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Mapping and Analysis of Edible Bird Nest Export Potential and Its Contribution to the Indonesian Economy

Wisnu Wasisa Putra[1], Imam Mujahidin Fahmid[2], Darmawan Salman[3], Syahdar Baba[4]

Abstract

Indonesia is the largest producer of edible bird nests (EBN) in the world. In 2022, the number of exports to China will be 290 tons, and exports to non-China will be 1,164.9 tons. This research aims to map and analyze the potential resources of edible bird nests (EBN) that are exported and the contribution of exports to the Indonesian economy. The EBN national export data was collected in three provinces: West Kalimantan, North Sumatra and Banten. Samples of swiftlet farmhouses (SFH) were taken in the Ketapang, Deli Serdang and Serang districts. The data was then analyzed descriptively and by multiple linear regression on the relationship between the number of SFH, export capacity and national exports. Data on production capacity in the three EBN-producing provinces, namely West Kalimantan Province, North Sumatra Province and Banten Province, with the following amounts, respectively, 175,979.08 kg, 163,165.29 kg and 81,194.74 kg. The potential annual regional income tax through the EBN tax in West Kalimantan Province, North Sumatra Province and Banten Province is 31.6 billion, 29.3 billion and 14.6 billion, respectively. The average annual household income of swiftlet breeders in Deli Serdang Regency is 10.2 billion, in Serang Regency, it is 5.5 billion, and in Ketapang Regency, it is 4.2 billion. EBN export capacity is significantly influenced by the number of registered SFHs and EBN washing companies ($p<0.05$). On the other hand, increasing the number of registered SFH and EBN washing companies does not significantly increase the number of EBN exports $p>0.05$. Not all of the export capacities the Chinese government has approved can be met by the number of exports to China. EBN production capacity is not significantly influenced ($p>0.05$) by the size of the SFH area and SFH floor type. Still, it is more influenced by macro and micro environmental conditions, including the availability of insects as swiftlet food, the habitat or environment around the SFH and the number of swallows that live in SFH. Increasing production in SFH and the amount of SFH washing impacts the household economy, regional economy and state income.

Keywords: *edible bird nests, export capacity, export potential, household income, regional income, swiftlet farmhouse.*

1. Introduction

As a tropical country, Indonesia has high rainfall in most of its territory. The availability of rainwater can affect the abundance of insects, thereby affecting the breeding of swifts (Fujita and Leh, 2020). Several islands in Indonesia are the primary habitat for swiftlets (Azahar et al., 2014). Cultivating swiftlets is a natural process because the selection of

[1] Doctoral Program of Development Studies, Hasanuddin University, Makassar, Indonesia
[2] Department of Agricultural Socio-Economic, Faculty of Agriculture, Hasanuddin University, Makassar, Indonesia
[3] Department of Agricultural Socio-Economic, Faculty of Agriculture, Hasanuddin University, Makassar, Indonesia
[4] Department of Socio-Economic, Faculty of Animal Science, Hasanuddin University, Makassar, Indonesia

swiftlets in building edible bird nests cannot possibly occur in the public interest, which is easy to regulate (Connolly, 2016).

The high demand for EBN has caused the swiftlet population in caves to decline drastically. The decline in the swiftlet population in Niah Cave, Sarawak, reached 90% over 70 years (Thornburn, 2014). Concerns about the decline in the swiftlet population are due to the high trade-in swiftlet. Italy initiated EBN to be included in the list of wild plants and animals that must be protected in 1994, as stated in the Convention on International Trades on Endangered Species of Wild Flora and Fauna (CITES) appendix II. CITES II regulates that species threatened with extinction will experience extinction if trade continues without regulation. The proposal to include EBN in CITES Appendix II was rejected due to protests from Southeast Asian countries, and it was proposed to carry out swiftlet rearing management to maintain the swiftlet population (Thornburn, 2014).

Edible bird nests (EBN) produced from the Swiftlet Farmhouse (SFH), known as swiftlet farmhouse (SFH) from Indonesia, control almost 98% of the world market supply because of their excellent quality (Simbolon, 2011). An average of 1,100 tons of EBN from Indonesia fills foreign markets annually. EBN trade foreign exchange generates a significant value, as data from the Agricultural Quarantine Agency of the Ministry of Agriculture shows that EBN exports worldwide in 2017 reached Rp. 27 trillion. The price of EBN globally averages around IDR 24.5 million per kilogram. The value of exports to China contributed Rp. 2 trillion with a total EBN of 52 tons (Sahri, 2020).

This enormous potential must be maintained so that EBN, as the largest export commodity for livestock products, can continue. Several strategies to increase EBN productivity include maintaining and preserving the swallow population, optimizing cultivation technology to produce quality products, and establishing good cooperative relationships with collectors (Harapuspa and Fitriani, 2018).

EBN commodities in international trade have a considerable role for Indonesia because EBN covers 3% of Indonesia's GDP (Gross Domestic Product) from the non-oil and gas sector. The People's Republic of China (PRC) is the leading market because China can absorb 60-85% of EBN worldwide every year (Ali, 2017). Based on data from the Ministry of Trade in 2017, Indonesia supplied 78% of the world's EBN needs; next in line was Malaysia, supplying 10% of EBN, Thailand 9%, and Vietnam 3%. Almost all of the world's EBN supply is sent to China and Hong Kong, the countries with the most significant consumers (Ministry of Trade, 2017).

The Indonesian Edible Bird's Nest Entrepreneurs Association stated that EBN exports from Indonesia have been going on since the 1960s; at that time, Indonesia exported raw EBN materials to Singapore. Furthermore, in the early 1980s, due to expensive labor in Singapore, several companies in Indonesia began washing EBN in Indonesia. In the 1980s, most EBN products from Indonesia were still sent to Singapore and Hong Kong. In the early 1990s, several exporters from Indonesia began sending EBN to Hong Kong, which was then sent back to China. This condition impacts EBN exports from Indonesia to Singapore, which are gradually decreasing. Several EBN companies were able to penetrate the PRC market in the 2000s, although deliveries were still made via Hong Kong (PPSBI, 2017).

Research on the technical and socio-economic aspects of EBN has been widely carried out in Indonesia. The socio-economic impact of EBN on communities (breeders or individuals) is felt in several regions in Indonesia, including the construction of public facilities (for example, roads, places of worship and schools in rural areas (Adrianti 2021, Kha et al. 2021). Research by Sebastian and Bahar (2021) and Susilawati (2018) regarding the influence of SFH location on the success of EBN businesses. Natural resources (forest area) and social factors influence EBN production efficiency. Forest areas ranging from 2,000-6,000 meters positively affect EBN production efficiency (Ito et al. 2021). Warisman et al. (2020) identified the strengths, weaknesses, opportunities and

threats of EBN business development. EBN business development has different methods, for example, the construction of a new SFH building, additional feed or mixing your feed, or the use of perfume, especially in the EBN building, paying attention to the cleanliness of the SFH building, temperature and humidity which can affect the quality of the EBN produced (Dahlan, 2022).

2. Objectives

This research aims to map and analyze the potential resources of edible bird nests (EBN) that are exported and the contribution of exports to the Indonesian economy. EBN national export data was collected in three provinces: West Kalimantan, North Sumatra and Banten. Samples of swiftlet farmhouses (SFH) were taken in the Ketapang, Deli Serdang and Serang districts..

3. Methods

3.1 Types of research

This type of research is descriptive, using qualitative and quantitative approaches. The research method used is a case study. According to Stake (1994) and Creswell & Pooth (2018), a case study is a research method that describes the current and previous conditions of a case unit, either by using cases to understand a theory/concept instrumentally or to draw important lessons from the specifics of the case. It is intrinsic. In this research, the case unit is the production and export processes of EBN in Indonesia. The type of case study in this research is an instrumental case study describing the unique characteristics of EBN production and exports and their contribution to the economy at the national, regional and business unit/household levels.

3.2. Research Location and Time

This research location includes several levels. First, to map and analyze the distribution of EBN production and export potential, data will be collected at the Indonesian Quarantine Agency of the Republic of Indonesia (Barantin RI), the authority for EBN exports to China, to find data on the contribution of EBN exports to the national level economy (contribution of EBN export value to the total national export value), the data collection locations are Barantin RI, Ministry of Trade, and BPS. Second, to map and analyze production and export potential and their contribution to the regional economy at the Regency/City level, the data collection locations are 3 Provinces, namely Banten, North Sumatra and West Kalimantan, as well as 3 Regency locations consisting of Serang Regency, Deli Serdang Regency and Ketapang Regency. Third, for data on EBN's contribution to the economy of the business unit (swiftlet breeders), the data collection location is the Regency/City, which is used as a case for data on the contribution of EBN businesses to the regional economy. Data collection and analysis will be conducted from August 2022 to March 2023.

3.3 Data Collection Technique

Data collection techniques are adjusted to the level of the research location and the case unit studied. The data collection techniques used are as follows:

a. Secondary Data Collection.

Documents will be collected from several relevant secondary data sources, namely Indonesia Quarantine Agency, Central Bureau of Statistics (BPS), Regional Agricultural Services, and other secondary data sources at the institutional level. Documents will also be collected at the level of EBN breeders, EBN traders and EBN exporters. The data collected from these various documents are number of EBN breeder business units, EBN

production volume, EBN export volume, EBN export value, and volume and flow of EBN shipments between islands. Apart from that, documents were also collected related to data on the production and trade value of EBN for each district/city, the contribution of EBN trade to total regional trade, and the contribution of production.

b. In-Depth Interview

In-depth interviews will be conducted with each EBN breeder. In each district/city, EBN breeders will be selected purposely. The essential data for all EBN breeders was processed from data held by the Indonesian Ministry of Agriculture's Barantan and verified in the field before determining the case units that would be interviewed in depth. The in-depth interview starts with general matters related to the identity of the business actor, business history, and current business conditions, to specific matters related to trends in production facility capacity, production volume, production value, marketing processes, as well as technological developments and their knowledge in supporting the process. Production. In-depth interviews will be conducted for 45-90 minutes for EBN breeders, with the interview location at their business location or another place agreed with them. In-depth interviews will also be conducted with several informants related to EBN production and export, namely EBN washing house entrepreneurs, EBN exporters, policymakers in areas related to EBN, and policymakers at the ministry level related to EBN. The in-depth interviews focused on information about trends in the number and characteristics of EBN livestock actors, production trends and EBN production values, EBN trade and export trends, as well as factors that are considered to influence the development of EBN, especially the knowledge behind this development. Data from in-depth interviews with each informant will be written as field notes from the interviews. The recordings will be transcribed as field notes for interviews that allow the use of recordings.

c. Interview Questionnaire

Questionnaire interviews were conducted with EBN farmers focusing on socio-economic conditions: distance of EBN farm locations from residential centers, components of EBN production facilities, EBN production costs and income from EBN. The questionnaire was filled in by 65 registered EBN breeders or SFH owners.

3.4. Technical Data Analysis

a. Primary and Secondary Data Analysis

The collected secondary data will be analyzed to produce a frequency table that describes the trend in the number of EBN breeder business units, EBN production volume, EBN export volume, EBN export value nationally, contribution of EBN export value to the total agricultural export value and total national export value; contribution of EBN trade to total regional trade in production center areas; contribution of EBN production and trade to GRDP of each production center area. Next, the data was analyzed using multiple linear regression using SPSS version 2.1 statistical software to analyze the correlation between the total SFH capacity and the number of EBN exports to China with the number of registered SFH and EBN washing companies. This research also analyzes EBN production capacity, which is related to the size of the SFH area and the type of SFH floor in three EBN production center districts. The three provinces selected in Indonesia as research locations were North Sumatra, Banten and West Kalimantan. Next, this was compared with EBN commodity traffic data from the three provinces. Three locations were obtained as EBN centers in each selected province: Deli Serdang Regency, Serang Regency and Ketapang Regency. These three EBN centers are the areas with the largest EBN harvests compared to all regions in one province.

b. Analysis of In-depth Interview Results

The results of in-depth interviews were carried out in stages: (1) Identification of essential themes related to the identity of business actors, business history, current business conditions, and specific matters related to trends in production facility capacity, production volume, production value, marketing processes, as well as technological developments and their knowledge in supporting the EBN production process; (2) Thematic analysis between cases and analysis between themes in all cases to find similarities and differences in the characteristics of each theme; (3) Abstraction of the main themes that emerge based on the analysis between themes and between cases.

c. Analysis of Questionnaire Interview Results

The results of the questionnaire interview are tabulated based on the variables measured and processed to produce a frequency table that shows the average number, highest number, and lowest number of each variable for the entire sample. A comparative analysis will also be carried out between centers about the highest and lowest values of these variables.

d. Writing Case Descriptions

The final stage is writing a comprehensive case description based on the themes of national export value, regional income potential and household income by utilizing the results of processed secondary data, the results of in-depth interviews, the results of questionnaire interviews and the results of observations.

4. Results

4.1 Export Volume of Edible Bird Nests from Indonesia

In 2018, Indonesia produced around 40% of the total EBN production in the world, and Indonesia's exports to the world reached USD 291 million. The People's Republic of China (PRC) has the largest EBN consumption globally. In 2020, China imported 1062 tons of EBN, which is around USD 547 million. This value increased 65.44% from 2019, namely USD 330 million. EBN imports from Indonesia in 2020 amounted to 259 tons or around USD 413 million, and 75.61% of the value came from Indonesia. Data depicting EBN trade between Indonesia and China is presented in Table 1.

Table 1 Bilateral Trade in Edible Bird Nests (EBN) between Indonesia and China

Number	Year	Tiongkok's Imports From Indonesia (USD)	Indonesia's Exports to The World (USD)	Tiongkok's Imports From The World (USD)	Tiongkok's Imports From Indonesia (Tons)	Indonesia's Exports From The World (Tons)	Tiongkok's Imports From The World (Tons)
1	2016	37,501,000	192,572,000	72,656,000	23	992	701
2	2017	103,075,000	280,585,000	154,677,000	55	1,294	773
3	2018	143,134,000	291,347,000	237,614,000	68	1,279	1,146
4	2019	219,934,000	364,201,000	330,597,000	128	1,263	898
5	2020	412,939,000	540,761,000	547,678,000	259	1,325	1,062
6	2021	349,905,000	517,541,000	552,533,000	222	1,569	1,156
7	2022	400,488,000	590,577,000	661,236,000	293	1,418	1,347

(Source: the international trade statistic website)

EBN exports to China were initiated in 2010 and succeeded in penetrating the PRC market for the first time in 2015. EBN exports to non-China in 2021 amounted to 1,276.7 tons, and China to 228.8 tons, totaling 1,505.5 tons. This number shows that the percentage of EBN exports to China is 15% of Indonesia's total EBN exports. The number of EBN exports to China in 2022 will increase by 290 tons, showing an increase in EBN exports from Indonesia to China of 20%. If the average price of EBN per kg is 27 million, the total value of EBN exports to China is 7.83 trillion. Data on the number of Indonesian EBN exports from 2015 to 2022 is shown in table 2.

Table 2 Exports of Indonesian Edible Bird Nests (EBN) for the 2015-2022 period

Number	Country of Destination	Year/Total/Unit (Tons)							
		2015	2016	2017	2018	2019	2020	2021	2022
1	Non Tiongkok	742,8	969,1	1.231,2	1.222,3	1.129,7	1.049	1.276,7	1.164,9
2	Tiongkok	18.4	23.0	55.5	69.6	129.1	263.5	228.8	290,0
Total		761,2	992,1	1.286,7	1.291,9	1.258,8	1.312,5	1.505,5	1.454,9
Percentage Tiongkok		2%	2%	4%	5%	10%	20%	15%	20%

Source : Indonesia Central Bureau of Statistics/Badan Pusat Statistik (BPS)

Indonesian EBN exports are also carried out to non-PRC countries. The top five export destination countries for EBN from Indonesia in 2021 are Hong Kong, amounting to 989.9 tonnes;, Singapore amounting to 80 tonnes, Vietnam amounting to 71.3 tonnes, the United States amounting to 66.2 tonnes and Taiwan amounting to 20.6 tonnes. In 2022, the five destination countries for exports from Indonesia, in order from the largest, are Hong Kong at 734.4 tons, Vietnam at 236.3 tons, Singapore at 45.2 tons, the United States at 31 tons and Taiwan at 9.2 tons. The volume of Indonesian EBN exports to various export destination countries is shown in Table 3.

Table 3 Exports of Edible Bird Nests from Indonesia to Various Countries

Number	Country of Destination	Year/Total/Unit (Tons)							
		2015	2016	2017	2018	2019	2020	2021	2022
1	Hong Kong	474.4386	625.4951	487.8	290.4	644.1	897.2	989.9	734,4
2	Singapore	100.1719	96.7966	71.6	90	75.4	68.8	80,0	45,2
3	United States of America	17.147	16.83012	18.2	16.6	47	20.4	66,2	31,0
4	Vietnam	124.323	203.7096	624.5	806.1	329.9	27.2	71,3	236,3
5	Canada	4.2118	3.512	3.4	2.7	2	1.8	2,3	2,4
6	Taiwan	11.909	11.686	8.3	5.5	5.6	12.9	20,6	9,2
7	Thailand	4.034	4.9561	3.9	4.4	1.1	2.4	1,8	0,5
8	Japan	0.514	0.1676	0.3	1	0.1	0.3	0,1	0,1
9	Cambodia	0.002	0.497	0.6	0	0	0	0,0	0,0
10	Other	6.0235	5.470425	12.6	5.6	24.5	18	44,5	66,8

Total	742.7748	969.1205	1,231.2	1,222.3	1,129.7	1,049	1,276.7	1,125.9

Source : Indonesia Central Bureau of Statistics/Badan Pusat Statistik (BPS)

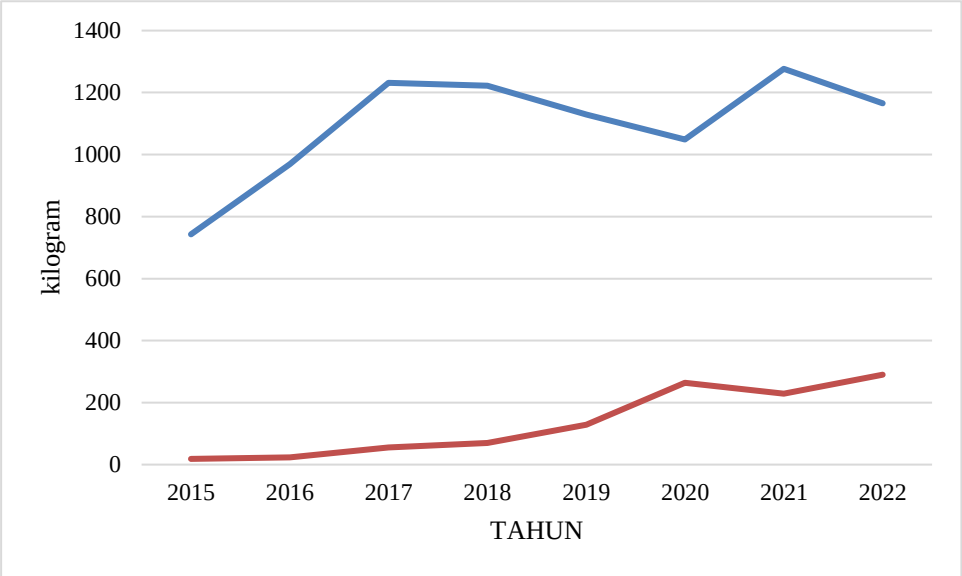

Figure 1. the Chinese export trend of edible bird nests from Indonesia using the color blue, and the export trend to Non-Chinese countries will be depicted in purple.

4.2 Edible Bird Nest Production at Location Centers

Based on the protocol for hygiene, quarantine and inspection requirements for importing EBN products from Indonesia to China, SFH must be registered or registered in Indonesia and China. SFH potential data that has been registered in 3 (three) provinces, namely North Sumatra, Banten, and West Kalimantan, and 3 (three) districts, namely Deli Serdang, Serang and Ketapang, are shown in Table 4.

Table 4 Recapitulation of Data on Registered Swiftlet Farmhouses in 3 Provinces and Number of Samples in 3 Districts in Indonesia

Number	Province	Number of Swiftlet Farmhouses (SFH)	Number	Regency	Number of Swiftlet Farmhouses (SFH)
1	Sumatera Utara	61	1	Deli Serdang	8
2	Banten	98	2	Serang	20
3	Kalimantan Barat	367	3	Ketapang	37

Source: Indonesia Agriculture Quarantine Agency (2022)

4.3 Contribution of Edible Bird Nests in Production Center Locations to Regional Income

The most significant number of EBN commodities among the three provinces was EBN from West Kalimantan, with a total of 175,979.08 kg. In second place is the number of EBN from North Sumatra, namely 163,165.29 kg, followed by EBN from Banten Province, amounting to 81,194.74 kg. The potential regional income tax through EBN tax in Banten Province is 14.6 billion, in North Sumatra Province 29.3 billion and West Kalimantan Province 31.6 billion, as shown in Table 5.

Table 5 Amount of Potential Regional Income Derived from Edible Bird Nests in North Sumatra, Banten and West Kalimantan

Number	Province	Number of Edible Bird Nest Commodities (kg)	City/district of origin	Regional Income Potential through Edible Bird Nest Tax (Rp)*
1.	Sumatera Utara	163.165,29	Deli Serdang, Medan, Tapanuli Utara, Deiyai, Ende, Bireuen	Rp.29.369.752.200
2.	Banten	81.194,74	Tangerang, Tangerang Selatan, Jakarta Barat, Jakarta Tmur, Jakarta Selatan, Jakarta Utara dan Jakarta Pusat	Rp.14.615.053.200
3.	Kalimantan Barat	175.979,08	Pontianak, Ketapang, Kubu Raya, kayong Utara, Mempawah, Singkawang, Sekadau, Sintang, Sanggau, Sambas, Melawi	Rp.31.676.234.400

Source : Indonesia Agriculture Quarantine Agency/Barantan (2022),

* Estimated EBN price Rp. 9 million/kg and the tax amount is 2%

4.4 The SFH Registration Policy on Export Performance

Increasing the volume of Indonesian EBN exports to various countries, directly or indirectly, will increase domestic economic growth. Indicators of economic growth can be seen by an increase in the number of EBN exporters, an increase in the number of SFH registered in the Animal Quarantine Installation Determination Application (AQIDA).

4.4.1 The Influence of Edible Bird Nest Export Capacity to China with the Number of Registered Swiftlet Farmhouses and Edible Bird Nest Washing Companies.

The EBN business has good development prospects, especially in Indonesia (Yahya 2010). Over the last 8 years, EBN cultivation has proliferated; this is proven by the increasing number of registered SFH and EBN washing companies throughout Indonesia from 2015 to 2023. The number of registered SFHs in 2015 was only 159. Registered until September 2023, it will increase to 2,808 SFH registered through the Agricultural Quarantine Agency. Likewise, EBN washing companies are also increasing every year, from initially 6 EBN washing companies in 2015, then growing to 36 EBN washing companies, as shown in Table 6.

Table 6. Data on the Development of Swiftlet Farmhouses and Registered Edible Bird Nest Washing Companies and Exports of Edible Bird Nests in 2015-2023

Number	Year	Number of Registered Swiftlet Farmhouses	Number of Exported Edible Bird Nest Washing Companies	China's Total Export Capacity (Kg)	Total Chinese Exports (Kg)
1.	2015	151	6	78.660	14.274
2.	2016	253	6	78.660	22.538
3.	2017	378	21	200.373	52.230

4.	2018	576	21	200.373	66.535
5.	2019	799	23	210.473	126.891,41
6.	2020	1.090	23	210.473	261.408,94
7.	2021	1.824	29	314.833	277.754,24
8.	2022	2.257	33	383.310	288.154,75
9.	2023*	2.808	36	484.952	261.127,51

Source : Indonesia Agriculture Quarantine Agency/Barantan (2022)

Description: *Data from January 1 to September 7 2023.

4.4.2 Effect of Edible Bird Nest Exports to China on the Number of Registered Swiftlet Farmhouses and Edible Bird Nest Washing Companies.

Multiple linear regression analysis results found no significant relationship ($p>0.05$) between EBN exports and the number of registered SFH and EBN washing companies. An increase in registered SFH and EBN washing companies does not necessarily increase the number of EBN exports.

4.4.3 Relationship between the Export Capacity of Edible Bird Nests, the Size and Floor Type of the Swiftlet Farmhouse

The number of SFH buildings in Indonesia is increasing from year to year. Generally, SFH is a multi-story building consisting of at least 2 floors and a maximum of 9 SFH floors. Meanwhile, the smallest SFH building area is 144 m2, and the largest is 3,740 m2, according to Table 7. It is assumed that the average EBN selling price is Rp. 9,000,000. Research data using multiple regression analysis shows that EBN production capacity is not significantly influenced ($p>0.05$) by the size of the SFH area and the SFH floor type.

Table 7. Recapitulation of Data on Swiftlet Farmhouses in West Kalimantan, North Sumatera, Banten

Number	Regency/ Province	Swiftlet Farmhouses Production Capacity (kg/year)	Wide (m^2)	Number of Floors (piece)	Estimated Annual Household Income (Rp)
1.	Deli Serdang - Sumatera Utara	802,72	800	3	7.224.480.000
		1000	320	4	9.000.000.000
		1188	324	3	10.692.000.000
		1201	324	3	10.809.000.000
		1740	1250	5	15.660.000.000
		1742	1000	4	15.678.000.000
		700	704	2	6.300.000.000
		766	752	4	6.894.000.000
2.	Serang – Banten	99,7	400	3	897.300.000
		115,73	576	2	1.041.570.000
		156	180	2	1.404.000.000
		216,58	540	3	1.949.220.000

		322	375	3	2.898.000.000
		343,34	840,8	6	3.090.060.000
		351,41	1152	5	3.162.690.000
		77,8	320	2	700.200.000
		622,08	399	3	5.598.720.000
		633,6	400	2	5.702.400.000
		669,108	240	2	6.021.972.000
		712,2	547	4	6.409.800.000
		792	547	4	7.128.000.000
		838,4	240	2	7.545.600.000
		870,4	334	2	7.833.600.000
		883,2	624	4	7.948.800.000
		909,6	390	3	8.186.400.000
		1232,39	1093	8	11.091.510.000
		1357,2	1786	7	12.214.800.000
		1752,96	1552	9	15.776.640.000
3.	Ketapang – Kalimantan Barat	33,59	400	4	302.310.000
		41	640	5	369.000.000
		50	640	5	450.000.000
		56,16	500	5	505.440.000
		125	400	4	1.125.000.000
		234	400	4	2.106.000.000
		302,7	400	4	2.724.300.000
		313,6	500	5	2.822.400.000
		315	144	3	2.835.000.000
		343	192	3	3.087.000.000
		350	288	3	3.150.000.000
		361	320	3	3.249.000.000
		373	144	4	3.357.000.000
		400	640	3	3.600.000.000
		402	320	4	3.618.000.000
		403,8	500	4	3.634.000.000
		412,5	500	5	3.712.500.000
		417	320	4	3.753.000.000
		440	468	4	3.960.000.000
		444	960	4	3.996.000.000

		466	480	4	4.194.000.000
		500	512	4	4.500.000.000
		522,5	1000	5	4.702.500.000
		523	900	3	4.707.000.000
		532	500	5	4.788.000.000
		560	640	4	5.040.000.000
		563	640	4	5.067.000.000
		600	630	5	5.400.000.000
		600	640	4	5.400.000.000
		628	960	5	5.652.000.000
		633	640	4	5.697.000.000
		679	576	3	6.111.000.000
		726,3	180	3	6.536.700.000
		743	1000	5	6.687.000.000
		784	800	4	7.056.000.000
		805	1200	5	7.245.000.000
		1718	3740	5	15.462.000.000

5. Discussion

5.1 Export Volume of Edible Bird Nests from Indonesia

The People's Republic of China (PRC) is the largest consumer of EBN in the world; almost 90% of the EBN market is aimed at China (Tangjitmanngamkul, 2019). Countries that can produce EBN and export to consumer countries include Indonesia, Malaysia, Thailand, the Philippines and Vietnam. Indonesia is the world's largest source of EBN exporters, with EBN exports of around 2000 tons per year, in second place, followed by Malaysia, which exports 600 tons of EBN annually (Tangjitmanngamkul, 2019).

Figure 1 shows that from 2015 until now, the EBN export trend has changed yearly. EBN exports to China increase yearly, while EBN exports to non-PRC have decreased since 2018. The decline in EBN exports to non-PRC is caused by several things, namely (1) the opening of direct EBN exports to China, (2) the existence of regulations in China regarding illegal products and (3) the existence of regulations from the Indonesian Government in the form of Regulation of the Minister of Agriculture Number 26 of 2020 and Regulation of the Minister of Trade Number 19 of 2021 which only allows exports of clean (semi-finished) EBN. Another factor is the increased EBN consumption during the COVID-19 pandemic in China and transportation obstacles to other trading partner countries due to the closure of transportation access and lockdowns in several countries. The volume of EBN exports from Indonesia to various countries has increased over the last 7 years from 2015 to 2021. The SARS-CoV-2 (COVID-19) outbreak, initially in China at the end of 2019 and then spread worldwide, increased Indonesian EBN exports to various countries.

5.2 Edible Bird Nest Production at Location Centers

Indonesia's natural and geographical conditions are very suitable and supportive for the life of swiftlet (Yahya 2020). The EBN industry proliferates in coastal areas and the lowlands of Kalimantan and Sumatra in Indonesia (Looi and Omar 2016). The market value of EBN depends on quality, form, type, and origin (Hao and Rahman 2016). The swiftlet business is believed to improve the welfare of swiftlet cultivation businesses because it brings in large profits with very high EBN selling prices (Yahya 2020).

Table 4 shows that the most significant number of registered SFHs is in West Kalimantan Province, namely 367 houses, second in Banten Province with 98 registered SFHs, and finally in North Sumatra Province with 61 SFHs. The SFH data sampled at 3 (three) central district locations, namely Ketapang, Serang and Deli Serdang, respectively, amounted to 37 houses, 20 houses and 8 houses. Each SFH built has a varying area and number of floors in the 3 district locations. Permanent SFH development has now been carried out in almost all of Indonesia. For example, SFH development in North Sumatra, Banten and West Kalimantan is developing rapidly. Likewise, West Kalimantan is a province that has many EBN businesses, and almost every sub-district has an EBN business. The condition of Kalimantan is supported by the geographical potential of the West Kalimantan area, which is suitable for the swiftlet environment (Aziz et al. 2022). The SFH data and capacity for three EBN center locations are presented in Appendix 1. The Indonesian Ministry of Agriculture estimates that EBN production from Indonesia can reach 400 tons annually (Looi and Omar 2016).

5.3 Contribution of Edible Bird Nests in Production Center Locations to Regional Income

Domestic EBN commodity traffic is sent to various cities and districts with destinations throughout Indonesia. Indonesia is the largest EBN producer in Southeast Asia, exporting around 2,000 kg/year (Ito et al. 2021). The EBN deliveries from North Sumatra, Banten and West Kalimantan show high numbers. The agricultural sector has a large contribution in the economy of Serang Regency, namely in fourth place at 8.5 % in 2019, although the agricultural sector has a fairly large role, the contribution of the agricultural sector from 2016 to 2019 experienced were decreased. Generally there are three agricultural sub-sectors that contribute to the GDP of the agricultural sector of Serang Regency. The three are the food crops subsector, livestock and fisheries subsector (Hasanah et al. 2021).

Banten's exports have increased from year by year. In 2020 the export value reached 10,683 US$. and in 2021, Banten’s export were valued at 13,493.6 million US$, and in 2022 were increased at 13,936.1 million US$. Some of leading commodities in Banten Province are mangosteen, vanili, dargon fruit, EBN, and rabits (Septiawan et al. 2023). Based on data from January 2014 to April 2021, Banten's export contribution to Indonesian exports reaches an average of 6 percent per month. Meanwhile, monthly export development, although fluctuating, the trending is increased to 1.17 billion US$ (Hidayat and Hakim 2021). Banten's high achievement in agricultural exports means that the gross regional domestic product (GRDP) figures for each district and city are also increasing; one example is the Serang Regency (Maulana et al. 2023). The GRDP value is an indicator for measuring a province, region, or city's economic condition in a certain period, either based on current or constant prices. GRDP is the amount of added value produced by all business units in a particular area or the total value of final goods and services produced by all economic units (Hartono et al. 2018).

The EBN production industry has developed, especially in North Sumatra Province (Ito et al. 2021). Based on the Indonesia Agricultural Quarantine Agency's IQFAST application, export operational data, especially EBN commodities, which were trafficked through the Medan Agricultural Quarantine, North Sumatra, during the period January to October 2021, showed a frequency of 1,293 times and an economic value of IDR 4.386 trillion in the period January to September 2022 with a frequency of 1,573 times with an economic value reaching IDR 6.026 trillion to the destination countries of China, Australia, France,

Hong Kong, Vietnam, America, Singapore and Taiwan. Specifically for EBN exports to China, there will be an increase from 2022 to September, namely an increase in volume of 27,407.20 kg with 3.71% compared to 2021, a volume of 26,426.21 kg. The frequency of EBN deliveries experienced a slight decrease in 2022, amounting to 147 and in 2021, 177 times. The value of commodity exports in 2022 will increase by 3.71%, with its economic value reaching IDR 548 billion, while in 2021, it will only reach IDR. 528 billion. The increase in EBN exports to destination countries is directly proportional to the increase in production and demand. Indonesian EBN commodities have comparative advantages and are highly competitive in five central destination countries, such as Hong Kong, China, the United States, Vietnam and Singapore, and are superior to their main competitor, Malaysia (IQFAST, 2021).

One of which Kalimantan region, Ketapang regency, has a large forest area and plantation area compared to with other islands (Wahyuni 2022). It is not surprising that the number of EBN entrepreneurs is increasing every year. Hayati's research (2019) shows that swiftlet cultivation in Palangka Raya City, basically has a positive economic impact because it is a source of financial income for the people who cultivate it. Likewise, it is a source of Original Regional Income for the local government (Hayati 2019).

The SFH can produce EBN as quickly as around 4-5 months. Research on the results of an analysis of the financial feasibility of the EBN business in Benua Kayong District, Ketapang Regency, obtained a Net Present Value (NPV) of Rp. 734,062,699, which means it will provide a profit of Rp. 734,062,699, over a project life of 10 years according to the current time value of money. The Net Benefit-Cost Ratio (Net B/C) value is 5.1, and the Internal Rate of Return (IRR) value is 38.4% and is greater than the applicable interest rate (6%), which means that the EBN business will provide significant profits. Greater than depositing capital in a bank at the prevailing interest rate and the results of the Payback Period (PP) analysis show that returning the investment value takes 4 years and months, which means that investment returns can take place relatively quickly, namely within 4 years, so this business is assessed good/worth trying (Azis et al. 2020). Research conducted by Saifullah (2018) obtained a positive NPV value of IDR. 193,259,295, Net B/C 3.36, IRR 10.97% and payback period 3 years. The Irsan report (2020) states that with a positive NPV value of IDR. 231,901,674 Net B/C 4.75, IRR 26% and payback period 4 years 11 months (Irsan 2020).

5.4 The Swiftlet Farmhouse Registration Policy on Export Performance

5.4.1 The Influence of Edible Bird Nest Export Capacity to China with the Number of Registered Swiftlet Farmhouses and Edible Bird Nest Washing Companies.

Based on multiple linear regression analysis, the results obtained were that EBN export capacity was significantly influenced by the number of registered SFHs and the number of EBN washing companies ($p<0.05$). This condition is likely influenced by the number of EBN produced by each SFH, which will increase the amount of export capacity carried out by one SFH. The capacity will also increase as the number of EBN products from SFH increases. The SFH is not the same as a human house because the condition of the SFH building is made as closely as possible to its natural habitat, requires appropriate room insulation, and resembles a cave where swallows live (Azis et al. 2020). The more companies wash uncleaned EBN (raw material), the cleaned EBN they can produce. The EBN washing companies can accommodate uncleaned EBN and then wash it until it becomes clean EBN ready to be sent/exported. The EBN washing company implemented a strategy by adding employees to remove and wash EBN when harvesting EBN in large quantities.

The EBN distribution system is divided into two distribution channels: direct and indirect. Direct distribution channels (also called zero-level distribution channels) are simple and short distribution channels. Producers directly sell their products as goods and services to consumers. Direct distribution of EBN products is used to distribute EBN

products directly to consumers in the domestic market. Meanwhile, indirect distribution channels have a reasonably long flow so that EBN products from producers can reach consumers because marketing channels can include one or more intermediaries. Indirect distribution is used to distribute EBN to collectors/collectors of EBN, and then the EBN is exported abroad (Salim 2017).

5.4.2 Effect of Edible Bird Nest Exports to China on the Number of Registered Swiftlet Farmhouses and Edible Bird Nest Washing Companies.

An increase in registered SFH and EBN washing companies does not necessarily increase the number of EBN exports. This is because the export capacity the Chinese government has approved cannot all be met by the number of exports to China. Not all companies registered by the Chinese government can export according to the production capacity that the Chinese government has approved.

Obtaining cleaned EBN requires a washing process stage in the EBN washing industry. Edible Bird Nests (EBN) from Indonesia that will be exported abroad must be cleaned or washed according to the destination country's standard operating procedures (SOP). For example, China requires SOPs regarding EBN washing to achieve safe EBN nitrite levels (Chan et al. 2018). The EBN is a semi-natural product, which is produced in SFH buildings that are designed and built in such a way as to resemble the conditions of the wild environment (cave), the natural habitat of swiftlet. Therefore, the quality of EBN production is closely related to SFH management (Syahrantau and Yandrizal 2018). The washing efforts carried out by the EBN company can clean fur and dirt and reduce nitrite levels in EBN (Chan et al., 2013; Hamzah et al., 2013). Nitrite levels in clean EBN (after washing) are significantly lower than in dirty EBN (not before washing) (Yeo et al. 2021).

On the other hand, the EBN washing process is carried out manually or using human power, so the EBN washing industry is labor-intensive and can absorb much labor. In 2020, were 8,917 workers registered in the EBN business process at registered EBN washing places in Indonesia and China; in 2021, there were 10,176 people, and in 2022, there were 11,788 people. The worker data above does not include the number of workers in SFH and the laundering process in non-PRC destination countries. Determining the number of workers for EBN exports to China will determine the company's production capacity in processing the number of EBN for one year. To increase the value of EBN, the government is encouraging the added value of EBN to be located in Indonesia. One form of increasing the added value of EBN is by producing processed EBN products in the form of ready-to-drink products. Only one company developing processed swallow drinks has been registered in Barantan for export plans to China. The market opportunity for swallow drinks is significant, both overseas and domestic.

Cultivating EBN by establishing SFH seems to be a promising business for the community. This business has clear market prospects, especially for exports and extensive domestic market opportunities among the upper middle class, with a slight increase in promotion within the country. Syahrantau and Yandrizal (2018) stated that the EBN business is efficient; for every IDR 1 spent, you will get a revenue of IDR 3.31 and a profit of IDR. 2.31

5.4.3 Relationship between the Export Capacity of Edible Bird Nests, the Size and Floor Type of the Swiftlet Farmhouse

Indonesia, with a population over of 270 million, is the 16th largest economy in the world based on nominal GDP (Fahmid et al. 2019). This research results also align with Wahyuni's (2022) study that all SFHs were built in stages. This multi-story building is only intended to attract swiftets and occupies the SFH building, and the ground floor adapts to its original condition in the form of soil (Wahyuni et al. 2022). On average, one SFH can accommodate up to 1000 swiftlets (Looi and Omar 2016). The size of the SFH area in the three districts varies greatly and is generally built in stages with a minimum of

2 levels. The average household income in Deli Serdang Regency is 10.2 billion, in Serang Regency, it is 5.5 billion, and in Ketapang Regency, it is 4.2 billion.

The small size of the SFH prevents swiftlets from flying freely, and this condition is less conducive to the development of swiftlets (Ibrahim 2015). Other research found that the agreed ideal size of SFH is 20 x 60 x 30 feet or around 3,344.4 m^2. Based on observations, an SFH measuring 20 x 50 feet (92.9 m^2) is considered a small building for swiftlet nesting (Ibrahim 2015). On the other hand, an enormous building will make the swiftlets more comfortable and most likely make them want to live in it.

The number of EBN produced at SFH is more influenced by macro and micro environmental conditions, including the availability of insects as food for swifts, the habitat or environment around the SFH and the number of swifts that live in the SFH. Food availability is one of the most critical factors controlling the breeding cycle of swiftlet. Swiftlets are a species of small insectivorous birds. The types of food for swiftlet in the SFH surveyed generally came from Hymenoptera, Hemiptera and Diptera (Wahyuni et al., 2022). The production results of an SFH are also greatly influenced by the habitat around the SFH. The areas that swiftlet like to live and nest in are caves, and some literature says they like rainforest habitats. Forests must be protected because the number of swiftlets will decrease when forests are cut down and oil palm plantations are cleared (Stimpson 2013). This decline may be caused by deforestation, which reduces the number of insects/arthropods that swiftlets feed on (Gibson et al. 2011, Koh et al. 2011; Mitchell et al. 2018).

A SFH can produce 100 grams of EBN per m^2 yearly (with an average weight of one EBN of around 7-8 grams) (Looi and Omar 2016). The estimated income of EBN breeders is very dependent on the yield or capacity of SFH each year and the price of EBN on the market. One household of SFH farmers in Serang district, Banten Province, with an SFH capacity of 15.6 kg/year, has a minimum income of around Rp. 234 million / year, assuming an EBN price of Rp. 15 million / kg. Swiftlet breeder households in Deli Serdang (North Sumatra) have a household income of Rp. 46,845,000 with an SFH capacity of 3,123 kg/year.

Gross sales proceeds from 48 kg of EBN can reach IDR 720 million, with a net profit of around IDR 685 million (US$70,000) annually. The cost of building a building or shophouse used as an SFH covering an area of 160 m2 per floor with three floors is around Rp. 200 million. Operational costs consist of officers/guards, per calculation of the owner's energy per time, water, electricity needs, depreciation and repairs to buildings and equipment, which are around Rp. 35 million per year. The risks of the SFH business are swallows not occupying the SFH and limited market access due to lack of knowledge (Looi and Omar 2016). The study of Ito et al. (2021) also shows that the average income from EBN cultivation is IDR 109 million (USD 7,638) per year. In SFH, which is jointly owned, investors/breeders must share the profits and income from EBN production, which is still very attractive to farmers/breeders in rural areas. Initial construction costs and production stability must be considered when planning sustainable development (Ito et al. 2021). The initial cost to build an SFH building is around IDR 104 million (USD 7,154.5); this initial construction cost is financially considered very expensive for many ordinary farmers/breeders in Indonesia; up to 66% of breeders make efforts to borrow money to build an SFH. The high initial cost of EBN cultivation is an obstacle for farmers who want to start harvesting EBN and impacts the growth of the EBN agricultural industry in Indonesia. Another effort implemented by breeders to overcome the high costs of developing SFH independently is the collaboration of several partners to invest together in SFH development. Profits in the partnership system by sharing the EBN results. Productivity and stability are problems that must be addressed so that EBN farming becomes a more viable and sustainable method for improving people's living standards (Ito et al., 2021).

6. Conclusion

Indonesia is the largest producer of edible bird nests in the world. In 2022, the number of exports to China will be 290 tons, and exports to non-China will be 1,164.9 tons. Data on production capacity in the three EBN-producing provinces, namely West Kalimantan Province, North Sumatra Province and Banten Province, with the following amounts, respectively, 175,979.08 kg, 163,165.29 kg and 81,194.74 kg. The potential annual regional income tax through the EBN tax in West Kalimantan Province, North Sumatra Province and Banten Province is 31.6 billion, 29.3 billion and 14.6 billion, respectively. The average annual household income of swallow breeders in Deli Serdang Regency is 10.2 billion, in Serang Regency, it is 5.5 billion, and in Ketapang Regency, it is 4.2 billion. The EBN export capacity is significantly influenced by the number of registered SFHs and EBN washing companies ($p<0.05$). The amount of EBN produced in SFH will be able to increase the amount of export capacity. On the other hand, increasing the number of registered SFH and EBN washing companies does not significantly increase the number of EBN exports $p>0.05$. This is because the number of exports to China cannot fulfill the export capacity the Chinese government has approved. Not all companies registered by the Chinese government can export according to the production capacity that the Chinese government has approved. In addition, EBN production capacity is not significantly influenced ($p>0.05$) by the size of the SFH area and SFH floor type. However, it is more influenced by macro and micro environmental conditions, including the availability of insects as food for swiflets, habitat or the surrounding environment. The SFH and number of swiftlet that reside within the SFH. Increasing production in SFH and the amount of EBN washing impacts the household economy, regional economy and state income. This research identifies the mechanism underlying the relationship between EBN production capacity and the amount of EBN exports in EBN exported to China. Therefore, it is recommended that future research focus on non-Chinese EBN exports.

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