Financial analysis of coffee from agroforest managed by women farmers group in Tanggamus Lampung

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Abstract.

Coffee (Coffea robusta) is one of the most important products of the community forest (HKm) of Beringin Jaya in Tanggamus Lampung. A women farmers group called KWT Himawari is managing the business of coffee processing. The KWT Himawari was established in 2014 and currently operating a set of coffee processing equipment. This group produces several coffee brands, i.e. Kopi Codot (bat battered coffee), Kopi Merah (red coffee), and Kopi Premium (premium coffee). This study aims to evaluate business feasibility of the coffee processing of KWT Himawari using the financial criteria of Net Present Value (NPV), Benefit Cost Ratio (BCR) and Internal Rate of Return (IRR) within an investment period of 15-years. This study concludes that without any improvement in the business process, the KWT Himawari will potentially lose hundreds million rupiah, indicated by the negative Net Present Value (NPV) of IDR 181,518,037, Internal Rate of Return (IRR) of (5.245%) and Benefit Cost Ratio (BCR) of 0.781 or less than 1. This study suggests some business improvement to make the women group business feasible. The improved business of coffee processing, so called optimal business model, will make the business profitable with a great potential gain, i.e. NPV of IDR 2,356,763,475, BCR of 1.33 and IRR of 259.57%. The optimal business model can be reached by optimizing production and market that provides several multiplier effects, such as increasing the women’s group income, raising the employment absorption, and stabilizing price of raw coffee from farmers around the forest area.

1. Introduction

Forest is a life support system that having very important functions of ecology, social, and economy to the human, particularly local communities. Although forests have been providing goods and services for communities, not all forest utilizations follow the regulations. Currently, some forest utilizations are informally operated because there is no legal permit given by the government authority to the community. Thus, social forestry program is pivotally important to provide legal access for forest utilization to the local communities, particularly through the implementation of community forest or Hutan Kemasyarakatan (HKm). The HKm is a forest utilization permit given by the state forest authority to the local communities to improve their livelihoods and to manage sustainable forests.

According to [1], forest conversions are mostly occurred due to increasing local population, changes of land use, migration, and poverty. The establishment of HKm is expected to empower local communities to participate in forest management. It is supposed that the implementation of HKm will
be able to optimizing forest utilization and then, improving livelihoods of the local communities. In addition, HKm is also considered to maintain the function of forests and is expected to prevent the destruction of the remaining forests, as well as improving participation of the community around the forest in forest management. This scheme is also considered to play role for conflict resolution between two different interests, i.e. preserving forest functions and improving community welfare [2 & 3].

This study shows that HKm of Beringin Jaya contributed number of economic benefits to the local community, particularly generating income through harvesting forest yields, creating products, and absorbing labour. Forests also provide intangible benefits for local community from ecosystem services. The HKm is located in two villages: Margoyoso and Talang Beringin, Sub-District of Sumberrejo, District of Tangerang, Province of Lampung. The southern part of the Community Forestry Beringin Jaya immediately bordered by the Protected Forest of Register 39 as the buffer zone of the Bukit Barisan Selatan National Park. Economically, the District of Tangerang is significantly depend on natural resources and agricultural activities.

The HKm of Beringin Jaya is managed by a consolidated forest farmers group, namely Gapoktan. In 2014, the Gapoktan established a cooperative as a business unit called the KWT (women farmers group) of Himawari that manages coffee processing. The members of this group are mostly wife of a coffee farmers. Initially, this business only produces limited amount of coffee made from a simple equipment. However, since 2018 this community got some modern equipment as a CSR of Bank of Indonesia that costs for amount IDR 250,000,000. Now, KWT Himawari produces three superior products, they are codot coffee, red coffee and premium coffee. KWT Himawari coffees are only marketed in local areas, not yet entering the realm of exports. The revenue that they get from the selling of those coffee is amount IDR 70,000,000 each year. The revenue is big enough and it increase the income of the members of KWT Himawari. Although their income is increasing, it will not last permanently. In 15 years, the roaster will be broken or inefficient and it must be replaced. It will be hard to get another CSR and they need at least IDR 250,000,000 to buy a new roaster. KWT Himawari needs to increase their selling with some profitable strategy if they want to survive in upcoming 15 years. Therefore, the purpose of this study is to increase the income of KWT Himawari, after comparing between the original and the optimal business model by analyzing business feasibility of the coffee processing using the financial criteria of Net Present Value (NPV), Benefit Cost Ratio (BCR) and Internal Rate of Return (IRR) within an investment period of 15-years.

2. Methods

2.1. Time and place

The study was carried out on July 31st to August 8th, 2019 at the HKm Beringin Jaya in Margoyoso Village, Sub-District of Sumberrejo, District of Tangerang, Province of Lampung, Indonesia.

2.2. Data collection method and survey design

Materials to support this research are the basic map of HKm Beringin Jaya, stationery, cameras, laptops, recording devices and Microsoft Excel as data processing programs.

Data were collected from both field surveys and key person interviews to obtain primary and secondary data. Primary data were gathered from field observations, key person interviews, and discussion with KWT Himawari. While secondary data were obtained from reports, scientific articles, and other sources related to the research topic.

2.2.1. Observation technique
Data was collected by direct observation of the object of research. This observation is expected to understand social phenomena related to the potential business development.

2.2.2. *Interview technique*

Interviews were conducted with the manager of the KWT Himawari related to the management of coffee processing business.

2.3. *Analytical method*

This study applied discounted financial analysis to evaluate financial feasibility of the coffee processing business operated by KWT Himawari. This financial calculation used cost and benefit components and uses investment criteria to evaluate business feasibility quantitatively, using the following assumptions:

1. Financial analysis is made for a 15-year period with the following assumptions:
   a. The first year is allocated for procurement of equipment investment.
   b. All costs are counted in financial analysis.
   c. The interest rate is 8% according to KUR program (*Kredit Usaha Rakyat*).
2. Production capacity is described with the following assumptions:
   a. The production capacity is 5 kg each roasting process.
   b. Each roasting process takes 30 minutes.
   c. The working time is 8 hours/day.
   d. The effective working day is 200 days/year.
   e. The demand of coffee is 16,000 kg/year.
3. 1.25 kg of coffee bean is equal to 0.8 liter of coffee.
4. The yields of coffee process are 45% of total 16,000 kg of coffee beans, 30% of total coffee is made for *Kopi Codot* (bat battered coffee), 20% for *Kopi Merah* (red coffee) and 50% for *Kopi Premium* (premium coffee).
5. All costs and revenues are using constant price.
6. The optimal model assumed that the market of coffee will follow the supply of coffee produced by the KWT Himawari.

2.3.1. *Components of cost and benefit*

The financial analysis was divided into components of cost and benefit [4]. Components of cost included fixed costs and operational costs. Investment costs or fixed cost are the initial costs usually incurred prior to a business operation, where the amount is relatively large and cannot be used up in one production period. Fixed costs are invested in a business with the aim of obtaining profits in upcoming period. Fixed costs are not affected by changes in input and output during production. Variable costs are a cost that affected by production process that is related to the number of inputs used and the amount of output produced.

2.3.2. *Data analysis*

Financial analysis was conducted by a calculation of quantitative data analysis conducted is a financial analysis using a discounted cash flow (DCF) and compounding cash flow methods based on Net Present Value (NPV), Internal Rate of Return (IRR) and Net Benefit Cost Ratio (Net B/C) eligibility criteria.

2.4. *Net Present Value (NPV)*
Net Present Value (NPV) is the difference between the present value of the investment and net cash receipts in the future [5]. NPV is one of the business feasibility criteria that considers the time value of money (time value of money) which is the difference between the value of the benefit flow and the value of money flow in cash flow. The NPV formula with a discount factor is referred to [6], as follows:

\[ NPV^a = \sum_{t=0}^{n} \frac{B - C}{(1+i)^t} \]

The formula for NPV with a combined factor is as follows:

\[ NPV^b = \sum_{t=0}^{n} \left\{ (B - C)(1 + i)^t \right\} \]

Notes:
NPV\(^a\) = Net Present Value with a discount factor at \(i\)
NPV\(^b\) = Net present value with a combined factor at \(i\)
\(B_t\) = Benefit in the \(t\)-year
\(C_t\) = Cost in the \(t\)-year
\(n\) = Evaluation period (15 years)
\(i\) = Applicable interest rate (\(i= 8\%\))

2.5. Benefit Cost Ratio (BCR)

Benefit Cost Ratio (BCR) in relation to business ratio between the present value of the benefit flow and present value of the cost flow. The B/C ratio for a business activity or project is feasible if the value of BCR \(\geq 1\). The formula of BCR with a discount factor is as follows (Gittinger 2008):

\[ BCR^a = \frac{\sum_{t=0}^{n} B}{\sum_{t=0}^{n} C} \]

The BCR formula with compound factors is as follows:

\[ BCR^b = \frac{\sum_{t=0}^{n} B (1+i)^t}{\sum_{t=0}^{n} C (1+i)^t} \]

Notes:
BCR\(^a\) = Benefit Cost Ratio with a discounted factor at \(i\)
BCR\(^b\) = Benefit Cost Ratio with compounding factor at \(i\)
\(B_t\) = Benefit in the \(t\)-year
\(C_t\) = Cost in the \(t\)-year
\(n\) = Evaluation period (15 Years)
\(i\) = Applicable interest rate (\(i= 8\%\))

2.6. Internal Rate of Return (IRR)

Internal Rate of Return (IRR) is the interest rate that equates of the expected value on cash outflows with expected cash inflows [7]. The interest rate is the maximum amount of costs can be paid by the project for the resources used in certain period. The formula for determining IRR is as follows (Gittinger 2008):
\[ \text{IRR} = i^{(+)} \frac{N (\text{+})}{N (\text{-})} \left[ i^{(-)} - i^{(+)} \right] \]

Notes:
IRR = Internal Rate of Return  
NPV(+) = NPV is positive  
NPV (-) = NPV is negative  
i (+) = Interest rate that makes a positive NPV  
i (-) = Interest rate that makes a negative NPV

Referring to [8], if the IRR is higher than bank interest, so the investment is more profitable than capital owned deposited in the bank. If the IRR is higher than interest rate then the business is feasible to run, and if the IRR less than interest rate, the business is not feasible to run.

3. Result and Discussion

Tanggamus is located at an area varies between lowlands and highlands. About 50% of the Tanggamus Regency is hilly and mountain with a slope of more than 40%, while the flat area is only about 19% of the total area. Tanggamus has an average temperature of 28° Celsius and most of the area is a mountain range with an altitude of about 500 meters above sea level to 2,000 meters above sea level at the foot of Mount Tanggamus. Rainfall is quite high approaching 3,000 mm per year, especially in the hilly and mountainous regions [9].

After observing in the field and obtaining data of benefits and costs of the coffee processing business, the data is processed and converted to annual cash flow with the addition of certain assumptions. The annual cash flows are then analysed for business feasibility and NPV, IRR, and BCR are obtained. In this study, we use the assumption of an annual loan interest rate of 8% approaching the value of the People's Business Credit interest rate (KUR).

Table 1 Cash flow of KWT Himawari business coffee with original model

| No | Components                | Price (IDR/year) | Time Management          |
|----|---------------------------|------------------|--------------------------|
| 1  | BENEFITS                  |                  |                          |
| 1  | Coffee sales              |                  |                          |
| 2  | Codot coffee              | IDR 49,010,000   | Every year               |
| 3  | Petik Merah coffee        | IDR 10,520,000   | Every year               |
| 4  | Premium coffee            | IDR 10,530,000   | Every year               |
| 5  | INVESTMENT COSTS          |                  |                          |
| 1  | Renovation                | IDR 15,000,000   | Once every 20 years      |
| 2  | Rent a building           | IDR 14,400,000   | per year                 |
| 3  | Roaster (Toper)           | IDR 250,000,000  | Once every 15 years      |
| 4  | Grinder                   | IDR 6,000,000    | 7 years                  |
| 5  | Sealer                    | IDR 4,000,000    | Once in 10 years         |
| 6  | Place to dry              | IDR 240,000      | 5 years                  |
| 7  | Digital scales            | IDR 110,000      | 13 years old             |
| 8  | Large scales              | IDR 2,500,000    | 13 years old             |
| 9  | Spoon sample              | IDR 30,000       | 5 years                  |
| 10 | Bucket                    | IDR 90,000       | 5 years                  |
| 11 | Glass cabinet             | IDR 2,100,000    | Once every 15 years      |
| 12 | The gas hose              | IDR 119,000      | 1 year                   |
| B  | OPERATING COSTS           |                  |                          |
| 1  | Electricity               | IDR 6,000,000    | per year                 |


| No | Components                                    | Price (IDR/year) | Time Management       |
|----|-----------------------------------------------|------------------|-----------------------|
|    | **BENEFITS**                                  |                  |                       |
| 1  | Coffee sales                                  |                  |                       |
| 2  | a Codot coffee                                | IDR 561,600,000  | Every year            |
|    | b Petik Merah coffee                          | IDR 230,400,000  | Every year            |
|    | c Premium coffee                              | IDR 234,000,000  | Every year            |
|    | **COST**                                      |                  |                       |
|    | **INVESTMENT COSTS**                          |                  |                       |
| 1  | Renovation                                    | IDR 115,200,000  | Once every 20 years   |
| 2  | Rent a building                               | IDR 120,000,000  | per year              |
| 3  | Roaster (Toper)                               | IDR 250,000,000  | Once every 15 years   |
| 4  | Grinder                                      | IDR 6,000,000    | 7 years               |
| 5  | Sealer                                        | IDR 4,000,000    | Once in 10 years      |
| 6  | Place to dry                                  | IDR 240,000      | 5 years               |
| 7  | Digital scales                                | IDR 880,000      | 13 years old          |
| 8  | Large scales                                  | IDR 20,000,000   | 13 years old          |
| 9  | Spoon sample                                  | IDR 240,000      | 5 years               |
| 10 | Bucket                                        | IDR 600,000      | 5 years               |
| 11 | Glass cabinet                                 | IDR 16,800,000   | Once every 15 years   |
| 12 | Gas-hose                                      | IDR 119,000      | 1 year                |
|    | **OPERATING COSTS**                           |                  |                       |
| 1  | Electricity                                   | IDR 46,800,000   | per year              |
| 2  | Gas                                           | IDR 2,310,000    | per year              |
| 3  | Roaster maintenance                           | IDR 900,000      | per year              |
| 4  | Grinder maintenance                           | IDR 2,400,000    | per year              |
| 5  | Sort employee                                 | IDR 14,400,000   | per year              |
| 6  | Roaster employee                              | IDR 14,400,000   | per year              |
| 7  | Grinder and sealer employees                  | IDR 7,200,000    | per year              |
| 8  | Codot coffee beans                            | IDR 156,000,000  | per year              |
| 9  | Red quotation coffee beans                    | IDR 96,000,000   | per year              |
| 10 | Premium coffee beans                          | IDR 160,000,000  | per year              |
| 11 | Packaging                                     | IDR 108,000,000  | per year              |
| 12 | Dry battery                                   | IDR 338,000      | per year              |

**Table 2** Cash flow of KWT Himawari business coffee with original model
Figure 1. Annual present value from original and optimal models

Table 3. Financial criteria of original and optimal business model of KWT Himawari

|                  | ORIGINAL MODEL            | OPTIMAL MODEL            |
|------------------|---------------------------|--------------------------|
| NPV              | IDR 181,518,037           | IDR 2,356,763,475        |
| IRR              | -5.245%                   | 259.773%                 |
| BCR              | 0.781                     | 1.331                    |

The KWT Himawari currently generates an annual turnover of IDR 70,000,000. Some investors contribute to the coffee processing, but the most capital is received from Bank of Indonesia grant funds. In this model, all of the costs including the roaster machine, machine granted by CSR fund, was counted. If the productivity of the KWT Himawari is not increased, based on a 15-year model, this business will produce an NPV of IDR 181,518,037, an IRR of -5.245%, and a BCR of 0.781. Based on a business feasibility analysis, a business is stated to be feasible if the NPV is greater than 0, the IRR is greater than the loan interest rate, and the BCR is greater than 1. This coffee processing business is unfeasible because the NPV, IRR, and BCR do not meet the eligibility requirements of a business.

Based on the results of an interview with KWT Himawari, it is known that the main process in managing this coffee is roasting process. The roasting process using a Toper-branded roaster takes about 20 minutes. After roasting, the coffee beans are cooled using a blower for 10 minutes and put in a closed bucket for 3 days or more. This roaster has a capacity of 5 kg per roasting process. After processing the data, it is known that coffee production should be optimized to 7,200 kg of coffee per year. If this is done, based on a 15-year model, NPV of IDR 2,356,763,475, IRR of 259.573%, and BCR of 1.331 will be obtained. Coffee management business with an optimal model is feasible because it meets the eligibility requirements of a business.

The optimal model, besides requiring optimization of coffee production into 7,200 kg of coffee per year, requires an increase of selling in coffee products. It needs a lot of new market and it may be reached by using the internet marketing. According to the Central Statistics Agency [10], it is known that coffee imports in Indonesia in 2019 reached 16,617 tons. Meanwhile, according to the Indonesian Coffee Exporters Association (AEKI), it is known that in 2018 the demand for coffee in the domestic market increased from 8 to 10 percent or equivalent to 5,350 to 6,688 tons. Based on this information, it is known that the demand for coffee in the Indonesian and foreign markets is still very large. The market allows for increased productivity from the KWT Himawari coffee business. How to reach a wider market can be done with several strategies, one of them is by using internet marketing.

According to [11], a survey conducted throughout 2016, stated that 132.7 million Indonesians were connected to the internet. The total population of Indonesia is 256.2 million. This indicates an increase of 51.8 percent compared to the number of internet users in 2014. The survey conducted by APJII in...
2014 only saw 88 million internet users. According to [12], internet marketing has five big advantages for companies that use it. First, both small companies and large companies can do it. Second, there are no real limits in the advertising space when compared to print and broadcast media. Third, access and search for information is very fast when compared to express mail or even fax. Fourth, the site can be visited by anyone, anywhere worldwide, and anytime. Fifth, shopping can be done more quickly. Tools can be used to sell the products through the internet market are: 1) Make a website, 2) Join to some online marketplaces, 3) Use social media.

If the optimal model with the respected strategies can be carried out, KWT Himawari companies will get higher benefit than before. In addition, a multiplier effect will emerge, i.e. more labour and absorption of raw coffee beans from the area around KWT Himawari, so that the price of coffee in the area can be relatively stable. This optimal model can also be used as a reference for other entrepreneurs in developing coffee processing businesses.

4. Conclusion

The KWT Himawari is part of the members of the Beringin Jaya Community Forest that produce coffee. Based on this research, we know that after 15 years, KWT Himawari will suffer a loss of IDR 181,518,037. If the members of this company want to keep continuing their business, they need to optimize their production. The optimal business model has been made and it requires an increasing number of markets that may be reached by using internet marketing. With the optimal model, in 15 years, the member of KWT Himawari will get net present value of IDR 2,356,763,475, they can buy a new roaster, and their income will increase. In addition, a multiplier effect will emerge, namely greater labour absorption and absorption of raw coffee beans from the area around KWT Himawari, so that the price of coffee in the area can be relatively stable.

Acknowledgment

We acknowledge Professor Bramasto Nugroho, Professor Dodik Ridho Nurrochmat, Ms. Okta Candra Aulia for their most valuable inputs on this paper. We also acknowledge Ms. Vita the leader of KWT Himawari for allowed us visit her community and made the interview. Our sincere gratitude for all member of KWT Himawari and the National Environomic and Social Talk (NEST), particularly all team members of Forest Management Expedition who helped us to collect data and information. We thank also to the Department of Forest Management for all supports in administrative procedures.

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