

Potential development of local varieties of Batabual Arabica coffee in Buru Regency, Maluku Province, Indonesia

Siti Sehat Tan^{1,*}, Chandra Indrawanto¹, Rita Indrasti¹, and Mangasi Panjaitan²

¹National Research and Innovation Agency, Gatot Subroto Campus, South Jakarta, 12716 Indonesia

²Trilogi University, Trilogi Campus, Kalibata, Jakarta 12760 Indonesia

Abstract. The Batabual Arabica coffee variety in Buru Regency, Maluku Province, has the potential to be developed as specialty coffee. However, the planting conditions are generally poorly maintained, most of the plants are old, the plant population is declining, and productivity is low (200 - 350 kg/ha/year). For this reason, government intervention is needed for the rehabilitation and development of Batabual coffee. This study aims to analyze the financial feasibility of Batabual coffee farming and design a development model for Batabual coffee. This study uses analysis of B/C ratio and NPV, as well as FGD to develop steps for developing Batabual Arabica coffee. The results of the financial analysis showed that Batabual Arabica coffee farming was feasible with a B/C ratio of 1.13 and an NPV of IDR 45,284,774. The three main things needed in the development of Batabual Arabica coffee are the establishment of seed plantations as a source of Batabual coffee seeds, improvement of cultivation techniques, and the establishment of farmers' economic institutions to strengthen the bargaining position of farmers, improve the quality of coffee products and expand the market.

1 Introduction

Buru Regency was officially established on October 12, 1999, based on Law Number 46 of 1999 and was later renewed by Law Number 6 of 2000. In 2008, through Law Number 32 of 2008, Buru Regency was divided into two autonomous districts namely Buru Regency and South Buru Regency [1]. The area of Buru Regency is 7,595.58 km² with a population in 2021 amounting to 137,000 people. The average population density is 18 people/km². The highest population density is in Waeapo District of 119 people/km², and the lowest is in Fena Leisela District, which is four people/km². Most of the population's livelihoods are in the agricultural, plantation, fishery, and livestock sectors. Other livelihoods are traders, employees, and government officials [2]. The plantation sector plays an important role in the economy in Buru Regency. The main commodities of Buru Regency are Coconut, Cocoa, Cashew, Clove, Nutmeg, and Coffee [3].

* Corresponding author: sititan2010@gmail.com

Batabual District in Buru Regency is a center for producing arabica coffee (*Coffea arabica* L.) which has a distinctive taste and aroma of cloves and nutmeg. This arabica coffee plant can reach 9 to 12 meters in height and grows at an altitude of 1,300 to 2,000 meters above sea level [4]. The unique taste and aroma of Batabual Arabica coffee is starting to attract consumers, there is even a demand from Turkey as much as 10 tons per year. The existing obstacle is the condition of the Batabual Arabica coffee plantations, which on average are not maintained and are old with low productivity (200 – 350 kg/ha/yr) which is much lower than the national average productivity of coffee (750 kg/ha/yr). The government's efforts to increase the productivity and quality of coffee through the National Coffee Movement (GPN) have not been able to increase the productivity and quality of Batabual Arabica coffee [5]. According to [6], Improving people's welfare can be done through increasing the added value of superior commodities. Therefore, special attention is needed from research institutions, government, and non-governmental organizations to coffee farmers to support and maintain the sustainability of Coffee [7]. According [8] the government's attention needed in the development of coffee commodities is superior coffee seeds, coffee processing technology, training, and organizing coffee events.

Indonesia is the fourth largest producer of Arabica coffee in the world [9, 10]. The biggest challenges for farmers in increasing Arabica coffee production are climate change and pest and disease attacks [11]. The use of pesticides for pest and disease control requires skilled workers so that pesticide residues do not contaminate coffee products which have the potential to be a problem in marketing [12]. Efforts to increase the production and quality of Batabual Arabica coffee must be carried out through improving plant materials, improving cultivation, and processing techniques and expanding the market. This study aims to provide information about Batabual Arabica coffee, its economic benefits, and development strategies, to meet the demand for the Indonesian Arabica coffee market.

2 Research method

The research was conducted from February to March 2022 in Batabual District, Buru Regency. In-depth interviews based on questionnaires to farmers were conducted to get an overview of the conditions of Batabual Arabica coffee farming. In addition, a focus group discussion (FGD) was also conducted with 30 Batabual coffee farmers from 3 farmer groups, 2 NGOs and 3 local government officials in Batabual Regency who handle coffee. Secondary data were obtained from various articles related to the writing and statistical data of coffee in Buru Regency. The data obtained is processed through several stages [13]: (1) the sorting process, the data is sorted according to the research focus and coded, and (2) the process of presenting the data in the form of a description to make it easier to understand and more communicative.

Analysis of B/C ratio and NPV were used to assess the feasibility of farming the Batabual Arabica coffee. The B/C Ratio analysis compares the benefits with the costs incurred. Farming is profitable if B/C Ratio > 1, otherwise if B/C Ratio < 1 farming is not profitable. The calculation of the B/C Ratio value uses the following formula:

$$B/C \text{ Ratio} = \frac{PV(\text{Benefits})}{PV(\text{Costs})} \quad (1)$$

NPV is a method that is carried out by comparing the present value of net cash inflows with the present value of the cost of spending an investment. This method of analysis takes into account changes in the value of money due to the time factor. Cash flow projections are assessed now (the initial period of investment) through discount factors which are then compared with the present value of the investment. To calculate NPV the following formula is used:

$$NPV = \frac{C1}{(1+r)} + \frac{C2}{(1+r)^2} + \frac{C3}{(1+r)^3} + \dots + \frac{Cn}{(1+r)^n} - CO \quad (2)$$

Where NPV was Net Present Value; C1, C2, C3...Cn were annual cash flow until the end of the business; C0 was Initial Investment Value; r was Discount factor

If the NPV value > 0, then the farming is feasible, otherwise if the NPV < 0, then the farming is not feasible to be funded.

3 Results and discussion

3.1 Why Batabual coffee?

The habit of drinking coffee is not only dominated by Asian people. Europeans have also become accustomed to it. The Nordic country is among the most coffee drinkers in the world. The six countries with the highest coffee consumption in the world are Finland (12 kg per capita/year), Norway (9.9 kg), Iceland (9 kg), Denmark (8.7 kg), the Netherlands (8.4 kg), and Sweden (8.2 kg per capita/year)[14]. Coffee has also changed coffee drinking habits in China. In 2014 some media outlets in the UK reported a global decline in alcohol-containing beverages. This has led to coffee becoming a new favorite drink trend that October 1 is celebrated as International Coffee Day. [15] said that the behavior of consuming coffee now occurs in all circles, ranging from the upper-middle to the lower middle. This behavior can be seen in the growing trend of coffee shops in Indonesia which showed an increase from 2011 to 2016, an increase of 189 units for franchise shops and 40 units for local shops [16]. This is in line with the findings of Antonella Samoggia (2019) that the coffee market is very dynamic, and consumers are more interested in coffee from small businesses and drinking coffee is a pleasure [17].

Batabual Arabica coffee has the potential to be a specialty coffee. The results of laboratory tests, the water content of Batabual coffee is about 4% with the characteristic taste and aroma of cloves and nutmeg. For comparison, based on Indonesian National Standard No: 01-2907-2008 regarding coffee beans, and referring to International Coffee Organization (ICO, 2020) resolution No: 407, the moisture content for export quality is set at 12.5%. According to [4], to qualify as a specialty coffee, a test of excellence needs to be done and the score for taste must be above 80 out of 100 points.

In several villages in the Batabual District, coffee processing still uses the traditional mortar, so it takes a long time, and the coffee quality is low. Most of the coffee processing is done for family consumption, so a lot of the coffee is left untreated and left to rot. In Batujungku Village, Batabual sub-district, it has the potential to produce 10 tons of coffee cherries, but only about 35% of the yield is processed into coffee beans, the rest is left to rot. This means that the potential income of coffee farmers in Batujungku Village is IDR. 81 million to IDR. 113 million per year. Actually, the difference in the price of coffee beans in Batujungku Village (IDR. 25 tis IDR per kg) with the price of coffee beans in Namlea District, the capital of Batabual Regency, is quite large (IDR. 35 thousand - IDR. 40 thousand per kg), but the difficulty of transportation makes access to Namlea sub-district becomes difficult.

3.2 Investment feasibility analysis

Investment analysis shows the feasibility of an investment decision in a particular business based on the profits to be obtained. The results of investment analysis on Batabual Arabica coffee farming show the B/C ratio value is 1.13, meaning that investment to develop

Batabual Arabica coffee farming is financially feasible. (Table 1).

Table 1. Analisis of B/C ratio for Batabual Arabica coffee farming.

Benefit dan cost	Current year value (IDR)	Present value (PV) (IDR)
Benefit: 2022-2023	200,000,000 ^{a)}	200,000,000
Benefit: 2023-2024	200,000,000 ^{b)}	188,679,245*
<i>Total Benefit</i>	400,000,000	388,679,245
Cost: 2022-2023	192,669,000	192,669,000
Cost:2023-2024	159,769,000	150,725,471
<i>Total Cost</i>	352,438,000	343,394,471
B/C Ratio		1.13

Notes: a): Selling Value of Coffee in 2022-2023

b): Selling Value of Coffee in 2023-2024

*: Assumed interest rate of 6% per year based on KUR (People's Business Credit) interest rate.

3.3 Net present value (NPV)

Net present value (NPV) analysis compares the present value of cash inflows with the investment costs of a business. The present value of cash inflows and investment expenditure costs is obtained through a discount factor using a certain reference interest rate. The investment of a business is feasible if the NPV value is positive. The results of the NPV analysis of Batabual Arabica coffee farming IDR. 45,284,774, which means that the investment to develop Batabual Arabica coffee farming is financially feasible

Table 2. Calculating the NPV of the Batabual Coffee Restoration Stage.

Year	Investment costs	PV Investment costs	Cash inflow	PV Cash inflow
2022	192,669,000	192,669,000		
2023	159,769,000	150,725,471*	200,000,000	200,000,000
2024	-	-	200,000,000	188,679,245*
TOTAL	-	343,394,471	-	388,679,245

Source: Processed data

* Assumed interest rate of 6% per year based on KUR (People's Business Credit) interest rate

3.4 Investment needs

Table 3. Budget for land clearing costs, seeds, planting, fertilization, maintenance per hectare of coffee plantations in Batabual District in 2022.

No	Description	Volume	Unit price	Total
1.	Land Clearing Costs	1	2,500,000	2,500,000
2.	Seed	833	3,000	2,499,000
3.	Planting wages	833	6,500	5,414,500
4.	Manure (3 kg/tree)	833	3,500	2,915,500
5.	Weed Cleaner (Gramason)	1	175,000	175,000
6.	Weed Cleaner (Supremo)	1	175,000	175,000
7.	Wage Spraying	4	100,000	400,000
Total				14,079,000

Opening or building a coffee farm requires a series of activities, including land clearing,

seedling supply, planting seedlings, fertilizing, and care before and after fruiting. The coffee tree bears fruit after 3-4 years of age. The estimated budget for land clearing, seedlings, planting, fertilization, and care is IDR 14,079,000 per year (Table 3).

Based on the budget details in Table 3, the investment needs for the development of coffee plantation areas during the development stage (2024-2028) are as follows (Table 4).

Table 4. Investment needs for expansion of coffee plantation area in Batabual District 2024-2028

Year	Expansion area (Ha)	Budget (IDR)
2024	200	2,815,800,000
2025	200	2,815,800,000
2026	200	2,815,800,000
2027	200	2,815,800,000
2028	200	2,815,800,000
Total		14,079,000,000

3.5 Batabual coffee development strategy

Based on the FGD, several actions that must be taken to develop Batabual Arabica coffee and improve the welfare of coffee farmers in Buru Regency are:

3.5.1 Development of coffee seed plantations as a source of superior seeds

Provision of superior coffee seeds is needed to support the improvement of coffee plants and increase coffee production. This can be done by developing Batabual coffee seed garden. Efforts to provide superior seeds also need to be supported by the same understanding from all stakeholders about the need for the use of superior coffee varieties.

3.5.2 Application of technology to integrate Batabual coffee plants with clove and nutmeg plants

Intercropping between Batabual Coffee with cloves and nutmeg will maintain the characteristic aroma of Batabual coffee. In addition, this intercropping also provides additional yields to farmers which can increase farmers' income. The application of good intercropping technology is needed to get these benefits.

3.5.3 Dissemination of coffee GAP (good agricultural practises) technology

Efforts to disseminate coffee GAP technology need to be improved through effective dissemination techniques for coffee farmers. The use of pioneer farmers as a target for dissemination which then transmits to other farmers through existing community social networks is highly recommended. Various media, communication techniques and information channels can be used in dissemination efforts.

3.5.4 Increase the ability of farmers in processing coffee

Coffee processing using a wet processing system can produce coffee with good quality. To reduce processing costs, farmers can do processing in groups by forming a coffee processing business unit in the Farmers Group. Farmers can process their coffee in this business unit at a low cost and at the same time controlled to comply with GMP so that the coffee beans produced are of high quality. Improvements in processing technology need to be accompanied by increasing the capacity of farmers in 'Good Handling Practice' (GHP)

through the preparation of standard operating guidelines for good harvest and post-harvest handling as well as training and assistance in their implementation.[18].

3.5.5 Increasing the role of cooperative institution in coffee marketing

Cooperative institution has to increase their role in processing and marketing coffee by establishing processing unit and marketing unit. This will increase the bargaining position of coffee farmers in the market, provide added value for farmers and improve farmers' welfare

4 Conclusion

Batabual Arabica coffee has the prospect of becoming a specialty coffee because it has a distinctive aroma of cloves and nutmeg and low water content. However, currently most of the plants are old and the population tends to decline with very low productivity, only 200 kg - 300 kg/ha. Therefore, management and conservation efforts for the development of Batabual Arabica coffee cultivation need to be carried out.

The results of the analysis of B/C ratio and NPV of Batabual Arabica coffee farming are financially feasible. Efforts to develop Batabual coffee farming are feasible and will provide benefits to farmers.

Efforts to develop Batabual Arabica coffee farming require several actions, (1) development of coffee seed plantations as a source of superior seeds, (2) application of technology to integrate Batabual coffee plants with clove and nutmeg plants, (3) dissemination of coffee GAP (good agricultural practices) technology, (4) increase the ability of farmers in processing coffee, (5) increasing the role of cooperative institution in coffee marketing.

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