheries, the government will provide assistance to coffee farmers in the form of subsidies to increase the production and quality of the coffee commodity in East Timor, especially in the district of Ermera. Government's coffee farming programs in Ermera aim to improve coffee cultivation, production and quality by removing coffee plants that are not productive.

Coffee farming should be done in a modern way so that it could generate revenue for the farmers. It

can also increase farmers' and national income, because the agriculture and plantation sector has been able to contribute 1-3% to national income each year (the coffee sector).

Based on the data from the plantation director of East Timor [1], there are 3 regional commodities that have been funded with the Regional Revenue and Expenditure Budget in 13 districts. One of them is the commodity of coffee. Coffee commodity is a commodity which its cultivation and land development is still very limited. It is proved by the lack of coffee development in some districts in East Timor, like Ermera, Ainaro, Manufahi, Aileu, Likisa and Bobonaro. Coffee is one of the most popular commodities in the district of Ermera, Ainaro, Manufahi, Aileu, Likisa and Bobonaro. Ermera is the central of coffee production in East Timor, but the coffee production in Ermera has decreased significantly for the last few years. It mainly happens due to the age of the plants, which cause the decline of productivity. Therefore, rejuvenation on coffee farming needs to be done because there a lot of farmers who decided to give up on their lands due to the large amount of business capital needed to develop their business. This program is one of the government's goal to regain the title of Ermera district as the central of coffee production in East Timor. Nowadays, coffee is cultivated using two cropping patterns: coffee monoculture and jackfruit intercropping which are still low in terms of production and quality. The decline in coffee production is mainly caused by expansion of jackfruit intercropping.

This study mainly focuses on financial analysis to determine whether the role of existing regional potential is able to improve the regional economy or not. The financial feasibility analysis needs to be done considering it can be used as reference in decision making by seeing the feasibility of the coffee monoculture farming and jackfruit intercropping to be developed. The purpose of this study is to analyze the cost of coffee production and farm income, to evaluate the financial feasibility of coffee monoculture farming and jackfruit intercropping, and to analyze the sensitivity of the coffee monoculture farming and jackfruit intercropping with changes in production cost and production price.

#### **RESEARCH METHODOLOGY**

Coffee farmers in the district of Railaco, Ermera do the coffee monoculture farming and jackfruit intercropping using their optimal resources to obtain the highest income possible. However, there are constraints in farming; some of them are the limited innovations and technology; limited venture capital; the risk of crop failure due to the long drought that causes flowers and small coffee crops to fall; as well as marketing issues. Whereas, as a competitive commodity from Ermera, coffee farming has a potential for development and the market opportunities are quite big, the availability of

sufficient land supported by the climate and good soil condition is very great for coffee farming.

Coffee farming development can be done by improving the technical aspects of farming (aquaculture) through the application of technology, and extending the scale of farming. It certainly requires a large capital so it needs investments. To attract farmers or investors that are willing to invest, they need the information about the feasibility of coffee monoculture farming and intercropping jackfruit itself. According to Gray [2], to determine how far a project can be beneficial, a study of the project needs to be done. The purpose of the study is to determine the level of benefits that can be achieved through investment in the project, to avoid the waste of resources, to conduct an assessment of the investment opportunities that exist, and to determine the investment priorities. The calculation of NPV is the most practical way to determine whether the project is profitable or not. Another criterion is the IRR and Net B / C. IRR (Internal Rate of Return) is the rate of profit on the net investment in a project based on any net benefits that had been realized (each Bt-Ct are positive) and automatically used again in the following year. The profits are equal and the interests for the rest of the project are given. While Net B / C is the ratio of which the numerator consists of the present value from the total net costs in the years which Bt-Ct is negative, i.e. gross cost over gross benefit [3].

In addition to the calculation of investment criteria, the analysis of payback period also need to be done. This method attempts to measure how fast an investment can return the capital. If the payback period is shorter than the requirement, then the project is profitable. However, if the payback period is longer, then the project is rejected [4]. A sensitivity analysis scale can explain whether a farm is able to withstand a variety of adverse changes, such as the decrease in production, an increase in the cost of coffee production, and the decrease in commodity prices of coffee. The level of investment is adjusted to the conditions of farming in the area and research and information from farmers about changes in input prices, output prices and yields. The results of a financial analysis will show whether the coffee monoculture farming and jackfruit intercropping is feasible or infeasible to develop. This information is useful for farmers and investors who are interested to develop or invest in coffee monoculture farming and jackfruit intercropping. The investment in farm development business is expected to ultimately increase the amount of coffee production and the farmers' profits as well as the investors themselves.

This research was conducted in the district of Ermera, precisely in the Village District of Railaco Liho. The research location is determined intentionally (*purposive*) based on the potential of specific agri-business characteristics in the areas using the

descriptive, analytical and comparative method [5] by quota sampling [6].

Data analysis performed in this study is based on the qualitative and quantitative approaches. Qualitative analysis is used to describe (description) a situation or phenomenon systematically based on real conditions in the field. In this research, the descriptive analysis is done by observing the coffee monoculture farming activities and jackfruit inter-cropping farmers.

Quantitative analysis is used for data in the form of numbers, making it easier to do the inference process from the research objectives.

### Cash Flow Analysis

Cash flow analysis is an overview of the costs and revenues of the coffee monoculture farming and jackfruit intercropping which can calculate all revenues and expenses during the production process.

### Production Costs

Production costs are all costs incurred by the coffee monoculture and jackfruit intercropping farmer during the production process

$$TC = TFC + TVC$$

Description:

TC = Total Cost

TFC = Total Fixed Cost

TVC = Total Variabel Cost

The calculation of production costs in the farming based on the type of input:

$$TC = \sum_{i=1}^n X_i \cdot P_{xi}$$

Description:

TC = Total cost incurred for coffee and jackfruit cultivation for 20 years

$X_i$  = Number of physical *inputs* needed in the coffee monoculture farming and jackfruit intercropping

$P_{xi}$  = Input prices

### Farming Income

The calculation of farming income can be formulated as follows:

$$TR = P \times Q$$

Description:

TR = Total Revenue

P = Price (Coffee and jackfruit prices in US \$ / kg / fruit)

Q = *Quantity* (Amount of production)

### Farming Revenue

Farming Revenue can also be referred as farming profits, it's the difference between the total revenue with costs during the production process. The formula is:

$$\pi = TR - TC$$

Description:

$\pi$  = Farming revenue or profits

TR = *Total Revenue*

TC = *Total cost*

### Financial Feasibility Analysis

The feasibility effort is analyzed financially using feasibility test, according to Soertriono (2003), it consists of four criteria:

1. NPV (Net Present Value), used to analyze the current value.

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

Description:

NPV : Present Value

Ct : Total cost at the n-th time (US \$)

Bt : Total benefit at the n-th time (US \$)

N : Time (years)

I : Interest rate (%)

2. Net B/C, used to analyze the feasibility

$$Net\ B/C = \frac{\sum_{t=0}^n \frac{B_t - C_t}{(1+i)^t} (Untuk\ B_t - C_t > 0)}{\sum_{t=0}^n \frac{B_t - C_t}{(1+i)^t} (Untuk\ B_t - C_t < 0)}$$

Description:

B<sub>t</sub> : *Benefit* or benefits at the time of the n-th  
 C<sub>t</sub> : *Cost* or cost at the time of the n  
 I : Interest rate  
 N : The n-th time  
 T : Time

3. IRR (Internal Rate of Return)

$$IRR = i_2 + \frac{NPV_2}{NPV_1 - NPV_2} x (i_2 - i_1)$$

Description:

IRR : *Internal rate of return* (%)  
 i<sub>1</sub> : *Discount rate* that results in a positive NPV (12%)  
 i<sub>2</sub> : *Discount rate* that results in a negative NPV (30%)  
 NPV<sub>1</sub> : Positive NPV (US \$)  
 NPV<sub>2</sub> : Negative NPV (US \$)

4. PP (Payback Period) used to calculate the payback period:

$$PP = \frac{Total\ Investment}{The\ average\ of\ Net\ Benefit\ per\ year}$$

### SENSITIVITY ANALYSIS

Sensitivity analysis is an analysis that is used to see what might happen from the analysis of farming if there is a fault or a basic change in the calculation of costs and benefits [7]. The purpose of sensitivity analysis is to determine things that might happen to the results of the analysis if there is an error or a change in the basic calculation.

### RESULTS AND DISCUSSIONS

The cost of coffee monoculture farming and jackfruit intercropping Coffee monoculture farming and

intercropping jackfruit covers all expenditure necessary to fund the coffee monoculture farming and jackfruit intercropping in the district of Railaco during the economic life of the plant, which is 20 years. In this study, this cost type is divided into two, the investment cost and the production costs.

The initial investment cost Investment is the use of resources for production that is expected to generate revenue in the future. The initial investment cost of coffee monoculture jackfruit intercropping in detail can be seen in Table 1 below:

**Table-1: The initial investment cost of coffee monoculture farming and jackfruit intercropping per hectare**

	Investment Type	Amount (unit)	Price / unit (US \$)	Total Investment (US \$)	Age (years old)	Depreciation (US \$)
1	I. Monoculture					
	Spades	4	5	20	10	2
	Hoe	4	5	20	5	4
	Hoe fork	4	5	20	5	4
	Ember	4	3.5	14	3	4.67
	Crowbar	2	5	10	3	3:33
	Coffee Peeling Machine	2	150	2.1503	10	30
	Machetes	4	3.5	14	4	3.5
	Tarpaulins	2	35	70	10	7
	Sacks	20	1	20	4	6.33
	Basket Fermentation	2	7	14	4	3.5
	1. Labor					
	Preparation of Land (10 days)	7 HOK		5350		
	Hole-Making Process (10 days)	7 HOK		5350		
	Planting (5 days)	3 HOK	5	75		
	Total			1277		63.66
2	II. Intercropping					
	Spades	4	5	20	10	2
	Hoe	4	5	20	5	4
	Hoe fork	4	5	20	5	4
	Ember	4	3.5	14	3	4.67
	Crowbar	2	5	10	3	3:33
	Coffee Peeling Machine	2	150	2.1503	10	30
	Machetes	4	3.5	14	4	3.5
	Tarpaulins	2	35	70	10	7
	Sacks	20	1	20	4	6.33
	Basket Fermentation	2	7	14	4	3.5
	2. Labor					
	Preparation of Land (10 days)	7 HOK		5350		
	Hole-Making Process (10 days)	7 HOK		5350		
	Planting (5 days)	3 HOK	5	75		
	Total			1277		63.66

Based on the data in Table 1, the total cost of the initial investment for the coffee monoculture farming and jackfruit intercropping in the district of Railaco, Ermera is US \$ 502.00. The biggest investment costs for the equipment is to purchase coffee peeling machine with the total of US \$ 300.00 and the cost to buy the tarp US \$ 70.00. Both of these tools are used to dry and grind the coffee later. In addition, the total cost of coffee monoculture farming and jackfruit intercropping including the depreciation cost of equipment is US \$ 63.66, and the labor cost is US \$ 775.00.

Revenues and income of coffee monoculture farming and jackfruit intercropping. The income of coffee monoculture farming and jackfruit intercropping is a multiplication of the number of coffee beans and jackfruit production (kg and fruit with coffee prices and jackfruit (US \$ / kg / fruit)) in the district of Railaco.

While the revenue is defined as the difference generated from the amount of revenue from the output reduced by the total cost issued in farming.

The income of coffee monoculture farming and jackfruit intercropping obtained in the first three years, but the results are not satisfying. Actually, the coffee plant can be harvested at the age of 2 years and 5 months, but the first harvest usually fails. This is due to their natural factors (droughts) and plant breeding.

The productivity of coffee monoculture farming tends to increase from year to year. Even over the age of 5 years, monoculture productivity can reach 6 kg / tree with proper care. While the productivity of intercropping increases slightly compared to monoculture from year to year. Above the age of 7 years of intercropping patterns, the intercropping productivity can reach 5 kg / tree with nutrients

competition. The productivity of coffee monoculture began to decline after the 17th year, and the most significant decline occurred at the age of 18 years. However, a decrease in productivity can be minimized by giving the optimal care for the coffee plant, a good breeding can extend the life of the plant economically. While the productivity of jackfruit intercropping began to decline after the 16th year, and the most significant decline occurred at the age of 17 years.

Farming income is obtained by multiplying the total production of coffee beans and jackfruit with the selling price. The coffee selling price for farmers is around US \$ 1.00 to US \$ 3.00. While the price of jackfruit ranges from US \$ 0.30 cents to US \$ 0:50 cent, equate to the quality of the crop. The amount of the annual revenue obtained by the farmers of coffee monoculture farming and jackfruit intercropping is shown in Table 2.

**Table-2: Revenue of coffee monoculture farming and jackfruit intercropping in the district of Railaco, Ermera (per hectare)**

Year	Coffee Mon		Jackfruit Int.		Net Benef. Mon and Intercrop	
	Ct (US\$)	Mon. Income US	Ct (US\$)	Int. Income (US\$)	Mon Benef. (US\$)	Net Int Ben.(US\$)
1	2	3	4	5	6=(3-2)	7=(5-4)
1	881	0	881	0	-881	-881
2	184	0	219	0	-184	-219
3	548	456	629	410	-92	-219
4	598	680	668	621.5	82	-46.5
5	618	720	643	672.3	102	29.3
6	588	1293.75	608	1264	705.75	656
7	588	1324.8	608	1300	736.8	692
8	588	1370.8	608	1386	782.8	778
9	598	1426	618	1434.5	828	816.5
10	618	1449	643	1442.5	831	799.5
11	608	1631.25	613	1689.55	1023.25	1076.55
12	588	1700	608	1727.75	1112	1119.75
13	608	1717.5	613	1755.8	1109.5	1142.8
14	598	1762.5	643	1771.2	1164.5	1128.2
15	618	1806.25	643	1781.25	1188.25	1138.25
16	608	2264	633	1994.7	1656	1361.7
17	608	2072	633	1748.5	1464	1115.5
18	588	1646	633	1475.9	1058	842.9
19	598	1530	618	1274.2	932	656.2
20	618	1380	643	1111.6	762	468.6
<b>Total</b>	<b>11849</b>	<b>26229.85</b>	<b>12405</b>	<b>24861.25</b>	<b>14380.85</b>	<b>12456.25</b>
<b>Average</b>	<b>592.45</b>	<b>1311.4925</b>	<b>620.25</b>	<b>1243.0625</b>	<b>719.0425</b>	<b>622.8125</b>

Based on the table above, the total production costs for coffee monoculture farming during its economic life (20 years) is US \$ 11848.00, so the average cost is US \$ 592.45 / ha / year. While the total cost for jackfruit intercropping during its economic life of 20 years is US \$ 12405.00, with the average cost of US \$ 620.25 / ha / year. From the revenue side, the total revenue of coffee monoculture farming that can be obtained is US \$ 26229.85 per hectare. Therefore, the average revenue of the farmers is US \$ 1311.49 / ha / year of coffee monoculture farming. The total revenue of jackfruit intercropping is \$ 24861.25 per hectare. The average revenue obtained by the farmer is US \$ 1243.06 / ha / year. Based on data, the revenue generated from coffee monoculture farming for 20 years is US \$ 14380.85. It means that every hectare of coffee monoculture farming land can generate the average benefit of US \$ 719.04 per year, meanwhile jackfruit intercropping farmer can obtain US \$ 12456.25 for 20 years. Every hectare of jackfruit intercropping land can

generate the total benefit of US \$ 622.81. Therefore, the total annual revenue indicates that the coffee monoculture farming and jackfruit intercropping is profitable.

Financial Feasibility Analysis of coffee monoculture farming and jackfruit intercropping. In annual business like coffee monoculture farming and jackfruit intercropping, the feasibility analysis can be done using analytical tools of investment criteria, NPV (*Net Present Value*), IRR (*Internal Rate of Return*) and *Net B/C*. The results of the calculation of NPV, IRR, and *Net B/C* indicates the value to be received in the future calculated by multiplying the current value with a discount factor. While the *payback period* analysis was conducted to determine the payback period for the investment. The interest rate in the area of the research is assumed equals to the interest rates in the bank at 12%.



**Table-3: Financial Feasibility Analysis of coffee monoculture farming and jackfruit intercropping (per hectare) in district of Railcar, Emera**

	Investment Criteria	Results with 12% of interests	Status
Monoculture			
1	NPV(US\$)	2781.73	Feasible
2	IRR	30%	Feasible
3	Net B/C	3.79	Feasible
4	PP	4 years	Feasible
Intercropping			
1	NPV(US\$)	2298.02	Feasible
2	IRR	29%	Feasible
3	Net B/C	3	Feasible
4	PP	11 years and 3 months	Feasible

The data in Table 3 shows that at the interest rate of 12% per year, the coffee monoculture farming and jackfruit intercropping in the district of Railaco is feasible to be developed further, because it has the *Net B/C* value of 3.79 and 3.00. *Net B/C* is the ratio between costs and revenues that have been multiplied by a discount factor, where a business is feasible to be developed if the *Net B/C* is more than one. The results of the *Net B/C* calculation in the analysis of this farm produces the value of 3.79 and 3.00, so the business is feasible. This value means that every US \$ 1.00 of investment issued by the farmer can generate the net benefit of 3.78 and 3.00. The greater the value of *Net B/C*, the more profitable the business is.

Moreover, this business is feasible because it meets the other investment criteria, which have the positive value of NPV ( $NVP > 0$ ). NPV value indicates the level of benefit in coffee monoculture farming and jackfruit intercropping if the business is has been around for 20 years, which is calculated using the present value and the interest rate that currently prevails. NPV calculation with an interest rate of 12% generates US \$. 2781.73 And US \$. 2298.02. The value shows a positive NPV value, so it is concluded that the coffee monoculture farming and jackfruit intercropping is feasible to develop.

According to other investment criteria, the coffee monoculture farming and intercropping jackfruit has an IRR value of 30% and 29%, higher than the prevailing interest rate of 12%. IRR shows the value of the interest rate when the  $NPV = 0$ , meaning that business is neither profitable nor loss. IRR calculation of coffee monoculture farming and jackfruit intercropping is done manually through experiments at different interest rates until the NPV of zero or negative is obtained, which results in the IRR of 30% and 29%. It means, until the interest rate of 30% and 29% ( $NPV = 0$ ), coffee monoculture farming and jackfruit intercropping still feasible. The  $IRR > 12\%$  of the prevailing interest rates, shows that investing for the

coffee monoculture farming and jackfruit intercropping is more profitable than depositing into the bank, with the best farm management.

The calculation of the payback period for the coffee monoculture farming and intercropping jackfruit in the district of Railaco results in 4 years old and 11 years and 3 months. These results indicate that at the interest rate of 12%, coffee monoculture farming and jackfruit intercropping is still feasible to be developed because the payback period does not exceed the economic life of the coffee plant, which is 20 years.

Sensitivity Analysis of Coffee Monoculture farming Jackfruit Intercropping. The sensitivity analysis was done by raising production costs by 65% with the consideration that the cost of production in the research area can be increased to 65%, especially for labor costs. The sensitivity analysis to selling price decline by 40% needs to be done because the price of coffee and jackfruit seeds in the market often decreases to 40% if the quality decreases due to natural factors (droughts).

Sensitivity analysis with the increase of production costs by 65%. The data in Table 4 shows that the 65% increase of cost production results in the *Net B/C* value of 0.96, and 0.85 (less than 1), so the business is not profitable to run. While the NPV values are US \$ -57.51 and US \$ -343.93. These NPV values are more than zero which indicates that the farm is infeasible to run. The IRR values are 11% and 5%, it's lower than the bank's interest rate. While the payback period values are -1.12 years and -0.91 years. The largest allocation for production cost of coffee monoculture farming and intercropping jackfruit is labor cost, especially for the plant breeding. Throughout the years, coffee plants could be harvested once but jackfruit could be harvested 4 to 5 times a month. The labor requirements for plant breeding and postharvest increased 3 to 5 people each year. Especially in the age of 3-20 years of the plant.

**Table-4: The sensitivity analysis of coffee monoculture farming and jackfruit intercropping with the increase in production costs by 65%**

Investment Criteria	Results with 12% of interests	Status
<b>1. Coffee Monoculture</b>		
NPV (US\$)	-57.51	Infeasible
IRR	11%	Infeasible
Net B/C	0.96	Infeasible
Payback Period	-1.12	Infeasible
<b>2. Jackfruit Intercropping</b>		
NPV (US\$)	-343.93	Infeasible
IRR	5%	Infeasible
NE B/C	0.85	Infeasible
Payback Period	-0.91	Infeasible

Sensitivity Analysis of Coffee Selling Price Decline by 40%. The result of sensitivity analysis to the decline of product prices by 40% in coffee monoculture farming and jackfruit intercropping in the district of Ermera is the *Net B/C* value of 0.91 and 0.82 (less than 1). This indicates that the business is infeasible to develop when price is decreased by 40%. These results are also supported by the results of the calculation of the other investment criteria such as NPV and IRR. The results of the calculation of NPV value gave negative

results, i.e. 78.19 and 258.77, with the bank interest rate of 12%. To be feasible, a business/investment should generate a NPV value greater than zero. Based on the results, the coffee monoculture farming and jackfruit intercropping is infeasible to be developed. The IRR values obtained when price the price is decreased by 40% are 10% and 3%, it indicates that the coffee monoculture farming and jackfruit intercropping is infeasible to be developed. Moreover, the payback period is more than 20 years.

Investment Criteria	Results with 12% of interests	Status
<b>1. Coffee Monoculture</b>		
NPV (US\$)	-78.19	Infeasible
IRR	10%	Infeasible
Net B/C	0.91	Infeasible
Payback Period	-1.81	Infeasible
<b>2. Jackfruit Intercropping</b>		
NPV (US\$)	-258.77	Infeasible
IRR	3%	Infeasible
NE B/C	0.82	Infeasible
Payback Period	-1.47	Infeasible

Sources: Processed primary data, 2017

**CONCLUSIONS AND SUGGESTIONS**

**Conclusions**

- The cropping patterns used in the study area are coffee monoculture and jackfruit intercropping. Coffee monoculture is more feasible than jackfruit intercropping.
- The analysis of the cost of production, reception, and farm income shows that coffee monoculture farming and jackfruit intercropping is considered feasible to be developed because it is profitable. The results are: the average production cost of US \$ .592,45 / ha / year and US \$ .620,25 / ha / year; farm income of US \$ .1311,49 / ha / year and US \$ .1243,06 / ha / year; also the average income of

farmers of US \$ .14380,85 / ha / year and US \$ .12456,25 / ha / year.

- Monoculture coffee farming in Ermera is more feasible than intercropping with the biggest NPV value of US \$ 2781.73. The value of jackfruit intercropping is US \$ 2298.02. The Net B/C of monoculture farming is 3.79, and the Net B/C of jackfruit intercropping is 3.00. Meanwhile, the IRR values are 30% and 29%. The payback period results in payback time in the 4th year in two patterns of intercropping and a payback time in the 11th year in the last pattern.
- The results of the sensitivity analysis shows that with the increase in production costs by 65%, and a



decrease in production rates by 40%, coffee monoculture farming and jackfruit intercropping is infeasible to be developed. These results indicate that coffee monoculture farming and jackfruit intercropping is feasible to be developed if the production cost fall by 60% and the production price fall by 35%.

### Suggestions

- The government needs to establish a policy on coffee farming management as a commodity that contributes to the national income through rehabilitation activities and rejuvenation (family economic subsidies).
- The citizens are expected to give better *inputs* to generate better *outputs* from the development of modern coffee farming based on the management and cultivation techniques.
- Improving degree attainment of farmers. Farmers with higher degree will be able to keep up to the latest farming technology both in terms of understanding as well as cost efficiency and management.
- The government and employers are expected to establish new industries for jackfruit, so that the other parts of the plant (leaves, trunk, etc.) can be used as an industrial material.

### REFERENCES

1. Cali G, Forlani F, Timor-Tritsch IE, Palacios-Jaraquemada J, Minneci G, D'antonio F. Natural history of Cesarean scar pregnancy on prenatal ultrasound: the crossover sign. *Ultrasound in Obstetrics & Gynecology*. 2017 Jul 1;50(1):100-4.
2. Gray. Pengantar Evaluasi Proyek. Edisi Kedua. Jakarta: Gramedia Pustaka Utama. 1992.
3. Soekartawi AS, Dillon JL, Hardaker JB. Ilmu usahatani dan penelitian untuk pengembangan petani kecil. UI-Press, Jakarta. 1986.
4. Guterres AD, Santosa B, Wirawan W. Perubahan sifat fisik buah apel kupas yang dilapisi penyalut edibel dari pati keladi dengan penambahan natrium metabisulfit. *Fakultas Pertanian*. 2016 Jun 29;4(1).
5. Hodgson JG, Agopyan N, Gutekunst CA, Leavitt BR, LePiane F, Singaraja R, Smith DJ, Bissada N, McCutcheon K, Nasir J, Jamot L. A YAC mouse model for Huntington's disease with full-length mutant huntingtin, cytoplasmic toxicity, and selective striatal neurodegeneration. *Neuron*. 1999 May 31;23(1):181-92.
6. Karo HS. Analisis Usahatani Kopi Di Kecamatan Simpang Empat Kabupaten Karo. 2009.
7. Pudjosumarto M. Evaluasi Proyek, Uraian Singkat dan Soal Jawab. Fakultas Ekonomi Brawijaya Malang. Edisi Kedua. Liberty. Yogyakarta. 1998.