

Ornamental fish export during the Covid-19 pandemic

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Abstract. Indonesia is one of the top 10 exporters of ornamental fish in the world. However, at the beginning of the Covid-19 pandemic, the performance of Indonesia's export of ornamental fish experienced significant contractions. The purposes of this paper were (1) to find groups of ornamental fish product types that experienced an increase and decrease in export value during the Covid-19 pandemic; (2) to find changes in the export share of ornamental fish by province of origin and airport/port of loading during the COVID-19 pandemic; (3) to determine the level of market penetration of Indonesian ornamental fish products in the international market; (4) to determine the strategy for increasing the export value of ornamental fish products. The group of marine ornamental fish product types during the Covid-19 pandemic experienced a greater decline in export value than the freshwater ornamental fish group. The share of ornamental fish export value from the Soekarno-Hatta Airport reached 96.17% of the total ornamental fish export value in the first quarter of 2021. The Indonesian ornamental fish market penetration index in 2019 reached 0.54. This means that Indonesia still has a large opportunity to increase the ornamental fish market in the international market.

Key Words: Covid-19 pandemic, seawater ornamental fish, freshwater ornamental fish.

Introduction. Indonesia's ornamental fish trade balance in 2019 reached 27.16 million USD, being the second largest exporter in the world, after Japan (International Trade Center 2021). Meanwhile, the share of Indonesian ornamental fish export value in 2019 reached 8.73% of the total world ornamental fish export value. Indonesian ornamental fish exports in the 2015-2020 period grew with an average of 7.33% year⁻¹. The highest export value growth occurred in 2016, reaching 25.28%, while the lowest occurred in 2020, reaching -7.07%. In 2020, the export value of ornamental fish will reach USD 30.77 million (Indonesian Central Statistics Agency 2021b). The growth of ornamental fish exports in 2020 is influenced by policies related to the handling of the Covid-19 pandemic. At the beginning of the Covid-19 pandemic, many live fish logistics fleets (airplanes) experienced a decrease in activity and an increase in shipping costs up to 3 times. As a result, ornamental fish shipments from several regions have decreased, such as shipments from Bali's Ngurah Rai Airport (Suhana 2020).

Ornamental fish are a key component of multi-million-dollar marine products, the aquarium trade industry is a controversial industry because it currently relies heavily on specimens collected from nature (Chen et al 2019). Metar et al (2018) stated in their research that marine ornamental fish is very popular all over the world and its trading on international markets is a multi-million-dollar industry. The marine ornamental fish trade is worth more than a billion dollars every year and consists of thousands of species. Historically, scientists have demonstrated the importance of accurate trade statistics to monitor such trades (Biondoa & Burki 2019). Ornamental fish are a source of entertainment for the entire world community, so that their trade affects the economy of a country. Business turnover, the profit method was also investigated by Han et al (2008) to show how ornamental fish contribute to the economy of Hong Kong. Indonesia is a supplier of ornamental fish mostly to the United States, Europe, and Japan (Palmtag 2017). Transportation of ornamental fish trade is not

easy, especially during the Covid-19 pandemic, attention is needed in maintaining the quality of shipping by paying attention to the health and behavior of fish during commercial transport (Vanderzwalmen et al 2020) and transporting live fish must reduce the causes of stress in order to prevent decline in quality (Vanderzwalmen et al 2021).

Export actors, industry, traders also automatically limit the purchase/absorption of fish produced by fishermen or fish cultivators. As a result, many fish produced by fishermen and fish cultivators are not absorbed and the price drops (Maliszewska et al 2020). The Covid-19 pandemic has forced many governments to shut down large parts of the economy, including businesses, restaurants and schools, at least temporarily, to promote distance and reduce infection rates (Althouse et al 2020; Hale et al 2021). Since the end of 2019 until now, the condition of the world fishery commodities market has experienced a shock caused by the Covid-19 pandemic. In the first quarter of 2020, many countries affected by the Covid-19 outbreak implemented Lockdown policies to limit the movement of residents to and from their countries. In fact, many countries have banned their residents from carrying out activities in their country to stop the spread of the Covid-19 outbreak. As a result, the demand for fishery commodities has decreased. However, along with the progress of handling the Covid-19 pandemic in export destination countries, residents in export destination countries have returned to many activities with strict health protocols and logistics facilities between countries are growing again. This has encouraged Indonesia's ornamental fish exports to increase by the end of 2020. Alternative strategies in dealing with the handling of ornamental fish export problems are product development and market penetration and prioritize the latest alternative strategies based on supply demand analysis, product development being the first, and market penetration strategies being the second Saputro et al (2007).

Based on this, it can be seen that the policy of handling the Covid-19 pandemic in export destination countries and domestically has an impact on the economic activity of Indonesian ornamental fish. Many countries have experienced the impact of the Covid-19 pandemic, one of which is Turkey also experiencing problems with the export of aquatic products (Can et al 2020). Therefore, the research questions in this paper are: (1) How does the Indonesian ornamental fish exports behave during the Covid-19 pandemic? (2) What is the adaptation pattern of export actors in dealing with problems during the Covid-19 pandemic? and (3) What is the strategy to increase the export value of ornamental fish during the Covid-19 pandemic? Based on these three questions, the purpose of compiling this paper was to (1) find groups of ornamental fish product types that experienced an increase and decrease in export value during the Covid-19 pandemic; (2) find changes in the export share of ornamental fish by province of origin and airport/port of loading during the COVID-19 pandemic; (3) know the level of market penetration of Indonesian ornamental fish products on the international market; (4) determine the strategy to increase the export value of ornamental fish products.

Material and Method

Description of the study sites. Indonesia has more than 400 species of ornamental fish (Said & Hidayat 2015), however, only a few species already have a nomenclature for classification of goods used worldwide (HS Code). Based on the HS Code 8 digits, ornamental fish products consist of 13 types of products, namely Botia fish seeds (*Chromobotia macracanthus*), other freshwater ornamental fish seeds like Koi (*Cyprinus carpio*), goldfish (*Carassius auratus*), Betta (Beta splendens), Arowana (*Scleropages formosus*), Arowana Jardini (*Scleropages jardini*), other freshwater ornamental fish, seeds of other ornamental fish, Cardinal prided fish (*Pterapogon kauderni*), Napoleon wrasse (*Cheilinus undulatus*) (Central Bureau of Statistics 2021c). Based on the types of ornamental fish products, it can be seen that there are 9 types of products belonging to the freshwater ornamental fish group and 4 types of products belonging to the marine ornamental fish group. The HS codes of the

13 ornamental fish products can be seen in detail in Table 1 (Indonesian Central Statistics Agency 2021c).

Table 1

Definition of ornamental fish products according to HS code 8 digit

No	Group	HS code	Description
1	Fresh water ornamental fish	03011111	<i>Chromobotia macracanthus</i> fish seeds
2	Fresh water ornamental fish	03011119	Other freshwater ornamental fish seeds
3	Fresh water ornamental fish	03011191	<i>Cyprinus carpio</i> , other than seeds
4	Fresh water ornamental fish	03011192	<i>Carassius auratus</i> , other than seeds
5	Fresh water ornamental fish	03011193	<i>Beta splendens</i> , other than seeds
6	Fresh water ornamental fish	03011194	<i>Astonotus ocellatus</i> , other than seeds
7	Fresh water ornamental fish	03011195	<i>Scleropages formosus</i> , other than seeds
8	Fresh water ornamental fish	03011196	<i>Scleropages jardini</i> , other than seeds
9	Fresh water ornamental fish	03011199	Other freshwater ornamental fish, other than seeds
10	Fresh water ornamental fish	03011910	Other ornamental fish, other than fresh water
11	Fresh water ornamental fish	03011991	<i>Pterapogon kauderni</i> , other than seeds
12	Marine ornamental fish	03011992	<i>Cheilinus undulatus</i> , other than seeds
13	Fresh water ornamental fish	03011999	Other ornamental fish, other than fresh water, other than seeds

Data types and sources. The data used in this study are secondary and primary data. Secondary data was obtained from the official international trade website through the website www.trademap.org. In addition, secondary data was obtained from the Central Statistics Agency of the Republic of Indonesia. Meanwhile, primary data was obtained through interviews/discussions with ornamental fish players who are members of the Indonesian Ornamental Fish Council (DIHI).

Analysis method. The analytical method used in the preparation of this paper comprised four steps. First, an analysis of the growth of Indonesian ornamental fish exports was performed. An increase in the volume and value of national ornamental fish exports was noted. The growth of the export value of Indonesian ornamental fish products was calculated by the following formula (Reyes et al 2013):

$$GOFEt Va = \left(\frac{\text{Export Value of Ornamental Fish Products}_t - \text{Export Value of Ornamental Fish Products}_{t-1}}{\text{Value of Ornamental Fish Products}_{t-1}} \right) * 100\%$$

Where:

GOFE Va - growth of ornamental fish export value.

Meanwhile, the growth of ornamental fish export volume was calculated by the formula (Reyes et al 2013):

$$GOFE Vo = \left(\frac{\text{Ornamental Fish Product Export Volume}_t - \text{Ornamental Fish Product Export Volume}_{t-1}}{\text{Ornamental Fish Product Export Volume}_{t-1}} \right) * 100\%$$

Where:

GOFE Vo - growth of ornamental fish export volume.

Second, an analysis of the share of Indonesian ornamental fish exports by province of origin and airport/port of loading was performed. The market share (share) of ornamental fish exports by province is mathematically formulated as follows (Reyes et al 2013):

$$P_i = \frac{X_i}{\sum_i^n X_i}$$

Where:

P_i - the market share of ornamental fish of the i province (%);

X_i - the export value ornamental fish province i (USD);

i, \dots, n - a province in Indonesia that exports ornamental fish.

Meanwhile, the market share of ornamental fish exports by airport/port is mathematically formulated as follows (Reyes et al 2013):

$$P_j = \frac{X_j}{\sum_j^n X_j}$$

Where:

P_j - the market share of ornamental fish from airports/ports loading to j (%);

X_j - the export value of ornamental fish from the to- j airport/port of loading (USD);

j, \dots, n - an exporting airport/port of loading in Indonesia that exports ornamental fish.

Third, an analysis of the export market penetration index was performed. This indicator measures the extent to which Indonesia's ornamental fish exports reach a proven market. This is calculated as the number of export destinations for Indonesian ornamental fish in a given year divided by the total number of countries worldwide that reported importing ornamental fish products in that year. A low export penetration may indicate trade barriers that prevent firms from expanding the number of markets they export to. The mathematical definition of the index is as follows (Reyes et al 2013):

$$\frac{n_{x,ik}}{n_{m,k}}$$

Where:

n_x - the number of countries to which Indonesia exports ornamental fish products (k);

n_m - the number of countries that import fish products ornamental (k) from any source. Value range: 0 to 1.

A value of 1 indicates that Indonesia exports ornamental fish to every country that imports ornamental fish products.

Fourth, a descriptive analysis was performed, by examining the present status. The purpose of this method is to make a systematic, factual and accurate description of the facts, characteristics and relationships between the phenomena being investigated (Nazir 1988).

Results and Discussion

Export growth of Indonesian ornamental fish products during the Covid-19 pandemic. At the beginning of the Covid-19 pandemic, Indonesia's ornamental fish exports

experienced a fairly high contraction. This can be seen from the export performance of ornamental fish in the first quarter of 2020. In the first quarter of 2020 the export value of Indonesian freshwater ornamental fish reached USD 4,948 thousand or decreased by 21.15% compared to the same period in 2019. Meanwhile, the export volume of ornamental fish in the first quarter of 2020 reached 182 tons, decreasing by 28.41% compared to the same period in 2019. The export performance of freshwater ornamental fish increased again in the next quarter, although it was still lower than in the same period of 2019. The increase in export performance of freshwater ornamental fish continued until the 1st quarter of 2021. In the 1st quarter of 2021, the export value of freshwater ornamental fish reached USD 7,115 thousand with a volume of 211 tons. The development of the export performance of freshwater ornamental fish can be seen in detail in Figure 1.

Based on Figure 1, it can be seen that in the first quarter of 2020 the export value of freshwater ornamental fish grew by 43.80% compared to the same period in 2020, meanwhile when compared to the previous quarter (Q4 2021) it had a growth of 13.59%.

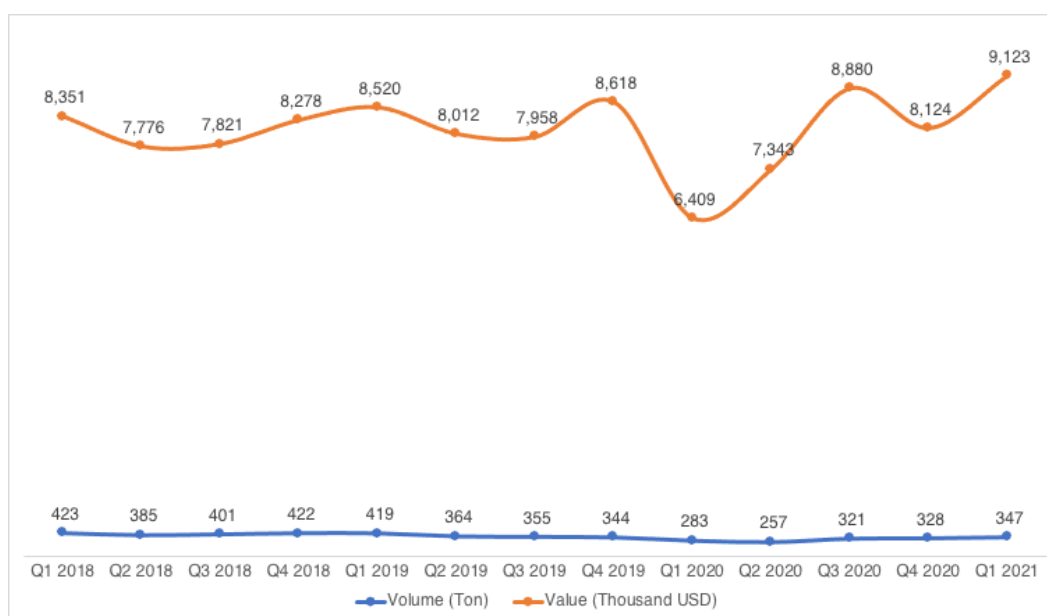


Figure 1. Exports of freshwater ornamental fish for the period from the 1st quarter 2018 to the 1st quarter 2021 (Source: Indonesian Central Statistics Agency 2021a, processed).

The export volume of freshwater ornamental fish in the 1st quarter of 2021 grew by 16.13% compared to the same period in 2020. Graphically, the development of freshwater ornamental fish export growth can be seen in Figure 2.

Meanwhile, the export performance of marine ornamental fish during the Covid-19 pandemic looks worse than the freshwater ornamental fish. The lowest export value and volume of marine ornamental fish occurred in the second quarter of 2020, reaching USD 1,126 thousand and 87 tons. However, the export performance of seawater ornamental fish increased again in the 3rd quarter of 2020 to the 1st quarter of 2021. The export value of the seawater ornamental fish in the 1st quarter of 2021 reached USD 2,007 thousand (Central Bureau of Statistics 2021a). The development of the value and volume of exports of marine ornamental fish can be seen in Figure 3.

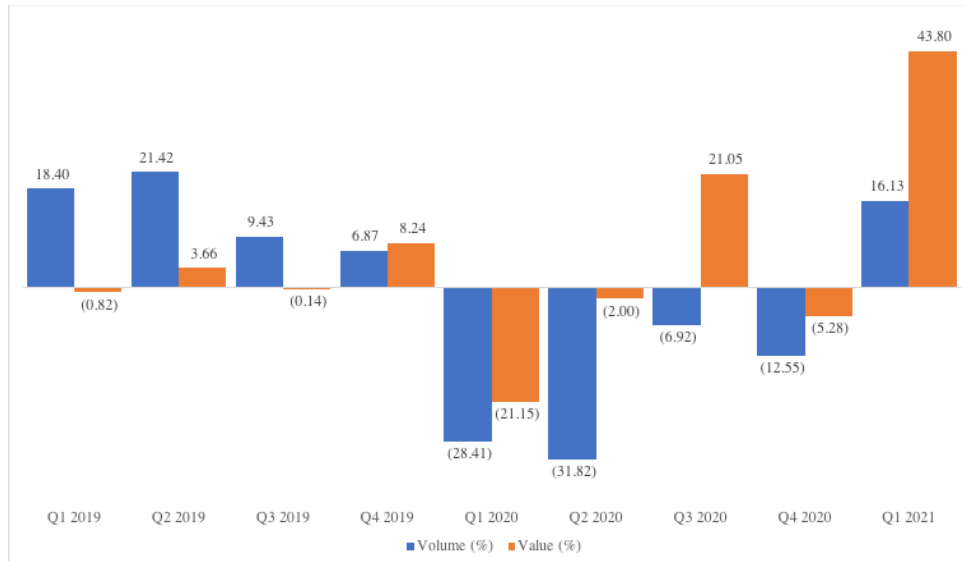


Figure 2. Export growth of freshwater ornamental fish for the period from the 1st quarter 2019 to the 1st quarter 2021 (Y on Y).

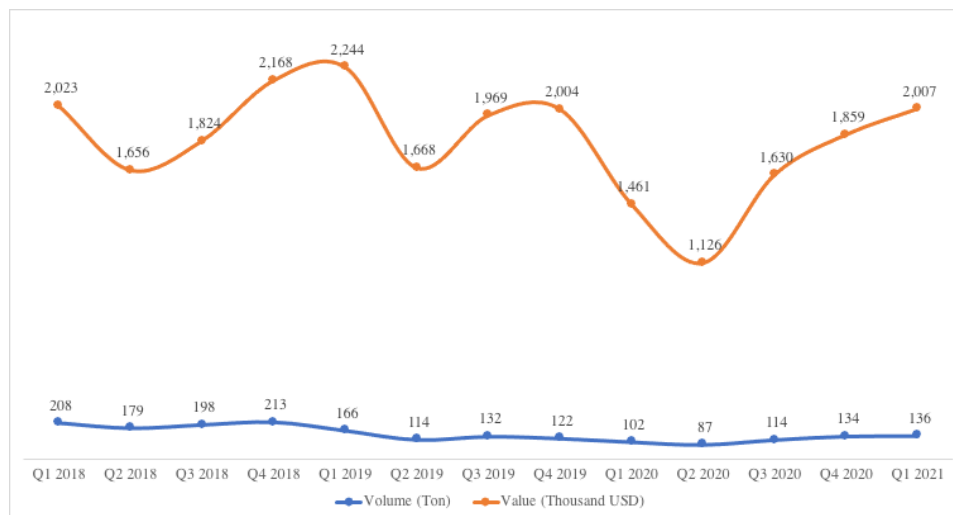


Figure 3. Seawater ornamental fish exports for the period from the 1st quarter 2018 to the 1st quarter 2021 (Source: Indonesian Central Statistics Agency 2021a, processed).

Based on Figure 3, it can be seen that the volume of export growth of seawater ornamental fish has slowed down since before the Covid-19 pandemic. Even during the pandemic it tends to be better than before the Covid-19 pandemic, although it is still experiencing contraction. However, in terms of value, it can be seen that export growth occurred from the 4th quarter of 2019 to the 4th quarter of 2020. The lowest growth of the value of seawater ornamental fish exports occurred in the 1st and 2nd quarters of 2020, namely -34.89 and -32.52%. However, the export growth of marine ornamental fish in the 1st quarter of 2021 was higher than in the years before the Covid-19 pandemic. The export value of marine ornamental fish in the first quarter of 2021 grew by 37.36% compared to the same period in 2019, while the export volume grew by 33.49%. This shows that marine ornamental fish is one of the commodities that quickly recovers from the "hit" of the Covid-19 pandemic. Graphically, the export growth of marine ornamental fish can be seen in Figure 4.

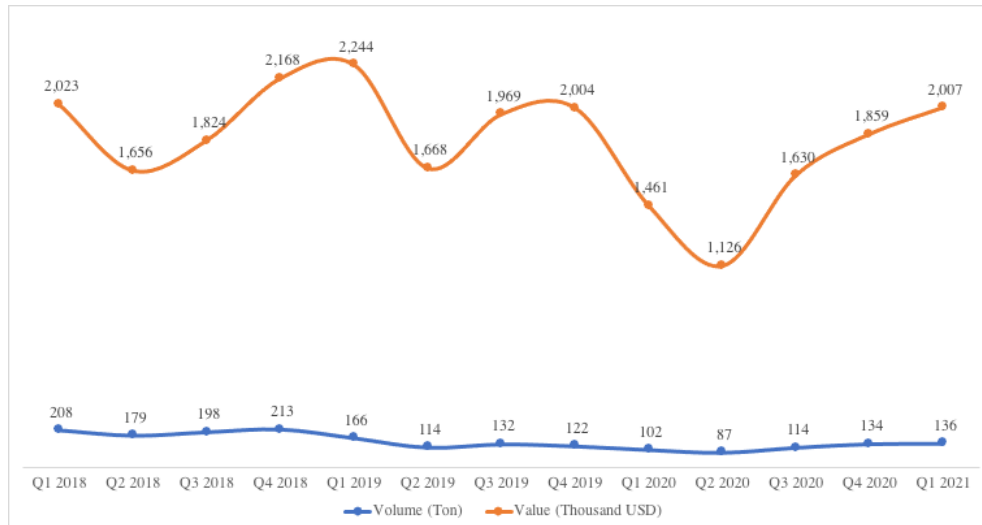


Figure 4. Export growth of seawater ornamental fish for period from the 1st quarter 2018 to the 1st quarter 2021 (y on y).

Based on this, it can be seen that the export performance of Indonesian ornamental fish (seawater and fresh water) in the first quarter of 2021 is much better than in the early days of the Covid-19 pandemic. In fact, it tends to be higher than before the Covid-19 pandemic. This is in line with the opinion of ornamental fish exporters who state that the demand for ornamental fish exports in the international market tends to be stable during the COVID-19 pandemic. However, the export performance of ornamental fish at the beginning of the Covid-19 pandemic decreased more due to the disruption of logistics activities and to the increase in logistics costs for ornamental fish from Indonesia to export destination countries. Some airports loading national ornamental fish exports until the 1st quarter of 2020 have not yet returned to export ornamental fish due to the cessation of international flight routes.

Share exports of ornamental fish products during the Covid-19 pandemic by province of origin and airport/port of load. The cessation of ornamental fish export activities during the Covid-19 pandemic can be seen from the export flow of each airport/port of loading. In the first quarter of 2019 there were 11 airports/ports that carried out loading and export activities of ornamental fish products, namely Tarempa Port, Supadio Airport, Sm Airport, Badaruddin, Sepinggan Airport, Panaru-Palangkaraya Airport, Tabing Airport (Padang), Husein Sastranegara Airport, Sam Ratulangi Airport, Kuala Namu International Airport, Ngurah Rai Airport and Soekarno Hatta Airport. The policy for handling the Covid-19 pandemic has an impact on the cessation of ornamental fish cargo services at several export loading ports in Indonesia, which occurred in the first quarter of 2021, only six airports/ports carried out export loading activities of ornamental fish products due to declining ornamental fish export performance. The six airports/ports are Nunukan Port, Sam Ratulangi Airport, Juanda-Surabaya Airport, Kuala Namu International Airport, Ngurah Rai Airport and Soekarno Hatta Airport (Central Bureau of Statistics 2021a). In the first quarter of 2021, ornamental fish export loading activities are concentrated at Soekarno-Hatta Airport, Jakarta. This is reflected in the share of ornamental fish export value from Soekarno-Hatta Airport, which reached 96.17% of the total export value of ornamental fish in the 1st quarter of 2021. In the 1st quarter of 2019, the share of ornamental fish export value from Soekarno-Hatta Airport only reached 74.80% of the total export value of ornamental fish. Graphically, the comparison of the share value of ornamental fish exports in the 1st quarter of 2019 and in the 1st quarter of 2021 can be seen in Figure 5.

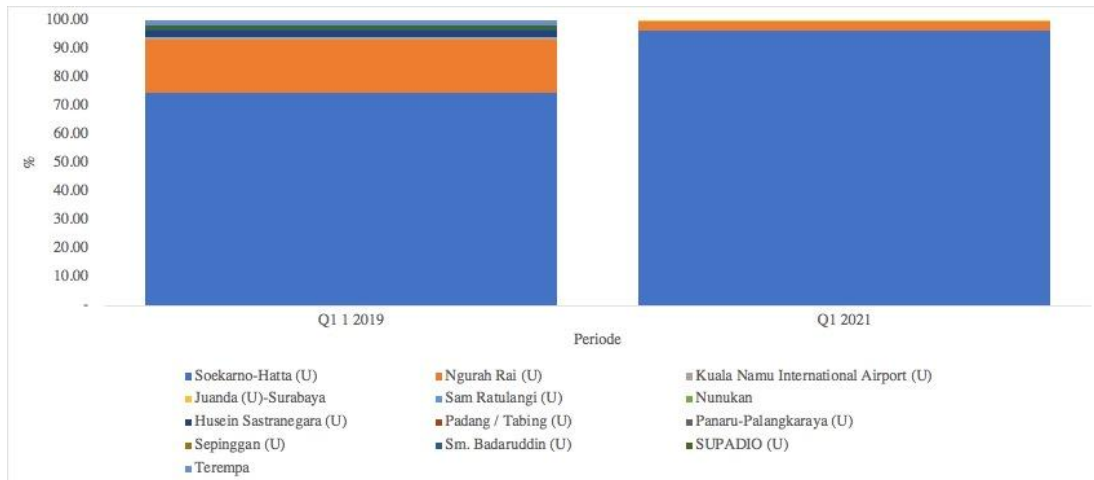


Figure 5. Comparison of share value of ornamental fish exports by airport/port of loading for the period from the 1st quarter 2019 to the 1st quarter 2021.

The cessation of export loading activities from several airports/ports resulted in a decline in exports from several provinces. In the first quarter of 2021, there were five provinces that did not record ornamental fish exports, namely South Sulawesi Province, East Kalimantan Province, Central Java Province, Jambi Province and Aceh Province. However, several other provinces increased their ornamental fish exporting in the first quarter of 2021, except for Bali, Riau Islands and East Java.

Based on the current burden of ornamental fish exports in the first quarter of 2019 it can be seen that the export of ornamental fish from Aceh Province is 100% carried out through Kuala Namu International Airport, while ornamental fish exports from the Province are carried out from Sepinggan Airport. The flow of ornamental fish exports by province of origin and airport/port of loading for the first quarter of 2019 can be seen in Table 2.

Meanwhile, in the first quarter of 2021, there were only 6 airports/ports of loading for ornamental fish exports, dominated by the Soekarno-Hatta airport. In the first quarter of 2021, there were changes in the airport/port of loading from several provinces of origin for ornamental fish exports. For example, ornamental fish exports from East Java Province, which in the first quarter of 2019 were exported through Ngurah Rai Airport (99.34%) and Soekarno-Hatta (0.66%), moved to the Djuanda Airport (44.82%), Ngurah Rai Airport (10.35%) and Soekarno Hatta Airport (44.83%).

This change certainly affects the economic rents of ornamental fish exporters from East Java Province. In theory, economic rent is strongly influenced by the logistics costs of ornamental fish exports. Meanwhile, logistics costs are influenced by the distance between the location of the ornamental fish business actor and the loading point and export destination. With the change in the export loading point of ornamental fish players in East Java Province, a decrease of the costs was predicted, because the location of the export loading point is closer. The development of ornamental fish cultivation, among others, must also be addressed by looking at the technical aspects, availability and quality of broodstock, limited fish seeds, water quantity and quality (decreased water quality), socio-cultural problems (decreased number of fish cultivators, difficulty accepting new technology, marketing). still dependent on demand, access to price information at the exporter level, labor still comes from within the family and depends on business owners, improving the quality of human resources (Nurlaili et al 2021).

Table 2

Export flow of ornamental fish in the 1st quarter of 2019 by province of origin and airport/port of load

Province	Airport/Port of load										
	Share export value (%)										
	Husein Sastranegara (U)	Kuala Namu International Airport (U)	Ngurah Rai (U)	Padang/Tabing (U)	Panaru-Palangkaraya (U)	Sam Ratulangi (U)	Sepinggan (U)	Sm. Badaruddin (U)	Soekarno-Hatta (U)	Supadio (U)	Terempa
Aceh	-	100.00	-	-	-	-	-	-	-	-	-
Bali	-	-	100.00	-	-	-	-	-	-	-	-
Banten	-	-	-	-	-	-	-	-	100.00	-	-
DKI Jakarta	-	-	-	-	-	-	-	-	100.00	-	-
Jambi	-	-	-	-	-	-	-	-	100.00	-	-
West Java	5.45	-	-	-	-	-	-	-	94.55	-	-
Central Java	-	-	-	-	-	-	-	-	100.00	-	-
East Java	-	-	99.34	-	-	-	-	-	0.66	-	-
West Kalimantan	-	-	-	-	-	-	-	-	87.91	12.09	-
South Kalimantan	-	-	-	-	-	-	-	-	100.00	-	-
Central Kalimantan	-	-	-	-	100.00	-	-	-	-	-	-
East Kalimantan	-	-	-	-	-	-	100.00	-	-	-	-
Riau Islands	-	-	-	-	-	-	-	-	60.37	-	39.63
South Sulawesi	-	-	-	-	-	-	-	-	100.00	-	-
North Sulawesi	-	-	-	-	-	51.44	-	-	48.56	-	-
West Sumatra	-	-	-	100.00	-	-	-	-	-	-	-
South Sumatra	-	-	-	-	-	-	-	100.00	-	-	-
North Sumatra	-	100.00	-	-	-	-	-	-	-	-	-
Total	1.89	0.87	18.56	0.30	0.08	0.03	0.05	0.06	74.80	1.66	1.69

Changes in loading points for ornamental fish exports also occurred in the Provinces of South Kalimantan, Central Kalimantan, West Sumatra and South Sumatra. In the first quarter of 2019 export operations could still be done from the local airports, but in the first quarter of 2021 one hundred percent were transferred through Soekarno-Hatta Airport. This certainly increased the logistics costs of ornamental fish exports from the region. The occurrence of changes in the logistics costs of ornamental fish exports and their effect on the economic rents of national ornamental fish exporters need to be studied comprehensively, in the field. The export flow of ornamental fish by province of origin and airport/port of loading for the period of the first quarter of 2021 can be seen in Table 3.

Table 3

Export flow of ornamental fish in the 1st quarter of 2021 by province of origin and airport/port of load

Home province	Airport/Port of load					
	Share export value (%)					
	Juanda (U)- Surabaya	Kuala Namu International Airport (U)	Ngurah Rai (U)	Nunukan	Sam Ratulangi (U)	Soekarno- Hatta (U)
Bali	-	-	24.83	-	-	75.17
Banten	-	-	-	-	-	100.00
DKI Jakarta	-	-	-	-	-	100.00
West Java	-	-	-	-	-	100.00
East Java	44.82	-	10.35	-	-	44.83
West Kalimantan	-	-	-	-	-	100.00
South Kalimantan	-	-	-	-	-	100.00
Central Kalimantan	-	-	-	-	-	100.00
North Kalimantan	-	-	-	100.00	-	-
Riau Islands	-	-	-	-	-	100.00
Riau	-	-	-	-	-	100.00
Southeast Sulawesi	-	-	-	-	-	100.00
North Sulawesi	-	-	-	-	13.82	86.18
West Sumatera	-	-	-	-	-	100.00
South Sumatera	-	-	-	-	-	100.00
North Sumatera	-	38.59	-	-	-	61.41
Total	0.24	0.27	3.31	0.00	0.01	96.17

Market penetration rate of Indonesian ornamental fish products in the international market. Based on the market penetration index value of Indonesian ornamental fish products in the international market, it can be seen that the Indonesian ornamental fish export market still has the potential to be further improved. In 2019, the Indonesian ornamental fish market penetration index only reached 0.54. In 2019, there were 143 countries in the world that reported importing ornamental fish. Meanwhile, Indonesia's ornamental fish exports have only been recorded to 77 countries (International Trade Center 2021). This means that Indonesia still has a large enough opportunity to increase the ornamental fish market in the international market.

Table 4

Indonesian ornamental fish market penetration index

<i>Description</i>	<i>2015</i>	<i>2016</i>	<i>2017</i>	<i>2018</i>	<i>2019</i>
Number of export destination countries	71	68	75	77	77
Number of countries importing ornamental fish	144	145	141	147	143
Ornamental fish market penetration index	0.49	0.47	0.53	0.52	0.54

Strategy to increase the export value of Indonesian ornamental fish products. Based on the results of the analysis, it can be seen that Indonesian ornamental fish products have the opportunity to continue to be improved. Several things that can be done to increase the value of national ornamental fish exports: First, the penetration of the Indonesian ornamental fish export market should be increased. Based on the results of the market penetration analysis, it can be seen that the export Indonesian ornamental fish products in 2019 could not reach 66 countries or 0.46% of the total countries that imported ornamental fish. Therefore, a good collaboration between the government and Indonesian ornamental fish players is needed for increasing the penetration of the ornamental fish export market. Second, the promotion of Indonesian ornamental fish in the export destination countries should be intensified. Third, the tariff for ornamental fish export logistics costs (cost of production, product packaging fee, bank charge, transportation fee from warehouse to port (trucking), forwarder fee, export document management fee, terminal handling charge (THC), export duty fee, sales agent commission fee (broker), shipping cost (freight), insurance fee, warehousing fee) should be adjusted in order to avoid penalties for the national ornamental fish players. Fourth, loading and unloading activities should be restored at the airports/ports that were closed during the Covid-19 pandemic, in order to avoid suppressing the income of national ornamental fish actors. Fifth, services and infrastructure for ornamental fish traffic between regions in Indonesia and the export points should be improved.

Conclusions. Based on the results of the analysis it can be concluded that: (1) The group of marine ornamental fish products during the Covid-19 pandemic experienced a greater decline in export value than the freshwater ornamental fish group. This is presumably due to the cessation of export loading activities at several airports loading and exporting seawater ornamental fish, such as Ngurah Rai Airport in Bali; (2) The activity of loading and exporting ornamental fish during the Covid-19 pandemic is concentrated at Soekarno-Hatta Airport, Jakarta. This is reflected in the share of ornamental fish export value from Soekarno-Hatta Airport, which reached 96.17% of the total value of ornamental fish exports in the 1st quarter of 2021. In the 1st quarter of 2019, the share of ornamental fish export value from Soekarno-Hatta Airport only reached 74.80% of the total export value of ornamental fish; (3) The Indonesian ornamental fish market penetration index in 2019 reached 0.54. This means that Indonesia still has quite a large opportunity to increase the ornamental fish market in the international market. Based on the results of the analysis, it can be seen that there has been a change in the loading point of ornamental fish exports during the Covid-19 pandemic in several locations. This change had an impact on the economic rents of ornamental fish exporters. Therefore, further research is needed to see how changes in export points affected the economic rents of ornamental fish business actors.

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