**Migration Letters**

Volume: 20, No: S12(2023), pp. 188-201

ISSN: 1741-8984 (Print) ISSN: 1741-8992 (Online)

www.migrationletters.com

# The Effect of Transaction Costs on the Sustainability of Milkfish Aquaculture in North Coast of Java, Indonesia

Asfi Manzilati[1], Yenny Kornitasari[2], Muhammad Dandy Alif Wildana[3], Nabila Akhiris Rakhmania[4]

## Abstract

*The potential of Milkfish Aquaculture on the North Coast of Java is very promising as the source of economy to both the farmers and Indonesia. However, the challenge faced by milkfish farmers is the fluctuation of input and selling prices may threaten business. Gresik as one of the center of milkfish production faces issues in accessing the market to sell their products, hence they require intermediaries that carries transaction costs which implicitly increase their final costs. Moreover, lack of cold storage and advance processing in the area complicate and reduce the bargaining value of milkfish farmers towards its buyer. This is because milkfish has a relatively very short shelf-life without proper storage or additional processing. The research is aimed to analyze the cost structure of milkfish farmers on the north coast of Java towards farmers income. Quantitative method is employed using two analyses: Ordinary Least Square (OLS) and Mann-Whitney Comparative Test. This study found that input cost is significantly affect the milkfish farmer, while the investment and transaction costs do not affect the milkfish farmer. Although the transaction cost variable is not significant, it shows negative coefficient value which implies reverse relationship with income. The result of Comparative Test is that the transaction cost of traditional farmers is higher compared to the semi-intensive. This is because the semi-intensive aquaculture has a higher bargaining position compared to the traditional ones, so that the cost of information, negotiation and other transaction cost are lower compared to the traditional ones. This study may useful for the milkfish farmer to increase efficiencies in the production by reducing the hidden costs and improve supply chain of the milkfish industry for the sustainability of milkfish farmers and its sub-industries in Gresik.*

***Keywords:*** *Transaction Cost, Milkfish, Aquaculture, Supply Chain, Business Sustainability.*

## Introduction

Indonesia as one of the countries which has the second-longest coastline in the world has a very promising potential in fisheries sector. Statistic Indonesia registered that the contribution of fisheries sector to Indonesia GDP in the second-quarter of 2021 amounted at 188 trillion rupiah, or 2.8% of GDP, an increase compared to the previous quarter in

[1] Economics Department, Faculty of Economics and Business, Universitas Brawijaya, asfi@ub.ac.id
[2] Economics Department, Faculty of Economics and Business, Universitas Brawijaya
[3] Economics Department, Faculty of Economics and Business, Universitas Brawijaya
[4] Economics Department, Faculty of Economics and Business, Universitas Brawijaya

the same year which is 109.9 trillion rupiah or 2.77% of GDP. (Luthfiana, 2021). Generally, fisheries are divided into two subcategories, which are capture fisheries and aquaculture. Fisheries sector in Indonesia has become one of the most important sectors in Indonesia because it is the biggest contributor of animal protein, 7 grams per capita (Fuada, Muljati, & Triwinarto, 2018) and nationally contributes as big as 54% from all animal protein consumed in Indonesia (Lutfiana, 2021).

Furthermore, the potential of fisheries sector in Indonesia is a blessing for Indonesian people who live along the coastline, especially for those who earn a living from fisheries industries (Rawung & Rawung, 2018). This statement is in line with the data from BPS (2022) which mentioned that in 2022, aquaculture fisheries produce 14.85 million tons of fish, where the biggest contributors are South Sulawesi (24,98%), followed by East Nusa Tenggara (14.54%), East Java (8.48%), West Java (7.94%) and Central Sulawesi (6.46%).

North coast of Java, especially Gresik regency is one of the leading coastal areas that produce milkfish, which occupies 40% of the entire areas utilized as breeding pond for milkfish and other aquaculture commodities such as vaname shrimp and other fish such as mujair and/or tilapia breed together in East Java Province. One of the reason Gresik produce one of the best milkfish is because the area sits on the delta of Bengawan Solo River, one of the biggest river systems in Java Island, and this area is known for hundreds of years as the place of aquaculture farmers or fisherman. Milkfish as the leading commodities for Gresik Regency, and in 2020 accounts for 87.12 thousand tons with economic value at 1.4 tn Rupiah and it increase to 90.38 thousand tons valued 1.43 tn Rupiah. The economic value measured is only based on the harvest of milkfish alone, and has not included the sub-industry which supports the entire ecosystem from upstream to downstream of the value chain.

Considering the management and supply chain of milkfish fishpond in Gresik Regency still semi-intensive, the potential for milkfish business still has room for development. The potential of Gresik area as the main ground for milkfish aquaculture is supported by the Ministry of Marine and Fisheries decided that one of the Gresik's villages named Pangkahwetan as the role model of milkfish aquaculture where its management is based on local wisdom developed in the society. This decision is intended by the government to develop the sub-business that support the supply chain of milkfish aquaculture. However, based on several research and supported by initial research conducted, it is almost certain that in the management of milkfish aquaculture is prone to hidden costs that do not reflect on the cost borne by the milkfish farmers, and it is known as transaction cost, which defines as the costs to do negotiations, measuring, and forcing exchange (Yustika, 2012).

Transaction costs can be broadened further into categories: 1). Cost of Information-seeking; 2). Cost of bargain and executing contracts; and 3). Costs of monitoring, enforcing, and compliance of the contract (Mburu, 2022 in Yustika, 2012). All in all, the milkfish business mostly stands on social capital and systems and managed traditionally, and this business has the tendencies carrying high transaction costs which considered economically inefficient in the perspective of institutional economics (Yustika, 2012). Transaction costs in aquaculture fisheries is affected by the access of farmers to the market, both information and geographic access.

Studies by Prayoto et al (2022) in Sedati, Sidoarjo Regency found that the longer supply chain for the milkfish distribution is prone to the generate transaction costs, where each of the chain take up margin for themselves, hence increasing the price gap between producers and end-customer. Similar findings are also found in Cambodia, where long supply chain, especially trans-country shipment may increase cost as high as 50% from the price of producer (Van Brakel & Ross, 2011). In Bangladesh, Hu et al (2017) suggest that the shorter the distance between producer and market may decrease transaction cost significantly. Furthermore, the research also suggests that for aquaculture industries to thrive and produce efficiently, it is necessary to create an economic agglomeration

between the farmers, markets, and the sub-industries that supports it, because the longer the distance, the higher the costs of handling the fisheries produce, because it has very short shelf-life if they are not stored and/or processed properly (Sonvinsen & Standal, 2019).

Besides the geographical and economic agglomeration, transaction costs may arise from other sources, such as financial constraints that limit the capability of small-scale milkfish farmers, which leads to the inability to produce at the economics of scale (Rimmer et al, 2013), regulation and standardization of fish produce (Sonvinsen & Standal, 2019), or other social factors such as social capital (networking, trust, and other social interaction) and access to key information of the business (Setyanto & Iskandar, 2021). Once again, it is necessary to categorize the source of transaction costs based on the commodities and characteristics of society, along with its institutional arrangements and regulation to determine the exact composition of cost structure for aquaculture business.

This study emphasizes on studying the cost structures of milkfish aquaculture business in one of the biggest milkfish producers in Java Island. Gresik accounts for almost half of the area for aquaculture in East Java Province and the biggest milkfish producer in Java Island (Prayoto et al, 2022). The findings of this research have the implications as benchmark on determining the cost structure and institutional arrangements of milkfish aquaculture, especially on milkfish aquaculture areas on the North Coast of Java, considering the size and impact of the milkfish produced in Gresik Regency. With efficient cost structure and good, supporting supply chain, it is expected that there will be an increase in the income of the milkfish farmers and in the long term supports the sustainability of the business.

## Literature Review

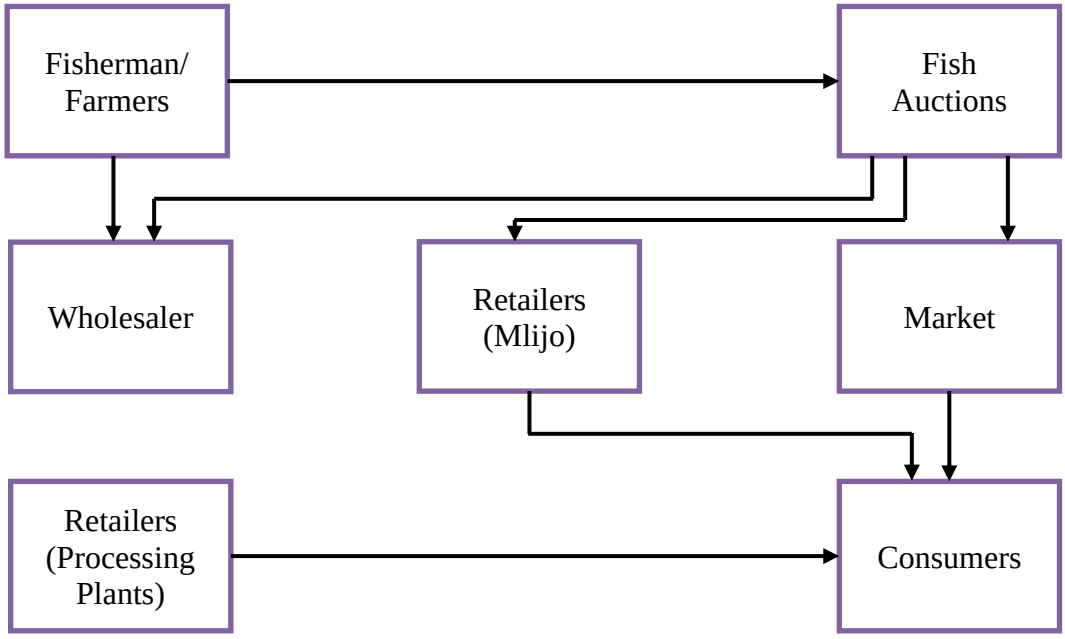
Contract as the Prerequisite of Transaction Costs

Transaction occurs when a good or services transferred interchangeably between different interface and separated by technology (Williamson, 1985 in Li, et. Al, 2014). Beside on calculating production costs, it is best to include transaction cost caused as the result of economic exchange. Li, et al (2014) illustrates the construction of transaction costs form contracts are divided into two, which are pre and post contract. It is possible that in the other industry apply this institutional setting using this contract. Furthermore, Li, et al (2014) mentioned that post-contract transaction cost can be higher compared to pre-contract. This situation shows that contract formed based on negotiations results in lower transaction cost. Types of contracts is one of important determination because of the difference between unit price of transaction costs. The basic law of a contract is the execution of a set promise or sets of promises. In other words, when sets of promises is enshrined in a contract, the harmed party may inquire authorities (courts) to force the harming party to comply with the contract (Mallor, et al, 2004).

Transaction Costs on the Aquaculture Product Supply Chain

Transaction costs defined as a cost used for services, accommodations, and wages by organization involved in microproject (Mackinnon, et al, 2018). Transaction cost is different with the cost of local wages, agriculture inputs used for production by people. Trades in aquaculture has complex supply chain where each of the actors has their own problems, and similar to other perishable food products e.g agriculture and meat products (Handayani, Affandi, & Irawati, 2019; Endoh, Pandey, & Sajow, 2021). Beginning from fisheries products going through several nodes of the supply chain especially between farmers and first-hand-buyer or preparation, and then between distributor and final consumer. The supply chain of aquaculture can be seen in the figure below:

Figure 1. Aquaculture Supply Chain




Source: Jakaria & Rini (2017)

The figure above shows the inefficiency of aquaculture supply chain and high transaction cost from the activity in the fishpond, fish harvest, its distribution until it reached the market. Larissa & Parung (2021) noted that the supply chain in the fishery export industry, data recording is still done manually from the beginning to delivery via expedition, so blockchain technology is needed in this industry. Zulham et al (2019) revealed that the fishing industry in Merauke needs improvements related to limited cooling capacity (cold storage), limited information related to fish shipments, and local traders do not have access to exports on national and international networks.

Meanwhile, Klein (1980) sees why a contract is incomplete for two reasons: first, the uncertainty that has implications for various uncertainties and it can be very expensive to know and sort out in order to deal with these possibilities. Second, the performance of a particular contract, say the amount of effort put in by workers on various tasks, will be difficult to measure. So, the two problems that arise are uncertainty and the difficulty of measuring how much transaction costs arise.

Implication of Transaction Costs on the Sustainability of Aquaculture

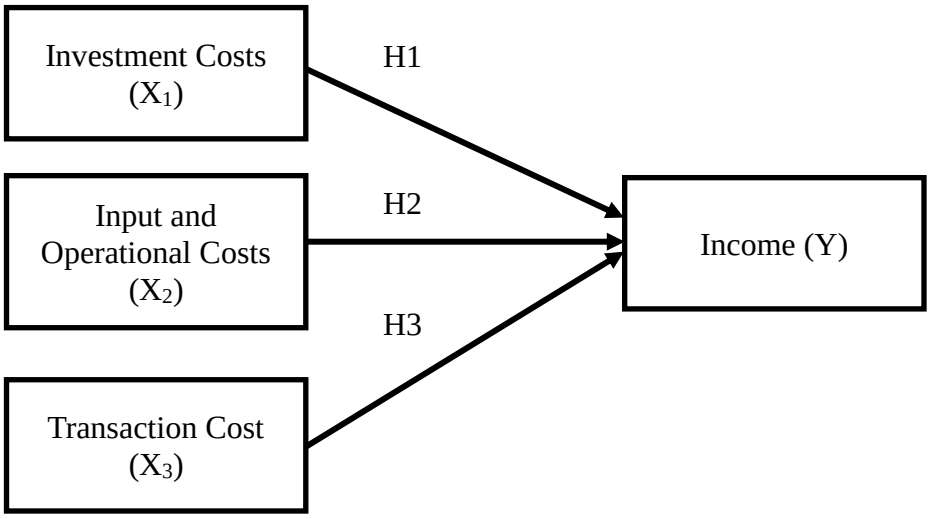
Transaction costs are recognized as an important issue for both projects and livelihoods and are a major concern for policy makers. In calculating transaction costs, two parties are involved in the course of negotiations. This process is important because many jobs fail at this stage (De et al., 2022). Even though the capital costs are low but the transaction costs are high, production may fail. Therefore, institutional design is needed to reduce transaction costs that have an impact on income so that people are expected to obtain symmetrical information and achieve production efficiency. In the long term it encourages them to be able to organize the costs and benefits that impact the project in the community. Moreover, production is dominated by small-scale farmers. More transaction costs participate in the aquaculture supply chain.

Transaction costs have implications for weaker competition and uncompetitive prices. The farmers are also racing with the speed of delivery to keep the quality of the fish. Slow response will cause unpredictable price movements and product standards are difficult to maintain, thus maintaining a profitable operating volume becomes more difficult (Jamandre & Bolivar, 2011). As a result, it is more difficult for farmers to

maintain market preference for milkfish which will have an impact on the sustainability of their business.

This study attempts to analyze the relationship between income as the proxy for business sustainability for milkfish farmers as dependent variable (Y), and the effect of Investment Cost (X1), Input and Operational Cost (X2), and Transaction Costs (X3) as independent variables. Hence this study has conceptual framework as follows:

Figure 2. Conceptual Framework




Source: Author (2022)

Theoretically, investment involves activities as an attempt to increase the amount of wealth by providing producer with capital to expand the business and increase the economic value of economic input into output. In macroeconomic theory, Investment and national income has positive relationship, which means that every increase in investment will generate additional national income, provided that the investment generates positive return. Therefore, the first hypothesis is:

H1. Investment Cost affects Income of the Milkfish Farmer

Production is the process of turning input into output, and in theory it is stated that production function is the maximum output that can be produced with a given quantity of input (Samuelson & Nordhaus, 2010). Meanwhile, the operational costs are the cost that covers operational activities in a company, and it can be classified into fixed costs, variable costs, and semi variable (mixed) costs. The study by Hutasoit et al (2022) shows that there is a strong relationship between operational costs and income. Hence, the second hypothesis is:

H2. Input and Operational Costs affect Income of Milkfish farmer

Transaction cost as mentioned by Yustika (2012) is a cost that is not directly involved in the production cost, but may affect the margin of the producer. Transaction costs generally explains as cost of negotiation, obtaining information, and enforcing of contract. In the perspective of Institutional Economics, an efficient economy is measured through low transaction costs and strong institutional presence, where every economic actor behaves logically based on agreed rule of the game. Therefore, the third hypothesis is:

H3. Transaction Costs affects Income of Milkfish farmer

## Research Methodology

This study employs quantitative approach while the data obtained for this research is from primary data. Data collected through questionnaire given to the milkfish farmers in Desa Pangkahwetan, Gresik regency. The questionnaire is structured to acquire the information of the costs related to the milkfish farming and are taken from previous studies and from preliminary visit to the area to obtain the initial information related to costs incurred in the milkfish business. From 42 farmers in the village, this study obtains responses from 35 milkfish farmers, and according to Roscoe (1975) in Riadi (2016) the sampling size is appropriate.

The variables definition for this study are: 1). Milkfish farmer's income as the proxy for business sustainability as dependent variables (Y); 2). Investment Cost which includes the initial cost to prepare the infrastructure for milkfish farming ($X_1$); 3). Input and Operational Costs which comprise of the costs of production and operational activities to maintain the milkfish from the initial stage (breeding) until harvest period (X2); 4). Transaction Costs which define as costs outside the initial (real) cost incurred to the producer. In this particular study, there are three costs that are listed: Information Costs, Retribution Costs, and Worker's Cost (exclude wages). All variables are measured in Rupiah denomination and listed in the table below:

Table 1. Operational Variables

| Variables | Codes | Description | Measurement |
|---|---|---|---|
| Milkfish Farmer's Income | Y | Income is used as proxy for milkfish aquaculture business sustainability | Rupiah (Rp) |
| Investment Cost | $X_1$ | Investment Costs (Dolorosa, et al, 2014).<br>1. Land Rent<br>2. Pond Creation<br>3. Supporting Tools<br>4. Transportation<br>5. Supporting Infrastructures | Rupiah (Rp) |
| Input and Operational Cost | $X_2$ | Input and Operational Cost (Dolorosa, et al, 2014).<br>1. Milkfish Seedling<br>2. Fertilizer<br>3. Vitamin<br>4. Pesticides<br>5. Fuel (Gasoline)<br>6. Wages<br>7. Maintenance<br>8. Tools for Maintenance<br>9. Land Tax | Rupiah (Rp) |
| Transaction Cost | $X_3$ | Transaction Cost (Manzilati, | Rupiah (Rp) |

| | | | |
|---|---|---|---|
| | | 2019; Setyanto & Iskandar, 2021)<br>1. Information Cost<br>2. Retribution Cost<br>3. Worker's Cost (exclude wages) | |

The analysis was carried out with the Regression Test and the Comparative Analysis. The regression analysis used is ordinary least squares (OLS) multiple regression. OLS is a regression analysis that is commonly used when the independent variable (predictor variable) is more than 1 (Retherford & Chloe, 1993). The equation used in this research is:

$Ypd = \alpha + \beta 1X1 + \beta 2X2 + \beta 3X3 + e$

where:

Ypd = Income (Proxy of Business Sustainablity)

$\alpha$ = Intercept

$\beta$ = Regression Coefficient

X1 = Investment Cost

X2 = Input and Operational Cost

X3 = Transaction Cost

e = error

Classical Assumptions and statistic test will be conducted to Ordinary Least Square equations. As for comparative analysis, Mann-Whitney Test will be used. This test is used to obtain detailed information the difference of transaction cost between traditional aquaculture and semi-intensive aquaculture.

## Results

Regression Analysis

Based on Table shown, it can be seen that there is 1 variable that has a significant effect and 2 variables that do not have a significant effect. Variables that have a significant effect are input costs, while variables that do not have a significant effect are investment costs and transaction costs. The t-test is used to see the individual significance of the influence of the independent variable on the dependent variable is as follows:

1. Investment cost is not significant to income at $\alpha$=5%

2. Input cost is significant and positive at $\alpha$=5%. The coefficient value of input cost at 0,546 shows that every 1 million rupiah increase in the input cost will increase the income by Rp. 0,546 million.

3. Transaction cost is not significant to income at $\alpha$=5%

4. R2 is accounted at 0,341 (34.1%) and the remaining value (65.9%) explained by other variables

Table 2. Regression Result

| Dependent Variable: Income | | | | |
|---|---|---|---|---|
| | Coeff | Std. Error | t-Statistic | Prob |
| C | 3,95e+07 | 2,43e+07 | 1,62 | 0,117 |
| Investment Cost | 0,0761 | 0,1818 | 0,42 | 0,679 |
| Input Cost | 0,5469 | 0,1786 | 3,06 | 0,005 |
| Transaction Cost | -5,9636 | 5,2973 | -1,13 | 0,271 |
| $R^2$ | 0,3410 | | | |
| Multicollinearity | VIF = 1,04 | | | |
| Heteroscedasticity | Prob = 0,0654 | | | |

Source: Authors analysis (2022)

The results of the classical assumption test show that there is no multicollinearity in the estimation results. This is shown in the average value of variance inflation factor (VIF) of 1.04 which is lower than 10. The results of the heteroscedasticity test show the value of Prob > chi2 of 0.0654 which is greater than $\alpha = 5\%$, so H0 is accepted, in other words the variance of the residual is constant or homoscedasticity

Mann-Whitney Comparative Test

Before conducting comparative test, it is necessary to test the conditions of parametric or non-parametric statistics. If a variable does not meet the requirements of parametric statistical analysis such as the assumption of normality, then the test can use non-parametric statistics. Table 3 shows the results of the normality test and the difference test on the transaction cost variables for each type of pond, namely traditional and semi-intensive.

Table 3. Normality Test

| Normality Test | | | |
|---|---|---|---|
| Variable | Type of Pond | Obs | Prob>z |
| Transcation Cost | Semi Intensive | 4 | 0.8546 |
| Transaction Cost | Traditional | 26 | 0.0060 |

Table 4. Comparative Analysis: Mann-Whitney Test

| Comparative Test: Mann-Whitney Test | | | |
|---|---|---|---|
| Transcation Cost | Semi Intensive | 4 | 0.0379 |
| Transaction Cost | Traditional | 26 | |

Based on the results of the normality test, it can be seen that the transaction costs of traditional pond types are not normally distributed. This is indicated by the probability value of less than =5%. Meanwhile, transaction costs for semi-intensive ponds are normally distributed. This is indicated by the probability of more than =5%. From the results of the normality test, it can be concluded that it does not meet the assumptions of parametric statistics, so this study uses non-parametric statistics, namely the Mann-Whitney Test. The Mann-Whitney test results show that there is a significant difference between transaction costs for traditional pond types and transaction costs for semi-intensive pond types. This is indicated by the probability value of z at 0.0379, less than α =5%.

## Discussion

Cost of Investment and Income

Based on regression, investment costs have no significant effect on income. This means that costs such as land rent, making ponds, supporting equipment, transportation equipment and supporting infrastructure that are incurred in investment by milkfish farmers do not have an effect on their income. This indicates that the investment costs incurred do not guarantee an increase in the income generated from the milkfish pond business. The results of this study are in line with research conducted by Yudi et.all (2015) which revealed that the descriptive method showed that operating costs affected income by 17%, whereas for 80% of them were other factors which were not explored in it. However, this research is not in line with Todaro (2012) which states that investment spending plays an important role in driving a better economic life because increasing capital formation will increase production capacity, which in turn will increase income.

The results of this study imply that the use of capital goods as a consequence of the input cost of production factors has not been optimized with maximum utility in the resulting production process. Because investment costs tend to be a component of long-term costs while income is in the short-term, so to see the impact of investment costs on income requires a medium-long term. In line with Firdausa (2013) that the duration of time affects the income of business actors, the longer the business time, the more engaged, knowing the pattern of business being undertaken and more efficient, so as to optimize income.

Furthermore, the investment cost component for pond farmers is a fixed cost that has no effect on the output produced, while the size of the income received by farmers is highly dependent on the amount of output. This means that, regardless of the results of the pond, profitable or not, the investment costs must still be incurred. For example, farmers who pay for land rent not only for one year but at the same time paying for a period of at least 5 years for several ponds. And this condition is supported by the research period during the pandemic. When all sectors of the economy experience a decline in aggregate income.

Cost of Input and Income

The results of this study indicate that the input costs which consist of cost components for Milkfish Seeds (nener), Fertilizer, Vitamins, Pesticides, Fuel Oil, Labor Honors, Pond Maintenance, Equipment Maintenance and Land Building Tax (PBB) have a significant effect on farmers' income. pond. Where the input costs incurred by farmers will affect the production of pond farmers which in turn will affect the level of income earned. That is, when the cost of production inputs increase, income will increase. For example, income from a farmer's harvest is determined by the size of the fish and the number of fish produced, which is then determined by the price in the market. In addition, if the farmer decides to increase the number of seeds, it can increase the success rate of the seeds sown at harvest time. In addition, the support of feed and vitamins can support the success of fish to get bigger sizes. Fish size for farmers has economic value because the selling price becomes higher which can further increase income.

In line with research conducted by Hutasoit et al (2022) stated that there was an effect of operational costs on revenue at Perum Damri Bandung Branch. The results of another study conducted by Aprilia (2019) also gave the same result that production costs had an effect on farmers' income. This implies that input costs have a very important role in the operational costs of a production, because when these input costs are not efficient and managed properly it will result in a decrease in income. Because operational costs in production are used as the basis for determining net income which shows the ability of the business to generate profits. The greater the operational costs in revenue, the more inefficient it is. An increase in operating costs and a decrease in income has an impact on a business.

Transaction Costs and Income

Table 2 shows that the transaction cost variable has a negative direction of -5.9636. This means that every increase in transaction costs will have an impact on decreasing farmers' income. In practice, milkfish farmers are divided into land owners and pandega. Pandega acts as an expert to maintain the quality and determine the harvest time of the milkfish. However, the management of the costs for operations is borne by the land owner. Meanwhile, Pandega acts like a supervisor. If it is calculated properly, the owners bear at least 50.05% of transaction costs which can reduce the revenue of pond farmers. In more detail, the largest proportion of transaction costs incurred by milkfish farmers is information costs, followed by retribution fees. This is in line with Yustika (2008) that farmers' transaction costs are very high from the total costs incurred during production.

On the other hand, there is a contradiction based on the findings in the field that the cost component is not so important for farmers. Farmers focus on high selling prices. However, when prices fall, farmers will tend to delay the harvest period until the maximum price point is reached. In addition, milkfish that are cultivated on the north coast of East Java are not harvested for market needs only but also for seasonal events such as annual contests. The information cost component absorbs high costs because farmers do not have a wide range of potential buyers who charge them high prices. Potential buyers or other access to information is controlled by only one large farmer. Therefore, farmers must incur costs to reach these potential buyers. In accordance with Deng & Zhang (2020) that the rules of transactions that are not open cause high costs for searching market information. The negative impact of this non-disclosure is that it is vulnerable to opportunistic actions which are feared to cause higher costs. Gong et al., (2017) support that negotiation costs are transaction costs that can hinder farmers' marketing channels.

Based on the regression results the effect of transaction costs is not significant on the income of milkfish farmers on the north coast of East Java. Historically, the coastal area is a legacy from the ancestors that the milkfish business is not only done as a livelihood but also preserves the culture inherent in the North coast of East Java. Farmers apply

milkfish business, especially on the cost aspect, which is not a major concern. As the results of research by Nikolaeva & Pletnev (2016), an irrational cost and/or asset structure is a hallmark of social-based business. This is influenced by past conditions where the North coast of East Java was a route for trade and the spread of religion so that adaptation and management of community business was socially based. In managing profits and costs, milkfish farmers tend to calculate them traditionally.

This is supported by the fact that when the harvest season arrives, farmers will leave the results to be distributed to freelancers or the term mburi as mentioned by the Chief of Village Pangkahwetan. This tradition stated that the leftovers of the harvest in the pond (milkfish, prawns, and other fish are given to the freelancer after harvest end as their wage. This implies that the dominant social element of sharing harvests with workers is not considered a loss of income for farmers, because the remaining harvest still has economic value to it, and the amount of loss is unknown, considering the owner does not have the exact measurement of how much kilograms and what produce (milkfish, prawns, and other fish) left in the pond. In addition, in terms of formal institutions, namely the village apparatus, they also participate in helping to provide easy access to information for farmers. Thus, farmers get convenience with facilities from village officials such as water pump assistance which is a subsidy from the Ministry of Maritime Affairs and Fisheries (KKP).

Traditional vs Semi-Intensive Milkfish Aquaculture Transaction Cost

Based on the interview conducted on the milkfish farmers in the north coast of Java, there are two striking differences between Traditional and Semi-Intensive Milkfish Aquaculture. The difference are feeds and tools used. Traditional farmers are depending on the algae that grows at the bottom of the pond to feed the fish. In the preparation stage, fertilizer is spread in the pond before the water flows in. The main reason for fertilizer is to give nutrients to the water for algae to grow as the feed for milkfish seedlings until the seedling is ready to harvest. Meanwhile, semi-intensive farmers are using additional feeds that are not algae. The feed is obtained form the factories that supplies it. The cost of one sack of factory-made feeds weighed 50kg is Rp. 60.000 (USD 3.93), and one of the farmers stated that the cost to feed the ponds are in hundreds of millions of rupiah (tens of thousands USD) in one cycle of harvest.

Another thing that made the difference between traditional and semi-intensive farmers are the tool used for fish breeding. According to the farmers interviewed, traditional farmers are using no additional tools to maintain their pond. After they prepare the pond for the next batch of milkfish seedling, they fill the pond with water using simple tool until it reached a desired level, then they put the seedlings in the pond and only occasionally check the pond condition until the farmer decide to harvest the milkfish. However, different situation is happened in the semi-intensive farmers. The pond for semi-intensive is helped by waterwheel, water pump, and other tools. These tools are necessary because according to the “pandega” or the supervisor of the ponds, the presence of factory-made feeds makes the water muddier. The consequences of muddier water the increase of viscosity that will result in less oxygen for the fish. To prevent that, additional water is needed and mixed with water wheel to reduce water viscosity and keep the milkfish alive until harvest period.

Regarding the transaction cost is significantly bigger in traditional farmers compared to semi-intensive farmers can be seen from the access of information in the pre-harvest and post-harvest conditions. Based on the interview conducted, the only means of communication outside their village or nearby villages are by telephone. This commonly occur during the harvest of the milkfish. The “Pandega” interviewed clearly stated that he obtained the information of the milkfish price is solely by phone call from “tengkulak’ (wholesaler) or “juragan” (boss) who offer him a certain price for a kilogram of milkfish. If he agreed to the price, deal concluded, and they determine when the buyer will come

and collect the fish and the payment is paid on spot or in the residence of the buyer himself.

It is highly suspected that the price offered by the "tengkulak" (wholesaler) or "juragan" (boss) is not the final price to the end customer, because they usually act as an agent to buy out milkfish from farmers under the order of bigger buyer which then either sold the milkfish directly or process the milkfish into products with higher value. This situation positioned farmers as the price taker given by the wholesaler, and in some cases "pandega" in lieu of the milkfish farmers make call to several contacts of his to determine and benchmark the price of the milkfish to be sold to the highest buyer before the deal is concluded. This type of practice positioned the "pandega" and farmers in the dark because of lack of information, and they rely on the information from their contacts as part of social capital system embedded in the society.

## Conclusion

Based on the analysis in this research, input and operational cost is significant because it is considered as capital and directly influence the income as the result of the investment activities. Meanwhile the other two variables are insignificant because those costs may not directly involves or implicitly included in the total cost. It is to be noted that the relationship between transaction cost and income are in reverse. This relationship demonstrates and confirm theory of transaction cost in institutional economics which stated that the increase in transaction cost will reduce income, hence it affects the efficiency of the milkfish farming.

On the other hand, the presence of significant (agent) actors called "pandega" who controls the technical information from the upstream down to the end stream of the milkfish supply chain suggested that there are hidden (transaction) costs included in the production of milkfish. Further research on the cost structure and supply chain efficiencies on other aquaculture commodities and areas will be beneficial for the business sustainability and improve the welfare of the aquaculture farmers in Indonesia.

## References

Badan Pusat Statistik. (2022). Statistik Indonesia 2022. Jakarta: Badan Pusat Statistik

Brakel, M. L. Van., & Ross, L.G. (2011). Aquaculutre Development and Scenarios of Change in Fish Trade and Market Access for the Poor in Cambodia. Aquaculture Research, Vol. 42, pp. 931 – 942.

De, I., Hasan, R., & Iqbal, M. (2022). Natural Treatment Systems and Importance of Social Cost Benefit Analysis in Developing Countries: A Critical Review. Sustainability, 1-15.DOI: 10.3390/su14073913.

Deng. M., & Zhang. A. (2020) Effect of Transaction Rules on Enterprise Transaction Costs Based on Williamson Transaction Cost Theory in Nanhai, China. Sustainability. 1-16

Dolorosa, E., Masyhuri, L., & Jamhari. (2014). Analisis Kelayakan Finansial UsahaPerikanan tambak Polikultur Bandeng - Udang Windu. Jurnal Social Economic ofAgriculture, Vol. 3 (2), pp. 20 - 36.

Endoh, E.K.M., Pandey, J., & Sajow, A.A. (2021). Analysis of the Supply Chain of Local Beef Cattle Commodity and Beef in North Sulawesi. International Journal of Applied Business and International Management (IJABIM), Vol. 6, No. 3, pp. 78 – 85.

Fuada, N., Muljati, S., & triwinarto, A. (2018) Sumbangan Ikan Laut terhadap Kecukupan Konsumsi Protein Penduduk Indonesia. Peneltian Gizi dan Makanan, Vol. 41 (2), pp. 77-88.

Ghozali, I., & Ratmono, D. (2013). Analisis Multivariat dan Ekonometrika. Semarang: Badan penerbit Universitas Diponegoro

Gong. W, Parton. K, Cox. R, & Zhou. Z. (2017). Transaction costs and cattle farmers' choice of marketing channels in China: A Tobit analysis. Management Research News. 47-56

Gujarati, D.N., & Porter, C.D. (2013). Dasar-Dasar Ekonometrika (5th ed.). Jakarta: Penerbit Salemba Empat.

Handayani, S., Affandi, M. I., & Irawati, K. (2019). Identifying Supply Chain Performance of Organic Rice in Lampung. International Journal of Applied Business and International Management (IJABIM), Vol. 4, No. 2, pp. 49 – 56.

Hu, C., Zhang, X., Reardon, T., & Hernandez, R. (2017). Value Chain Clusters and Aquaculture Innovation in Bangladesh. Food Policy. pp. 1-17.

Hutasoit, N.P., Nurfaizah, B. C., & Gunardi. (2022). Pengaruh Biaya Operasional Terhadap Pendapatan pada Perum Damri Cabang Bandung. Ekonomis: Jurnal of Economics and Business, Vol. 6, No.1, pp. 92 – 97.

Jakaria, R., & Rini, C. (2017). Analisis Supply Chain Manajemen Guna Optimalisasi DistribusiIkan Bandeng. Seminar Nasional Inovasi Teknologi UN PGRI, (pp. 429-434). Kediri.

Jamandre, W., & Bolivar, R. (2011). Improving the Supply Chain of Tilapia Industry of the Philippines. Better Science, Better Fish, Better Life Proceedings of the Ninth International Symposium on Tilapia in Aquaculture (ISTA 9), (pp. 132-150). Shanghai, China.

Klein, B. (1980). Transaction Cost Determinants of “Unfair” Contractual Arrangement. The American Economic Review, Vol. 70, No. 2, Papers and Proceedings of the Ninety-Second Annual Meeting of the American Economic Association (May 1980).

Larissa, S., & Parung, J. (2021). Designing supply chain models with blockchain technology in the fishing industry in Indonesia. IOP Conf. Series: Materials Science and Engineering, 1-7. DOI:10.1088/1757-899X/1072/1/012020.

Lutfiana, N. (2021, Agustus 05). Trenggono Bawa Sektor Perikanan Tumbuh 9.69% di Triwulan Kedua 2021. Biro Humas dan Kerjasama Luar Negeri Kementerian Kelautan dan Perikanan.

Li, H., Arditi, D., & Wang, Z. (2014). Transaction costs incurred by construction owners. Engineering, Construction and Architectural Management, 444-458. DOI:10.1108/ECAM-07-2013-0064.

MacKinnon, J., Andriamaro, L., Rambeloson, A., Razafindrazakasoa, M., & Harvey, C. (2018). Costs of delivery approaches for providing livelihood projects to local communities as part of REDD+ programmes: An analysis from Madagascar. Environmental Conservation, 324-332. DOI:10.1017/S0376892917000571.

Mallor, J. P. A., Barnes, J., Bowers, T., Philips, M. J., & Langvardt., A. W. (1998). Business Law and Regulatory Environment; Concept and Cases. Tenth Edition. Irwin McGraw-Hill. USA.

Manzilati, A. (2019). Transaction Cost: Institutional Efficiency of Sugar Cane Contract in Malang Regency. Advances in Economics, Business, and Management Research, Vol. 144, pp. 142 - 148

Mawenda, W. (2022, Maret 26). Sasar Komoditas Bernilai Ekonomi Tinggi, KKP akan Bangun Kampung Bandeng di Gresik.

Muhajir, A., & Mubarok, F. (2019a). Bandeng Gresik: Bisnis Nener yang Bikin Nanar. Mongabay: Situs Berita Lingkungan.

Muhajir, A., & Mubarok, F. (2019b). Alih Lahan Ancam Keberlanjutan Perikanan Bandeng di Gresik. Mongabay: Situs Berita Lingkungan.

Nikolaeva. E, & Pletnev D. (2016). The Role of the Transaction Costs in the Business Success of Small and Medium Sized Enterprises in Russia. Procedia - Social and Behavioral Sciences. 176-184.

Patria, A.D., Adrianto, K., Kusumastanto, T., Kamal, M.M., & Dahuri, R. (2014). Biaya Transaksi Usaha Perikanan Skala Kecil di Kabupaten Cilacap. J. Sosek KPI, Vol. 9 (2), pp. 247 - 254.

Prayoto, Nugraha, J.P., Waluyo, B.P., Hamdani, Priono, B., & Wartini. S. (2022). Analisis Saluran dan Margin Pemasaran Ikan Bandeng di Kecamatan Sedati Kabupaten Sidoarjo Jawa Timur. Chanos chanos, Vol. 20, No.1, pp. 29-44.

Rawung, S.S., & Rawung, F.H. (2018). The Impact of Implementation of the Regulation of Minister of Marine and Fisheries Number 56 and 57 of 2014 to the Fishing Industry in Bitung, North Sulawesi, and Indonesia. International Journal of Applied Business and International Management (IJABIM), Vol. 3, No. 1, pp. 131 – 143.

Retherford, R.D., & Choe, M.K. (1993). Statistical Methods for Causal Analysis. New York: John wiley and Sons.

Riadi, E. (2016). Statistika Penelitian (Analisis Manual dan IBM SPSS). Yogyakarta: CV Andi Offset.

Rimmer, M.A., Sugama, K., Rakhmawati, D., Rofiq, R., & Habgood, R.H. (2013). A Review and SWOT Analysis of Aquaculture Development in Indonesia. Reviews in Aquaculture Vol.5, pp. 255-279.

Samuelson, P.A., & Nordhaus, W.D. (2010). Economics 9th edition. New York: McGraw-Hill Irwin.

Setyanto, A. R., & Iskandar, D.D. (2021). Analisis Determinan Biaya Transaksi (Studi Kasus Tambak Bandeng Kecamatan Juwana Kabupaten Pati). J. Sosek KP, Vol. 16 (1), pp. 13-27.

Sonvisen, S.A., & Standal, D. (2019). Catch-based Aquaculture in Norway – Institutional Challenges in the Development of a New Marine Industry. Marine Policy, Vol. 104, pp. 118-124.

Yustika. A.E (2008). The Transaction Cost of Sugarcane Farmers: An Explorative Study. Jurnal Ekonomi dan Bisnis Indonesia. 1-26.

Yustika, A.E. (2012). Ekonomi Kelembagaan: Paradigma, Teori, dan Kebijakan. Jakarta: Penerbit Erlangga

Zulham, A., Hikmah, H., & Shafitri, N. (2019). Fisheries in Merauke: linking fishermen to markets. IOP Conf. Series: Earth and Environmental Science, 1-8. DOI:10.1088/1755-1315/348/1/012051.