FEASIBILITY OF KELULUT (*Heterotrigona itama*) HONEY BEE CULTIVATION BUSINESSES BY FOREST FARMERS GROUP IN SOTEK VILLAGE, PENAJAM DISTRICT

ABSTRACT

Communities around the forest need a kelulut (***Heterotrigona itama***) honey bee business because it has many benefits, including producing healthy bee products, products with high economic value, and can be an alternative livelihood for the community, especially those around the forest. Cultivating honey bees in kelulut communities around the forest can contribute to the sustainability and improvement of forest ecosystem governance. This research aims to determine the cultivation of kelulut honey bees, the characteristics of breeders, and to analyze the feasibility of the kelulut honey bee business in Sotek Village, Penajam District, North Penajam Paser Regency. This research used a survey method of Kelulut honey beekeepers with a quantitative descriptive approach carried out in Sotek Village, North Penajam Paser District, North Penajam Paser Regency. from March to May 2024. The research stages are preparation, field observation, sample determination, data collection, data analysis, and reporting. The collection in this study used a saturated sampling method, namely all breeders who were still actively running the kelulut bee business and were members of 5 Forest Farmer Groups assisted by KPHP Bongan with a total of 27 members. The feasibility of farming is analyzed using the R/C ratio approach. The results of the research show that (1) kelulut honey bee cultivation technology includes stages of preparation of stup, nest media, colony transfer, production, and harvest; (2) characteristics of Kelulut beekeepers aged between 18 – 63 year, high school education level, 2 years of farming experience, and the number of kelulut honey stock cultivated is between 2 – 10 stups;; (3) the production cost of Kelulut bee honey is IDR 484,029.11/month, the average income is IDR 3,660,555.56/month, the income received by Kelulut honey bee farmers is an average of IDR 3,283,820.87/month, and (4) The R/C Ratio value is 7.65, which shows that the Kelulut honey bee business is efficient and worth pursuing.

Keywords: Kelulut Honey Bee business, Business Feasibility Analysis, Forest Farmer Group

1. INTRODUCTION

The Bongan Production Forest Management Unit (KPHP) is one of the 30 KPHPs in East Kalimantan Province. The Bongan KPHP was established through the Decree of the Minister of Forestry number: SK. 718/menhut-II/2014 [1]. This KPHP has areas in 3 districts covering parts of West Kutai Regency, Paser Regency, and North Penajam Paser Regency. One of KPHP Bongan's activities as part of forest area management is to empower communities around the forest through counseling, assistance, and guidance to communities around the forest to improve welfare.

Community empowerment activities are intended as an effort to resolve land conflicts and develop economic aspects. Community empowerment activities are an effort to increase capacity and productivity towards independence, so that groups will develop and be formed in the community to support and participate in forestry development/management. One of the community groups that have joined to improve the economy and participate in forest conservation is the Forest Farmers Group (KTH) [13,14].

Forest management involving Forest Farmer Groups is very important because there is very high interaction between local communities and the forest area so that the utilization of forest products will be maximized and improvements in economic quality will be easily achieved. [2] stated that increasing the role of communities in forest management is a necessity because communities are an integral part of the forest ecosystem.

Several Forest Farmer Groups fostered by KPHP Bongan utilize the potential of Non-Timber Forest Products (NTFPs) with kelulut bee farming activities. In KPHP Bongan 3 areas cultivate kelulut bees, namely Sotek Village, Sepandan Village, and Bukit Subur Village which are in Penajam District, North Penajam Paser Regency. These three areas still have very large expanses of forest and plantations so they are suitable for the living environment and food availability of kelulut bees. By the statement [3,15,16]

the level of success in cultivating Kelulut honey bees can be assessed in terms of locations such as plantations or forests, these locations can provide abundant food reserves for the survival of the bee colony.

Honey bee cultivation, apart from providing economic benefits for residents around forest areas, also brings ecological benefits because this activity requires maintaining and enriching the population of trees and flowering plants to maintain the availability of bee food. Developing a honey bee business can bring economic and ecological benefits if it is carried out using sustainable cultivation techniques.

To find out how profitable Kelulut honey bee farming is and whether the business activity is feasible to continue to be developed, it can be evaluated by carrying out farming business analysis calculations. Farming analysis is a comprehensive evaluation process of various aspects related to agricultural operations. The aim is to increase the productivity, sustainability, and profitability of farming businesses.

This research aims to determine the cultivation of kelulut honey bees and the characteristics of breeders, as well as to analyze the feasibility of the kelulut honey bee business in Sotek Village, Penajam District, North Penajam Paser Regency.

2. METHODOLOGY

2.1. Place and Time

This research uses a survey method of Kelulut honey beekeepers with a quantitative descriptive approach. The research was carried out from March – May 2024 in Sotek Village, North Penajam Paser District, North Penajam Paser Regency, East Kalimantan Province. The Kelulut honey bee cultivation location belongs to the Bina Bersama Forest Land Group, the Bina Bersama Forest Farmers Group Secretariat Office, the Sotek KPHP Bongan Resort II Office, and the Bongan KPHP UPTD Office.

2.2. Research Activities

The research stages are preparation, field observation, sample determination, data collection, data analysis, and reporting.

2.3. Sample Determination

The collection in this study used a saturated sampling method, namely all breeders who were still actively running the kelulut bee business and were members of 5 Forest Farmer Groups assisted by KPHP Bongan with a total of 27 members.

2.4. Data Collection

The data taken consisted of (1) primary data derived from direct interviews with samples (Kelulut honey bee farmers) using a list of direct questions in the field; and (2) secondary data obtained from related agencies, journals, and research reports related to this research.

2.5. Data Analysis

2.5.1 Analysis of the characteristics of Kelulut honey bee breeders and cultivation was carried out descriptively.

2.5.2. Production cost

Production costs are all costs incurred by farmers in their farming business. Total costs can be calculated using the following formula [4] and [5]: TC=TFC+TVC

Note: TC = Total Cost) (IDR); TFC = Total Fixed cost) (IDR); and TVC = Total Variable Cost IDR)

2.5.3. Revenue

Revenue was obtained by multiplying the production obtained by the selling price. Revenue calculations use the following formula [6]: TR=P x Q

Note: TR = Total Revenue) (IDR); P = Price (IDR); and Q = Quantity (IDR)

2.5.4. Income

Income was the difference between receipts and all costs. Income calculation uses the formula [7] namely: I=TR-TC

Note: I = Income (IDR); TR = Total Revenue (IDR); and TC = Total Cost IDR)

2.5.5. Feasibility of Farming Business

Whether or not a farming business is feasible or not can be measured using the R/C ratio approach, namely the comparison between total revenue and total costs using the formula [4] as follows: R/C = TR/TC
Information: R/C = Revenue Cost Ratio; TR = Total Revenue; and TC = Total Cost.
If the R/C Ratio > 1, then the business being run is profitable or worthy of development. If the R/C Ratio = 1, then the business is at the break-even point (Break Event Point); and if the R/C Ratio < 1, then the business is experiencing a loss or is not worth developing.

3. RESULTS AND DISCUSSION

3.1. Characteristics of Kelulut Honey Bee Breeders

3.1.1. Breeder Age

Age was one of the factors that influences a person's activities in their field of business. Generally, someone who is young and healthy has stronger physical abilities than someone who is elderly. The population aged 15-55 years is included in the productive age. The characteristics of Kelulut honey beekeepers in Sotek Village, North Penajam Paser District are presented in Table 1.

Table 1. Age Distribution of Kelulut Honey Bee Breeders in Sotek Village, North Penajam Paser District in 2024

No	Age Group (Year)	Total (Person)	Percentage (%)
1	18-25	4	14,81
2	26-33	4	14,81
3	34-41	8	29,63
4	42-49	4	14,81
5	48-55	6	22,22
6	56-63	1	3,70
Amount		27	100,00

Source: Processed Primary Data (2024)

Based on Table 1, it is known that in general the age of Kelulut honey beekeepers is generally 8 people aged 18 - 33 years (29.63%), 8 people 34-41 years old (29.63%), and 4 people 42-49 years old. (14.81%), 6 people aged 48-55 years (22.22%) and 1 person aged 56-63 years (3.70%). In general, the average Kelulut honey beekeeper is of productive age.

3.1.2. Level of Education

Education greatly influences the attitudes and decisions that will be taken, especially in implementing innovations that will ultimately affect farmers' production and income. The characteristics of the education level of Kelulut honey beekeepers in Sotek Village, North Penajam Paser District are presented in Table 2.

Table 2. Distribution of Educational Levels of Kelulut Honey Bee Breeders in Sotek Village, North Penajam Paser District in 2024

No	Educational Levels	Total (Person)	Percentage (%)
1	Elementary School	5	18,51
2	Junior High School	7	25,93
3	Senior High School	8	29,63
4	Bachelor	7	25,93
Amount		27	100,00

Source: Processed Primary Data (2024)

Based on Table 2, it is known that the education level of Kelulut honey beekeepers is an elementary school (SD) with 5 people (18.51%), junior high school with 7 people (25.93%), high school with 8 people (29.63%), and undergraduates as many as 7 people (25.93). In general, Kelulut honey beekeepers have adequate education so it is hoped that the application and adoption of technology can be well absorbed to develop their farming business which will ultimately affect production results.

3.1.3. Farming Experience of Kelulut Honey Bee Breeders

Business experience is one of the things that influences an entrepreneur's ability to manage his business with optimal results, because the longer a person's experience in business, the more adept he becomes at making decisions and considerations in running his business. Characteristics of the farming experience of kelulut breeders in Sotek Village, North Penajam Paser District are presented in Table 3.

Table 3. Distribution of Farming Experience of Kelulut Honey Bee Breeders in Sotek Village, North Penajam Paser District in 2024

No	Farming Experience (Year)	Total (Person)	Percentage (%)
1	1	4	14,81
2	2	11	40,75
3	3	8	29,63
4	4	4	14,81
Amount		27	100,00

Source: Source: Processed Primary Data (2024)

Based on Table 3, it is known that the length of experience in Kelulut honey bee farming is 1 year with 4 people (14.81%), 2 years with 11 people (40.75%), 3 years with 8 people (29.63%), and 4 years as many as 4 people (14.81%). In general, Kelulut honey beekeepers are still relatively new.

3.1.4. Number of Bee Boxes (Stup)

The bee box (stup) is one of the factors that influence kelulut honey production, the more the number of stups cultivated, the more honey production will be produced. The characteristics of the number of stups cultivated by Kelulut honey beekeepers in Sotek Village, North Penajam Paser District are presented in Table 4.

Table 4. Distribution of the Number of Kelulut Honey Bee Breeding Staff in Sotek Village, North Penajam Paser District in 2024

No	Number of stups cultivated (stup)	Total (Person)	Percentage (%)
1	2-10	8	29,63
2	11-19	3	11,11
3	20-28	6	22,22
4	29-37	4	14,81
5	38-46	5	18,52
6	47-55	1	3,70
Amount		27	100,00

Source: Processed Primary Data (2024)

Based on Table 4, it is known that the number of 2-10 stups is 8 people (29.63), the number of 11-19 stups is 3 people (11.11%), the number of 20-28 stups is 6 people (22.22). , the number of stup 29-37 was 4 people (14.81%), the number of stup 38-46 was 5 people (18.52%), and the number of stup 47-55 pieces for 1 person (3.70%).

3.2. Kelulut Honey Bee Cultivation

Based on the results of interviews with breeders, in general, the Kelulut honey bee cultivation activities carried out by breeders at the research location are as follows:

1. Making bee boxes: breeders make bee boxes/stups of different sizes according to the conditions where the stup is sheltering or standing. However, not larger than 60 x 40 x 20 cm.
2. Prepare the nest or stup media: the stup is made upright on the ground around the bridal tear plant as the main source of food for kelulut bees, then part of the stup is hung on the terrace of the house or a shade canopy is made.
3. Moving the bee colony to Kelulut: the colony is moved in the morning, the transfer is done by moving the queen first, then the eggs.
4. Production process: the development of kelulut in producing honey is quite varied, ranging from 2-6 months. kelulut bee production process The nest cover must not be opened. If you open it just to see the development of the kelulut bee colony and nest, it should not be too long, because it can affect the production and quality of honey and avoid pest attacks and ant nests.
5. Kelulut honey harvesting: harvesting activities are carried out every month, harvesting is carried out by taking the kelulut honey bee nest in a stopper carefully using a modified suction pipette using a vacuum system.

3.3. Kelulut Honey Bee Business Analysis

3.3.1. Initial Costs (Capital)

Initial costs or capital is one of the important factors in the Kelulut honey bee farming business. Business capital together with other cost production factors will produce products. The state of business capital for Kelulut honey bee breeders in Sotek Village, North Penajam Paser District is presented in Table 5.

Table 5. Condition of Business Capital for Kelulut Honey Bee Farmers in Sotek Village, North Penajam Paser District

No		Initial capital (IDR)	Total (Person)	Percentage (%)
1		5.000.000 - 10.000.000	6	22,22
2		10.000.000 – 15.000.000	5	18,52
3		15.000.000 – 20.000.000	4	14,82
4		20.000.000 – 25.000.000	5	18,52
5		25.000.000 – 30.000.000	1	3,70
6		30.000.000 – 35.000.000	5	18,52
7		35.000.000 – 40.000.000	1	3,70
	Jumlah		27	100,00

Source: Source: Processed Primary Data (2024)

Based on Table 5, it is known that business capital is IDR 5,000,000 - 10,000,000 for 6 people (22.22%), business capital is IDR 10,000,000 - 15,000,000 for 5 people (18.52%), and business capital is IDR 15,000. 000 - 20,000,000 as many as 4 people (14.82%), capital business IDR 20,000,000 - 25,000,000 as many as 5 people (18.52%), business capital IDR 25,000,000 - 30,000,000 as much as 1 person (3.70%), business capital IDR 30,000,000 - 35,000,000 as much 5 people (18.52%), and business capital IDR 35,000,000 - 40,000,000 for 1 person (3.70%).

3.4. Farming Business Analysis

3.4.1. Fixed Costs

Fixed costs are costs that are relatively fixed in amount and continue to be incurred during the production process. Data regarding the use of fixed costs incurred by Kelulut honey beekeepers in Sotek Village, North Penajam Paser District can be seen in Table 6.

Table 6. Distribution of Use of Fixed Costs for the Kelulut Honey Bee Business in Sotek Village, North Penajam Paser District in 2024

No	Description	Amount (Unit)	Value (IDR/month)
1	Bee Jacket	1,48	9.979,42
2	Honey Vacuum Machine	1,70	26.975,31
3	Gloves	6,22	2.565,14
4	Box (Stup)	22,19	221.666,98
Amount		31,59	261.186,85

Source: Processed Primary Data (2024)

Based on Table 6, it is known that the fixed costs used by Kelulut honey breeders in Sotek Village, North Penajam Paser District are IDR 261,186.85 per month. These costs are costs used from the depreciation of farming equipment such as bee jackets, honey vacuum machines, gloves, and bee boxes.

3.4.2. Variable costs

Non-fixed costs or variable costs are costs whose amounts change depending on the volume of activity. Data regarding the use of variable costs used by Kelulut honey beekeepers in Sotek Village, North Penajam Paser District can be seen in Table 7.

Table 7. Use of Variable Costs for Kelulut Honey Bee Farmers in Sotek Village, North Penajam Paser District in 2024

No	Description	Queen Bee (Tail)	Value (IDR/month)
1	Purchasing Kelulut Honey Bee Seeds	42,79	222.842,36
Amount		42,79	222.842,36

Source: Processed Primary Data (2024)

Based on Table 7, it is known that the number of colonies used by Kelulut honey beekeepers is 599 colonies and each colony has 1 queen bee, so the average queen bee used by Kelulut honey beekeepers in the research location is 42.79 queen bees, with an average of average variable costs are IDR 222,842.36 per month. These costs are the costs used to purchase Kelulut honey bee seeds.

3.4.3. Kelulut Honey Production, Revenue and Income

Kelulut bee honey can be harvested at the age of 2 – 6 months, honey production is 6.66 liters with a selling price at the research location of IDR 550,000 per liter. The revenue and income of adu kelulut beekeepers in Sotek Village, North Penajam Paser District can be seen in Table 8.

Table 8. Production and Income of Kelulut Honey Bee Farmers in Sotek Village, North Penajam Paser District in 2024

No	Description	Amount (Unit)	Value (IDR/month)
1	Production (liters)	6,66	
2	Price (IDR/liter)		550.000,00
3	Revenue		3.660.555,56
4	Production Costs (Fixed Costs and Variable Costs)		484.029,11
5	Income		3.283.820,87

Source: Processed Primary Data (2024)

Based on Table 8, it is known that revenue is IDR 3,660,555.56/month, production costs come from fixed costs of IDR 261,186.85, and variable costs of IDR 222,842.36, so the income received by farmers is revenue minus production costs, which is IDR 3,283,820.87/month.

3.4.3. Business Feasibility (Business Efficiency)

Farming business efficiency or R/C ratio (Revenue Cost Ratio) is used to measure the level of business efficiency as seen from the ability of the business to be able to generate profits with a certain amount of costs incurred. The greater the RCR, the greater the profits obtained by the entrepreneur. According to [4], to determine whether a farming business is feasible or not, it can be measured using the R/C ratio approach, namely the comparison between total revenue and total costs. Based on the research results, it is known that the farmer's income is IDR 3,660,555.56 and production costs are IDR 484,029.11, so the R/C ratio value is 7.563. This means that every IDR 1 spent in the Kelulut honey bee business will produce a gross income of IDR 7.56 and a net income of IDR 6.56, so it can be stated that the Kelulut honey bee business is efficient and worth pursuing. Similar research results were reported by [8] on the efficiency of the *Trigona* sp honey bee cultivation business. In Landono District, South Konawe Regency with an average R/C ratio of 3.01, which means that the cultivation business is profitable and feasible to continue. [9] reported that the Kelulut honey bee cultivation business at the Malimbu Resort is also feasible with an NPV value = IDR. 45,491,153 – Rp. 92,973,767/ 10 years; BCR = 1.21 – 1.34; IRR = 23.52% – 27.91%. [10] reports that honey bee farmers in Paya Cut Village, Juli District, Bireuen Regency, production costs for cultivating honey bees are an average of IDR. 10,861,000 per year, the total gross income received is Rp. 56,040,000 per year, so the average net income obtained is Rp. 45,179,000 per year with an R/C ratio value of 5.159. It was also reported by [11] that the costs incurred for the production of honey from Kelulut bee cultivation on Lombok Island amounted to IDR 17,893,468, revenues amounted to IDR 21,850,000 resulting in a profit of IDR 3,956,532. The RC ratio value obtained is 1.2, which means that the kelulut cultivation business is worth pursuing. The profits obtained are relatively small. This is due to the scale of the business which is still small; and [12] reported that the total revenue from the Kelulut honey business of the Rimbun Lestari Forest Farmers Group in Kampar Regency was IDR. 110,845,000/year and total production costs of Rp. 8,734,000/year, so that the total net income from kelulut honey for one year is Rp. 102,111,000, the R/C ratio value is 12.691, which means that the cultivation business is profitable and feasible to continue.

4. CONCLUSIONS AND RECOMMENDATIONS

4.1. Conclusion

Based on the results of the research and discussion, conclusions are drawn, namely as follows: (1) Kelulut bee cultivation technology includes stages of preparation of stup, nest media, colony transfer, production, and harvest, (2) Characteristics of kelulut beekeepers aged between 18-63 years, high school education level, 2 years of farming experience, and the number of kelulut honey stock cultivated is between 2 – 10 stups, (3) the production cost of Kelulut bee honey was (IDR. 484,029.11/month, the average income of farmers is IDR 3,660,555.56/month, the income received by Kelulut honey bee farmers is an average of

IDR 3,283,820.87/month, and (4) the R/C Ratio value is 7.65, which shows that the Kelulut honey bee business is efficient and worth pursuing.

4.2. Suggestion

Based on the research results, several suggestions are put forward, namely : (1) for kelulut breeders as a whole, they can provide alternative feed for their cultivated bees so that honey production is greater, such as sugar water or sugar cane juice as a substitute for natural flower essence, or planting bridal tears plants, and (2) he government is expected to pay more attention to kelulut breeders in Sotek Village, North Penajam Paser District because their potential is very good, such as technical guidance/continuous development and providing assistance with seeds or bee colonies because the price of seeds is relatively expensive.

Disclaimer (Artificial intelligence)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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