IJEBAS
International Journal of Economic, Business, Accounting, Agriculture Management and Sharia Administration
RADJA PUBLIKA

TECHNICAL EFFICIENCY ANALYSIS OF MILKFISH POND FARMING (CHANOS CHANOS F) IN JANGKA DISTRICT OF BIREUEN REGENCY

[1*]Adhiana, [2] Riani, [3]Maulina,
[1,2,3]Faculty of Agriculture, Universitas Malikussaleh
Correspondent Author: *adhiana@unimal.ac.id

Abstract

This study examines efforts to increase milkfish production through technical efficiencycarried out in the District of Jangka, Bireuen Regency. The population was all milkfish pond farmers in the Jangka District, and the number of samples in this study were 78 milkfish pond farmers using a random sampling method. This research uses primary data and secondary data. Data were analyzed using the stochastic frontier method and analyzed descriptively qualitatively. The research objective is(1) analyze the factors of land area, labor, logs, fertilizers, feed and pesticides for milkfish pond farming, and (2)analyzethe level of technical efficiency of milkfish pond farming in the Jangka District of Bireuen Regency.The research results are therethe five production factors of milkfish pond farming, namely land area, labor, spindles, fish feed and pesticides which have a significant effect on milkfish production while the fertilizer variable has no significant effect on milkfish production. On average, milkfish pond farmers in the Jangka District of Bireuen Regency are technically efficient. However, farmers still have the opportunity to further increase efficiency, through the use of production factors according to their needs.It is recommended for further research to use more diverse variables so as to provide better results.

Keywords: ***technical efficiency, milkfish, Bireuen.***

1. INTRODUCTION

The agricultural sector is a reliable sector in the recovery of the national economy. Various things can be done to be able to develop agriculture from now on. The welfare of farmers and their families is the main goal that must be a priority in carrying out all activities related to agricultural development. Agriculture as one of the pillars of the country's economy, the agricultural sector, especially in areas that have superior potential for agriculture, is expected to increase regional income, especially from rural residents who are still below the poverty line. For this reason, various investments and policies have been made by the government to encourage growth in the agricultural sector (Indrawati, 2013).

One of the sub-sectors that is able to support economic development and plays a very important role is the fisheries sub-sector. This is because fishery resources are development assets that have the greatest opportunity to be used as a source of economic growth. Fishery resources that are owned are diverse and have the potential to include captured fisheries and aquaculture which lead to the advancement of the community's economy, and one of which is widely cultivated by the community is milkfish.

Milkfish is one of the fisheries resources produced from pond cultivation. Advances in maintenance techniques have developed rapidly, so that milkfish production in ponds has been able to reach 2000 kg/ha/year. Meanwhile, the expansion of the aquaculture business area has also increased a lot, both in Indonesia and in neighboring countries such as the Philippines and Taiwan (Mudjiman, 2006).

Term District is one of the minapolitan areas (fish-producing areas) for Bireuen Regency. Its geographical location is directly adjacent to the Malacca Strait. Therefore, the Term District is the center of fisheries and maritime affairs.

Table 1. Pond Area, Production and Productivity of Milkfish according to Jangka District in Bireuen Regency.

Subdistrict	Pond Area (Ha)	Production (Tons)	Productivity (Tons/Ha)
(1)	(2)	(3)	(4)
Samalanga	235,10	159.60	0.67
Simpang Mamplam	555.89	326.80	0.59
Pandrah	139.59	152.00	1.08
Jeunieb	155,36	190.00	1.22
Peulimbang	151.53	68,40	0.45
Peudada	222.91	174.80	0.78
Jeumpa	97,19	304.00	3.13
Kuala	514,73	304.00	0.59
Jangka	**1019.94**	**592.80**	**0.58**
Peusangan	134.06	380.00	2.83
Gandapura	**815.32**	**532.00**	**0.65**
Kuta Blang	2.34	4.56	1.94
Total	**4043.96**	**3,188.96**	

Source: Food Security and Fisheries Office of Bireuen Regency, 2021.

Based on Table 1, it can be seen that the Term District has a land area of 1,019.94 with a production of 592.80 tonnes and a productivity of 0.58 tonnes/ha. This situation indicates that the Kecamatan Jangka has a lower milkfish productivity compared to other Districts, even Gandapura District which has a land area of 815.32 ha with a production of 532.00 tonnes and a productivity of 0.65 tonnes/ha. However, milkfish pond farmers in the Jangka District have a serious problem, namely low productivity.

The low productivity of milkfish is caused by the inefficient use of inputs. Efforts need to be made to increase milkfish production in the Term District, namely by increasing the technical efficiency of the use of production factors used by milkfish pond farmers. Factors that affect technical efficiency in milkfish pond farming in the Term District of Bireuen Regency are the land area, the amount of labor used, the logs used are 5-10 cm in size, the amount of fertilizer used, the feed used is still natural feed and the use of pesticides to eradicate pests and diseases in milkfish is still not optimal.

Therefore, it is necessary to carry out an analysis of the technical efficiency of milkfish (chanos chanos f) farming in the Kecamatan Kecamatan Bireuen Regency. The aims of this study were (1) to analyze the factors of land area, labor, logs, fertilizers, feed and pesticides that affect milkfish pond farming in the Jangka District of Bireuen, (2) to analyze the level of technical efficiency of the milkfish pond farming in the Jangka District of Bireuen Regency.

IJEBAS
International Journal of Economic, Business, Accounting, Agriculture Management and Sharia Administration

2. LITERATURE REVIEW

Farming is essentially a company, so a farmer or producer before managing his farm will consider costs and income, by allocating existing resources effectively and efficiently, in order to obtain high profits at a certain time. It is said to be effective if farmers or producers can allocate the resources they have as well as possible, and it is said to be efficient if the use of these resources produces output that exceeds input. In many experiences, the analysis of farming carried out by farmers or producers is indeed intended for the purpose of knowing or researching (Soekartawi, 2002).

Production is an activity that produces output in the form of goods and services. In producing goods and services required a process that requires a certain time.(Daniel, 2002), said that in agricultural business, production is required through a process that is quite long and full of risks. The length of time needed depends on the type of commodity cultivated. In general, the business of plantation crops requires a longer time than the business of food crops and horticulture.

According to Miller and Meiners (1994), production is the use and utilization of resources that change a completely different other commodity, both in what sense, where or when the commodity is allocated, as well as in terms of what consumers can do with that commodity. Thus, production is not limited to manufacture but also storage, distribution, transportation, dilution, and packaging. Whereas each production process has a technical basis which in economic theory is called the production function (Boediono, 2010). The production function is a function or equation that shows the technical relationship between the number of factors of production used and the amount of production produced per unit time.

Efficiency is a measure of output per unit of time, effort and cost by taking into account the input factors used in production. According to Nicholson (2002), efficiency is the ability to achieve an expected result at the expense of output. Efficiency in production is the ratio of input and output, related to the achievement of maximum input. If the output ratio is large, the efficiency is said to be higher. To measure the level of efficiency, information is needed regarding the estimated input used and the estimated output. The concept of efficiency can be seen from two things, the concept of minimizing input and the concept of maximizing output.

In optimizing the use of production factor inputs, there are three types of efficiency, namely: (1) Allocative Efficiency (Price), ierelated to the success of farmers in achieving maximum profits in the short term, namely the efficiency achieved by conditioning the marginal product value with the input price (NPMx = Px). (2) Technical efficiency, namely efficiency that connects between actual production and maximum production. Technical efficiency will be achieved if the entrepreneur is able to allocate production factors in such a way that high yields can be achieved (Daniel, 2002). Technical efficiency can be measured using the input side and output side approaches. The measurement of technical efficiency in terms of output is the ratio of the observed output to the limit output. This efficiency index is used as an approach to measure technical in frontier stochastic analysis. Technical efficiency includes the relationship between input and output. A company is said to be technically efficient if the production or output produced uses a combination of certain inputs. (3) Economic efficiency is achieved when technical efficiency and price (allocative) efficiency are achieved and two conditions are met.

The stochastic frontier production function is a production function that is used to measure how the actual production function is in relation to its frontier position (Soekartawi, 2003).The stochastic frontier production function model was introduced by Aigner, et al., (1977) in (Coelli, 1996). The stochastic frontier model is an extension of the original deterministic model to measure stochastic effects within the production limit.The production function is the physical relationship between the factors of production and production on the frontier whose position lies on the isoquant line which is the line where the dots indicate the combination point for the optimal use of production inputs (Soekartawi, 2003).

3. METHOD OF IMPLEMENTATION

This research was conducted in the District of Jangka, Bireuen Regency. The location selection was made purposively (purposively) with the consideration that Term District has a large pond area with the largest amount of production but has lower productivity compared to Gandapura District.

The object of this study were all milkfish pond farmers in the Term District of Bireuen Regency with a pond area of 1,019.94 Ha. The population in this study were milkfish pond farmers in the study area. Of the 23 villages that have milkfish ponds, 3 villages were selected purposively (purposive sampling) with the consideration that these three villages are milkfish production centers. By using the slovin formula, the number of milkfish pond farmers who will be used as samples is 78 respondents by random sampling. This study uses primary data obtained directly through interviews and questionnaires from fishermen. Secondary data was obtained from the Maritime Service, the Central Bureau of Statistics, the Agricultural Extension Center and other related agencies.

Data analysis

Technical efficiency can be analyzed using the stochastic frontier production function estimation. The stochastic frontier production function is a function that shows the highest possible production that can be achieved by pond farmers with the conditions in the field. The selection of the stochastic frontier production function is based on the assumption that the production level achieved by pond farmers is close to the maximum (frontier) condition, so that productivity can still be increased on the same land. With the stochastic frontier method, the factors that are expected to influence the level of technical efficiency to be achieved can be explained with the help of econometric models. Meanwhile, the factors that cause inefficiency can also be captured simultaneously.

The specifications of the model used to estimate the parameter estimation of the Cobb-Douglas function using the stochastic frontier approach in milkfish production are as follows:

$$Ln\ Y = \beta0 + \beta1LnX1 + \beta2LnX2 + \beta3LnX3 + \beta4LnX4 + \beta5LnX5 + \beta6LnX6 + vi - ui$$

Information:

Y = ProductionMilkfish (Kg)
X1 = AreaLand (Ha)
X2 = Labor (HOK)
X3 =Log (Tail)
X4 = Fertilizer (Kg)
X5 = Pfish (Kg)

IJEBAS
International Journal of Economic, Business, Accounting, Agriculture Management and Sharia Administration
RADJA PUBLIKA

X6 = Pesticide (Liters)
β0 = intercept
βj = Estimation parameters, where i = (1,2,3,4,5,6,7,8)
vi-ui =*Error term*(ui = effect of technical inefficiency in the model)

The expected coefficient values are β1, β2, β3, β4, β5, β6 > 0. The expected coefficient is positive which means that milkfish production can be increased.

(Coelli, et al. 1998) make of the technical inefficiency effect model assumed to be free and the distribution is normally truncated with non-negative random variables. For the i-th farm in the t-year, the technical efficiency effect μi is obtained by clipping the distribution N(μit,σ|), with the formula: μi = δ0 + zi δ +wi where zi is the explanatory variable, δ is a scalar parameter, wi is a random variable. In this study, the effect of technical inefficiency can be analyzed using the following model:

LnUi = δ0 + δ1Z1 + δ2Z2 + δ3Z3 + δ4Z4 + δ5Z5

Information:

Ui = Technical inefficiency effect
Z1 = Income outside of pond farming (Rp/month)
Z2 = Farmer's experiencepond (Year)
Z3 = Formal education of pond farmers (Year)
Z4 =Age of pond farmer (years)
Z5 = Number of Dependents (Person)

4. RESULTS AND DISCUSSION

4.1. Production Function Estimation with the OLS Method

The production function model in this study consists of land area, labor, logs, fertilizer, fish feed, and pesticides which are the independent variables and the amount of milkfish production which is the dependent variable. The results of the estimation of the production function using the OLS method can be seen from the following table:

Table 1. Results of Estimating the Production Function with the Ordinary Least Square (OLS) Method

Parameter	Variable	Coefficient	t-Ratio
β0	intercept	0.9526	96,5504***
β1	Land area (X1)	1.0302	8,0622***
β2	Labor (X2)	0.9498	13,7487***
β3	Spindle (X3)	0.0686	5,4597***
β4	Fertilizer (X4)	-0.1988	-0.0119ns
β5	Fish Feed (X5)	-0.3175	3,3156***
β6	Pesticides (X6)	0.0547	1,9710*
Return to Scales		1,587	

Source: Primary data processed, 2022

Description: *** real at α 1%,** real at α 5%,* real at α 10%,
ns = not significant

In Table 1 it can be seen that of the six selected independent variables, four independent variables were found which had a significant effect on α = 1% (ttable = 2.38161) on milkfish production in the Jangka District. Independent variables that have a significant effect are land area, labor, fish logs and feed. One pesticide independent variable that has a significant effect on the level α = 10% (t table = 1.66724). Meanwhile, fertilizer had no significant effect on milkfish production.

Table 1 describes the position of the business scale (return to scale) in milkfish pond farming in the Kecamatan Jangka. This business scale is obtained from the sum of each independent variable coefficient value. Milkfish pond farming in the Jangka Subdistrict is in a position of increasing return to scale (1.587), which indicates that milkfish pond farmers in the Jangka District must increase the use of production factors according to their needs. The return to scale value of 1.587 means that if farmers increase production input by 1%, the total output will increase by 1.578%.

4.2. Production Function Estimation with the MLE Method

The estimation results of the MLE production function are results that can be interpreted with the stochastic frontier production function model. The results of the estimation of the MLE method on milkfish pond farming in the Jangka District can be seen in Table 2.

Table 2. Analysis of the Frontier Function with the Maximum Likelihood Approach Estimation (MLE)

Parameter	Variable	Coefficient	t-Ratio
β0	intercept	10.0111	1.7379*
β1	Land area (X1)	0.0108	-10.8353***
β2	Labor (X2)	1.0109	2.0302**
β3	Spindle (X3)	0.0010	14,1884***
β4	Fertilizer (X4)	-0.0264	-0.0234ns
β5	Fish Feed (X5)	-0.0413	-4,3393***
β6	Pesticides (X6)	1.1016	4,9570***
Sigma-squared σ2		0.6375	7,9112***
Gamma(γ)		0.9796	2.3309**
Log likelihood function			5,5592***
LR			121,9616***

Source: Primary data processed, 2022

Description: *** real at α 1%,** real at α 5%,* real at α 10%, ns = not significant.

In Table 2, the sigma-squared (σ2) and gamma (γ) values resulting from the MLE estimation method are 0.6375 and 0.9796, which are significant at an error rate of 1% (ttable = 2.38161). The value of σ2 which is greater than 0 indicates that there is an influence of technical inefficiency in the model and shows that the distribution of the error term (μi) is normally distributed. This is consistent with the reference that the coefficient σ2 > 0 means that there is an influence of technical inefficiency (Greene in Adhiana, 2005) and if σ2 > 0 then the distribution of the error terms is normally distributed (Nauli, 2017).

The gamma (γ) value of 0.9796 (Table 2) is the ratio between the technical inefficiency deviation (μi) and the deviation (deviation) that may be caused by the random variable (vi). Statistically, the gamma (γ) value is 0.9796 indicating that technical efficiency is heavily influenced by farmer management factors in their farming. Thus the model of the frontier production function used in this study is declared perfect because the variations in the frontier model occur not due to coincidence but are caused by technical inefficiencies.

Table 2 also explains that the generalized-likelihood ratio (LR) value of 121.9616 is greater than the value of the kodde and palm table of 17.755. This means that the stochastic frontier function can explain the existence of technical efficiency and inefficiency in the production process.

The stochastic frontier production function model for milkfish pond farming can be written in the following equation:

Ln Y = 10.0111+ 0.0108Ln X1 + 1.0109Ln X2 + 0.0010Ln X3 - 0.0264Ln X4 -0.0413Ln X5 +1.1016Ln X6 +Vi -Ui

The following is an interpretation of each factor of production from the estimation of the stochastic frontier production function model:

l. Land area

The land area variable has a significant and positive effect on milkfish production at α = 1% with a coefficient value of 0.0108. Shows that if the land area is increased by 1% it will increase milkfish production by 0.0108%, assuming other variables are considered constant (cateris paribus). This situation illustrates that the wider the amount of land used by milkfish pond farmers in the study area, the more production will increase, because the land in the research location includes land that has the potential to make it suitable for doing milkfish pond business. The results of this study are also in line with the results of research (Purwati, 2019) and(Rani, 2018), which states that land area has a significant and positive effect on the efficiency of milkfish cultivation in Tarakan City with a coefficient value of 1.332.

2. Labor

The labor variable has a significant and positive effect on milkfish production at α = 5% with a coefficient value of 1.0109. This value indicates that if the workforce is increased by 1% it will increase milkfish production by 1.0109% assuming that other variables are considered constant (cateris paribus). Additional labor is needed in maintenance activities which consist of controlling pests and diseases. The results of this study are in line with the results of the study(Rachmina, 2008)And(Purwati, 2019)which states that labor has a significant and positive effect on the efficiency of rice crops and milkfish cultivation in Tarakan City with a coefficient value of 1.240.

3. The spindle

The spindle variable has a significant and positive value on milkfish production at α = l% with a value of 0.0010. This value indicates that if the logs are added 1% it will increase milkfish production by 0.0010% assuming that other variables are considered constant (cateris paribus).The use of logs has a significant and positive effect on the maximum production produced. This is because the logs used by farmers are superior spindles purchased by farmers. The results of this study are in line with research(Rani, 2018) which states that the logs have a significant and positive effect on the technical and economic efficiency of milkfish farming in North Aceh District with a coefficient value of 0.716.

4. Fertilizer

The fertilizer variable has no significant and negative effect on milkfish production with a coefficient value of -0.0264, meaning that if the amount of fertilizer is added by 1% it will reduce milkfish production by -0.0264% assuming other variables are considered constant (cateris paribus). The application of fertilizers in the field is in accordance with the recommendations of the local extension officers. However, there are some farmers who use fertilizer before the preparation of the pond land reaches 80% so that when the land is prepared for further use, the nutrients needed are eroded during the actual land preparation. The results of this study are also in line with the results of the study(Noor, 2005)And(Jannah, 2016)which states that fertilizer has no significant and negative effect on the technical efficiency of grouper farming in Lampung waters and tiger prawns in Tanah Jambo Aye District, North Aceh Regency with a coefficient value of -0.481.

4. Fish feed

The fish feed variable has a significant and negative effect on milkfish production at α = l% with a value of -0.0413. This value indicates that if the amount of fish feed is increased by 1% it will decrease milkfish production by -0.0413% assuming that other variables are considered constant (cateris paribus). This is because the types of fish feed and the method of using fish feed in the research location are as recommended for each land area capacity, but there are farmers who provide additional feed with the aim of achieving kilogram weight of fish for export purposes, so that some also experience reduced yields due to body paralysis of fish. and had to be harvested before harvest time arrived. This research is different from(Liana, 2019)And(Shalih & Hayati, 2021)which shows that the addition of feed will increase the production of catfish in Siak Hulu and catfish in Bangkalan

6. Pesticides

The pesticide variable has a significant and positive effect on milkfish production with a coefficient value of 1.1016, meaning that if the amount of pesticide is increased by 1% it will increase milkfish production by 1.1016% assuming other variables are considered constant (cateris paribus). This is because the types of pesticides and how to use pesticides in the research location are correct and correct.The results of this study are in line with research(Sumartin, 2017)And(Adhiana & Riani, 2019) which istate that pesticides have a significant and positive effect on the technical and economic efficiency of milkfish farming in North Aceh District with a coefficient value of 0.098.

4.3. Technical Efficiency and Inefficiency Analysis

4.3.1. Achievement of Technical Efficiency Level

The technical efficiency of milkfish pond farming in the Jangka District can be seen from Table 3. The efficiency index values of the analysis results can be categorized into two, namely: ≤ 0.70 is said to be inefficient and > 0.70 is said to be efficient (Adhiana, 2005).

Table 3. Results of Estimating the Level of Technical Efficiency of Milkfish Ponds in the Term District

Technical Efficiency Level	**Efficiency Index**	
	Number of Farmers	Percentage
0 < TE ≤ 0.50	9	11.54%
0.51 <TE ≤ 1.0	69	88.46%

Amount	78	100%
Minimum TE	0.3586	
TE maximum	0.9998	
Average	0.8492	

Source: Primary data processed, 2022

In Table 3 it can be seen that most of the milkfish pond farmers are technically efficient. The lowest technical efficiency is 35.86%, which indicates that farmers have a 64.14% opportunity to further improve efficiency. Furthermore, the highest level of technical efficiency is 99.98%, this shows that farmers have a 0.2% opportunity to further improve efficiency and an average level of technical efficiency is 84.92%. On average, pond farmers still have the opportunity to obtain more efficient results such as those obtained by farmers who have maximum technical efficiency. Technical efficiency can still be improved by implementing good technical management, such as more optimal use of production factors and good human resource management in milkfish pond farming.

4.3.2. Achieved Level of Technical Inefficiency

The technical inefficiency factor for milkfish pond farming in the Jangka District from the stochastic frontier function can be seen in Table 4 below.

Table 4. Estimation of Frontier Function Technical Inefficiency Factors in Milkfish Pond Farming in Jangka District

Parameter	Variable	Coefficient	t-Ratio
δ0	intercept	4.0836	620891***
δ1	Outside Farm Income	-1.3874	1.9064*
δ2	Experience	-0.0239	4,6826***
δ3	Education	-0.0261	-0.0265ns
δ4	Age	-1.2341	-2.9725***
δ5	The number of dependents	1.2010	4,9570***

Source: Primary data processed, 2022

Description: *** real at α=1%, ** real at α=5%, * real at α=10%, ns=not significant

In Table 4 it can be seen that of the five technical inefficiency variables, there are four variables that have a significant effect on milkfish production in the Term District. There are four inefficiency variables that have a significant effect, namely off-farm income, experience, age and number of dependents. While the education variable has no significant effect.

The technical inefficiency model of the frontier production function is:

Ln Ui = 4.0836 - 1.3874Ln Z1 - 0.0239Ln Z2 - 0.0261Ln Z3 - 1.234- Ln Z4 + 1.2010Ln Z5

The following is an interpretation of each inefficiency variable in milkfish production:

1. Income outside of farming

Income factor outside of pond farming has a significant and negative effect on the technical inefficiency of milkfish ponds with a coefficient of -1.3874. Shows that if there is non-farming income of 1%, it will reduce the technical inefficiency of milkfish by 1.3874%. The more farmers' income, the better farmers can take care of milkfish farming because they are not constrained by costs and will increase production.

2. Experience of Pond Farmers

Farming experience has a significant and negative effect on the technical inefficiency of milkfish ponds with a coefficient of -0.0239. Shows that if there is an increase in experience of 1%, it will reduce the technical inefficiency of milkfish ponds by 0.0239%. The more experience of farming milkfish ponds, the more learning from previous farming to be used as learning for the next season's farming. The results of this study are also in line with the results of the study(Purwati, 2019)which states that farming experience has a significant and negative effect on the efficiency of milkfish cultivation in Takaran City with a coefficient value of -0.077.

3. Formal Education

The factor of formal education has no significant and negative effect on the technical inefficiency of milkfish ponds with a coefficient of -0.0261 (Table 13). This shows that if there is an increase in formal education by 1%, it will reduce the technical inefficiency of milkfish ponds by 0.0261%. The longer farmers study, the more open and willing they are to receive information and new technologies that can be used for their farming activities. In line(Machmuddin et al., 2017)And(Ayomi et al., 2008)that education has a positive effect on technical efficiency.

4. Age

Farmer age has a significant and negative effect on the technical inefficiency of milkfish ponds with a coefficient of -1.2341. Shows that if m age of farmers is 1%, it will reduce technical inefficiency by 1.2341%. This is because the age of farmers in the research area is in the productive age. The average age of farmers is 48 years so that with increasing age, it is expected that milkfish pond farming can be carried out more efficiently. This happens because the addition of age is still in the productive age. With a productive age, farmers have the ability to work well in managing their farms. The results of this study are also in line with the results of the study(Noor, 2005)And(Jannah, 2016)which states that age has a significant and negative effect on the technical inefficiency of tiger shrimp farming in Tanah Jambo Aye District, North Aceh Regency with a coefficient value of -0.2898.

5. Total Dependents

The number of dependents has a significant and positive effect on the technical inefficiency of lowland rice with a coefficient of 1.2010. This shows that if there is an increase in the number of dependents by 1%, it will increase the technical inefficiency of milkfish ponds by 1.2010%. In line with research(Adhiana et al., 2021), that the number of dependents affects the technical inefficiency of chili farmers. This is because by increasing the number of dependents, farmers use capital for the cost of necessities of life which is greater than their farming activities (costs used for farming are reduced). In addition, in the research location, family members owned by milkfish pond farmers in the study area were generally of school age (1-20 years), making it impossible to help farmers in milkfish pond farming..

5. CONCLUSION

Based on the results and discussion in the study, the following conclusions can be drawn. Of the six factors of production for milkfish pond farming in the Jangka District of Bireuen Regency, namely land area, labor, logs, fertilizer, fish feed and pesticides. Obtained variable area of land, labor, logs, fish feed and pesticides that significantly affect milkfish production. Meanwhile, the fertilizer variable has no significant effect on milkfish production.

IJEBAS
International Journal of Economic, Business, Accounting, Agriculture Management and Sharia Administration

On average, milkfish pond farmers in the Term District of Bireuen Regency are technically efficient. However, farmers still have the opportunity to further increase efficiency, through the use of production factors according to their needs.

Suggestion

Suggestions for farmers to be able to increase the use of production factors such as the use of land area, labor, logs, fertilizers, fish feed and pesticides to improve the technical efficiency of milkfish pond farming and also farmers in the research area to share knowledge, skills and experience which are owned. For future researchers, it is expected to be able to design a research model by including variables that are different from this research.

REFERENCE

Adhiana, A., Martina, Riani, & Suryadi. (2021). the Analysis of Economic Efficiency of Red Chilli Business in Sawang Subdistrict, North Aceh. International Journal of Economic, Business, Accounting, Agriculture Management and Sharia Administration (IJEBAS), 1(2), 112–122. https://doi.org/10.54443/ijebas.v1i2.21

Ayomi, N.M.S, Mirza Andrian Syah, Ika Sari Tondang, NR (2008). Analysis of technical and economic efficiency in the use of production factors for smallholder oil palm plantations in the district. West Kotawaringin. 2, 115–122.

Central Bureau of Statistics. 2018. Population Conditions in the Term District.

Boediono. 2010. Analysis of Technical Efficiency and Revenue of Shallot Farming (Case Study: Sukasarikaler Village, Argapura District, Majalengka Regency, West Java Province) (Thesis). Faculty of Agriculture

Coelli T, DSP Rao, and BG. (n.d.). An Introduction to Efficiency and Productivity Analyzes. Kluwer Academic Publishers.

Coelli, T. (1996). A. Guide to Frontier Version 4.1: A Computer Program For Stochastic Production Function For panel Data. Empirical Economics, 20, 325–332.

Daniel, M. (2002). Introduction to Agricultural Economics. Script Earth.

Jannah, W. (2016). Technical Efficiency Analysis of Tiger Shrimp Farming in Tanah Jambo Aye District, North Aceh Regency (Thesis). Malikussaleh university.

Liana, L. (2019). TECHNICAL EFFICIENCY OF SIAM PATIN FISH CULTIVATION BUSINESS (Case Study of UPT Pond-Islamic University of Riau Kubang Raya, Siak Hulu District, Kampar Regency). Journal of Agribusiness, 12(1), 64–72.

Machmuddin, N., Kusnadi, N., & Syaukat, Y. (2017). Economic Efficiency Analysis of Organic and Conventional Rice Farming in Tasikmalaya Regency. Agribusiness Forum, 6(2), 145–160. https://doi.org/10.29244/fagb.6.2.145-160

Mudjiman, A. 2006. Milkfish Cultivation in Ponds. Jakarta. Self-help Spreader

Nicholson, W. 1995. Intermediate microeconomics and its applications. First Edition. Jakarta: Grafino Persada.

Noor, T. & M. (2005). Efficiency Analysis of Grouper Cultivation Business Techniques in Floating Net Cages in Lampung Bay Waters: Productivity, Influencing Factors and Policy Implications for Developing Their Cultivation. Journal of DEVELOPMENT ECONOMICS, 10(1), 95–105. https://doi.org/https://doi.org/10.20885/vol10iss1aa608

Purwati, Y. (2019). Technical Efficiency Analysis of Milkfish (Chanos chanos) Production in Tarakan City. Tarakan Borneo University.

Rachmina, D. ; M. (2008). Analysis of Technical Efficiency and Income of Rice Farming Certified Seed Program: Stochastic Production Frontier Approach (Technical Efficiency and Income Analysis for Certified Rice Seed Program: Stochastic Production Frontier Aproach). Journal of Agribusiness and Agricultural Economics, 2(2), 11–20.

Riani, . (2018). Analysis of Allocative Efficiency of Milkfish Pond Farming (Chanos Chanos F) in North Aceh District. Agrifo : Journal of Agribusiness, Malikussaleh University, 3(1), 69. https://doi.org/10.29103/ag.v3i1.678

Shalih, RI, & Hayati, M. (2021). Technical Efficiency of Catfish Cultivation in Bangkalan District. Agriscience, 1(3), 563–572. https://doi.org/10.21107/agriscience.v1i3.9734

Sumartin. (2017). Analysis of Production Factor Efficiency in Milkfish (Chanos chanos) Cultivation Business (Case Study on Alumni of Fish Cultivation Training Participants at BPPP Banyuwangi. Journal of Aquaculture Science, 2(1), 6–16.