



ANALYSIS OF EFFICIENCY OF TECHNICAL AND FACTORS AFFECTING IN AROMATIC RICE FARMING IN THE SELUMA REGENCY

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ABSTRACT

The research objective is to determine the level of technical efficiency and the factors that influence the level of technical inefficiency, to analyze the relationship between input and output in the production process of aromatic rice farming in Seluma regency. Total number of respondents were 73 farmers who planted Aromatic rice. The Cobb Douglas of Frontier Stochastic approach was used, whereas for the factors that influence the inefficiency function as the initial answer of the above analysis results of the production function parameter were obtained through the Maximum Likelihood Estimation (MLE), with an LR value of 14.3620 which was higher than t table 99% (2.39). It had a significant effect on the 99% confidence level. It was seem that, there was no meaning that all aromatic rice farmers in the regency were 100% efficient. It could be seen that the MLE log-likelihood value of 29.9157 was higher than the OLS log-likelihood value of 22.7347. The lowest technical efficiency value was achieved by the farmers by 0.55 and the highest by 0.97. In the research area, the majority of the use of production factors was efficient, from 73.34% already in the value of efficiency between 0.90-1.00, meaning that 73.34% had approached the maximum efficiency. The result of the disseminated coefficient (R²) of 0.277 could mean a significant effect of 27.7 percent on the inefficiency variable while the remaining 72.3 percent is influenced by other factors not included in this research variable.

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INTRODUCTION

Growing population growth makes the application of various technologies and agricultural innovations a necessity so that production can support high food demand. The agricultural sector has an important role in economic development in Bengkulu Province. Based on the agroecosystem and land suitability, rice plants have great potential and opportunities to be developed in Seluma Regency. The harvested area of paddy in Seluma is 21,11 Ha, the productivity of paddy in Seluma only reaches 39.18 Kg / Ha and the production of paddy is 82,727 tons (BPS, 2013).

Rice production in Seluma Regency decreased from 2010 to 2015. Rice production in 2013 reached 82,313 tons, and subsequently continued to decline every year until 2015 rice production was only 59,461 tons (BPS Bengkulu Province, 2015). Responding to the problem, the Seluma Regency Government innovated in increasing rice production under the guidance of the Bengkulu Province Agricultural Technology Study Center (BPATS). The rice varieties planted are aromatic rice. The availability of sufficient agricultural land makes this a potential for agricultural development in Seluma Regency.

According to the BBPADI(2015), to produce aromatic rice with higher levels of 2 Acetyl – 1 Pyroline (2-AP). Aromatic rice plants are recommended to be planted in cool climatic conditions and then harvested earlier than ordinary varieties. 2 Acetyl, 1 pyroline (2-AP) is an odorant that has a fragrance like pandan or popcorn. The fragrance of this pandanus fragrance is easily recognized from the aroma of rice, or even on rice that is in flower. This fragrant compound is naturally synthesized by aromatic rice plants, but not synthesized by non-aromatic rice plants. Some previous studies have shown that aromatic rice is non-aromatic rice that has mutations in certain chromosomes. These chromosome mutations cause the enzyme BADH2 (betaine aldehyde dehydrogenase 2) in rice plants to become dysfunctional so that rice contains 2-AP compounds.

In every economic activity, an appropriate combination of inputs will be sought in order to obtain maximum output. In economics this is called efficiency. Soekartawi (2003) added that in economic terminology, efficiency can be divided into three, are technical efficiency, allocative efficiency and price as well as economic efficiency. Technical efficiency to cover the relationship between input and output. A company is technically efficient if the production with the largest output used a combination of several inputs.

According to Sukiyono (2005), technical efficiency measures the extent to which a farmer converts inputs into outputs on economic levels and factors certain technology. This means that two farmers using the same amount and type of input and technology may produce different amounts of output. Besides, age, formal education, aromatic rice farming experience, number of family dependents, and land ownership status also affect technical efficiency. Achieving technical efficiency can be done if farmers know the production inputs that affect the farming undertaken by farmers, these production inputs must be allocated by farmers for their farming in order to get the maximum output. Based on the discussion above, this study aims to determine the level of technical efficiency of aromatic rice farming in Seluma District and to determine the factors that influence the level of technical inefficiency of aromatic rice farming in Seluma Regency.

RESEARCH METHODS

Determination of Research Locations

This study was conducted in July - August 2018. Retrieval of the first planting season data in 2018. The method of determining the location was determined purposively in Seluma District with the consideration that Seluma Regency was the center of aromatic rice production in Bengkulu Province.

Method of Collecting Data

Data to be taken in this study are primary data and secondary data. Primary data is data obtained directly from respondents using in-depth interview techniques (dept interviews) using questionnaires or interview instruments. Secondary data can be obtained from pre-existing data (Arikunto, 2006). This data can be obtained from agencies or institutions that are closely related to research or obtained from the literature or literature then this data is tabulated and analyzed further.

Methods for Determining Respondents

The method of determining respondents in this study is the census method or total sampling. This method applies if the population is relatively small and easy to reach. It is expected that this sampling method tends to be closer to the real value and can minimize errors in population values (Husaini, et.at, 2008). Respondents in this study were all members of the population of aromatic rice farmers in Seluma Regency. Based on oral communication with the Department of Agriculture in Seluma District and the chairman of the Seluma District Contact Farmers Main Fishermen Organization. it was found that 73 farmers were planting aromatic rice. The distribution of aromatic rice farmers in Seluma Regency can be seen in Table 1.

Table 1 Number of farmers planting aromatic rice in Sintanur Varieties in Seluma Regency

No	Sub-District	Number of Farmers
1	Semidang Alas Maras	9
2	Semidang Alas	11
3	Kecamatan Ilir Talo	5
4	Talo Induk	9
5	Talo Kecil	3
6	Seluma	6
7	Seluma Selatan	17
8	Sukaraja	7
9	Kecamatan Lubuk Sandi	4
	Total	73

Source: KTNA Seluma Regency, 2018

Data Analysis Method

To be able to analyze the factors that influence the level of technical efficiency of aromatic rice farming, the first thing to do is to measure the level of efficiency of each respondent at the study site. Therefore, to further simplify the analysis of the collected data, a model is used. This model is used to connect inputs with output in the

production process. This case is the form of the production function is the Cobb-Douglas production function of the Stochastic Frontier approach because 1) this functional form is commonly used in many empirical studies, especially farm research in developing countries, and 2) can be formed into the dual functions needed to calculate economic efficiency (Fauziyah, 2010). According Soekartawi (1994), production function form Cobb-Douglas functional equation, systematically is written as follows:

$$Q = aX_1^{b_1} X_2^{b_2} X_3^{b_3} \dots X_n^{b_n} e^u$$

$$= a\pi X_i^{b_i} e^u$$

If the Cobb-Douglas function is expressed by the relationship Y and X then:

$$Y = f(X_1, X_2, \dots, X_i, \dots, X_n)$$

Notes:

- Q = Variable explained
- X = Variable that explains
- e = Natural logarithm
- A, b = Expected magnitude
- u = Error (disturbance term)

Empirical Model

This model is further transformed in a linear, Cobb-Douglas stochastic frontier production function for aromatic rice farming can be as follows:

$$\ln Q_t = \beta_0 + \beta_1 \ln Area + \beta_2 \ln Bni + \beta_3 \ln Kndg + \beta_4 \ln Pnska + \beta_5 \ln fungi + \beta_6 \ln insek + \beta_7 \ln Labor + (V_i - U_i) \tag{1}$$

Notes:

- β_0 = Intercept
- $\beta^1 \dots \beta^7$ = Coefficient Regression Coefficient production factors
- V_i = Model random error
- U_i = Random variable representing the inefficiency of technical

While the measurement of the efficiency or inefficiency of aromatic rice farming technique is assumed by using the equation formulated by Battese and Coelli (1988) and Kumbhakar and Lovell (2000) cited by Sukiyono (2005) as follows:

$$TE_i = \frac{Q_i}{Q_i^*} = \frac{\exp(x_i\beta + V_i - U_i)}{\exp(x_i\beta + V_i)} = \exp(-U_i) \tag{2}$$

Notes:

- TE_i = Technical efficiency that can be achieved by the i-th farmer
- Q_i = actual output of aromatic rice farming (kg / ha)
- Q_i^{*} = potential output of aromatic rice farming (kg / ha)
- U_i = one-side error term ($v_i \geq 0$) or random variable

To determine the factors that influence technical efficiency, the econometric model cited from Sukiyono & Sriyoto (2010) is used as follows:

$$eff_i = \alpha_0 + \alpha_1 Edu_i + \alpha_2 Exp_i + \alpha_3 Ext_i + \alpha_4 Age_i + \alpha_5 Skl_i + u_i \tag{3}$$

Notes:

- eff_i = technical efficiency
- Age = Farmer Age (Year)
- Edu = Length of Formal Education (Year)
- Exp = Farming Experience (Year)
- Skl = Land Ownership Status

The results of processing the FRONTIER 4.1c program according to Aigner et al. (1979), Jondrow et al. (1982) or Greene (1993) in Coelli, et. al, (1998), will provide an estimated value of variance in the form of parameters as follows:

$$\sigma^2 = \sigma_v^2 + \sigma_u^2 \quad (4)$$

$$Y = \frac{\sigma_u^2}{\sigma_v^2} \quad (5)$$

The parameter of this variance is used to find the value of γ so that $0 < \gamma < 1$. The parameter value γ is a contribution of technical efficiency in the total residual effect. To partially test the regression coefficient, a t-test is performed, at a certain significance level. In the hypothesis test the factors that influence inefficiency function as an initial answer from the above analysis.

RESULTS AND DISCUSSION

Characteristics of Aromatic Rice Farmers

Characteristics are data or properties of the objects observed in the study. The purpose of the characteristics is to determine the condition and condition of the object to be observed as presented in Table 2.

The average experience of farming in Aromatic rice farmers is 18.84. The biggest percentage is in the range of 13-23 years or 47.95% as many as 35 people than the range of <13 years is 21 people or 28.77% while the smallest range is > 23 years as many as 17 people or 23.29%. The experience of farming is referred to as the experience of rice farming in addition to aromatic rice farming which is usually used as experience in helping the management of aromatic rice farming that they are currently trying. This means that the experience of rice farming in addition to aromatic rice they have done so far has been very petrified in optimizing the production factors of aromatic rice cultivation because cultivation is almost the same as rice cultivation in general, this experience ranges from 13 years to 23 years or 47.95%.

The average of rice farming experience is 2.98 years. The highest percentage had 2 years of rice farming experience, 36.99% while the lowest farming experience was in the range of 5 years, 2.74%. This shows that most farmers have a relatively new experience in rice farming, so this is one of the indications that illustrates that the farmers have less experience in the field of aromatic rice farming so that it can affect the productivity of Aromatic rice farming.

The average area of aromatic rice farming in Seluma Regency is 0.59 Ha. The largest percentage of aromatic rice farming areas is 61.64% with a range of 0.48 to 0.7 Ha with 45 people, followed by a range between <0.48 Ha with 19 people or around 26.03%. The range of aromatic rice farmers' smallest land area is > 0,7 Ha with an area of 9 people or around 12.33%. This means that the most extensive use of land area cultivated by aromatic rice farmers in Seluma Regency is the most cultivated area ranging from 0.48 to 0.7 Ha or 61.64% less than 1 hectare of land used by farmers to grow aromatic rice whether it is their land or even the land that they lease while the farmers who own their land number 40 people with a percentage of 54.79%. Farmers with leased land status amounted to 33 people with a percentage of 45.21%. owning their land, only some rent land. This means that farmers in the study area can still rely on the agricultural sector to meet the needs of their families through the income they receive from the farming they work on.

Table 2 Characteristics of Aromatic Rice Farmers in Seluma Regency

No	Characteristic	Amount (Person)	Percentage (%)	Average
1	Age (years)			
	< 37	21	28,77	42,30
	37- 46	38	52,05	
> 46	14	19,18		
2	Family Dependent (person)			
	< 3	49	67,12	27,97
	3 - 4	24	32,88	
> 4	0	0		
3	Formal Education (years)			
	6	21	28,77	9,45
	9	22	30,14	
12	30	41,07		
4	Non Formal Education			
	0 (never)	57	78,08	0,45
	1 (during 1 year)	7	9,59	
	2 (during 2 years)	1	1,37	
3 (during 3 years)	8	10,96		
5	Experience of farming (years)			
	<13	21	28,77	18,84
	13-23	35	47,95	
>23	17	23,29		
6	Experience of rice farming (years)	27	36,99	2,98
	2	22	30,14	
	3	23	31,51	
	4	2	2,74	
	5			
7	Area of rice farming (Ha)			
	< 0,25	18	28,87	0,55
	0,48-0,7	44	65,67	
> 0,7	5	2,46		
8	Land Ownership Status			
	One's own	36	54,79	
	Rent	37	45,21	

Source: Primary Data, 2018

Production Input Used for Aromatic Rice Farming

Input Use of production inputs in farming activities is very important because it will affect the products produced. Production inputs analyzed in this study include the area of land, seeds, manure, ponska fertilizer, fungicides, insecticides, and labor to be presented in Table 3.

The area of farming land is often taken into consideration by farmers in making decisions to accept innovation. Usually, farmers who have large arable farming will dare to take risks compared to farmers who have smaller arable land. But generally, farmers feel afraid if the costs incurred to buy production facilities are greater than the harvest they receive. The average area of aromatic rice land managed by farmers is

0.55 ha. The seeds used in aromatic rice farming will affect production to be achieved. The seeds planted by aromatic rice farmers are sintanur varieties certified with an average seed use of 17.14 kg. Besides seeds, farmers also need other inputs in the form of 1.74 tons of manure, 111.58 kg of Ponska fertilizer, 0.66 liters of fungicide, 2 liters of insecticide. The use of pesticides by farmers differs depending on the disease, price, and habits of the farmer. Furthermore, aromatic rice farming requires a workforce of 89.53 HKSP/ha.

Table 3 Average Usage of Aromatic Rice Production Input in Seluma Regency

No	Description	Average	Minimum	Maximum
1	Area of land (ha)	0,56	0,25	1,7
2	Seeds (kg)	17,14	10	40
3	Manure (ton)	1,74	0,5	4,5
4	Ponska (kg)	111,85	50	300
5	Fungicides (liter)	0,66	0	4,5
6	Insecticides (liter)	2,00	0,25	3,5
7	Labor (HKSP)	89,53	35	235

Source: Primary Data, 2018

Analysis of Stochastic Frontier Production Function Aromatic Rice

Production Function Aromatic Rice

Production Function The model used to estimate aromatic rice production function is the stochastic frontier Cobb-Douglass function model. This production function model uses the Maximum Likelihood Estimation (MLE) estimator method which is carried out through two stages. The first stage uses the OLS method (ordinary least square) to illustrate the average performance of aromatic rice production can be seen in Table 4.

Table 4 Estimation Results of OLS Stochastic Frontier Production Function in Aromatic Rice Farming in Seluma Regency

Variable	Coefficient	StandardError (Se)	T-ratio
Beta 0 (constan)	-0,9807	0,5685	-1,725
Beta 1 (area of land)	0,2090	0,0960	2,1771**
Beta 2 (seeds)	0,2059	0,1151	1,7886**
Beta 3 (manure)	0,1736	0,0676	2,5674**
Beta 4 (ponska)	0,1866	0,0901	2,0703**
Beta 5 (fungicide)	0,0072	0,0031	0,2317
Beta 6 (insekticide)	0,0116	0,0116	0,9980
Beta 7 (labor)	0,1765	0,1048	1,6828
Gamma (γ)	0,820		
Sigma squared	0,0352		
Log likelihood function OLS	22,7347		
Tabel ($\alpha = 99\%$)	2,39		
Tabel ($\alpha = 95\%$)	1,67		
Tabel ($\alpha = 90\%$)	1,29		

Source: Processed Data by frontier 4.1c, 2018

Notes: ** = very significant

The results of the estimation by the OLS method are presented in Table 4. The gamma (γ) value obtained was 0.8200. These results indicate that 82% of the variation of aromatic rice farming in Seluma Regency is caused by technical efficiency while the remaining 18% is influenced by the effects of stochastic, so many aromatic rice farming is not caused by inefficiency variables but the effect of random errors that are not included in the model. Table 4 shows that land area, number of seedlings, manure and ponska fertilizer as factors affecting aromatic rice farming in Seluma Regency, have a positive and significant influence on production factors with a 95% confidence level. This result is proven by t-ratio greater than t-table on area of land variable that is equal to $2.177 > 1.67$, the variable number of seeds is $1.78 > 1.67$, manure variable is $2.56 > 1.67$, variable Ponska fertilizer is $2.070 > 1.67$ and labor variable is $1.682 > 1.67$. While the other variables do not have a positive influence on the aromatic rice farming factor in Seluma Regency.

The MLE method is used to describe the relationship between maximum production (output) that can be achieved at the level of use of existing production factors (inputs), as well as to see the level of technical efficiency and technical inefficiencies of Aromatic rice production in Seluma Regency. For more details about the results of the estimation using the MLE stochastic frontier function model in Table 5.

Table 5 Estimation Results of MLE Stochastic Frontier Production Function in Aromatic Rice Farming in Seluma Regency

Variable	Coefficient	StandardError (Se)	T-ratio
Beta 0 (constan)	-1,0328	0,4878	-2,1173
Beta 1 (area of land)	0,1613	0,0730	2,2083**
Beta 2 (seeds)	0,1710	0,0996	1,7171**
Beta 3 (manure)	0,1804	0,0581	3,1053***
Beta 4 (ponska)	0,1663	0,0713	2,3327**
Beta 5 (fungicide)	0,0023	0,0027	0,8814
Beta 6 (insekticide)	0,0115	0,0010	1,1523
Beta 7 (labor)	0,2531	0,0960	0,9910
Sigma squared	0,1738	0,1753	9,2461
Gamma (γ)	0,9090	0,0984	
Log likelihood function MLE	29,9157		
LR test of the one-side error	14,3620		
Mean efficiency	0,9005		
Tabel ($\alpha = 99\%$)	2,39		
Tabel ($\alpha = 95\%$)	1,67		
Tabel ($\alpha = 90\%$)	1,29		

Source: Processed Data by frontier 4.1c, 2018

Notes:

*** = significant

** = very significant

The estimation results using the MLE method in Table 5 show a gamma value (γ) that is greater than the OLS method that is equal to 0.9090. This means that there is a factor between the actual Aromatic rice farming and maximum production caused more by the effects of technical inefficiency, not other factors not included in the model. The

gamma value (γ) of 0.9090 indicates that the variation in the value of the error is due to the high technical inefficiency component that is equal to 90%. The measurement and gamma value (γ) which are close to 1 indicate that the error term only comes from the inefficiency. If it is close to zero, it is interpreted that all error terms are a result of noise (ν) such as weather, pests, and so on, not due to inefficiency.

To answer the proposed hypothesis whether all aromatic rice farmers do their farming efficiently, it can be seen by the LR value. LR value of 14.3620 is greater than t table 99% (2.39) significantly affected the level of confidence of 99%. Judging from the value there is no 0 or which means that all aromatic rice farmers in the Regency are 100% efficient. The estimation result of the MLE log-likelihood value of 29.9157 is greater than the OLS log-likelihood value of 22.7347 this means that the production function using the MLE method can be said to be good. Also, the alleged results by using the MLE method on average production factor variables have a positive effect on the increase in aromatic rice farming production in Seluma Regency.

Technical Efficiency Levels on Aromatic rice farming

Technical efficiency is analyzed simultaneously using the stochastic frontier production function model to get the maximum output from the use of inputs. The level of technical efficiency of each factor influencing the production of aromatic rice farming in Seluma Regency. The distribution of technical efficiency of aromatic rise farming in Seluma Regency is shown in Tabel 6.

Table 6 Farming Distribution Based on Efficiency Level in Seluma Regency

Efisiensi teknis	Jumlah	Persentase(%)
0,30-0,69	4	5,48
0,70 – 0,79	3	4,11
0,80 – 0,89	11	15,07
0,90 – 1,00	55	73,34
Rata-rata	0,90	
Minimum	0,55	
Maksimum	0,97	

Source: Processed Data, 2018

In the study area, the majority use of production factors is efficient. This is evident from 73.34% of farmers who are in an efficient value between 0.90-1.00, meaning that 73.34% of farmers have approached maximum efficiency. This means that the average production is achieved by 90% of the frontier and can still be added by 10% of production inputs to get the maximum results that can be achieved through the best management of the system. This is supported by research conducted by Hasan et. al (2016). The results from the inefficiency model are estimated to indicate that land size, age, education, training, and credit facilities are significant factors that are negatively related to the technical inefficiencies of aromatic rice production.

Factors Influencing the Performance of Technical Inefficiencies

To see the value of the achievement of technical inefficiencies and the factors of production that affect the inefficiency of aromatic rice farming, the SPSS program is used with the results of estimating the analysis of the factors affecting the level of performance of technical inefficiencies in Aromatic rice farming presented in Table 6. It shows that value of R^2 has a value of 0.277 which means that overall the independent

variables namely age (age), experience (exp), education (Edu) number of families (Agk) and land status (SKL) can explain changes in the dependent variable namely the level of technical inefficiency by 27, 7%. While the remaining 72.3% is explained by other factors not included in the model.

Table 7 Estimation Results of Inefficiency Level in Aromatic Rice Farming in Seluma Regency

Estimator	coefficient	Standard error (Se)	T-ratio
Constant	0,205	0,105	1,960
Age	-0,001	0,001	-0,677 ns
Experience	-0,031	0,010	-3,049 ns
Education	-0,005	0,004	-1,046 ns
Number of families	0,027	0,009	3,115***
Land status	-0,045	0,017	-2,567ns
R ²	27,7		
F-ratio	5,141***		
T-Table (99%)	2,383		
F-table (99%)	3,059		
Responden	73		

Source: Processed Data, 2018

Notes:

*** = significant at α 1%

Ns = Not significant

Tabel 7 shows that the F value is 5.141. When compared with the F-table value, then the F-ratio is greater than the F table that is $5.141 > 3.059$. This means that this value is significant at the error level (α) of $\alpha = 0.01$ or has a confidence level of 99%. This means that all independent variables together have a significant effect on technical inefficiency. Whereas the test used for individual licensing variables can be explained as follows:

Age

T-value of the age is -0.6677 and a regression coefficient of -0.001. When compared with a table of 1,264, then $t\text{-ratio} < t\text{-table}$. This means that H_0 is accepted, which means age does not affect technical inefficiency. In the research of Isyanto (2011), Yoko, et. al (2014), explained that age levels harmed technical inefficiencies. This means that the older the farmer, the higher the level of technical inefficiency.

Experience

T-test on experience generated t value of -3.049 and a regression coefficient of -0.031. When compared with t-table of 1.264, $t\text{-ratio} < t\text{-table}$. This means that H_0 is accepted, which means the experience does not affect technical inefficiency. In contrast to the research Suharyanto, et.al (2015), Heni & Ketut (2018) in this study the experience affected the technical inefficiency although it was negative. These conditions indicate that if the experience added by 10% will reduce inefficiency by 0.031 ten percent, the more experienced the farmer, the more efficient his farming or the lower the inefficiency.

Educational

From the results of the t-test on Educational generated a t-ratio of -1.046 and a negative coefficient value of -0.005. When compared with the t-table of 1.264, then $t\text{-ratio} < t\text{-table}$. This means that H_0 is accepted, which means the educational does not affect technical inefficiency. Heni & Ketut (2018), states that education increases the ability of farmers to find, obtain, and interpret useful information about production inputs. However, in the research location, many people took tertiary education, after succeeding they preferred to work outside the agricultural sector.

Number of families

Statistic test to the variable number of families is indicates t-value of it is 3.115 and a positive coefficient value of 0.027. When compared with t-table at a 99% confidence level of 2.383, then $t\text{-ratio} > t\text{-table}$. This means that H_1 is accepted, which means the variable number of families significantly influences technical inefficiency. By having a positive value coefficient (0.027) which means the more the number of household members, the more inefficient the farming business. This is because at the research location families who have family members who are dependents but cannot help farming activities because they are still pursuing education.

Land Status

Land Status is the Land Ownership Status by farmers that are measured by a dummy variable with the statement 1 = "self-owned land" and 0 = "leased land". Estimation results show that the Land Status Variable with a t-ratio of -2.567 and a negative coefficient value of -0.045. When compared with the t-table of 1.264, then $t\text{-ratio} < t\text{-table}$. This means that H_0 is accepted, which means that the Land Status variable does not affect technical inefficiency. This condition is consistent with research conducted by Kusnadi, et. al (2013), Tinaprilla, et.al (2013) which shows that ownership status does not have a significant effect with a negative sign on technical inefficiency. This is since each of the owner's farmers and their smallholders have an interest in the success of their farming.

CONCLUSIONS AND POLICY IMPLICATIONS

Conclusions

1.
 - a. Aromatic rice farmers in Seluma District have done their farming efficiently.
 - b. Aromatic rice production in Seluma Regency is significantly affected by land use, seeds, manure, phonska fertilizer, insecticides, fungicides, and labor, which has been technically efficient with an average performance value of 0.9005 technical efficiencies.
2. The number of families (Agk) significantly influences the inefficiencies of aromatic rice farming in Seluma District, while the experience (Exp), Land Ownership Status (SLC), age (Age), and Education (Edu) do not affect.

Recommendations

In an effort to increase the yield of aromatic rice production in Seluma District, farmers need to make efforts to expand their farming. This is based on the results of research showing that factors of production such as land area, seeds, manure and ponska fertilizer affect the amount of aromatic rice production. Furthermore, in the long term farmers need to do intensive business by developing the farming technology used. In order to achieve these two objectives, the government needs to play a role in increasing the role of extension workers to provide guidance and assistance to farmers, especially related to obstacles faced by farmers.

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