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Pekalongan Purse Seiners Fisheries Technical Efficiency Using Stochastic Frontier Panel Data

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Abstract. Along 2000-2010, purse seiners fishing fleets in Indonesia dwindled 4.02 percent. In Pekalongan Fishing Port, Central Java has the similar condition. The objectives of this study were to determine the technical parameters of purse seiners fisheries and to compare the technical efficiency of purse seiners in Pekalongan using stochastic frontier analysis (SFA) with panel data. The study applied two models to measure purse seiners efficiency. Model 1: Random-effects Model with panel data will be estimated with Maximum Likelihood and Model 2: Fixed-effects Model SFA for panel data estimated by LSDV. Independent variables used in this study were fishing days, GRT (Gross Registered Tonnage), number of crew members. Dependent variable was the production of purse seine vessels production from 2015-2017. The results of this study indicate the efficiency value in the use of three input variables in the Random-effects model and the Fixed-effects model was quite low. According to Hausman test, Fixed-effects method gives a better output than the Random-effects model in predicting the parameters coeficient because it reduces the bias of the misspecification model. Input variables fishing days and crew members have a significantly effect to gain purse seiners production.

1. Introduction

Fishing operation using purse seine fishing gear in Indonesia was recorded at 1,862,760 units or 5.19% of the total types of fishing gear in Indonesia [1]. The Purse seine is a fleet size of at least 30 GT to 200 GT. With large ship size and engine power the purse seine catching fleet can catch up to the fishing lane in deep sea areas (fishing lanes II and III). But unfortunately, the number of purse seine fleet units in Indonesia from 2000 to 2010 dwindled by 4.02%. In Central Java Province there are 844 units of purse seine fleets [1]. One of the cities in Central Java Province that became the home base of the purse seine fleet was Pekalongan. Large capacity fishing vessels are needed to be able to explore fishing in wider areas of marine waters. The purse seine fleet dominates 80% of the total number of fishing gear at Pekalongan Fishing Port. From 1998-2014 the number of fishing fleets had a significant decline in accordance with national data of fishing gear. In 1998, there were 426 fleets and dropped to 116 in 2013-2014 [2]. The dwindling percentage of purse seine fleet in Pekalongan was 70% from 1998 to 2014. And the main concern of this research is about how the production factor utilization of the purse seiners in carrying out fishing operations. Are the input factors sufficiently technically efficient? If its not, this is likely to be a factor in the decline of purse seine fishing gear in Pekalongan. So, it is necessary to estimate the technical efficiency of the purse seine fleet at the Pekalongan Fishing Port.

The stochastic frontier model is an option to estimate the technical efficiency of the firm's production. The aim of stochastic frontier model is to maximize output or minimize input in production activities [3]. In the last decade, the use of panel data began to be applied into stochastic frontier methodologies. Panel data is useful for estimating technical efficiency in production. This model has the different calculations from various aspects of production to produce consistent calculations and unbiased estimates. The use of panel data makes it possible to use time as a invariant factor or a time factor varies to calculate technical efficiency [4]. Potential ability to measure technical efficiency by using panel data is quite large. Panel data has more information than cross section data [5]. The model developed by Schmidt and Sickles (1984) can be used for panel data to estimate the random-effects or (RE) and fixed-effects (FE) on estimates using stochastic frontier production [3] and [5].

Research on fisheries commerce efficiency has been carried out by researchers in the field of fisheries by using Frontier analysis, including Kirkley et al. [6] which measures the technical efficiency of scallop fisheries in the Atlantic Ocean; Sharma and Leung [7] regarding the technical efficiency of long-term pelagic capture in Hawaii. Kompas et al. [8] analyzed the technical efficiency of input controls for Banana Prawn fisheries in Australia. Garcia del Hoyo et al. [4] examined the determinants of factors that affect the technical efficiency of purse seine capture in the Gulf Cadiz, Spain. Esmaeili [9] examines the technical efficiency of the fishing industry in Iran. Fathelrahman et.al [10] discusses economic risks and measure the efficiency of fisheries in Abu Dhabi, the United Arab Emirates with a stochastic frontier approach. Jamnia et al. [11] analyzed the technical efficiency of catching fleet operations in Chabahar, southern Iran and Pinello et al. [12] calculates fleet efficiency of catching small-scale trawl bottom in Greece. Meanwhile in Indonesia, research on the technical efficiency of fisheries conducted by some researchers such as Jeon et al. [13] regarding the technical efficiency of purse seine capture in the Java Sea, Wiyono and Hufiadi [14] measured the technical efficiency of small-scale purse seine capture in Indonesia by the DEA method. Those researches use cross-section data to estimated technical inefficiency. This study takes a different aspect by focusing on purse seine vessels with size over 90 GT and carrying out capture fishing in line II of the Indonesian Fisheries Management Area (WPP 712 Java Sea and 713 Makassar Strait, Bone Bay, Bali Sea, and Flores Sea). Research utilizes panel data usage of fishing fleet firms and time series data. Panel data allows the use of time-dependent stochastic output frontier and technical inefficiency effects, both together to be estimated in one step [8].

The objectives of this study were to determine the technical parameters of purse seine fishing effort in Pekalongan Fishing Port in stochastic frontier and analyze the technical efficiency of purse seine fishing using panel data in Pekalongan Regency. So, it can be analyzed whether the use of the main input variable is technically efficient or not.

2. Research method

It was a survey research and based on purse seiners fishing case in Pekalongan. Research focused on input efficiencies allocations of purse seiners production factors. Effective and efficient production factor utilization are expected can increase fishing production. Generally, production function of fisheries capture industry is different with other firms. It is affected by fishing efforts and fish stock size. Fish stock size in the fishing ground also connected with fishers fishing effort. Vessel's input can driving the total trip fishing effort. And otherwise, fishing production couldn't controlled by the fishers. Concept of fishing capacity in short term as considered by Kirkley dan Squires in Kirkley et al. [15] has limitation inter alia, capital, vessels size, regulation and recent technological conditions. Capacity can be defines as output level to satisfies producers target and its purpose. Main key that give differencess between capacity and technical output efficiency are capacity is output when a fixed factor limits the production. The technical efficiency of output is a certain maximum output of fixed factors and variables used in production activities.

This study uses panel data that has a usage compared to the use of cross-section data. The advantage of using panel data is that it can generate specifications by isolating the heterogeneity of the firm. And to be able to specifically estimate the use of inefficient technologically production factors appropriately [16]. The definition of efficiency in production, that efficiency is the ratio of output and input related to the achievement of maximum output with a number of inputs. It means that if the output ratio is large, then the efficiency is estimated to be higher. The technical inputs of this purse seine fishing combine the 3 (three) main variables (X) that are considered the most decisive in technical fishing capture.

2.1. *Sampling Method and Types of the Data*

Respondents of the research are purse seine skippers at Pekalongan Fishing Port. Total of purse seiners fleet are 114 units. On observations examined the efficiency of vessels up to > 90 GRT. Based on data from Pekalongan Fishing Port, fleet with size > 90 GRT were 54 units and will be taken as much 30% from total population. Given the unpredictable fishing activity and its uncertain presence in the location, the sampling technique is conducted by purposive sampling method. Primary data collected were duration of fishing trips (fishing days or FD), purse seine vessels size GRT (GRT) and number of crew members (CM). Meanwhile for secondary data of fishery production obtained from monthly report in Pekalongan Fishing Port. The secondary data consists of time series data of capture production from 2015 to 2017. Cross-section data is data derived from purse seine vessel in Pekalongan Fishing Port i.e. fishing vessels' name and its size (GRT). Later, data can be combined into panel data to estimate technical efficiency of purse seiners fishing industry in Pekalongan.

2.2. *Data Analysis*

The analysis method of technical efficiency using Stochastic Frontier Analysis (SFA). SFA is a parametric model used to measure technical efficiency. SFA was developed originally by Aigner et al. (1977) and Meeusen and Van den Broeck (1977) [4], [5], and [17]. The reason using this method is SFA technique requires specification of technological characteristics in a production process [18]. This research method uses technical variables from purse seine catching according to Garcia del Hoyo et al. [4]. Since in this research using the same object with Garcia del Hoyo et al. [4]. The stochastic production frontier specification model allows the error term to have a non-negative random component value to produce a technical inefficiency measurement or the actual ratio of the expected maximum output, based on the specific input value from the existing technology [8]. This idea can be applied to panel data. Formally formulated, indexing (fishing) firms based on *i* can be written as follows:

$$Y_{it} = f(X_{it}, \beta, t)\, e^{v_{it} - u_{it}} \quad (1)$$

Where *t* is time, Y_{it} output (or catch), X_{it} is a vector of parameters to be estimated. Error term v_{it} assumed to be independent and distributed as an asymmetric two-sided error of two-sided random and random variations of capture in output related to factor beyond the control of the firm, such as weather conditions. Meanwhile error term u_{it} is a one-sided error term ($u_{it} > 0$)of the technical inefficiency of capture production assumed to be firm-specific, non-negative random variables, and independently distributed as non-negative truncation (half normal) based on Battese and Coelli (1995) in [4]:

$$\varepsilon_{it} = v_{it} - u_{it} \quad (2)$$

The equation defines an ineffeciency distribution parameter for the vector of firm-specific effects u_{it} which determines the technical inefficiency and *v* is the vector of the parameter to be estimated. Firm-specific effects on fisheries can include the size of the ship's GRT, the length of fishing days, the number of crew members and many others.

Based on equation (2) for panel data of purse seine vessels (2015-2017) is specified with the log-linear Cobb-Douglas production function ([4] and [11], as follows:

$$\ln Y_{it} = \alpha + \beta_1 \ln FD_{it} + \beta_2 \ln GRT_{it} + \beta_3 \ln CM_{it} + v_{it} - u_{it} \quad (3)$$

Whereas Y_{it} is the output of purse seine capture, FD is the length of days for fishing (fishing days), GRT is the size of the ship (Gross registered Tonnage), and CM is the number of crew members (Crew Members). Panel data models can be also estimated by Least Squares with Dummy Variables (LSDV) or the Fixed-effects Model, Generalized Least Squares (GLS) or the Random-effects Model [4].

The research applied two of estimation model for technical efficiency, there are :

Model 1 : SFA Model Random-effects for panel data estimated by ML process, assumed to have a half-normal distribution for error term in-efficiency. Estimated error with BC process.

Model 2 : SFA Model Fixed-effects for panel data and estimated with LSDV (Least Square Dummy Variable).

Selection of estimation model for panel data is using hausman test. The purpose is to find which of the two models has a better estimation of technical efficiency measurements by reducing the estimator bias. With the null hypothesis is the random-effects model of the data panel can estimate better than the fixed-effects model.

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3. Result and discussion

3.1. Purse Seine Fishing in Pekalongan

In Pekalongan Fishing Port, purse seine fishing gear is operated by one boat of purse seiners. Purse seine fishing fleets in Pekalongan can be classified into two categories are group ranged by size 60-90 GT and> 90 GT. Fishing vessel is made of wood and also a mixture of wood with fiber. Purse seiners operation activities with range of days fishing a 40 to 80 days per trip. The number of crew members are 30 to 50 persons per fleet. The length of the head rope for group >90 GT is more than or equal to 600 m. The purse seiners is also equipped with a refrigrated sea water (RSW) system as fish preservation on the fishing vessel.

Table 1. Purse seiners Fleet Specification

No	Fishing Fleet Specification	Range
1)	Vessels size	91 – 126 GT
	Length (L)	19.5 – 27.10 m
	Breadth (B)	7.8 -8.2 m
	Depth (D)	2.25 – 2.95 m
	Engine power	280 - 350 HP
	Length of head rope	> 600 m
2)	Fishing days	40-80 days
3)	Crew members	30-50 persons

Source : research data (2017)

The target of purse seine fishing is the small shoaling pelagic fish species. The dominance of the species of fish caught by purse seiners is small pelagic fishes, as follows: Shortfin scad (*Decapterus macrosoma*), Indian scad (*Decapterus russelli*), Bali Lemuru (*Sardinella lemuru*), and Indian mackerel (*Rastrelliger kanagurta*).

3.2. Purse Seine Technical Efficiency Analysis

This study analyzes the production input of the purse seine vessel to its output, which is the production of the catch. Production inputs used are X_1 namely Fishing Days, X_2 is GRT (Gross Registered Tonnage), and X_3 is the number of crew members with unit of person. The model used to assess technical efficiency applied two methods, namely Stochastic Frontier Analysis (SFA) using model panel data 1 SFA Model Random-effects and Model 2 Model Fixed-effects for panel data to be estimated with LSDV (Least Square Dummy Variable).

The effects of input variables on output for random-effects and fixed-effects models using panel data is to combine time series and cross section data of the firms The objective is to estimate TE of the outputs for each sample entity over a time period from the use of all input factors. The value of technical efficiency of the use of input variables can be known from the two models used.

Table 2. Output SFA Panel data RE Model and FE Model of Pekalongan Purse seiners

Dependent variable =			Ln (Production)					
Included observations =			16			16		
	Random-effects Model				*Fixed- effects Model*			
Variable	*Coefficients*	*Standard Error*	*t Stat*	P-value	*Coefficients*	*Standard Error*	*t Stat*	P-value
Intercept	0.268166	3.351397	0.080016	0.9366	-0.10588	3.376855	-0.031355	0.9751
Ln (FD)	0.533945	0.288684	1.849585	0.0713	0.499033	0.296183	1.684883	0.0996
Ln (GRT)	1.610055	0.682508	2.359026	0.0229	1.620292	0.685773	2.362722	0.023
Ln (CM)	0.335357	0.396218	0.846396	0.402	0.464149	0.403143	1.151325	0.2563
λ^2		0.0625						
Σu		0.0363						
Σv		0.0053						
Log-L		-13.06739				-10.70592		
R	0.4805965				0.5518107			

Table 3. Hausman Test Result

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	4.847035	2	0.0886

Tests using random-effects and fixed-effects show quite low correlation coefficients, there were 0.48 and 0.55. This may indicate as inefficiency on the use of input variables in purse seine operations. Hausman test shows there is misspesification in the random effect model, because the chi-square statistic value is greater than the chi-square table. It could be indicate the fixed-effects model is more appropriate to be used to estimate technical efficiency of purse seine capture in Pekalongan.
The equation model of the SFA data panel method for the Random-effects model:

$$Ln\ (Y) = 0{,}2681 + 0{,}5339\ \ln\ (FD) + 1{,}6100\ \ln\ (GRT) + 0{,}3353\ \ln\ (CM) + e \quad (5)$$

Equation model for the SFA method of data panels for the Fixed-effects model:

$$Ln\ (Y) = -0{,}1058 + 0{,}4990\ \ln\ (FD) + 1{,}6203\ \ln\ (GRT) + 0{,}4641\ \ln\ (CM) + e \quad (6)$$

Whereas:

Y = Production (metric tonnage)
FD = Fishing Days (days)
GRT = Gross Registered Tonnage (Gross Tonnage)
CM = Crew Members (persons)

According to Hausman Test, the comparison between random and fixed-effects model was generated by test of estimation of fishing days variable and number of crew members has significant effect on purse seine production. So, when there is addition of input production factor is able to gain fishing production. However, it is assumed that the number of small pelagic fish resource stocks is still sufficient to be explored. In addition, the ability of skilled purse seiners fishing crew will give a positive impact. Because in common, the labors for purse seine fishing operations employ a lot of crew members. But unfortunately, they were have low skill ability or even without any experience of fishing ability. This will affect more longer time process of setting, hauling and sorting in the sea so that the production of catching less than the maximum. The length of trip is also related to the process of setting, hauling and sorting the catch. The higher the skill of the purse seine crew member can improve the efficiency of the production process.

The efficiency estimation using the SFA data panel method gives result there is inefficiency of the use of the main input variable in fishing operation process. The three input variables can not be maximized to influenced the output change. Group of fishing vessels size above 90 GT has one independent variable (fishing days) which has positive and significant effect. Based on Hausman's test for panel data, the best method used to estimate the technical efficiency model of the SFA method is the Fixed-effects method. This indicates that the Fixed-effects can provide a better explanation because the residual bias can be reduced. Fixed-effects here indicates a permanent effect of one of the factors that is the size of the fishing fleet (GRT) which is considered as an unchanging factor for each observation. And GRT is likely to have a correlation with the dummy variable used in fixed-effects determination. When viewed from technical efficiency, this group of purse seine fleet is also not efficient to allocate technical factors in fishing activities. This will certainly have a negative impact on the purse seine fishing commerce at the Pekalongan Fishing Port. And if it continues then it will be detrimental to purse seine entrepreneurs in Pekalongan. This gives an illustration of the factors generate the decrease of purse seiners fishing fleet in Pekalongan Regency, namely the lack of efficiency in purse seine fishing operations.

4. Conclusions and Suggestions

The results did not show definite results. But at least, it can give an indication of how the use of production input factors can be interpreted. Fishery production with purse seine measuring above 90 GT has not resulted in any effiency in the use of production factors. The factor of the fishing days and the number of crew has positive impact and is significant to the addition of purse seine production. But it also need to pay attention also about fishing skill of the captain and crew in the process of capture fishing activity. The fixed-effects method is chosen to provide a closer approximation to the condition because it is considered to reduce the bias of the missspecification model.

The suggestion for further research is to provide additional information about the characteristic changes of the fishing fleet, such as the age of the fishing fleets and the length of the vessel. Also the technological changes used by the fleet's to be incorporated into the model. In addition, it is necessary to estimate the number of small pelagic fish stocks in Indonesian Fishing Management Area (WPP) 712 and 713 to be a limiting factor in the exploration of purse seine fishing. So that can be point the level of utilization and potential of target fish resources purse seiners. This information can be used as an indicator for the establishment of fishing quotas for sustainable fisheries.

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References

[1] Ministry of Fisheries and Marine Affairs 2011 Capture fisheries statistics of Indonesia 2010 (Jakarta: Indonesia) chapter 2 pp 24-25
[2] Pekalongan Fishing Port 2014 Fishing fleet record according to fishing gear type at Pekalongan Fishing Port (Pekalongan: Indonesia) chapter 4 pp 60-66
[3] Rashidghalam M, Heshmati A and Pishbahar G 2016 Comparison of panel data models in estimating technical effiency *IZA Discuss. Paper No. 9807*(Bonn: Germany) p 1
[4] Garcia del Hoyo J J, Espino D C and Toribio J J 2004 Determination of technical efficiency of fisheries by stochastic frontier models: a case on the Gulf of Cadiz (Spain) ICES *J. of Mar. Sci.* **61** 416
[5] Henderson D J 2003 The measurement of technical effiency using panel data https://www.binghamton.edu/economics/research/old-working-papers/docs/WP0308.pdf.
[6] Kirkley J, Squires D and Strand I E 1995 Assessing technical efficiency in commercial fisheries: the mid-Atlantic sea scallop fishery *Am. J. of Agr. Econ.* **77** 686.
[7] Sharma K and Leung P 1999 Technical Efficiency of the Longline fishery in Hawaii: an application of a stochastic production frontier *Mar. Res. Econ.***13** 259
[8] Kompas T, Che T N and Grafton R Q 2003 Technical efficiency effects of input controls: evidence from Australia's banana prawn fishery *Working Paper No.03 3* (Canberra: Australian National University) p 1
[9] Esmaeili, A 2006 Technical efficiency analysis for the Iranian fishery in Persian Gulf ICES *J. of Mar. Sci.* **63** 1759
[10] Fathelrahman E, Basarir A, Gheblawi M, Sherif S and Ascough J 2014 Economic risk and efficiency assessment of fisheries in Abu-Dhabi, United Arab Emirates (UAE): a stochastic approach. *Sustain.* **6**: 3878-3898.
[11] Jamnia A R, Mazloumzadeh S M and Keika A A 2013 Estimate the technical efficiency of fishing vessels operating in Chabahar region, Southern Iran *J.of the Saudi Soc. of Agri. Sci.* **14** 26
[12] Pinello D, Liontakis A, Sintori A, Tzouramani I and Polymeros K 2016 Assesing the efficiency of small-scale and bottom trawler vessels in Greece *Sustain.* **8** 681
[13] Jeon Y, Omar I H, Kuperan K, Squires D and Susilowati I 2006 Developing country fisheries and technical effiency: the Java Sea purse seine fishery *Appl. Econ.* **38**: 13 1541
[14] Wiyono E S and Hufiadi 2014 Measuring the technical efficiency of purse seine in tropical small-scale fisheries in Indonesia *Asian Fish. Sci.* **27** 297

[15] Kirkley J E, Squires D, Walden J and Ward J 1999 Assesing efficiency and capacity in fisheries *Nation. Mar. Fish.Work. of "Assessing Technical Efficiency and Capacity in Fisheries*" (Maryland: United States of America) chapter 4 pp 20-60

[16] Greene W 2002 Fixed and random effects in stochastic frontier models *North Am. Productv. W.* (New York: United States of America) pp 1

[17] Alam M J, Van Huylenbroeck G, Buysse J, Begum I A and Rahman S 2011 Technical efficiency changes at the farm-level: A panel data analysis of rice farms in Bangladesh *African J. of Busi. Manag.* **5** 5559

[18] Kumbhakar S C and Lovell C A K 2000 *Stochastic frontier analysis* (England: Cambridge University Press) chapter 3 pp 95-114

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