Analysis Of Production Factors Of Gill Net Catches

Mustika Palupi and Ren Fitriadi

Abstract: Increased productivity of gill net fishing gear through economic and technical efficiency (input) in order to obtain maximum profits can improve the welfare of gill net fishermen. The variables studied for successful fishing aimed at increasing production yields on fishing line equipment are the size of the fishing boat (GT), engine power (PK), length of main rope (m), number of hooks, length of rope in waters (m), distance of fishing area (miles), number of settings per trip, experience of the crew, experience of the captain, amount of fuel and time spent on working (hours). The results of the study note that the factors of production that significantly affect the catch of gill net fishing gear, namely; experience of the captain with a regression coefficient of 0.437 and the t-value of 3.658, and time setting with a regression coefficient of 0.621 and the t-value of 2.422. While other factors of production have no significant effect on fish catch production on gill net gear.

Keywords: The production factor, gill net, fish catch, analysis, bottom,

1 INTRODUCTION

Indonesia is an archipelagic country where two thirds of its territory is ocean [1] [2]. The data shows, as many as 37% of fish species worldwide are in the Indonesian sea. East Java fisheries resources consist of 5 territorial waters, including: Java Sea Region (starting from Gresik waters to Tuban, and northern waters of Madura) with pelagic fish species potential, Madura Strait area with demersal fish species, Madura Islands Region with potential reef fish species, Bali Strait Area with the potential of Lemuru fish, and South East Java Region with the potential of pelagic fish and coral reefs. [3] Situbondo Regency has a very wide sea area, with a coastline of 150 km, from the west of East, from the Banyuglugur sub-district to the Banyuputih sub-district. The huge potential of marine and fisheries has not been fully managed. In 2005, the production of catched fish at sea reached 6,913.90 tons. Situbondo waters are located at the mouth of the Madura Strait, in the eastern part bordering the Bali Strait so that it has a strategic position. These waters cover a large enough area so that they have a large potential for capture fisheries. The considerable fisheries potential has not been fully managed. The fishing effort spreads in all sub-districts and coastal villages, there are approximately 30 Fish Drop Bases (PPI) and supported by 9 Fish Auction Sites (TPI). The Fish Auction Place was built at the Mina Village Unit Cooperative (KUD) location which is an institution that acts as the manager of the fish auction site and organizes the fish auction[4] Modern fishing technology is needed so that the potential of fisheries can be utilized. The emergence of nets made of fiber is an important step in the development of fishing gear. Then also develops various types of gill nets, splints from nets and other tools made of nets such as pocket nets, tackle, and trawl. [5] according to [6] productivity is an amalgamation of the conception of business (physical) efficiency with the capacity of many of its production outputs obtained from a unity of inputs.

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[7] states that the factors of production are divided into 3 namely labor, capital and technology. Labor and technology are considered as factors of production whose use changes according to changes in production volume. While the factor of capital production is considered a fixed factor of production, in the sense that the amount does not change and is not affected by changes in production.

2. MATERIALS AND METHOD

The factors of production studied in this study were determined after conducting a field study in advance in order obtain any factors of production that can be used in gill net research. Primary data obtained from interviews and field observations. Interviews were conducted with gill-net fisherman, boat owners and DKP Situbondo officials. In this interview the data collectionincluded; 1). Technological factors namely boat size, engine power, width net,length the net, net size, depth of water, distance of fishing area, number of setting per trip and working time spending. 2). Capital factors are number of crew members, amount of fuel. 3). HR factors, namely the experience of the captain and the experience of the crew. Observation were made on 30 gill net boats by observing to determine the size of the boat, engine power, length of the main rope, the number of ropes and the size of the mesh in the field. Secondary data were obtained fromDKP Situbondo fisheries statistics, general condition data from the kelurahan office and literature study from books and literature from internet after primary and secondary data are obtained, the data then focusing on the factors of production were analysed using the cob douglas production function method and then calculation the SPSS 16 application.

Mathematical methods of production functions

To find out the relationship between the factors of production (input) with the product (output) and also the relationship between the factors of production itself requires an appropriate analysis model. Many models of production function analysis that we can use in a study, among these methods the most widely used by experts is the Cobb Douglas model Mathematically the Cobb Douglas function model is as follows:

$$Y = a\, X_1^{bi}\, X_2^{b2} \ldots X_i^{bi} \ldots X_n^{bn}\, e^{u}$$

Model Testing

Testing of a model and the result of estimation of these parameters aim to be able to know the suitability of a model

used in research, to test the model and estimate the parameters obtained from testing with the cob douglas function parameters used include F-test coefficient of determination (R2) and T test.

3. RESULT AND DISCUSSION

From the F test results, it is known that the Fcount of 4.646 is greater than the Ftable of 2.40 at a 95% confidence level (α = 0.05). Because Fcount> Ftable, so it can be concluded that the production model can be used to resolve the relationship between the dependent variable (Y) and the independent variable (X). From the results of the analysis using the Cobb Douglas function the regression equation is obtained as follows:

$$Y=2{,}516X_1^{0{,}008}X_2^{-0{,}008}X_3^{-0{,}519}X_4^{0{,}092}X_5^{-1{,}210}X_6^{-0.096}X_7^{0.066}X_8^{0.076}X_9^{0{,}437}X_{10}^{-0{,}082}X_{11}^{0{,}051}X_{12}^{-0{,}269}X_{13}^{0{,}621}$$

or:

Which :

- Y = Production result
- X_1 = Boat size(GT)
- X_2 = Engine HP(PK)
- X_3 = Length of net(m)
- X_4 = Width of net(m)
- X_5 = Mesh Size
- X_6 = Age of the captain(year)
- X_7 = Distance of fishing area(mil)
- X_8 = Number of Setting per trip
- X_9 = Experience of the captain
- X_{10} =Experience of the crew (year)
- X_{11} = Number of the crew
- X_{12} = Amount of the oil fuel(Liter)
- X_{13} = Working hour

Coefficient of determination (r2)

The coefficient of determination (R2) is a quantity that shows how much the variables that are entered (Xn) in the model have an effect on changes in production (Y). The coefficient of determination obtained from the analysis results for each net is the coefficient value obtained from the analysis of the gill net is 0.928. The coefficient of determination (R2) is close to one or equal to one, it can be concluded that the production model can explain the closeness of the relationship between the dependent variable (Y) with the independent variable (X) correctly and expressed in percent (%). From the F test results, the Fcount of 4.646 is greater than the Ftable of 2.40 at a 95% confidence level (α = 0.05). Because Fcount> Ftable so it can be concluded that the production model can be used to resolve the relationship between the dependent variable (Y) and the independent variable (X).Uji-t

BOAT SIZE (GT)

The shape and size of a fish boat will affect the strength of the boat above the sea like holding a wave. Besides the size of the boat affect the movement of the boat at sea. The boat GT is related to boat loading. The size of the boat (boat GT) gill nets (bottom gill net) on the Besuki Coast, small ranging between 2-5 GT with boats made of wood which have a length of 7-9 m, width 1- 2m and in 1-1.5 m. From the results of t-test analysis, the value of tcount is 0.048 and ttable is 2.1199 and the results show that tcount <ttable at 95% confidence interval (α = 0.05). So it can be concluded that the GT boat has no effect on the outcome of capture. This is because when viewed from the fishing operation technique, that the bottom gill net is classified as a passive fishing gear. Because after the net is stocked it will be left in a long period of time around 17-19 hours.

Engine power(pk)

The engine of the boat serves as a driving force for the boat to the fishing area and back again to the mainland, besides that the engine power is closely related to the cruising power of the boat. There are two types of engines used for the bottom gill boat on the Besuki coast, namely Dongfaeng and Yanmar with strengths ranging from 9-13 PK. From the calculation results, the value of tcount is -0.038 and ttable is 2.1199 and the results show tcount <ttable at 95% confidence interval (α = 0.05). This shows that engine power has no significant effect on production output. This is due to the passive bottom gill net fishing operation technique (waiting for the bait to be eaten by the fish) so that the boat's engine is turned off or left for a while. So if the addition of the engine power of the boat is enlarged more than what is needed it is likely that the boat will become inefficient because the outboard motor boat is only used when going home and leaving so it will not affect the fish catch.

Length of net(m)

The length of the bottom gill net used by fishermen ranges from 800-1000 meters. The results of the t-test analysis of the bottom gill net length showed no significant effect on the catch. The t-count value on the bottom gill net is -1.225, where the value is smaller than the table value of 2.1199 at a 95% confidence interval (α = 0.05). This shows that the variable length of the bottom gill net does not have a significant influence on the catch. This is because the length of the net is not too long around 800-1000 meters because it adjusts to the size of a small fishing boat used in the process of setting and hauling. In order to avoid accumulation of nets that can be difficult for fishermen at the time of capture. And also possible because at the time of the study was not a season of fish and sea water waves are high. So that the results obtained are less than the maximum or significantly affect the capture results.

Width of net

The width of the bottom gill net used by fishermen ranged from 1.5 - 2 meters. The results of the t-test analysis of the bottom gill net width showed no significant effect on the catch. The t-count value on the bottom gill net is 0.612 where the value is smaller than the table value of 2.1199 at a 95% confidence interval (α = 0.05). This is because the width of the bottom gill net used by Besuki fishermen is not much different from the average width of 1.5 - 2 meters. This shows that the net width width variable does not have a significant effect on the catch.

Size of mesh

The size of the mesh is the number of mesh used in a fishing gear. The size of the bottom gill net used in Situbondo waters is 2.5 and 2.6 inches. The results of t-test analysis on the number of bottom gill net eyes showed no significant effect on the catch. The t-count value on the bottom gill net of -0.397, where the t value is smaller than the table value of 2.1199 at 95% confidence interval (α = 0.05). This shows

that the variable number of bottom gill net eyes does not have a significant effect on the catch. With a mesh size of around 2 -2.5, this shows that this size is a selective measure on a bottom gill net, so if it refers to the type of fish or shrimp caught more with an average body size according to the mesh size used in the fishing ground area, this shows that only certain types of fish can be caught so this does not directly affect production.

Age of the captain

Someone who has been aged 15 years and over is called a fisherman. Under that age, even though the particular people going to sea, they is not called a fisherman. From the results of t-test analysis for the age of fishermen, the t-test value of -0.452 where the value is smaller than the t-table value of 2.1098 tcount <ttable at 95% confidence interval (α = 0.05). This shows that the fisherman age variable has no significant effect on yield. This is because fishermen who have an older age may not have sufficient experience and may not be able to determine the fishing grounds properly. Therefore, the age of fishermen does not really affect the catch.

Distance of fishing area

Fishing area is a certain water area where there are a lot of certain fish, so that it is appropriate to hold fishing operations. From the calculation results, the tcount is 0.408 and the table valueis 2.1199 and the results show that tcount <ttable at 95% confidence interval (α = 0.05) .. This shows that the Distance of fishing area has no significant effect on production results. Because even if the distance is added to fishing, it will not increase production. Does not affect the distance of the arrest area. This fish catch is due to the reach of the fishing area which is still close to the coastal area, which is around 3-5 nautical miles. This is due to the small size of the ship so that it cannot carry out fishing operations to further capture areas. In addition, there are natural factors that exist outside of human control, such as: seasons, weather, etc.

Number of setting pertrip

The number of settings per trip is the number of fishermen lowering their fishing gear into the waters. The number of trip fishermen in the Besuki coast, from the calculation results obtained tcount of 0.903 and ttable of 2.1199 and the results show tcount <ttable at 95% confidence interval (α = 0.05) .. This shows the number of settings per trip has no significant effect of production. This shows that the number of trips made by Besuki coastal fishermen is only 1-2 times in one trip. So that the number of settings made does not affect the catch of fishermen.

Experience of the captain

The captain's experience will be needed in determining where the fishing ground will be headed. The captain is the leader of the ship in operating the ship. From the calculation results obtained tcount of 3.658 and ttable of 2.1199 and the results show t count < t table at 95% confidence interval (α = 0.05). This shows the experience of the captain has a significant effect on production results. It can be seen from the factor of production that the length of experience of the skipper fishermen began to participate in operating the bottom gill net for longer so that it had a real influence.

Experience of the crew

The experience of boat crew is when and how long the fishermen start to participate in the fleet that operates the catch gill net. From the results of the t-test analysis for the experience of the crew, the t-value of -1,141 where the value is smaller than the t-table value of 2.1199 tcount <ttable at 95% confidence interval (α = 0.05). This shows that the experience of the crew variable does not significantly affect the results. This is because not all bottom gill net boats have experienced crew, there are several gill net fishing boats that double as captain and the crew, also the average crew experience is not so great compared to the experience of the captain to locate fish location because of lack of experience and low level of education.

Number of the crew

The number of crew is the large number of fishermen in one fishing operation. From the calculation results, the value of tcount is 0.753 and ttable is 2.1098 and the results show tcount <ttable at 95% confidence interval (α = 0.05). This shows the number of crew has no real effect on production results. This is possible because at the time of the catching fish operation carried out each crew has his own tasks such as the skipper, regulator of the net, etc. which of course the composition of the duties of each crew will affect the number of crew members who carry out capture operations. And also the number of crew is adjusted to the capacity of existing ships so that if an addition is made to the number of fishermen who participate it will affect work safety.

Amount of oil fuel (liter)

The amount of fuel is the large amount of fuel used by fishermen in one fishing operation in liters. From the calculation results obtained a t-count of -1.299 and t-table of 2.1199 and the results show that t-count <t-table at 95% confidence interval (α = 0.05). This shows the amount of fuel has no significant effect on production results. It can be seen from the production factor that the engine fuel (BBM) used by gill net fishermen is relatively the same, ranging from 4-6 liters in other words there is no difference in the amount of fuel per boat. This is because the amount of fuel determines how far the fishing area can be traveled.

Length of working hour (hour)

How much time the fishermen do the setting of fishing operations in the sea within a time period. From the calculation results, the value of tcount is 2.422 and ttable is 2.1199 and the results show tcount <ttable at 95% confidence interval (α = 0.05). This shows the working time has a significant effect on production results. It is seen that the available work time flow is very effective, due to other components also support, such as: the time of the ship used to go to the fishing ground area does not take a long time, the determination of the area proper fishing ground and also fast and fish season.

4. CONCLUSION

Based on the results of the analysis of the data obtained in this study, the following conclusions can be drawn:

1. Factors that simultaneously have a significant effect on catch results with bottom gill net fishing gear are the captain experience and setting time.

2. Factors that have positive values are boat's GT, net width, fishing area, number of trips, captain experience, number of crew members, and time setting. And those that have negative values are machine HP, net length, net mesh, age of fishermen, crew experience, and the amount of fuel.
3. From the results of the analysis using the Cobb Douglas function the regression equation is obtained as follows:

$$Y=2{,}516X_1^{0{,}008}X_2^{-0{,}008}X_3^{-0{,}519}X_4^{0{,}092}X_5^{-1{,}210}X_6^{-0.096}X_7^{0.066}X_8^{0.076}X_9^{0{,}437}X_{10}^{0{,}082}X_{11}^{0{,}051}X_{12}^{-0{,}269}X_{13}^{0{,}621}$$

4. SUGGESTION

From the results of this study, suggestions that can be given by researchers are: To increase production results on bottom gill net fishing gear, it is necessary to increase the variables that have been studied that have simultaneous effect. On the variables that have been studied that have negative values do not need to be added so as not to cause a decrease in catch on bottom gill net fishing gear. For fishermen it is necessary to develop fishing aids such as fish finder, GPS, and also qualified knowledge about fish distribution

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