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Analysis of the Efficiency of Swallow Cultivation as an Agribusiness Effort in Society

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Abstract: This research aims to analyze the efficiency value of swallow cultivation as an agribusiness effort in the community in Bone Regency. The demand for swallow nests on the world market is still very high, so to meet market demand, people are starting to try to cultivate swallows by building swallow houses, including in Bone Regency. Every business, including the swallow business, is certainly not free from various risks, especially in terms of financial risks, even though the production volume is quite high. Therefore, swallow breeders must know the analysis of the business they are carrying out, not only limited to how to maintain and cultivate swiftlets to produce nests as the main product of production. This research uses quantitative research methods with data collection techniques using questionnaires distributed to 30 wallet bird entrepreneurs. The results of the research prove that the business efficiency value for swiftlet cultivation in Bone Regency with a period of 1 - 4 years is 12. Meanwhile, businesses with a period of more than 5 years obtain a value of 23. This explains that the swiftlet cultivation business in Bone Regency has been implemented. efficient because the R/C Ratio value is > 1, meaning that every Rp. 1 of costs incurred in the swiftlet cultivation business over a business period of 1 – 4 years will generate Rp. 12. Meanwhile, businesses with a business period of more than 5 years will generate revenues of IDR. 23.

Keywords: Community Agribusiness; Cultivation Efficiency; Swallow

Introduction

Indonesia is known to have a fertile regional topology so that its natural resources are abundant (Dharmawan et al., 2023). Therefore, agro-industry must be a driving force for other subsystems to build competitive advantages (Zhou et al., 2018; Liu et al., 2023). However, farming activities often encounter many problems, including limited land, accessibility to markets, bargaining position and so on (Borda et al., 2023; Magingxa et al., 2009). Therefore, it is necessary to diversify the types of farming businesses that are able to capture market opportunities while also being able to minimize existing problems (Siebrecht, 2020; Mortensen & Smith, 2020). One of the agro-industrial commodities that has large market opportunities, especially for the export market and has high economic value is swallow's nest.

Swallow's nest is one of the world's most famous foods and is considered a prestigious food. Swiftlets (*Collocalia sp.*) as a biological resource have many ingredients that are beneficial for health, including containing glycoprotein and being rich in minerals such as amino acids, calcium, sodium, magnesium and potassium (Elfita et al., 2020; Benjakul & Chantakun, 2022). Protein and amino acids help the process of cell renewal in the human body and increase the body's metabolism. Apart from having good health benefits, many people believe that bird's nest can be an alternative medicine (Permatasari et al., 2023). The

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impacts that result from making swallow houses include visual disturbances due to the view of towering swallow houses, obstructed air circulation making the air hot, the smell of swallow droppings and the emergence of noisy sounds from the calls of swallows, and the possibility of impacts that affect public health.

The swallow's nest business has very good prospects and trade potential to be developed, because it has many benefits that are very good for the health of the human body, it is not surprising that the price is very expensive. The economic value of swallow's nests is the main reason why many people are interested in cultivating swallow's nests. Swallow's nest is one of the world's most famous foods (Ammartsena & Dittapan, 2023). Swallow's nest is believed to have efficacious benefits for strengthening lung function, increasing nerve function, improving digestion, treating vomiting of blood, coughs, cancer, increasing body stamina, renewing damaged body cells and prolonging life.

Currently, Indonesia is the largest producer of swallow's nests in the world. Data shows that swiftlet nests from Indonesia control almost 98% of the world market supply because they are cleaner, whiter and not too thick. The largest market reach for swallow's nests from Indonesia is Hong Kong, China, Taiwan, Singapore and Canada. The demand for swallow nests on the world market is still very high, so to meet market demand, people are starting to try to cultivate swallows by building swallow houses, including in Bone Regency. Every business, including the swallow business, is certainly not free from various risks, especially in terms of financial risks, even though the production volume is quite high (Fang, 2016). Therefore, swiftlet breeders must know the analysis of the business they are running, not just limited to how to maintain and cultivate swiftlets to produce nests as the main product of production (Mursidah et al., 2021).

The swiftlet cultivation industry has become one of the agribusiness sectors that is attracting attention in various regions in Indonesia, including Bone Regency (Pasaribu et al., 2021; Purba et al., 2022). Indonesia's rich biodiversity, along with stable and growing demand for swiftlet products, has driven the industry's growth significantly. Bone Regency, as part of South Sulawesi which is rich in natural resources, also has great potential to develop swallow cultivation as a sustainable agribusiness effort. In this context, it is important to conduct an in-depth analysis of the efficiency of swiftlet cultivation as an effort to understand the economic and environmental dynamics involved in this cultivation practice (Mursidah et al., 2021; Hasanah et al., 2019). This analysis will not only provide a better understanding of the economic potential of swiftlet farming activities, but will also provide insight into its impact on the environment and other factors that influence the sustainability of the agribusiness (Hasanah et al., 2019; Ito et al., 2021; Permatasari et al., 2023).

By paying attention to these matters, this article aims to present an analysis of the efficiency of swiftlet cultivation as an agribusiness effort in the Bone Regency community. Through this approach, it is hoped that strategies can be found that can increase production efficiency, reduce environmental impacts, and overall support economic development and welfare of local communities. In this article, we will discuss various aspects related to swallow cultivation in Bone Regency, including factors that influence production efficiency, challenges faced, and opportunities for further development. Through a comprehensive analysis, it is hoped that this article can provide a meaningful contribution to stakeholders in decision making related to the development of the swallow cultivation industry in Bone Regency and this is the aim of this research, namely analyzing the swallow cultivation business in Bone Regency.

Method

The research method used is a quantitative research method (Pilcher & Cortazzi, 2024). Determining the research location was carried out purposively from February to December 2023 in Bone Regency. Primary Data is obtained directly from respondents. In this research, respondents filled out a questionnaire consisting of several structured question instruments. Then the respondent answers the question, and the results of the respondent's answers will be analyzed. Questionnaires were conducted on 30 Swallow bird breeders. Furthermore, secondary data is obtained from trusted agencies or parties and is still related to the research objectives. The research results were obtained to determine and analyze the Swallow Bird cultivation business. Data analysis used:

Acceptance

$$TR = Y \times Py \quad (1)$$

Description:
TR = Total Revenue (farming business revenue).
Y = Output (production obtained)
Py = Price (output price)

Income

$$Pd = TR - TC \quad (2)$$

Description:
Pd = Total Income (Rp/year)
TR = Total revenue (Rp/year)
TC = Total Cost (Rp/year)

Return Cost Ratio (R/C)

$$\text{Return Cost Ratio} = \frac{\text{Total Revenue}}{\text{Total Cost}} \quad (3)$$

Description:
TR = Total Revenue (Rp)
TC = Total Cost (Rp)

The criteria used in determining business efficiency are:
RC Ratio > 1 means that the business being run is efficient.
RC Ratio = 1 means the business reaches the break-even point.
RC Ratio < 1 means the business being run is inefficient.

Result and Discussion

Identify Demographic Profile

Tables 1 and 2 show the demographic profile of 30 Swallow breeders in Bone Regency based on gender and age group.

Table 1. Age Group of Respondents

Age group	Amount	percentage (%)
16 - 32 Years	5	16.67
33 - 49 Years	2	66.67
50 - 66 Years	5	16.67
Amount	30	100

Table 2. Gender of Respondents

Gender	Amount	percentage (%)
Man	17.00	56.67
Woman	13.00	43.33
Amount		100

Table 1 explains that the respondents' ages are included in the productive age, namely 16 years to 66 years. Based on gender, the role of male breeders is higher, namely 17 people or 56.67%. Meanwhile, the role of female breeders is smaller than that of male breeders. Most of the breeders have low education, namely junior high school graduates.

Fixed Costs and Variable Costs

Costs are sacrifices of economic resources measured in units of money that have occurred to achieve certain goals (Gleißner et al., 2022). The costs in this research are all costs incurred for the swallow nest production process, both costs incurred. The swallow nest production process involves a number of costs that need to be taken into account by breeders. These costs cover various aspects from initial preparation to harvesting swallow nests. The costs of the swallow nest production process can be detailed as follows: Initial Investment Costs: Before starting swallow cultivation, breeders need to pay money to prepare an artificial nest or swallow house. These costs include the construction or purchase of building structures, installation of lighting and ventilation systems, as well as procurement of equipment such as speakers for recording swallow calls; Cost of Purchasing a Swallow's Nest: If the breeder chooses to start a business by purchasing an existing swallow's nest, this cost will be part of the initial investment. The price of swallow nests varies depending on the quality and size; Daily Maintenance Costs: The daily maintenance process includes costs for bird feed, facility maintenance, and labor.

Feed costs can be a significant part, especially if breeders choose to provide additional feed in the form of nutritional supplements to increase nest production; Nest Maintenance Costs: To maintain the quality of swallow nests, breeders need to pay money to clean the nests periodically. This may involve the expense of hiring skilled workers or using special equipment to clear the nest; Energy and Water Costs: The process of regulating the environment in a swiftlet house requires the use of energy for heating or cooling the room according to the swiftlet's needs. Apart from that, there are also costs for providing clean water for swallows and for facility maintenance needs; Costs for Monitoring and Controlling Diseases: To maintain the health of swiftlets and prevent the spread of disease, breeders need to pay for health monitoring, vaccination, and controlling pests and diseases that may interfere with nest production; Marketing and Distribution Costs: After the swallow nests are harvested, breeders need to incur costs for marketing and distribution of the product.

This can include costs for packaging, transportation, and promotion of swallow's nest products. Several costs are generally incurred for the swallow nest production process, but it is important for breeders to take all these costs into account carefully in their business planning to ensure the success and sustainability of their swiftlet cultivation business. The costs of the swallow's nest production process consist of fixed costs and variable costs which can be seen in Table 3 below.

Table 3. Average Fixed Costs of Swallow Cultivation Business in Bone Regency

Description	Length of Business	
	1 - 4 Year	> 5 Year
Fixed Cost Depreciation (IDR)	16,032,500	9,532,500
Total	16,032,500	9,532,500

Table 3 shows that the largest costs are in the swiftlet cultivation business over a period of 1 - 4 years, namely Rp 16,032,500 while the business period of more

than 5 years is Rp 9,532,500. This is in line with research of Patel et al. (2022), Essel et al. (2019), and Lévesque & Stephan (2020). The length of business is the length of time the entrepreneur works on the business he is running. The length of business can influence the level of income because it will affect productivity and expertise which can increase efficiency so that production costs can be reduced to less than sales proceeds. Meanwhile, variable costs are costs whose total amount changes in proportion to changes in the volume of activities or costs incurred by entrepreneurs as a result of the use of variable production factors so that the amount of these costs changes with the number of goods produced (Verhoef et al., 2021). According to Nasution & Siregar (2018) costs in relation to products are divided into two parts, namely production costs and non-production costs. Production costs are the costs used in the production process including raw materials, direct labor costs and factory overhead costs. The composition of variable costs can be seen in Table 4.

Table 4. Variable Costs of Swallow Cultivation Business in Bone Regency

Description	Length of Business	
	1 - 4 Year	> 5 Year
Auxiliary Materials (IDR)	7,540,000	7,540,000
Labor (IDR)	17,600,000	12,000,000
Total (IDR)	25,140,000	19,540,000

Table 4 shows that the variable costs in the swiftlet cultivation business over a period of 1 – 4 years are Rp 25,140,000 while businesses with a period of more than 5 years are Rp 19,540,000. The total costs of the Bone district swiftlet cultivation business are in Table 5 below.

Table 5. Total Cost of Swallow Cultivation Business in Bone Regency

Description	Length of Business	
	1 - 4 Year	> 5 Year
Fixed cost (IDR)	16,032,500	9,532,500
Variable cost (IDR)	25,140,000	19,540,000
Total (IDR)	41,172,500	29,072,500

Table 5 shows that the total cost of the swiftlet cultivation business over a period of 1 – 4 years is Rp 41,172,500 while businesses with a period of more than 5 years are Rp 29,072,500. This is influenced by differences in operational costs and the number of workers for each existing business.

Revenue and Profits

Analysis of the acceptability and profitability of swiftlet farming involves a series of important steps to understand the economic potential of this activity. First of all, the initial step taken is to evaluate the estimated revenue from selling swallow's nests. This is done by determining the average selling price per gram or per kilogram of swallow nests in local or international markets, which is then multiplied by the number of swallow nests produced in a certain period, for example per year (Kim et al., 2023). Next, another important step is to calculate the production costs involved in cultivating swiftlets. This involves identifying and collecting data on various costs, such as initial investment costs, daily maintenance costs (including feed, labor, and facility maintenance), nest maintenance costs, energy and water costs, bird health monitoring costs, and marketing and distribution costs.

After having estimates of revenue and production costs, the next step is to calculate business profits. This is done by subtracting the total production costs from the total revenue obtained from the sale of swallow nests. Profits can be calculated for a certain period, such as per month, per quarter, or per year. Apart from that, it is also important to carry out a break-even point analysis to find out the minimum number of swallow nests that need to be produced so that this business does not experience losses. The break-even point can be calculated by dividing the total fixed costs by the difference between the selling price per unit and the variable costs per unit. In carrying out this analysis, it is also necessary to carry out a sensitivity analysis to identify factors that can influence the profits of a swallow farming business, such as fluctuations in market prices, changing production costs, or changing demand (Qiao et al., 2023). By carrying out this analysis carefully, breeders or potential investors can gain a better understanding of the potential profits and risks associated with swiftlet farming.

This analysis can also be a basis for making more appropriate decisions in managing or developing swiftlet cultivation businesses (Connolly, 2016). Revenue analysis is the multiplication of the production produced by the selling price and usually production is negatively related to price, meaning that prices will fall when production is excessive (Farm, 2020; Weber & Wasner, 2023) and profit is the main goal in opening a planned business. The greater the profits received, the more feasible the business being developed. Meanwhile, according to Yildirim et al. (2024) and Jian et al. (2015) the size of the revenue depends on the level of production and the price in effect at the time of sale of the product or the results received through the production process and the value in money as a result of the sale of goods or services. The amount of revenue and profits from the swiftlet cultivation business in Bone district can be seen in Table 6.

Table 6. Average income and profits in the Bone Regency Swallow Nest Cultivation Business

Description	Length of Business	
	1 - 4 Year	> 5 Year
Reception (IDR)	500,000,000	675,000,000
Total Cost (IDR)	41,172,500	29,072,500
Profit (IDR)	458,827,500	645,927,500

Table 6 shows that swallow nests with a business period of 1 – 4 years produce an average of 50 kg a year with a selling price of Rp 10,000,000/kg to obtain revenue of Rp 500,000,000. While businesses with a period of 5 years and above produce an average of 45 kg a year with a selling price of Rp 15,000,000/kg to obtain revenues of 675,000,000. The swiftlet nests produced are sold in a mixed manner (mixed quality between A, B and C qualities) at a price that has been determined based on cooperation between breeders and producers. According to Calvino et al. (2022), determining the economic age is based on the business scale and raw materials used for the swallow house, guided by the law of diminishing returns (if other inputs are considered cost-effective, then when one particular input is added in the production process, initially the additional output will increase; but as the input continues to be added to a certain point, the additional output produced will decrease).

Business Efficiency Analysis

Analysis of the efficiency of swallow farming businesses is an important step in understanding the operational and economic performance of these activities. In general, business efficiency can be defined as the ability to achieve maximum results by using available resources optimally (Arbelo et al., 2021; Farida & Setiawan, 2022). In the context of swiftlet cultivation, business efficiency can be seen from various aspects, including land use, utilization of cultivation facilities, resource management, and operational effectiveness. First of all, efficient land use is a key factor in maximizing swallow nest production. This involves selecting a suitable location, optimal placement of building structures, as well as environmental regulation in the cultivation room (Al-Kodmany, 2023).

Apart from that, good use of cultivation facilities is also an important part of business efficiency. This includes the use of appropriate technology and equipment, setting up efficient lighting and ventilation systems, as well as good maintenance of cultivation facilities (Chel & Kaushik, 2018) by ensuring that cultivation facilities operate well, farmers can increase productivity and reduce production costs. Management of resources such as feed, water and energy is also an important factor in the efficiency of swiftlet cultivation. Providing quality and regular feed, efficient use of water, and optimal regulation of energy consumption can help reduce production costs and increase productivity (Scardigno, 2020). Furthermore, operational effectiveness in business management also contributes to overall efficiency. This includes good planning, regular monitoring of swallow health and production, as well as efficient financial and marketing management. By carrying out a thorough analysis of these various aspects, breeders can identify areas where efficiency can be improved and implement appropriate strategies to improve the performance of the wallet bird cultivation business (Khan et al., 2021). Thus, business efficiency analysis is the key to achieving success and sustainability in the swiftlet farming industry. Business Efficiency Analysis is calculated using the R/C Ratio (Return Cost Ratio) formula which is a comparison between total revenue and total costs. The efficiency of the swiftlet cultivation business in Bone Regency can be seen in Table 7.

Table 7. Average Efficiency Analysis of Swallow Cultivation Businesses in Bone Regency

Description	Length of Business	
	1 - 4 Year	> 5 Year
Reception (IDR)	500,000,000	675,000,000
Total Costs (IDR)	41,172,500	29,072,500
RC Ratio	12	23

Table 7 shows that the business efficiency value for swiftlet cultivation in Bone Regency with a period of 1 – 4 years is 12. Meanwhile, businesses with a period of more than 5 years get a value of 23. This explains that the swiftlet cultivation business in Bone Regency has been carried out it is efficient because the R/C Ratio value is > 1, meaning that every Rp 1 of costs incurred in the swiftlet cultivation business over a business period of 1 – 4 years will generate Rp 12. Meanwhile, businesses with a business period of more than 5 years will generate revenues of Rp 23.

Conclusion

Based on the research that has been presented, it can be concluded that the business efficiency value for swiftlet cultivation in Bone Regency with a period of 1 - 4 years is 12. Meanwhile, businesses with a period of more than 5 years get a value of 23. This explains that the swiftlet cultivation business in Bone Regency which has been implemented is efficient because the R/C Ratio value is > 1, meaning that every Rp 12. Meanwhile, businesses with a business period of more than 5 years will generate revenues of Rp 23. To increase profits, the processing or cleaning of swallow nests should be done

directly in Tembilahan without having to leave town and the buildings under the swallow nests should be used for other business activities to increase income.

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Author Contributions
Conceptualization; A. B. D.; methodology.; R. T. N. M.; validation; S. N.; formal analysis; M. H.; investigation.; R. Z.; resources; A. B. D.; data curation: R. T. N. M.; writing—original draft preparation. S. N.; writing—review and editing: M. H.; visualization: R. Z. All authors have read and agreed to the published version of the manuscript.

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This research was carried out based on assignment letters from each institution to increase the research power of lecturers. All author declare that there is no conflicts of interest.

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