

Impact of the Covid-19 Pandemic on Catfish Farming Income in Kampar Regency

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ABSTRACT The Covid-19 pandemic that has occurred since 2020 is thought to have a different magnitude of impact on each type of catfish farming in Kampar Regency. This study aimed to analyze the structure of costs and revenues as well as differences in income from catfish farming based on the type of farming in Kampar Regency before and during the Covid-19 pandemic. This research was carried out in Koto Mesjid Village and Kuok Village from November 2021 to June 2022. The sample in this study was 60 farmers who farmed catfish for smoked fish raw materials were determined using a purposive sampling technique, and 60 farmers who farmed catfish for consumption were determined using a simple random sampling technique. The analytical method used is the structure of costs and revenues analysis, income analysis, and different tests. The results of the analysis show that there is a significant difference between income earned before and during the Covid-19 pandemic. However, there is no significant difference in income obtained between types of farming. Based on the R/C ratio of cash costs, catfish farming as raw material for smoked fish is financially feasible. However, based on the R/C ratio of total costs, no catfish farming is economically feasible to run during the Covid-19 pandemic.

Keywords: Cost structure; covid-19; income

INTRODUCTION

Fisheries are one of the agricultural sub-sectors that have great potential to be developed in Indonesia. In the economic field, the fishery sub-sector has made an increasing contribution over the last few years. Figure 1 shows the contribution of the fisheries sub-sector, which has a positive trend from 2016 to 2019 (Figure 1).

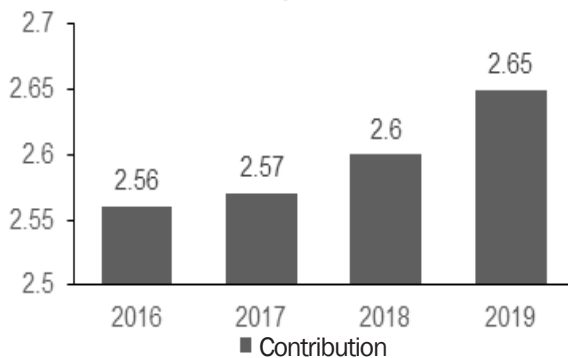


Figure 1. Fishery contribution to GDP at current prices 2016-2019 (Jayani, 2020).

One of the leading aquaculture commodities in Indonesia is catfish (Dinas Ketahanan Pangan dan Perikanan Kabupaten Buleleng, 2018). Favorable foreign market conditions have made catfish one of Indonesia's aquaculture commodities contributing to the country's foreign exchange. The average export volume of catfish (which consists of catfish and catfish) from 2012 to 2020 is 6.073.690 kilograms (Table 1), with an average export value of USD 11.078.731 (MMAF, 2021^a).

Kampar is a district that is the center of catfish production in Riau Province. In 2018, 71 percent of the catfish production in Riau Province came from Kampar Regency (Badan Pusat Statistik Kabupaten Kampar, 2019). This number increased to 92 percent in 2020 (Badan Pusat Statistik

Kabupaten Kampar, 2021). Figure 2 shows catfish production in Kampar Regency and Riau Province in 2018-2020.

Table 1. Catfish commodity export volume and value in 2012-2020.

| Year | Volume (kilogram) | Value (USD) |
|---------|-------------------|-------------|
| 2012 | 7.538.001 | 22.008.162 |
| 2013 | 7.764.179 | 18.138.566 |
| 2014 | 4.880.463 | 9.764.509 |
| 2015 | 6.769.804 | 10.427.363 |
| 2016 | 11.136.979 | 14.615.612 |
| 2017 | 5.293.898 | 8.044.322 |
| 2018 | 3.190.584 | 4.122.148 |
| 2019 | 3.465.588 | 5.701.934 |
| 2020 | 4.623.716 | 6.885.959 |
| Average | 6.073.690 | 11.078.731 |

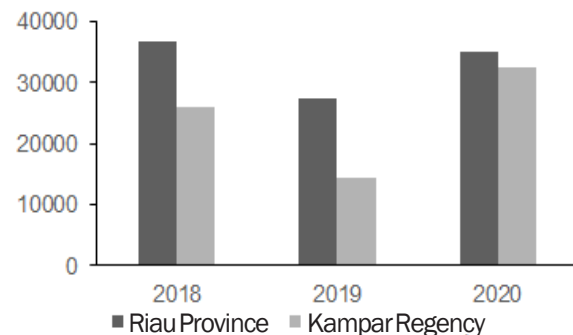


Figure 2. Catfish production in Riau Province and Kampar Regency in 2018-2020 (modified from Badan Pusat Statistik Kabupaten Kampar, 2019, 2020, 2021; MMAF, 2021^b)

The Covid-19 pandemic has impacted all sectors of activity, including catfish farming. Figure 2 shows an increase in catfish production in Kampar Regency from before the Covid-19 pandemic in Indonesia (2019) and during the Covid-19 pandemic (2020). The price of catfish in Riau Province increased before and during the Covid-19 pandemic, which was Rp14,731 in 2019, increasing to Rp24,906 in 2020 (MMAF, 2021^b).

Although there was an increase in production and the price of catfish from before and after the Covid-19 pandemic, the components of farming costs, such as feed, also increased due to restrictions on mobility to break the spread chain of Covid-19. Feed is a factor that significantly affects production (Fitri & Maleha, 2021), and the proportion of costs is most significant in catfish farming (Sazmi *et al.*, 2018; Simbolon *et al.*, 2015). The increase in feed prices will increase the cost of catfish farming. The increase in feed cost during the Covid-19 pandemic, which is higher than the farm income obtained, will make the farm lose.

The production of catfish in Kampar Regency is not only to meet household consumption needs but also to meet industrial needs. Therefore, there are differences in the duration of fish rearing in catfish farming in Kampar Regency. Thus, catfish farming in Kampar Regency is divided into catfish farming for smoked fish raw materials and catfish farming for consumption. Catfish for smoked fish are kept for 3-4 months, while catfish for consumption are kept for 7-8 months. Most catfish farmers do catfish farming for consumption. In fact, the longer the duration of fish farming, the greater the farming costs incurred. Therefore, it is necessary to conduct an in-depth study of the impact of the Covid-19 pandemic on catfish farming income based on the scale and type of farming in Kampar Regency.

This study aims to analyze the structure of costs and revenues from catfish farming based on the type of farming in Kampar Regency before and during the Covid-19 pandemic and to analyze the comparison of catfish farming income based on the type of farming in Kampar Regency before and during the Covid-19 pandemic.

MATERIALS AND METHODS

Methods

The research was conducted in two locations in Kampar Regency: Koto Mesjid Village, XIII Koto Kampar District, and Kuok Village, Kuok District. Koto Mesjid Village is a center for catfish production and processing, especially smoked catfish. Meanwhile, Kuok Village is the area with the largest catfish production for consumption in the Kampar Regency. The research was conducted from November 2021 to June 2022.

This study's population was catfish farmers in Koto Mesjid Village and Kuok Village. There are differences in the method of determining the sample in this study due to the availability of a sampling frame. Determination of the sample in the village of Koto Mesjid using a non-probability sampling method with a purposive sampling technique because there is no available sample frame. The determination of the sample using the purposive sampling technique met the requirements. Most villagers worked as catfish farmers, farming before and during the Covid-19 pandemic (at least from 2019 to 2022). The number of catfish

farmers for smoked fish raw materials in Koto Mesjid Village is 187. Sugiyono (2013) said that if the population size is around 100, the sample is at least 30 percent. Thus, as many as 60 farmers became the sample in this study.

Determination of the sample in Kuok Village using probability sampling with a simple random sampling technique. The sampling frame obtained is as many as 100 catfish farmers who are partners of CV. Patin Prima. Then a sample of 60 farmers was selected for catfish farming for consumption using random numbers in Microsoft Office Excel 2019.

Data processing and analysis methods used in this research are cost, revenue, farm income analysis, and different tests. The structure of costs and revenues was analyzed to determine the components and amount of costs and revenues of catfish farming. Income analysis was conducted to determine the reward for farmers' resources in catfish farming.

After calculating farm income, the Return Cost Ratio (R/C ratio) was analyzed. A comparative analysis of revenues and costs (R/C ratio) was conducted to determine whether farming was profitable. In this study, the R/C ratio is divided into the R/C ratio for cash costs and the R/C ratio for total costs. The value of the R/C ratio < 1 means farming is losing. The value of the R/C ratio = 1 means that the farm is neither profiting nor losing (break-even). The value of the R/C ratio > 1 means that farming is profitable. However, Nugroho & Mas'ud (2021) include an element of profit of 0.3 so that a farm that has an R/C ratio > 1.3 means it is feasible to run.

Two different test analyses were carried out in this study: Wilcoxon Signed Rank Test and the Kruskal-Wallis test. The Wilcoxon Signed Rank Test is used to see differences in income (costs, revenues) of catfish farming before and during the Covid-19 pandemic. The Kruskal-Wallis test was used to see differences in the income of catfish farming based on the type of farming.

RESULTS AND DISCUSSION

The cost structure presents expenditures for inputs used in catfish farming activities. The cost structure is classified into cash and non-cash costs, then cash and non-cash costs are further classified into fixed and variable costs.

Table 2 shows the components and costs of catfish farming as raw material for smoked fish and catfish farming for consumption. There was an increase in variable costs, fixed costs, and total costs during the Covid-19 pandemic, both in catfish farming for smoked fish raw materials and catfish farming for consumption. This result is in line with the research of Sarni & Sidayat (2020) and Ragasa *et al.* (2022) that farming costs increased during the Covid-19 pandemic.

Feed is a component of cash costs, with the most significant proportion in both types of farming. Catfish farming for smoked fish uses factory feed and artificial feed, while catfish farming for consumption only uses factory feed because partner companies have provided it. Apart from the difference in the duration of fish rearing, the difference in the use of feed makes the cost of catfish farming for consumption greater than catfish farming for smoked fish raw materials.

Table 2. The average cost structure of catfish farming per kilogram of harvest per season.

| Cost component | Catfish for smoked fish raw materials | | | Catfish for consumption | | |
|------------------------------------|---------------------------------------|--------|-------------------------------|-------------------------------|--------|-------------------------------|
| | Before Covid-19 pandemic (Rp) | % | During Covid-19 pandemic (Rp) | Before Covid-19 pandemic (Rp) | % | During Covid-19 pandemic (Rp) |
| Cash cost | | | | | | |
| Variable cost | | | | | | |
| Fingerlings | 1,003.28 | 7.73 | 1,060.05 | 406.19 | 2.85 | 467.99 |
| Feed | 6,380.66 | 49.16 | 7,093.05 | 12,868.13 | 90.29 | |
| Medicine | 68.60 | 0.53 | 67.32 | 53.50 | 0.38 | |
| Hired labor | 197.99 | 1.53 | 195.63 | 177.86 | 1.25 | |
| Chalk | 74.58 | 0.57 | 73.64 | 58.95 | 0.41 | |
| Electricity | 50.37 | 0.39 | 49.60 | - | - | |
| Fuel oil | 10.49 | 0.08 | 10.33 | - | - | |
| Total variable cost | 7,785.98 | 59.99 | 8,549.62 | 13,564.62 | 95.18 | |
| Total cash cost | 7,785.98 | 59.99 | 8,549.62 | 13,564.62 | 95.18 | |
| Non-cash cost | | | | | | |
| Variable cost | | | | | | |
| Feed | 4,842.99 | 37.31 | 6,568.67 | - | - | |
| Family labor | 73.48 | 0.57 | 71.70 | 123.87 | 0.87 | 126.67 |
| Total variable cost | 4,916.47 | 37.88 | 6,640.37 | 123.87 | 0.87 | 126.67 |
| Fixed cost | | | | | | |
| Depreciation of agricultural tools | 276.36 | 2.13 | 274.74 | 563.77 | 3.96 | 578.31 |
| Total fixed cost | 276.36 | 2.13 | 274.74 | 563.77 | 3.96 | 578.31 |
| Total non-cash cost | 5,192.84 | 40.01 | 6,915.11 | 687.64 | 4.82 | 704.98 |
| Total cost | 12,978.81 | 100.00 | 15,464.73 | 14,252.26 | 100.00 | 16,401.91 |

Table 3. Average income of catfish farming per kilogram per season.

| Income measure | Catfish for smoked fish raw materials | | Catfish for consumption | |
|-----------------------------------|---------------------------------------|--------------------------|--------------------------|--------------------------|
| | Before Covid-19 pandemic | During Covid-19 pandemic | Before Covid-19 pandemic | During Covid-19 pandemic |
| Gross farm income* | 15,000.00 | 15,000.00 | 15,700.00 | 16,000.00 |
| Cash cost* | 7,785.98 | 8,549.62 | 13,564.62 | 15,696.93 |
| Non-cash cost* | 5,192.84 | 6,915.11 | 687.64 | 704.98 |
| Total farm expenses | 12,978.81 | 15,464.11 | 14,252.26 | 16,401.91 |
| Income on cash cost* | 7,214.02 | 6,450.38 | 2,135.38 | 303.07 |
| Net farm income* | 2,021.19 | -464.73 | 1,447.74 | -401.91 |
| Net farm earnings* | 2,021.19 | -464.73 | 1,447.74 | -401.91 |
| Return to total capital (%) | 23.55 | 1.23 | 32.87 | 20.17 |
| Return to farm equity capital (%) | 112.29 | 14.32 | 34.65 | 21.15 |
| Return to family labor (Rp/HOK) | 35,475.00 | 35,475.00 | 55,650.92 | -18,470.80 |
| R/C ratio on cash cost | 1.93 | 1.75 | 1.16 | 1.02 |
| R/C ratio on total cost | 1.16 | 0.97 | 1.10 | 0.98 |

Revenue from catfish farming as raw material for smoked fish and catfish farming for consumption is only obtained from the sale of catfish, in line with the research of [Sazmi *et al.* \(2018\)](#), [Agriansa *et al.* \(2020\)](#), and [Gultom \(2021\)](#). Before and during the Covid-19 pandemic, catfish was sold as raw material for smoked fish for Rp15,000 per kilogram. Meanwhile, catfish for consumption experienced an increase in price during the Covid-19 pandemic, from Rp15,700 per kilogram to Rp16,000 per kilogram. In line with [Sarni & Sidayat \(2020\)](#) research, the Covid-19 pandemic has an impact on increasing the selling price of vegetable commodities in Ternate.

The results of the calculation of catfish farming income based on the type of farming before and during the Covid-19 pandemic can be seen in [Table 3](#). During the Covid-19 pandemic, there has been a decrease in net farm income, net farm earnings, return to total capital, return to farm equity capital, and return to family labor both in catfish farming for smoked fish raw material and catfish farming for consumption. The decline in farm income during the pandemic is in line with the research results of [Firdaus *et al.* \(2021\)](#), [Hidayat \(2021\)](#), and [Ragasa *et al.* \(2022\)](#) that the decrease in farm income was caused by increased farm expenditure during the Covid-19 pandemic.

Only catfish farming for smoked fish raw materials has an R/C ratio over cash cost of more than 1.3 before and during the Covid-19 pandemic. In contrast, the R/C ratio of total costs before and during the Covid-19 pandemic in catfish farming for smoked fish raw materials and catfish farming for consumption is worth less than 1.3. This result means that catfish farming for catfish farming as raw material for smoked fish is financially feasible to run during the Covid-19 pandemic. In line with [Kova \(2021\)](#), farms with an R/C ratio for cash costs of more than 1 and an R/C ratio of less than 1 for total costs are financially feasible but not economically. The cause of this unfeasibility is the significant feed costs incurred during the Covid-19 pandemic due to the increase

in feed prices.

The impact of the Covid-19 pandemic on catfish farming income is seen by conducting different tests to see differences in income (costs, revenues) of catfish farming before and during the Covid-19 pandemic. In addition, a different test was also carried out to see if there was a difference in income (costs, revenues) of farming between catfish farming for smoked fish raw materials and catfish farming for consumption.

Table 4. The results of the Wilcoxon signed rank test of catfish farming income before and during the Covid-19 pandemic between types of farming.

| Income measure | Catfish for smoked fish raw materials | Catfish for consumption |
|-----------------------------------|---------------------------------------|-------------------------|
| Gross farm income* | 1.000 | 0.000 |
| Cash cost* | 0.013 | 0.000 |
| Non-cash cost* | 0.000 | 0.472 |
| Total farm expenses* | 0.000 | 0.000 |
| Income on cash cost* | 0.013 | 0.000 |
| Net farm income* | 0.000 | 0.000 |
| Net farm earnings* | 0.000 | 0.000 |
| Return to total capital (%) | 0.000 | 0.000 |
| Return to farm equity capital (%) | 0.000 | 0.000 |
| Return to family labor (Rp/HOK) | 0.000 | 0.000 |
| R/C ratio on cash cost | 0.049 | 0.000 |
| R/C ratio on total cost | 0.000 | 0.000 |

*Rp/kg harvest.

[Table 4](#) shows the results of the different tests of catfish

farming income before and during the Covid-19 pandemic. In each type of catfish farming, all income measures are significant at the 5 percent significance level. This result means that the Covid-19 pandemic impacts the income of catfish farming at each type.

Table 5 shows the different test results of catfish farming income between types of farming before and during the Covid-19 pandemic. Before and during the Covid-19 pandemic, only 4 out of 12 income measures had a significance value of less than 5 percent. This result shows that, in general, before and during the Covid-19 pandemic, there was no difference in income obtained by catfish farming for smoked fish raw materials with catfish farming for consumption because there is no significant difference in the components that make up costs and revenues between types of farming.

Table 5. The results of the Kruskal-Wallis test of catfish farming income before and during the Covid-19 pandemic between types of farming.

| Income measure | Before Covid-19 pandemic | During Covid-19 pandemic |
|-----------------------------------|--------------------------|--------------------------|
| Gross farm income* | 0.000 | 0.000 |
| Cash cost* | 0.000 | 0.000 |
| Non-cash cost* | 0.261 | 0.243 |
| Total farm expenses | 0.614 | 0.437 |
| Income on cash cost* | 0.000 | 0.000 |
| Net farm income* | 0.825 | 0.103 |
| Net farm earnings* | 0.825 | 0.103 |
| Return to total capital (%) | 0.862 | 0.117 |
| Return to farm equity capital (%) | 0.026 | 0.564 |
| Return to family labor (Rp/HOK) | 0.900 | 0.079 |
| R/C ratio on cash cost | 0.000 | 0.000 |
| R/C ratio on total cost | 0.830 | 0.124 |

*Rp/kg harvest.

CONCLUSION AND RECOMMENDATION

Conclusion

Catfish farming in Kampar Regency, both catfish farming for smoked fish raw materials and catfish farming for consumption, experienced an increase in production costs during the Covid-19 pandemic. Revenue from catfish farming in Kampar Regency only comes from the sale of catfish. There has been no change in the selling price of catfish before and during the Covid-19 pandemic.

The Covid-19 pandemic has had an impact on decreasing the income of catfish farming in Kampar Regency. There is a significant difference between income before and during the Covid-19 pandemic. However, there is no significant difference in income between the types. The value of the R/C ratio for the cash costs of catfish farming for smoked fish raw materials during the Covid-19 pandemic is more than 1.3, so it is financially feasible to continue running. However, based on the R/C ratio of total costs, no catfish farming is economically feasible to continue during the

Covid-19 pandemic due to the significant feed costs incurred during the Covid-19 pandemic due to the increase in feed prices.

Recommendation

Feed is a component of catfish farming costs, with the most significant proportion and increase during the Covid-19 pandemic. Catfish farming that uses artificial feed costs less than catfish farming that uses only factory feed. Therefore, catfish farmers for consumption can produce artificial pellets independently to reduce feed costs.

AUTHOR'S CONTRIBUTIONS

SAR contributes to conception and design of the study, acquisition of data, analysis and interpretation of data, drafting the manuscript. AF and DR contributes to conception and design of the study, analysis and interpretation of data, drafting the manuscript, critical review/revision.

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