Sensitivity Analysis of Swiftlet Farming in Kota Bangun, District Kutai Kartanegara Regency, Indonesia

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ABSTRACT
farming is a high-risk business. However, given the level of income (as measured by financial viability), most swiftlet farmers take the risk. Swiftlet farming is a business that lasts for a long time. During this period there are several changes that occur, which will affect the viability of the business. These changes include costs, selling prices and production. This research aimed to analyze the sensitivity of swiftlet farming in Kota Bangun Subdistrict, East Kalimantan, Indonesia. This research used quantitative analysis method. Data were collected using purposive sampling to determine the location and sample of swiftlet houses, as well as in-depth interviews with respondents. The sensitivity analysis of Swiftlet farming was analyzed using the net Benefit-Cost Ratio (net B/C), Net Present Value (NPV), Internal Rate of Return (IRR) and Payback Period (PP) methods, assuming an increase in operating costs of 15 % and a 30% reduction in benefits. The results showed that Swiftlet farming in Kota Bangun District is still financially feasible if there is an increased in operational costs by 15% or a decreased in benefits by 30%, as well as an increased in operational costs and a decreased in benefits occured simultaneously.

***Keywords**: Benefit, Cost, Financial feasibility, Sensitivity analysis, Swiftlet*

1. INTRODUCTION

The number of demands for swiftlet nests continues to increase and the prices are relatively high, resulting in more and more people who are interested in pursuing swiftlet farming. The traded swiftlet nests come from swiftlet houses and caves in the forest. Loot harvesting techniques that do not pay attention to sustainability make the swiftlet population less and less, so that the availability of swiftlet nests decreases, while demand increases. To answer this question, a swiftlet farming was carried out by making a swiftlet house [1]. Swiftlet farming by building swiftlet houses began to develop in Indonesia in the 1800s [2].

Each area where there is swiftlet cultivation has its own uniqueness, both geographically, Swiftlet population, food sources and micro environment, including whether the swiftlet cultivation area is man-made or natural habitat [3][5]. One of the islands that produce edible swiftlet nests is the island of Borneo [4]. There are two types of swiftlet houses on the island of Borneo, made of concrete or wood. The cost of making a concrete swiftlet house is more expensive to build than a wooden building [6]. The area of the swiftlet house varies, depending on the area of land and the capital owned.

Consideration in choosing a business is the feasibility or benefits that will be obtained later. The market value or selling value of the swiftlet's nest is one of the determinants of the revenue to be obtained and the profits obtained. On the other hand, acceptance is also determined by the number of edible swiftlet nest produced. According to [6] land cover around the Swiftlet house affects the productivity of the swallow's nest produced from the Swiftlet's house, because land cover affects the availability of feed for the Swiftlet. In addition, a business that takes place in the long term, of course, cannot be separated from the business risks it faces. In the edible Swiftlet nest business, there are several changes that are feared to result in reduced profits, including an increase in operational costs if there is an effort to meet the Swiftlet's feed needs.

Another change is the decrease in benefits due to lower selling prices. Because of these changes, it is necessary to carry out a sensitivity analysis.

This research aimed to analyze the sensitivity of swftlet farming in Kota Bangun District, Kutai Kartanegara Regency.

2. MATERIALS AND METHODS

This research was conducted in Kota Bangun District, Kutai Kartanegara Regency. The swiftlet house observed was chosen purposively, the selection was based on the building material of the swiftlet house (made of wood), already in production and the size of the swiftlet house (more than 400 m^2). The research was conducted from June 2019 to December 2019.

Sensitivity analysis was carried out through financial feasibility assessment, which was analyzed using net benefit-cost ratio (Net B/C), net present value (NPV), internal rate of return (IRR) and payback period (PP) [7-12]:

2.1. Net benefit-cost ratio (net B/C)

Net B/C is the ratio between the present value of positive net benefits and the present value of negative net benefits.

$$NetB/C = \frac{\sum_{t=1}^{n} NBt(+)}{\sum_{t=1}^{n} NBt(-)} \quad (1)$$

(a business is feasible or profitable if Net B/C > 1, not feasible if Net B/C < 1, and the project is not profitable or loses if Net B/C = 0).

2.2. Net Present Value (NPV)

Net present value is the difference between the present value of the benefits and the present value of the costs.

$$\text{NPV} = \sum_{t=1}^{n} \frac{Bt - Ct}{(1+i)^t} \quad (2)$$

Note :
Bt = benefit or gross profit in year t (Rp)
Ct = cost in year t (Rp)
i = discount factor (%)
n = economic life of swiftlet house (years)

A business is feasible or profitable if NPV > 0, not profitable or loss if NPV < 0, and will return on capital or break even if NPV = 0.

2.3. Internal Rate of Return (IRR)

The discount rate that can define a project's NPV as zero or the benefit-cost ratio equal to one is called the IRR.

$$\text{IRR} = i' + \frac{NPV'}{NPV' + NPV''}(i'' - i') \quad (3)$$

Note :
NPV' = positive NPV
NPV" = negative NPV
i' = interest rate when NPV is positive
i" = interest rate when NPV is negative

A business is said to be feasible or profitable if IRR > i, not feasible if IRR < i, and if IRR = I it means break even, or neither profit nor loss.

2.4. Payback Period (PP)

Payback period is the time required to recover all costs incurred or the period required to return the invested capital using the yield or net cash flow.

$$\text{PP} = n + \frac{(a-b)}{(c-b)} \times 1 \; years \quad (4)$$

Note :
n = the last year in which the cash flow was not able to cover the initial investment capital
a = amount of initial investment
b = cumulative cash flow for year n
c = sum of accumulated cash flows for n + 1 years)

This project is feasible or profitable if PP < the economic life of the project, but the project is not feasible if PP > the economic life of the project, and the project is not profitable and does not lose money if PP is equal to the economic life of the project. project.

The assumption used in this sensitivity analysis is an increase in operational costs by 15% and a decrease in benefits by 30%. The basis for determining the cost increase of 15% is the cost incurred if additional feeding is carried out. While the decrease in benefits if there is a decrease in the selling price.

3. RESULTS AND DISCUSSION

Changes in land cover will affect the availability of food for swiftlets. Swiftlet feed, which previously depended entirely on its availability in nature, will be supported by artificial feeding. Provision of artificial feed will certainly affect the costs incurred. The addition of artificial feed costs will certainly increase the total cost of swiftlet farming which in turn will affect the

Table 1. Sensitivity Analysis of Swiftlet Farming

Busineess Scale	Investment Criteria	Cost Increased 15%	Benefit Decreased30 %	Cost Increased 15% and Benefit Decreased 30%
512 m2	Net B/C	3.79	2.42	2.18
	NPV	1,300.58	653.50	550.28
	IRR	29.61	26.15	25.04
	PP	5.68	7.54	8.20
800 m2	Net B/C	2.25	1.32	1.09
	NPV	1,051.38	265.64	71.69
	IRR	24.02	16.43	12.11
	PP	10.48	15.79	19.73
1,600 m2	Net B/C	2.08	1.27	1.10
	NPV	1,534.51	379.93	139.62
	IRR	23.19	15.75	12.47
	PP (tahun)	9.84	12.91	14.29

assessment of the financial feasibility of the business. On the other hand, the conditions mentioned above can also cause a decrease in the amount of production.

Sensitivity assessment is carried out to determine the financial feasibility of Swiftlet nest business if the above changes occur. Assessment is carried out if there is a 15% increased in costs (due to an increased in input prices and additional feed) and a 30% decreased in benefits (due to a decreased in selling prices and production).

3.1. Cost Increased by 15%

If there is an increase in costs by 15%, then the swiftlet house with a size of 512 m^2 Net B/C will decrease to 3.79 previously 4.06), the NPV will decrease by IDR 103.21 million to IDR 1,300.58 million, the IRR will decrease from 30.00% to 29.61% and PP becomes longer to 5.68 years. To swiftlet house size of 800 m^2, there was a decrease in Net B/C from 2.51 to 2.25, NPV decreased to IDR 1,051.38 million (previously IDR 1,245.33 million), IRR decreased by 1.11% from 25.13 % to 24.02% and PP for 10.48 years (longer 1.64 years). Meanwhile, in the swiftlet house with a size of 1,600m^2, all investment criteria also decreased. Net B/C decreased to 2.08, NPV decreased from IDR 1,774.83 million to IDR 1,534.51, IRR to 23.19% and PP to 9.84 years.

3.2. Benefits Decreased by 30%

In the 512 m^2 swiftlet house, all investment criteria experienced a significant decline. Net B/C decreased from 4.06 to 2.42, NPV decreased by 53.45% to IDR 653.50 million, IRR from 30.00% to 26.15% and PP 2.10 years longer to 7.54 years. For swiftlet house size of 800 m^2, there was a decrease in Net B/C from 2.51 to 1.32, NPV decreased to IDR 265.64 million (previously IDR 1,245.33 million), IRR decreased by 8.70% from 25.13 % to 16.43% and PP for 15.79 years (longer 6.95 years). For swiftlet house size of 1,600 m^2, Net B/C will decrease to 1.27 (previously 2.27), the NPV will decrease by IDR 1,394.90 million to IDR 379.93 million, the IRR will decrease from 24.09% to 15.75. % and PP became slower to 12.91 years.

3.3. Cost Increased by 15% and Benefits Decreased by 30%

For swiftlet house with a size of 512 m^2, there was a decreased in Net B/C from 4.06 to 2.18, NPV decreased to IDR 550.28 million (previously IDR 1,403.79 million), IRR decreased by 4.96% from 30.00 % to 25.04% and PP for 8.20 years (longer 2.76 years). For swiftlet house size of 800 m^2 Net B/C will decrease to 1.09 (previously 2.51), the NPV will decrease by RP 1,173.64 million to RP 71.69 million, the IRR will decrease from 25.13% to 12.11 % and PP became longer to 19.73 years. Likewise, for a swiftlet house with a size of 1,600 m^2, all investment criteria experienced a significant decrease. Net B/C decreased from 2.27 to 1.10, NPV decreased by 92.13% to IDR 139.62 million, IRR from 24.09% to 12.47% and PP 4.89 years longer to 14.29 years.

Based on the sensitivity analysis (Table 1), it can be seen that the swiftlet farming studied based on investment criteria is financially feasible, both when experiencing an increased in costs, a decreased in benefits, as well as an increase in costs and a decrease in

benefits. Although the sensitivity analysis for both assumptions reduces the feasibility value of the swiftlet farming, the lower selling price results in a greater reduction in the value of financial viability. Although the sensitivity analysis for both assumptions reduces the feasibility value of the swiftlet farming, the lower selling price results in a greater reduction in the value of financial viability.

Sensitivity analysis was carried out with different assumptions by Sumardi et al. [13], namely production decreased by 30% and selling prices decreased by 20%, with the results of this swiftlets farming being sensitive to changes in production, due to a significant decrease in the value of NPV, IRR and Net B/C. While the research of Yuniarti et al. [14], it was found that an increase in operational costs, an increase in benefits, and a decrease in benefits by 10% in Swiftlet farming indicate that this business is still feasible to be cultivated and developed.

As a business, of course the swiftlets farming also has risks that must be taken into account, including the lack of natural feed availability, so it is necessary to provide artificial feed, which will result in additional costs. On the other hand, high fluctuations in the selling price of swallow nests will have an impact on decreasing benefits. Based on the sensitivity analysis, all business scales still show that they are feasible to operate, even though their financial feasibility performance has decreased. To reduce the risk of decreasing the benefits obtained, it is necessary to make efforts to provide added value to swallow nests which have been marketed in the form of raw nests.

4. CONCLUSION

The increase in costs and the decrease in benefits resulted in a decrease in the performance of the investment criteria, although it was still financially feasible.

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