



## Cost-benefit analysis of cocoa agroindustry micro, small and medium enterprises

Effendy <sup>1\*</sup>, Max Nur Alam <sup>1</sup>, Zainuddin <sup>2</sup>, Made Antara <sup>1</sup>, Muhardi <sup>2</sup>,  
Ambo Abdul Kadir Pakanyamong <sup>3</sup>

<sup>1</sup> Department of Agriculture Economics, Agriculture Faculty of Tadulako University, Palu, INDONESIA

<sup>2</sup> Department of Agrotechnology, Agriculture Faculty of Tadulako University, Palu, INDONESIA

<sup>3</sup> Graduate student, Department of Agriculture Economics, Agriculture Faculty of Tadulako University, Palu, INDONESIA

\*Corresponding author: [effendy\\_surentu@yahoo.com](mailto:effendy_surentu@yahoo.com)

### Abstract

In operation, the cocoa agroindustry required capital, so it was necessary to calculate the optimal rate of return on cash money. This research aimed to measure the costs and benefits of cocoa agroindustry over a certain period of time. The net present value was used to measure the net benefit over time resulting from an investment. The results of the net present value analysis show that the cocoa agroindustry micro, small and medium enterprises (MSMEs), were profitable. The cocoa agroindustry MSMEs were quite effective in facing the economic recession during the Covid-19 pandemic. If there was an increase in variable costs and credit interest, and there was no increase in yield, the increase in cash flow would be similarly smaller so that the NPV would also decrease. Cocoa agroindustry MSMEs produced NPV = 0 when the discount was 25.45%. The difference between the MSMEs credit interest of 6% and the break-even point discount of 25.45% was quite large. This suggested that the cocoa agroindustry MSMEs looked strong in terms of profitability.

**Keywords:** net present value, agroindustry, break-even point, profitability

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### INTRODUCTION

Cocoa production in Indonesia was increasingly under pressure from various threats such as various pests and diseases, old plant age, low quality of cocoa beans, and less optimal farming efficiency (Effendy et al. 2013, Effendy 2015, Effendy and Antara 2015, Effendy 2018a; Saidi et al., 2018). In addition, environmental problems such as a decrease in soil fertility rate also caused cocoa production to decrease (Hartemink 2005, Effendy 2018b) so that caused high fluctuations in supply and demand and this made cocoa bean prices become unstable (Sianipar and Widaretna 2012). Subsequently, cocoa bean price instability affected production in the cocoa agroindustry.

Micro, small and medium enterprises (MSMEs) of the cocoa agroindustry are some of the producers of the secondary products of cocoa. This business depends on the cocoa production of rural communities (farmers), and farmers were seen as producers who were responsible for meeting market demand (Hasnah et al. 2011, Samad and Hasyim 2019, Wijayanti et al. 2019). The production activities of the cocoa agroindustry MSMEs were threatened by the unstable price of cocoa beans. The cocoa agroindustry MSMEs were an

autonomous association that was able to meet the needs and aspirations of the economy in Indonesia.

In operation, the cocoa agroindustry MSMEs required capital, so it was necessary to calculate the optimal rate of return on cash money and total profits. VanSickle and Ladd (1983) calculated the cash money return rate and the total profit after tax. They found that the total profit after tax increased with the length of the revolving fund cycle. Barton et al. (2011) maximized the expected utility function, and they found that the optimal solvency ratio was positively correlated with the variance of asset returns, interest rate variance, and interest rate while it was negatively correlated with the rate of asset returns. Hailu et al. (2007) revealed that the financial structure and company size contributed to variations in cost efficiency and could increase a company's efficiency. Yung-Chang (2016) argued that large deviations in the effective tax rate could affect allocated profit. Royer (2014) formulated an equation to show that the cost of equity was positively correlated with growth

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**Table 1.** Summary of NPV values for six production cycles (6 years) in cocoa agroindustry MSMEs

	Year of production					
	2018	2019	2020	2021	2022	2023
Revenues (IDR)	47,500,000	24,450,000	24,939,000	49,400,000	50,388,000	51,395,760
Variables costs (IDR)	38,000,000	19,560,000	19,951,200	39,520,000	40,310,400	41,116,608
Depreciation (IDR)	3,750,000	3,750,000	3,750,000	3,750,000	3,750,000	3,750,000
Profit Before Tax (IDR)	5,750,000	1,140,000	1,237,800	6,130,000	6,327,600	6,529,152
Tax (IDR)	237,500	122,250	124,695	247,000	251,940	256,979
Profit After Tax (IDR)	5,512,500	1,017,750	1,113,105	5,883,000	6,075,660	6,272,173
Discount factor (DF) (6%)	0.94	0.89	0.84	0.79	0.75	0.70
Proceed (IDR)	9,262,500	4,767,750	4,863,105	9,633,000	9,825,660	10,022,173
CF <sub>t</sub> (IDR)	8,738,208	4,243,281	4,083,157	7,630,238	7,342,305	7,065,237
PV (IDR)	39,102,424					
Investment (IDR)	22,500,000					
NPV (IDR)	16,602,424					

and negatively correlated with the length of the rolling period.

This research discussed the costs and benefits of optimal cocoa agroindustry MSMEs, where the owner tried to maximize total profit after tax. To measure the costs and benefits of the cocoa agroindustry MSMEs, the economic profit had to be calculated within a certain period of time. The net present value (NPV) is a standard measure of the net benefit over time resulting from an investment. By calculating the NPV changes within a certain period of time, the net benefits of the cocoa agroindustry MSMEs could be measured more precisely and comprehensively.

## MATERIALS AND METHODS

This survey was done in Central Sulawesi from March until April 2020. Purposive sampling was used to select cocoa agroindustry MSMEs. The targeted sample criteria were cocoa agroindustry MSMEs with the same scale. Based thereon, three cocoa agroindustry MSMEs were obtained with the same scale. A survey was done to collect information on their production. The data collected included: 1) input, 2) input prices, 3) output, 4) output prices, and 5) investment. The average input and output of the three cocoa agroindustry MSMEs was used to analyze their costs and benefits.

To analyze the costs and benefits of cocoa agroindustry MSMEs, we used NPV. This was done because NPV was considered to be higher than the internal rate of return (IRR) when used to evaluate and rank projects (Weber, 2014). NPV is defined as the difference between the amount of discounted cash inflows and cash outflows (investment) over a certain period of time, this describes the current value of money with the value of money in the future. NPV is determined by the formula:

$$NVP = PV - TI \quad (1)$$

where TI is the total cost of investment, and PV is the total present value of cash flows. The PV of cash flow is determined by the number of cash flows in each year adjusted using the real discount rate of decreasing nominal value:

$$PV = \frac{CF_1}{1+r} + \frac{CF_2}{(1+r)^2} + \dots + \frac{CF_t}{(1+r)^t} \quad (2)$$

Then

$$NPV = \sum_{t=1}^n \frac{CF_t}{(1+r)^t} - TI \quad (3)$$

where r is the interest rate, CF<sub>t</sub> is the cash flow in time period (t).

If NPV ≥ 0, then cocoa agroindustry MSMEs could be interpreted as feasible in terms of economic profits. The cash flow in each year could be determined using the following calculation scheme:

$$\text{Revenues (R)} = p \times Q$$

$$\text{Cost (C)} = VC + FC$$

$$\text{Profit Before Tax (PBT)} = R - C$$

p = output price

Q = output quantity

VC = variable cost

FC = fixed cost

Tax = 0.005 x PBT (2019 MSMEs tax is 0.5%)

Profit After Tax (PAT) = PBT - Tax

Inflation was estimated to be 2% based on annual average inflation in December 2019. The discount rate was 6% using the December 2019 MSMEs interest rate.

## RESULT AND DISCUSSION

**Table 1** presents the estimated annual NPV for the micro, small and medium enterprises (MSMEs) of the cocoa agroindustry in Central Sulawesi.

The NPV of the cocoa agroindustry MSMEs in Central Sulawesi was positive (profitable) during the economic life of the investment. The number for investments of cocoa agroindustry MSMEs is IDR 22,500,000. One year after investing in the cocoa agroindustry MSMEs, resulted in the following annual cash flows: IDR 8,738,208, IDR 4,243,281, IDR 4,083,157, IDR 7,630,238, IDR 7,342,305, and IDR 7,065,237. The discount rate was 6 percent for MSMEs. In 2019 and 2020, the cash flow of cocoa agroindustry MSMEs was lower because, on September 28, 2018, there was a natural disaster so the company started producing again in June 2019. In April until July 2020, the cocoa agroindustry MSMEs stopped producing due to the Covid-19 pandemic. NPV calculation in **Table 1** shows that the cocoa agroindustry MSMEs were quite effective in facing economic recession.

**Table 2.** Sensitivity analysis of cocoa agroindustry MSMEs

	Year of production					
	2018	2019	2020	2021	2022	2023
Revenues (IDR)	47,500,000	24,450,000	24,939,000	49,400,000	50,388,000	51,395,760
Variables costs (naik 5%) (IDR)	39,900,000	20,538,000	20,948,760	41,496,000	42,325,920	43,172,438
Depreciation (IDR)	3,750,000	3,750,000	3,750,000	3,750,000	3,750,000	3,750,000
Profit Before Tax (IDR)	3,850,000	162,000	240,240	4,154,000	4,312,080	4,473,322
Tax (IDR)	237,500	122,250	124,695	247,000	251,940	256,979
Profit After Tax (IDR)	3,612,500	39,750	115,545	3,907,000	4,060,140	4,216,343
DF (11.5%)	0.90	0.80	0.72	0.65	0.58	0.52
Proceed (IDR)	7,362,500	3,789,750	3,865,545	7,657,000	7,810,140	7,966,343
CF <sub>t</sub> (IDR)	6,603,139	3,048,322	2,788,599	4,954,036	4,531,943	4,145,814
PV (IDR)	26,071,854					
Investment (IDR)	22,500,000					
NPV (IDR)	3,571,854					

**Table 3.** Analysis of the main return point of cocoa agroindustry MSMEs

	Year of production					
	2018	2019	2020	2021	2022	2023
Revenues (IDR)	47,500,000	24,450,000	24,939,000	49,400,000	50,388,000	51,395,760
Variables costs (IDR)	38,000,000	19,560,000	19,951,200	39,520,000	40,310,400	41,116,608
Depreciation (IDR)	3,750,000	3,750,000	3,750,000	3,750,000	3,750,000	3,750,000
Profit Before Tax (IDR)	5,750,000	1,140,000	1,237,800	6,130,000	6,327,600	6,529,152
Tax (IDR)	237,500	122,250	124,695	247,000	251,940	256,979
Profit After Tax (IDR)	5,512,500	1,017,750	1,113,105	5,883,000	6,075,660	6,272,173
DF (25.44825%)	0.80	0.64	0.51	0.40	0.32	0.26
Proceed (IDR)	9,262,500	4,767,750	4,863,105	9,633,000	9,825,660	10,022,173
CF <sub>t</sub> (IDR)	7,383,523	3,029,593	2,463,314	3,889,584	3,162,559	2,571,427
PV (IDR)	22,500,000					
Investment (IDR)	22,500,000					
NPV (IDR)	0					

If there was an increase in variable costs (5%), credit interest increased from 6% to 11.5% and there was no increase in yield (**Table 2**), then the increase in cash flow would be smaller so that the NPV was smaller than before (Matos et al. 2015, Patil and Poddar 2016, Effendy et al. 2018). Finally, the break-even yield, the yield in which the cash flow continued to decrease where additional profit would equal with an increase in input costs which resulted in NPV = 0, was estimated at a discount of 25.45% (**Table 3**). Considering that the difference between the MSMEs credit interest of 6% and the break-even point discount of 25.45% was quite large, this illustrates that the cocoa agroindustry MSMEs looked strong in terms of profitability (Sojková and Adamičková 2011, Bode-Greuel and Nickisch 2014). These figures also indicated that the cocoa agroindustry MSMEs needed to increase their production by 25.45% to compensate for the increase in variable costs (Zereyesus and Dalton 2017).

## CONCLUSIONS

The analysis results of the net present value of the cocoa agroindustry MSMEs during the economic age were positive; this indicated that the business was

profitable. The cocoa agroindustry MSMEs were quite effective in facing economic recession during the Covid-19 pandemic. If there was an increase in variable costs (5%), credit interest increased from 6% to 11.5% and there was no increase in yield, then the increase in cash flow would be smaller so that the NPV was smaller. If the cash flow of the cocoa agroindustry MSMEs continued to decrease, it would produce NPV = 0 and was estimated to occur at a discount of 25.45%. The difference between the MSMEs credit interest of 6% and the break-even point discount of 25.45% was quite large, thus this illustrates that the cocoa agroindustry MSMEs looked strong in terms of profitability. This showed that the cocoa agroindustry MSMEs needed to increase their production by 25.45% to compensate for the increase in variable costs.

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