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Financial Feasibility of Arabica Coffee Plantation Business Through Partnership Pattern in Solok Regency, West Sumatra

Faidil Tanjung[a], Dwi Evaliza[a] , Rafnel Azhari [a]

[a] Department of Socio and Economic of Agriculture, Faculty of Agriculture, Universitas Andalas, Kampus Unand Limau Manis Padang 25163, West Sumatra, Indonesia

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A B S T R A C T

Lembah Gumanti District has the largest area of Arabica coffee in Solok Regency, with a production of 2588.8 tons in 2019. Some problems farmers face in developing Arabika coffee farming include a lack of knowledge of cultivation techniques and low selling price of coffee (cherry) beans at the farm gate. The Solok Radjo Cooperative emerged to solve farmers' problems and is willing to help develop Arabica coffee plantations in partnership. This study aims to: (1) describe the implementation of partnerships in Arabica coffee farming and (2) analyze the feasibility of arabica coffee farming with partnership pattern. A survey method was used involving 40 sample farmers selected using simple random sampling. Data analysis was carried out qualitatively to determine the implementation and benefits obtained by the partnering parties (farmers and Solok Radjo Cooperative). Quantitative analysis is intended to determine the financial feasibility of developing Arabica coffee with a partnership pattern. In the partnership system, the Solok Radjo Cooperative provides farmers assistance to use superior seeds, socialization of Arabica coffee cultivation and harvesting techniques, and willingness to buy coffee beans (cherry) from farmers with higher prices than local collectors. The benefit obtained by the Solok Radjo Cooperative is the guaranteed supply of Arabica coffee production with better quality. Arabica coffee plantation business through this partnership is feasible with a Net BC ratio of 2.43.

1. INTRODUCTION

The development of the agricultural sector must be directed at a people-based development approach, especially the empowerment of plantation farmers (Zakaria, 2019). Various development outcomes, especially those related to empowering plantation communities, generally have significant incomes enjoyed mainly by large entrepreneurs and have not widely benefited farmers (Hariance et al., 2015). The plantation sub-sector is one of the strategic and mainstay businesses in the Indonesian economy, even during the economic crisis.

Furthermore, Wahyuni et al. (2013) and Afrianingsih et al. (2018) state that the demand for coffee in the world and domestic markets are increasing, especially Arabica coffee which has its specialty. On the other hand, the need for Arabica coffee is growing with the proliferation of brewed coffee businesses and various use of coffee, such as for perfume or cosmetics.

Solok Regency focuses on developing Arabica coffee to meet world market demand by expanding the planting area

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in highland areas. Furthermore, Gatra.com (2019) reports that Arabica coffee in Solok Regency has a vast market share, besides the selling price is also higher than Robusta. Arabica coffee is developed in areas with an altitude of 1,200-1,600 meters above sea level, namely in Lembah Gumanti District and Lembang Jaya, Solok Regency. The support of young agricultural entrepreneurs in the local area supports the development of the Arabica coffee planting area.

The Solok Regency Government's support for developing people's Arabica coffee plantations continues. On the other hand, many rural farmers and young agricultural entrepreneurs are interested in developing Arabica coffee plantations in suitable areas for their agro-climate. However, the development of the Arabica coffee plantation business is faced with a problem, namely business support both in terms of financing and technical aspects of the Arabica coffee plantation business. The Solok Radjo Cooperative expressed a willingness to cooperate with farmers and young agricultural entrepreneurs to cultivate Arabica coffee with a partnership pattern. Thus, the research problem can be formulated by implementing the Arabica coffee partnership pattern between farmers and cooperatives and the feasibility of smallholder Arabica coffee plantations through a partnership pattern.

This study aims to: (1) determine the implementation model of the partnership pattern in developing Arabica coffee plantations and (2) analyze the financial feasibility of the arabica coffee plantation business in Solok Regency.

2. METHOD

The research location was determined purposively, namely in Lembah Gumanti District, for the following reasons; (1) Lembah Gumanti Sub-district is an agro-climatically suitable location for arabica coffee exploitation; (2) The presence of the Solok Radjo Cooperative, which opens up opportunities to develop coffee plantations in partnership; (3) The number of young farmers and agricultural entrepreneurs who are interested in investing in Arabica coffee plantations as Solok Radjo cooperative partners. The research was carried out for six months, from June to November 2021.

In line with the purpose of this research which emphasizes feasibility analysis and partnerships in developing people's arabica coffee, the appropriate research method combines a quantitative approach (survey) and a qualitative approach (case study). This research method employed a dominant-less dominant approach. Creswell (2016) states that in research with dominant-less dominant positions, the survey results will be studied further with qualitative methods through interviews with key informants.

To achieve goal 1, a qualitative analysis was carried out on the data obtained from key informants regarding the implementation of the partnership implementing the development of Arabica coffee. Qualitative analysis of the partnership pattern in the development of Arabica coffee plantations includes: (1) the process of implementing the partnership pattern; (2) the form of cooperation between farmers and partners (Solok Radjo cooperative); (3) The benefits obtained by the partnering party in the development of people's coffee plantations,

A quantitative approach was used to determine the financial feasibility of coffee plantations in the partnership pattern. Data analysis to determine business feasibility using investment criteria, namely NPV, Net B/C, IRR, PBP, and the sensitivity of the analysis are as follows (Husnan, 1994):

2.1. Net Present Value (NPV)

Net Present Value is a method to compare the present net cash inflows (proceeds) with the Value of investment expenditure costs. The formula for the NPV value is as follows:

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

Informatio
NPV = Net Present Value
Bt = Benefit in year t
Ct = Cost in year t
t = Period or year t
i = The prevailing interest rate (i = 12%)
n = the economic life of the project (25 years)

The assessment criteria are as follows:
a) NPV > 0 (positive), the arabica coffee plantation business is feasible to be implemented.
b) NPV < 0 (negative), arabica coffee plantation business is not feasible or rejected
c) NPV = 0, arabica coffee plantation business is at break-even point (BEP)

2.2. Net Benefit Cost Ratio (Net B/C)

Net Benefit Cost Ratio (Net B/C) is a method of comparing the present value of positive net revenues and the negative Value of investment expenditures during the economic life of the business. The Net B/C Value is calculated using the following formula:

$$Net\ B/C = \frac{\sum_{t=0}^{n} Net\ Benefit\ (+)}{\sum_{t=0}^{n} Net\ Benefit\ (-)}$$

Net Benefit (+) = Net benefit after discount is positive (+)
Net Benefit (-) = Net benefit after discount is negative (-)
t = Period or t year
n = Lenght period (economic life of the project 25 years)

The assessment criteria are as follows:

a) Net B/C > 1, arabica coffee plantation business is feasible to be implemented.
b) Net B/C < 1, arabica coffee plantation business is not feasible.
c) Net B/C = 1, arabica coffee plantation business is at the break-even point (BEP)

2.3. Internal Rate of Return (IRR)

Internal Rate of Return (IRR) is the discount rate that causes the net present Value (NPV) to be equal to zero (0). The following formula calculates the IRR value:

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

Information:
IRR: Internal Rate of Return
NPV+ : positive NPV (Rp)
NPV- : negative NPV (Rp)
i+ : Interest rate (%) on NPV+
i - : Interest rate (%) on NPV-

The assessment criteria are as follows:

a. IRR > 12%, the arabica coffee plantation business is feasible to be cultivated and developed.
b. IRR < 12%, the arabica coffee plantation business is not feasible to be cultivated and developed.
c. IRR = 12%, arabica coffee plantation business is at the break-even point (BEP)

2.4. Payback Period (PBP)

Pay Back Period (PBP) is a period required for the investment return from net cash flow or cumulative revenue flow equal to the amount of investment in the form of present Value. The Payback Period (PBP) is calculated as follows (Soetriono, 2015):

$$PBP = T_{p-1} + \frac{\sum_{i=1}^{n} \overline{I_i} - \sum_{i=1}^{n} \overline{B_{icp-1}}}{\overline{B_p}}$$

Information:
PBP = Payback Period
Tp-1 = the year before the occurrence of PBP
I = Total investment after discount
B_{icp-1} = The number of benefits that have been discounted before PBP
Bp = The amount of benefit on PBP

The assessment criteria are as follows:

An investment is worth investing in a project if the calculation result of the payback period is shorter than the maximum payback period, and vice versa; if the payback period is longer than the maximum Period, the investment is not feasible.

a. PBP < 25 years, meaning that investment in Arabica coffee plantations is feasible
b. PBP > 25 years, meaning that investment in Arabica coffee plantations is not feasible

2.5. Sensitivity analysis (SA)

Sensitivity analysis is performed to see changes to the IRR if they occur; (a) a decrease in benefits due to the decline in cherry prices and a 20% reduction in production. (b) increase in production costs by 20%. Sensitivity analysis reflects a reduction in IRR due to an increase in expenses or a decrease in benefits.

The assessment criteria are as follows:

IRR (SA) > i indicates that the arabica coffee plantation business is still feasible and not sensitive to a decrease in benefits and or an increase in costs.
IRR (SA) < i, indicates arabica coffee plantation business is not feasible to be continued and is very sensitive to a decrease in benefits and or an increase in costs.

3. RESULTS AND DISCUSSION

3.1. Characteristics of Arabica Coffee Farmers

This research was conducted in Lembah Gumanti District, the second largest area after Tigo Lurah District in Solok Regency. The area's topography is hilly with medium and high plains, with an altitude of 1382-1458 meters above sea level. This area is very suitable for the development of Arabica coffee plantations. Rukmana (2014: 86) and Sumina et al. (2016) said that Arabica coffee farming can be planted in areas with an altitude of 500-2000 meters above sea level. The optimal growth and production are in areas with an altitude of 800-1500 meters above sea level with rainfall between 2000-3000 mm/year as an area located in the highlands with temperatures ranging between 180C-300C. The type of Alluvial soil is gray to brownish with a sandy loam texture, including an agro-climate suitable for cultivating Arabica coffee plantations.

Arabica coffee plantation business in Lembah Gumanti District has been going on for a long time, in addition to other horticultural farming. Characteristics of Arabica coffee farmers in this research area include several aspects, namely the age of the farmer, education level, area of land cultivated, source of livelihood or primary type of work, farming experience, number of dependents, and land ownership status.

Arabica coffee farmers generally are of the productive age range of 25-60 years. And only a tiny percentage (10%) of Arabica coffee farmers are over 60 years old. Characteristics of the age of farmers classified as products that will affect the exploitation of Arabica coffee. The age of farmers is classified as productive (25-60 years), indicating the development of Arabica coffee plantations

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in this area has promising opportunities. Mahendra (2014) revealed that farmers in the age range of 25 -60 years are classified as productive age, and the agricultural business they are engaged in will have prospects for development. In general, the education level of Arabica coffee farmers in this area is junior high school and senior high school graduates, and only a tiny percentage (10%) have an elementary school education level. The education level of Arabica coffee farmers in this area is relatively high, thus facilitating the absorption of innovations for developing Arabica coffee plantations.

Zainura et al. (2016) stated that a higher level of farmer education affects farmers in adopting new technologies and entrepreneurship. In addition to government support in the form of counseling and training, capital assistance and production inputs, promotion and marketing, business regulations, and the availability of market information, it is deemed adequate to follow the needs of farmers.

The land area cultivated by farmers for Arabica coffee is more with a land area of 0.5 ha (60%), and the rest (40%) farmers who grow Arabica coffee with a land area of more than 0.5 ha. The size of land cultivation for Arabica coffee indicates that farmers are more intensive in managing their farming, starting from fertilization, weeding, pest and disease prevention, and harvesting. It suggests that farmers carry out their activities for Arabica coffee plantations because of the difficulty of obtaining paid labor (outside the family) and, at the same time, minimizing the costs to be incurred by farmers.

The implementation of Arabica coffee cultivation is carried out, starting with land clearing. Land designated for Arabica coffee cultivation is new land (vacant land/no cultivation) and land previously planted with horticulture (Pudji, 2012). Land preparation takes 5-7 days, depending on the land area, the type of previous use, and the amount of labor used. The average use of labor carried out in land preparation is four working days (HOK) with a wage of Rp. 75,000/HOK. Land preparation includes clearing land to be used as planting areas. The next activity is making planting holes size 40cm x 40 cm x 40 cm with a distance between holes of 2.5x2.5 meters. Plan- ting holes that have been made are given compost (manure) of as much as 5kg per planting hole.

Arabica coffee seedlings are planted in planting holes that have been given compost. The seeds used are superior seeds obtained from Arabica coffee breeders, seeds from local government assistance, and or seeds produced by the Solok Radjo Cooperative. Solok Radjo Cooperative is always present to assist farmers in the use of seeds and planting by farmers. The number of workers needed for this planting is 3 HOK with a wage of Rp. 75,000/HOK.

Arabica coffee plants are maintained through fertilization, weeding, pruning, and controlling plant pests and diseases. The fertilizers used by farmers are manure, urea, and NPK fertilizers. The number of doses of fertilizer used is irregular depending on the availability of funds to buy fertilizer and the availability of the fertilizer itself. The maintenance of coffee plants by farmers following the direction of the Solok Radjo Cooperative.

3.2. Solok Radjo Cooperative as a Partner of Arabica Coffee Farmers

The Solok Radjo Cooperative was founded in June 2014 in Nagari Air Cold, Lembah Gumanti District, Solok Regency. The establishment of this Cooperative is based on the farmers' need to develop Arabica coffee plantations which they have been working on so far. The problem they face is that the price of Arabica coffee they produce is low, set by local collectors, around Rp. 2,500–Rp. 4,500/Kg, and there is no alternative to market their Arabica coffee production other than to the local collectors. On the other hand, farmers generally understand that the Arabica coffee they produce has a special taste because it is supported by an appropriate agro-climate, such as an altitude above 1200 m above sea level, with an air temperature of 24-280 C and fertile land.

This condition encourages farmers to establish farmer cooperatives to overcome the problems farmers face in Arabica coffee cultivation and low selling prices. This desire paid off, namely, the establishment of a cooperative initiated by local farmers and youth. The coffee cooperative built was named the Solok Radjo Cooperative, started by Mak Radjo (coffee farmer/community leader), Alfadriansyah, and Zulfikar. One of the founders of this cooperative, Mak Radjo, was considered to have a significant role, and they agreed to include the name in question in the name of this coffee cooperative, namely the Solok Radjo Cooperative.

The Solok Radjo Cooperative has a vision and mission, namely: (Vision: Developing arabica coffee with a sustainable agricultural orientation, with the following tasks: (1)trying to produce the best green arabica coffee by implementing procedures; (2) tested, measurable and controlled post-harvest in one agribusiness management; (3) Develop a national Arabica coffee green bean market to provide higher price margins at the coffee farmer level, and (4) Build a controlled smallholder plantation concept with comprehensive and sustainable agricultural management principles. Strengthening the position of the Solok Radjo Cooperative as a community institution already has a legal entity through a notary Yeni Gusnita, SH. M.Kn in August 2016.

The Solok Radjo Cooperative is home to specialty coffees produced by the Minang region, which farmers and the farmer groups manage within it. The Solok Radjo Cooperative was established not only to solve the problem of low coffee prices but also as a place for farmers to share knowledge about good and correct coffee cultivation from

the cultivation process to the coffee post-harvest process. The Solok Radjo Cooperative is a production because the Solok Radjo cooperative produces coffee beans from its members.

The management of the Solok Radjo Cooperative consists of Chairman, Secretary, Treasurer, Audit & Supervisory Board, and is equipped with Seeds and Nurseries, Agronomy, Production, and Warehouse sections. The chairman of the Solok Radjo Cooperative, Alfadriansyah, is the son of an Arabica coffee farmer and has the ability as a Q grader (determining the quality of Arabica coffee produced by farmers) and willingness to follow the methods of growing Arabica coffee recommended by the Cooperative.

The Solok Radjo Cooperative carries out its role as a farmer partner in cultivating Arabica coffee, including directing farmers about its cultivation and marketing. Socialization activities on cultivation carried out by cooperatives include land clearing, use of superior seeds, spacing and planting, maintenance and harvesting, and post-harvest techniques. This socialization activity was carried out by making visits to the lands of farmers who were members of the Cooperative at a time agreed upon by both parties. Included in harvesting and post-harvest handling, the cooperative, through its force team, teaches farmers to determine the harvest time, namely when the coffee cherries are ripe, or the fruit's skin color is entirely red. In general, farmers fostered through this partnership already have experience in arabica coffee farming but are not in line with the recommended technical culture. The Solok Radjo Cooperative is here to improve the ability of farmers to cultivate arabica coffee.

The Solok Radjo Cooperative has a Harvest Yield Collection Unit (UPH), which is a unit for collecting coffee cherries from members of the Cooperative in the form of cherries. UPH, which Kopi Solok Radjo founded, is located in two places: in Lembah Gumanti District and Danau Kembar District. Establishing this UPH makes it easier for farmers to sell their harvests and shorten the distance traveled. So that the quality of farmers' coffee is controlled because it does not take long to market the results to cooperatives.

The Solok Radjo Cooperative only buys coffee harvested in the form of cherries and sets the purchase price for coffee in the form of cherries to farmers at a minimum of Rp. 7000/Kg and much higher than the price set by local collectors of Rp. 2500 - Rp.4500/Kg. Furthermore, the cooperative process the cherries from farmers to be used as green beans (coffee beans). To produce 1 kg of green bean, it takes 7 kg of cherries with a yield of 14.5%. The Solok Radjo Cooperative only sells coffee in the form of green beans (processed coffee beans), with different prices according to the quality: specialty Rp. 85.000/kg, natural Rp. 110,000/kg, honey Rp. 95.000/kg, and full wash Rp. 85,000. The difference in the price of green beans depends on the cherry produced by farmers and the processing process. The determination of green bean quality is carried out by Q Grader, which the Solok Radjo Cooperative already owns.

Thus, the Solok Radjo Cooperative has a role in developing Arabica coffee plantation businesses for farmers, from providing input, cultivation, counseling, and ensuring the price of cherry coffee. Cooperatives play a role in providing inputs, especially Arabica coffee seeds, and in the form of compost obtained through the Solok Regency plantation office.

The role of cooperatives in the cultivation of coffee plants, such as counseling carried out in the form of socialization of land clearing, planting, maintenance, and harvesting socialization provided by the support team. Socialization of land clearing and planting methods was given to farmers who had just started coffee farming, and socialization of land clearing and planting methods was provided directly by the support team by visiting the cooperative members' lands with the cooperative members. Maintenance socialization concerns fertilization, pruning, and pest and disease management. Harvesting socialization provided by the Cooperative is in the form of picking ripe or red fruit. Socialization regarding the method of opening and planting is carried out by agreeing on a time determined by both parties. Socialization regarding maintenance and harvesting is carried out at the end of each month or once a month. The extension provided aims to improve, equalize and improve the standards and quality of farmers' produce.

The role of cooperatives in marketing is as a place for farmers to sell their coffee harvests to cooperative members. After the coffee beans are processed into green beans, the Solok Radjo Cooperative markets its coffee products to various regions, especially coffee cafes located in Padang City and outside other areas.

3.3. The Concept of Partnership in the Development of People's Arabica Coffee Plantations

The development of a community coffee plantation with a partnership pattern in Solok Regency has been running since 2014. The partnership is a collaboration between farmers and the Solok Radjo Cooperative. Referring to Law no. 20 of 2008, that partnership is cooperation in business linkages, either directly or indirectly, based on the principle of mutual need, trust, strengthening, and benefit involving Micro, Small, and Medium Enterprises with Large Enterprises. In line with the Big Indonesian Dictionary (KBBI), partners are friends, co-workers, or colleagues. The word partnership means a relationship between partners to cooperate (Sulistiyani, 2004).

The partnership in developing smallholder Arabica coffee plantations between farmers and the Solok Radjo Cooperative is a collaborative effort carried out by the two parties who collaborate. The form of cooperation that is applied is the sharing of skills, expertise, and information

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in the form of coaching the people of Arabica coffee farmers. The objectives to be achieved are profits for coffee farmers and the assurance of a supply of coffee production that meets the standards required by the Solok Radjo Cooperative. The type of partnership that occurs in developing people's Arabica coffee plantations is more about building social interactions, such as increasing the ability of farmers to try Arabica coffee, mutual benefit, and commitment to produce coffee according to market needs.

The partnership that was built between the two parties emphasized the commitment to produce coffee according to the required standards. The bond of cooperation between farmers and the Solok Radjo Cooperative in developing Arabica coffee is more of an inner bond and is not done in writing. The implementation of this partnership looks effective, as seen from the increase in the ability of farmers to produce Arabica coffee following the coffee production needs desired by the Solok Radjo Cooperative. The Solok Radjo Cooperative benefits from the guaranteed quality and quantity of Arabica coffee grown by farmers. Farmers fostered by the Solok Radjo Cooperative will sell their Arabica coffee production to the Solok Radjo Cooperative because of price and marketing guarantees. This unwritten bond of cooperation (inner bond) between the two parties shows a pattern of mutual need. From the farmers' point of view, they want the ability to produce Arabica coffee at high prices. Solok Radjo Cooperative feels secure in getting Arabica coffee from farmers. The partnership between farmers and the Solok Radjo Cooperative focuses more on coaching, with farmers as the object being fostered and the Solok Radjo Cooperative as the party conducting the coaching. The guidance referred to in this case is the socialization of technical culture (cultivation) of Arabica coffee, maintenance and handling of harvest, and post-harvest.

On the other hand, to overcome the problems faced by farmers, the Solok Radjo Cooperative acts as a problem solver to the issues faced by farmers in cultivating arabica coffee, such as seeds and maintenance (fertilizers and overcoming plant pests and diseases). The Solok Radjo Cooperative will find superior seeds from related parties (such as assistance from local governments) and other parties and distribute these seeds to farmers. This partnership pattern focuses on the farmers as the fostered party and the Solok Radjo Cooperative as the core.

Farmers, as the party fostered by the Solok Radjo Cooperative, contacted the cooperative and asked to be directed in Arabica coffee farming. On the other hand, the management of the Solok Radjo Cooperative also visited farmers to socialize about Arabica coffee cultivation. In general, farmers want to be directed and simultaneously ask the Cooperative to be willing to accommodate their coffee production. With this partnership activity, farmers are greatly assisted in producing and marketing their products. Coffee made by farmers is in the form of Cherry, and the Solok Radjo Cooperative is willing to give a higher price than collectors (local collectors). The price of Cherry purchased by local collectors is around Rp. 5000/kg, and the Solok Radjo Cooperative are willing to give a minimum price of Rp. 7000/kg. With the many benefits farmers receive, such as guidance in cultivation and guarantee of marketing products at higher prices, Arabica coffee farmers in this area want to partner with the Solok Radjo Cooperative.

No specific requirement is needed to become a partner with the Solok Radjo Cooperative. The Solok Radjo Cooperative only conveyed written evidence of farmers' willingness to be guided (directed) to cultivate Arabica coffee following provisions such as using superior seeds, organic fertilizer (manure), harvest, and post-harvest techniques. For the marketing of the produce, the Solok Radjo Cooperative is entirely up to the farmers to sell the coffee they produce to local collectors or the Solok Radjo Cooperative. In general, farmers market their Arabica coffee to the Solok Radjo cooperative. The reasons put forward by the farmers were that the price was higher than the price set by local collectors and as an expression of gratitude for the guidance (directions) carried out by the Solok Radjo Cooperative in Arabica coffee cultivation.

The partnership relationship between the Cooperative and Arabica coffee farmers has the opportunity to create symmetrical information due to the increased ability of farmers to manage Arabica coffee farming (cultivation). The Solok Radjo Cooperative benefits from the quality of coffee produced by farmers. The concept of partnership is a concept of cooperation that has an equal role between the two parties. Farmers are concerned about implementing Arabica coffee cultivation directed by the Cooperative (Pembina), and the Cooperative obtains Arabica coffee following guaranteed quality.

3.4. Financial Analysis of Arabica Coffee Plantations

The feasibility analysis of the development of Arabica coffee plantations by farmers refers to the financial analysis of the Arabica coffee plantation business carried out by farmers. The components in the feasibility analysis consist of two parts, namely (1) costs consisting of investment costs, operational and maintenance costs (O&M), and other costs; (2) benefits consisting of revenue (production x price) and salvage value from the arabica coffee plantation business at the end of the economic life. (the economic life of the project is calculated for 25 years), with an interest rate (opportunity cost/occ) of 12%. The intended costs, in this case, are all costs (victims) incurred for the development of Arabica coffee plantations starting from the first year to the end of the economic life of the project (25 years). The costs for operating an Arabica

coffee plantation consist of investment, land clearing, planting, seed, and equipment costs for Arabica coffee plantations.

3.4.1. Arabica Coffee Plantation Costs

a. Investment cost

Investment costs are all costs incurred by farmers for developing Arabica coffee plantations, including land costs (rent), land clearing, planting, fertilization, seeds, and equipment. Farmers own the land used for the Arabica coffee plantation business, the seeds are obtained from the Solok Radjo cooperative, and the labor for land clearing, making planting holes, and planting is local labor. The fertilizer for planting Arabica coffee seeds is manure from local farmers/ breeders. Equipment to cultivate Arabica coffee plantations is provided directly by farmers in the early stages of the development of Arabica coffee plantations. The investment costs needed for developing Arabica coffee plantations by farmers in partnership with the Solok Radjo Cooperative are as follows (Table 1).

The land used is self-owned, with the prevailing land rent in this area being Rp. 2,000,000/ha/year. In calculating the feasibility of an arabica coffee plantation with an economic life of 25 years, the investment value of a land lease is Rp. 50,000,000/ha.

Table 1. Investment Cost of Arabica Coffee Plantation by Farmers in Lembah Gumanti

Type of Investment Cost	Amount (Rp/Ha)
Land Rent	50,000,000
Land clearing and planting	2,700,250
Seeds	4,800,000
Manure	2,400,000
Equipment	1,000,000
Total	60,432,250

Land clearing for Arabica coffee plantations in this area is calculated from the number of working days (male working days/HOK) to clear land and make planting holes is 25 HOK/Ha with the prevailing wage in this area of Rp. 75,000/ HOK. For planting, 11 HOK workers are needed with a labor wage of Rp. 75,000/HOK. So that the Cost Cost and clearing, making planting holes, and planting is as much as Rp. 2,700,000/Ha.

Farmers in this area use superior seeds following the recommendations of the Solok Radjo Cooperative, namely Andungsari and Sigarar Utang. Seedlings are obtained from breeders and the Solok Radjo cooperative for Rp. 3,000/stem. The seed requirement for each hectare of Arabica coffee plantation is 1600 stems (planting distance of 2.5 m x 2.5 m). The Cost of Arabica coffee seeds issued by farmers is Rp. 4,800,000/Ha. Farmers use manure in the early stages of planting Arabica coffee after the planting holes are prepared. Arabica coffee farmers apply as much as 5 kg of manure per planting hole. The Cost required is 8000 kg/ha at Rp.400/Kg, which is Rp. 2,400,000/Ha.

At the initial stage, farmers working on Arabica coffee have provided the necessary equipment: hoes, wheelbarrows, pruning shears, sickles, hand sprayers, boots, and sacks. This equipment is provided by farmers to be used in Arabica coffee plantation activities, from land clearing to harvesting. The costs incurred by farmers for procuring equipment are following the type of equipment and prices prevailing in the local area. The Cost for the procurement of the equipment is Rp. 1,000,000/Ha.

b. Operational and maintenance costs

Operational and maintenance costs (O&M costs) for arabica coffee plantations in Lembah Gumanti Sub-district (research area) are costs incurred from year 2 to age 25 years (economic life of the project). The operational and maintenance costs consist of fertilizers, pesticides, and labor. These operational and maintenance costs are incurred annually from year 1 to year 25, which differs each year depending on the age of the arabica coffee plant cultivated by the farmer. The O&M costs of the Arabica coffee plantation business carried out by farmers every year can be seen in Table 2 below.

Table 2. Average Operational and Maintenance Cost of Arabica Coffee Plantations in Lembah Gumanti

Plant Age	Operational and maintenance costs (Rp/Ha/Year)			
	Labor	*Fertilizer*	*Pesticide*	*Amount*
1	2,475,000	1,504,000	120,000	4,099,000
2	3,000,000	2,240,000	215,000	5,455,000
3	4,425,000	2,592,000	220,000	7,237,000
4-10	7,650,000	3,520,000	280,000	11,450,000
11-25	8,100,000	2,160,000	280,000	10,540,000

Labor costs include maintenance costs consisting of weeding, fertilizing, pruning, and harvesting costs that vary each year. Year 1 required 15 HOK for weeding and 6 HOK for fertilizing. Furthermore, in year 2, it takes manpower to weed 18 HOK, utilize as much as 7 HOK, and prune 12 HOK. In the third year, labor is needed for harvesting 12 HOK, fertilizing 7 HOK, weeding 20 HOK, and pruning 20 HOK. At the age of 4-10 years, each year required labor for weeding 28 HOK, pruning 24 HOK, fertilizing 8 HOK, and harvesting 12 HOK. At the age of Arabica coffee plants, 11-25 years, the need for labor increases in line with the increase in production and plant age. The need for manpower for weeding is 28 HOK, pruning 24 HOK, fertilizing 8 HOK, and labor for harvesting as much as 48 HOK

Fertilization of coffee plants is different every year; at the age of 1 -2 years, 500 kg of manure is fertilized, 160 Kg/Ha

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of urea, and 56 Kg/Ha of NPK every year. At the age of coffee plants, 3-6 years, 120 kg/ha of urea, 240 kg/ha of NPK fertilizer, and 300 kg/ha of manure are given annually. The age of Arabica coffee plants is 7-10 years, and the annual fertilizer required is 80 kg/ha of urea and 240 kg/ha of NPK fertilizer. At the age of Arabica coffee plants 11-25 years old, 80 kg/ha of fertilizer is given annually, and 120 kg/ha of NPK fertilizer. Farmers also apply pesticides to overcome pests and diseases of coffee plants; the amount of pesticide use is 2 liters/ha and tends to be the same as those applied by Arabica coffee farmers in the research area.

c. Equipment replacement cost

Equipment replacement costs are incurred during the project's economic life, namely for equipment needed or for expired equipment. The equipment used can be seen in Table 3, with the replacement time according to the tool's service life. The Cost of replacing this equipment is shown in Table 3 below.

Table 3. Cost of Equipment Replacement Coffee Plantation Business in Lembah Gumanti

Plant Age (Years)	Equipment Needs	Amount (Rp/Ha)
5	Hoes, wheelbarrow, boots, sickle	680,000
10	Hoes, pruning shears, hand sprayer, wheelbarrow, boots, sickle	1,000,000
15	Hoes, pruning shears, wheelbarrow, boots, sickle	680,000
20	Hoes, pruning shears, hand sprayer, wheelbarrow, boots, sickle	1,000,000

d. Other costs

Other costs incurred by Arabica coffee farmers in the research area (in Lembah Gumanti District, Solok Regency) are land tax costs of Rp. 10,000/ha/year. The costs incurred for Arabica coffee plantations in Lembah Gumanti District during the economic life (25 years) can be seen in Table 4 below.

3.4.2. Benefits of Arabica Coffee Plantation

The benefits or benefits of the Arabica coffee plantation business are the results of the production of Arabica coffee yearly. Arabica coffee started producing at the age of 2.5 years, and its production continues to increase every year in line with the development of the age of the plant. The production value of Arabica coffee is shown in Table 5 below.

Table 4. Total Cost of Arabica Coffee Cultivation in Lembah Gumanti District

Plant Age (Year)	Investment	O&M Cost	Replacement Cost	Other Costs	Total Cost
0	60,432,250	0	0	0	60,432,250
1		4,099,000		10,000	4,109,000
2		5,455,000		10,000	5,465,000
3		7,237,000		10,000	7,247,000
4		11,450,000		10,000	11,460,000
5		11,450,000	680,000	10,000	12,140,000
6-9		11,450,000		10,000	11,460,000
10		11,450,000	1,000,000	10,000	12,460,000
11-14		10,540,000		10,000	10,550,000
15		10,540,000	680,000	10,000	11,230,000
16-19		10,540,000		10,000	10,550,000
20		10,540,000	1,000,000	10,000	11,550,000
21-25		10,540,000		10,000	10,550,000

Table 5. Production Value of Arabica Coffee (Cherry) per year

Plant Age (Years)	Production Cherry (Kg)	Price (Rp/Kg)	Production Value (Rp/Ha/Year)
1	0	7,000	-
2	0	7,000	-
3	520	7,000	3.640.000
4	1.200	7,000	8.400.000
5 - 6	3.200	7,000	22.400.000
7	4.200	7,000	29.400.000
8- 10	4.600	7,000	32.200.000
11-12	7.800	7,000	54.600.000
13-19	8.200	7,000	57.400.000
20-23	7.800	7,000	54.600.000
24-25	6.400	7,000	44.800.000

The feasibility of smallholder Arabica coffee plantations through partnerships with Solok Radjo cooperatives is determined by four criteria, namely: (1) Net BC Ratio; (2) Net Present Value (NPV); (3) Internal Rate of Return (IRR) and (4) Sensitivity Analysis. Financial analysis People's Arabica coffee plantation business is calculated over an economic age of 25 years with an opportunity cost of capital (OCC) or an interest rate of 12%. The Value of each investment criterion is presented in Table 6.

Table 6. Details of Business Feasibility of Arabica Coffee Plantation in Lembah Gumanti District

Description	Total Value
Investment	60,432,250
O&M Costs	255,041,000
Replacement costs	3,360,000
Other costs	250,000
Discount Factor (DF)	12%
Economic Age	25 years
Production (Cherry)	149,520 Kg
Cherry Price	Rp. 7,000/Kg
Total Benefits	1.046.640.000
Total Cost	319.183.250
PV Gross Cost	134.919.376
PV Gross Benefit	228.945.229
NPV1 at DF 17%	29.535.310
NPV2 at DF 23%	- 9.609.134
Investment Criteria	
Net BC Ratio	2.43
Gross BC Ratio	1.69
NPV	Rp. 94.025.853
IRR	20.77%
Sensitivity Analysis	
IRR (Cost Costeased by 20%)	17,96%
IRR (Benefit decreased by 20%)	17,18%

3.4.3. Investment Criteria

The financial analysis of the arabica coffee plantation business conducted by farmers in partnership with the Solok Radjo Cooperative in Lembah Gumanti District, Solok Regency, consists of (1) Net Present Value (NPV); (2) Net BC Ratio; (3) Internal Rate of Return (IRR); (4) Pay Back Period (PBP) and; (4) Sensitivity Analysis. Financial analysis People's Arabica coffee plantation business is calculated for 25 years with an opportunity of capital (OCC) or an interest rate of 12%.

a. Net Present Value (NPV) is the net present Value of a sum of money further obtained from the Arabica coffee farming business with a partnership pattern. The Value of future receipts is converted to present Value at a determined interest rate (12%) with an economic life of 25 years. Based on the calculation of the people's arabica coffee plantation business, this partnership pattern obtained an NPV of Rp. 94,025,853. The accumulated NPV value generated from smallholder arabica coffee business has a positive value. This figure shows that the people's Arabica coffee plantation business with this partnership pattern is profitable and feasible to be developed.

b. Based on the data in table 7 above, the calculation of the Net BC Ratio of the smallholder coffee plantation business in this partnership pattern obtained the present Value (PV) of the gross benefit of Rp. 228,945,2Valued the current PV cost is Rp. 134,919,376. The net BC ratio is 2.4, meaning that a benefit of 2.43 will be obtained for one rupiah of invested capital. With a large Net BC Ratio value of 1, it shows that the arabica coffee plantation business with this partnership pattern is feasible because it brings benefits from the investment invested.

c. Internal Rate of Return (IRR) is a method for determining the interest rate of return. It is used to find an interest rate that equates to the Present Value of expected cash flows in the future. The calculation of NPV1 on DF of 17% and NPV2 on DF of 23%, obtained an IRR of 20.77%. The IRR value obtained is 20.77% greater than the prevailing commercial bank interest rate of 12%. This IRR value indicates that the smallholder Arabica coffee plantation business in partnership with the Solok Radjo Cooperative is feasible and developed.

d. Pay Back Period (PBP) shows that the coffee farming has faster investment return than the maximum age of the arabica coffee (25 years), and it is feasible business.

e. Sensitivity analysis was carried out to determine the feasibility of arabica coffee farming if there are changes in costs, benefits, or the price of arabica coffee beans (cherry).

1. The sensitivity analysis results with an increase in costs of 20% obtained an IRR of 17.96%. The change in IRR to 17.96% indicates that the arabica coffee plantation business is still feasible because it is greater than the OCC of 12%.
2. The results of the sensitivity analysis with a decrease in benefits (a decrease in cherry prices or a decrease in production) of 20% resulted in the IRR of the Arabica coffee plantation business falling to 17.18%. This IRR value is still higher than the commercial bank interest rate of 12%, and the smallholder arabica coffee business with this partnership pattern is still feasible to run.

4. CONCLUSIONS AND RECOMMENDATION

4.1. Conclusion

1. The development of people's arabica coffee plantations through a partnership with the Solok Radjo Cooperative has been running for six years since 2014. It tends to continue to grow in the future. This condition supports the development of Arabica coffee plantations by farmers, and the number continues to increase every year. In 2020 it was recorded that 357 farmers had partnered with the Solok Radjo Cooperative in building Arabica coffee plantations with an area of almost 230 Ha.

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2. The partnership run by the Solok Radjo Cooperative with Arabica coffee farmers includes assistance in using superior seeds, guidance in Arabica coffee cultivation technical, maintenance, harvesting techniques, and the willingness to buy coffee from farmers at a high price. The Solok Radjo Cooperative is willing to cooperate with farmers in building and developing Arabica coffee plantations through a partnership pattern, provided that farmers become active members of the cooperative and own land for Arabica coffee cultivation.
3. The benefits obtained by the two partnering parties, namely from the farmer's side, are the increased understanding of the technical culture of the Arabica coffee plantation business and the guarantee of the selling price of Arabica coffee production received by the farmers. The benefits obtained by the Solok Radjo Cooperative are a guaranteed supply of Arabica coffee production from farmers with better quality following Arabica coffee quality standards.
4. People's Arabica coffee plantation business through this partnership is feasible to run and develop as indicated by the investment criteria: Net BC Ratio of 2.43 (> from 1), NPV Value of Rp. 94,025,853 (positive NPV) and an IRR Value of 20.77% (higher than occ 12%), and a sensitivity IRR of 17.18% (assuming a production decrease of 20%). This condition shows that the development of partnership pattern arabica coffee in Solok Regency is feasible to be cultivated. Thus, young farmers and agricultural entrepreneurs deserve to invest in Arabica coffee plantations in this area because they have high and profitable prospects.

4.2. Recommendation

1. The Solok Radjo Cooperative increases the subject of partnerships in Arabica coffee development by providing financial assistance for the development of Arabica coffee plantations, and the partnering participants expand interested parties to invest in Arabica coffee plantations
2. The farmers who partner with the Solok Radjo Cooperative continue to carry out directives on technical culture, technical maintenance, and harvesting techniques to ensure the quality of Arabica coffee production.
3. Young farmers and agricultural entrepreneurs can invest in Arabica coffee plantations because this business is feasible and profitable.

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