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MEASUREMENT OF TECHNICAL EFFICIENCY OF JH37 CORN SEED IN THE CONDITIONS OF TANAH LAUT DISTRICT OF SOUTH KALIMANTAN, INDONESIA

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ABSTRACT
The need for corn in Tanah Laut District in the last seven years has increased significantly, although in certain years it has decreased it is certainly caused by factors that farmers cannot predict such as pests, uncertain climatic conditions, etc. The production of JH37 seed corn breeding is very important to maintain the availability of corn seeds, so as not to experience a shortage in the supply of conventional cultivated corn seeds. One of the efforts to increase the availability of corn seeds in addition to increasing planting area, it is also necessary to look at what production inputs affect production, so that farmers can calculate appropriate production inputs. In addition, technical efficiency measurement can later provide an idea of whether farmers have done farming in technically efficient conditions, so that it can be a reference to increase productivity from seed corn breeding. This research was carried out in Tanah Laut Regency from April 2022 to June 2023, namely from the stages of making research proposals, taking data, processing data to research reports. This study used the census method, where the population was taken all as respondents with a total of 64 captive farmers who carried out JH37 corn seed farming in Tanah Laut Regency.

KEYWORDS
Corn, technical efficiency, seed, stochastic frontier.

Agricultural development needs to continue to be developed in order to lead to the creation of agriculture that is efficient, competitive, and able to increase the income and standard of living of farmers in particular and the wider community in general. The direction of development is through improving agribusiness patterns, especially improving the quality and quantity of production, diversifying superior commodities, increasing the added value of products and expanding market control (Mahfudz, 2012).

Agricultural development needs better attention, even if the priority on industrialization policy has been dropped, but the agricultural sector can have the ability to generate increased income (Suardiman, 2001). The agricultural sector is the answer to the problem of unemployment and poverty. By optimizing agricultural land with the right farming, farmers are expected to improve the welfare of farmers (Julainsyah &; Riyono, 2018).

Indonesia as an agricultural country must have independence in providing food needs. We do not need to import rice, corn and soybeans if agricultural production which is our basic food need is sufficient. The problem is that our agricultural production and productivity are low, even though our country is very fertile compared to our neighboring countries. The potential is so great but we are not able to manage and enjoy it. Many factors affect the low productivity and competitiveness of our agriculture.

One of the problems is the problem of seeds, especially food crop seeds. In addition, there are indeed many analyses and studies of agricultural development that mention the problem of limited farmer knowledge, narrow land ownership, seasonal changes and so on are factors causing our low agricultural productivity.

Initu seed production is a must that must be carried out to overcome the problem of providing seeds in a location. By empowering local farmer groups to become seed producers and given government assistance facilities in the form of production facilities assistance. Agricultural business activities will be successful if farmers have adequate capacity.

Corn is one of the food crops that has a strategic role and economic value and has the potential to be developed because this commodity has a multipurpose function, namely as the main source of carbohydrates and proteins after rice (food), as raw material for the food industry and feed industry (feed), as well as the latest developments as fuel (fuel). The need for corn continues to increase both for food and feed as well as industrial raw materials. At a time when domestic production is inadequate, imports are forced to make ends meet. Nationally, corn is the second important food crop after rice and its demand is increasing every year in line with population growth, increasing livestock business, and the development of the food industry made from corn, Purwono (2009) in Sulistyaningsih (2019).

The need for corn in Tanah Laut District in the last seven years has increased significantly, although in certain years it has decreased it is certainly caused by factors that farmers cannot predict such as pests, uncertain climatic conditions and so on. Based on data from the Horticultural and Plantation Food Crops Office of Tanah Laut Regency (2021), it is stated that the planting area of corn in Tanah Laut Regency has fluctuated; it's just that productivity tends to increase. This is because corn farmers are still dependent on government assistance in the form of corn seeds. Therefore, the need for corn seeds in Tanah Laut Regency is still very necessary. Basically, the factor that most determines how much corn production is produced is land area, which is also a capital for corn farmers.

As one of the subjects in the agricultural development system, the Tanah Laut Regency government supports the existence of farmer groups, especially for breeding corn seeds. With several reasons that have been outlined, it can be seen that the Corn Seed Breeding in Tanah Laut Regency has increased from 2019 to 2020, while in 2021 the planting area has remained. This is of course the planting area carried out by corn breeders will affect the production of corn. On the other hand, the number of groups does not affect production because from 2019 to 2020 there is a reduction in farmer groups. The scientific logic means that the productivity of seed corn in Tanah Laut District can still be increased by increasing the land area. As shown in the table above, the increase in the need for corn seeds has triggered an increase in the number of captive breeding areas every year. This also encourages the Tanah Laut Regency government to support the development of JH37 Corn seed breeding.

The production of JH37 seed corn breeding is very important to maintain the availability of corn seeds, so as not to experience a shortage in the supply of conventional cultivated corn seeds. One of the efforts to increase the availability of corn seeds in addition to increasing planting area, it is also necessary to look at what production inputs affect production, so that farmers can calculate appropriate production inputs. In addition, technical efficiency measurement can later provide an idea of whether farmers have done farming in technically efficient conditions, so that it can be a reference to increase productivity from seed corn breeding. The objectives of this study are: 1) analyze the influence of production factors (land area, seeds, organic fertilizers, inorganic fertilizers, pesticides, and labor), and 2) measure the level of technical efficiency in JH 37 corn seed farming in Tanah Laut Regency.

METHODS OF RESEARCH

This research was carried out in Tanah Laut Regency from April 2022 to June 2023, namely from the stages of making research proposals, taking data, processing data to research reports. This study used the census method, where the population was taken all as respondents with a total of 64 captive farmers who carried out JH37 corn seed farming in Tanah Laut Regency.

The method used to answer the first objective is to analyze the effect of production factors (land area, seeds, organic fertilizers, inorganic fertilizers, herbicides, and labor) on the production of JH 37 corn seed farming in Tanah Laut Regency analyzed quantitatively with multiple linear regression models. The effect of land area, seeds, organic fertilizers, inorganic fertilizers, herbicides, and labor on corn farming production is used by Multiple Linear Regression analysis according to (Sugiyono, 2018), which is as follows:

$$Y = b_0 + X_1^{b1} + X_2^{b2} + X_3^{b3} + X_4^{b4} + X_5^{b5} + X_6^{b6} + e$$

Where: Y = Production (kg); b_o = Constant; b_1, b_2, b_3, b_4, b_5, b_6 = Regression Coefficient X_1, X_2, X_3, X_4, X_5, X_6; X_1 = Land area (ha); X_2 = Seed (kg); X_3 = Organic fertilizer (kg); X_4 = Inorganic fertilizer (kg); X_5 = Herbicide (liters); X_6 = Manpower (HOK); e = *error term*.

The coefficient of determination R^2 is a statistical value calculated from sample data. This coefficient represents the %tase of variation of all bound variables that can be described by changes in explanatory variables. This coefficient is a measure of the extent to which the independent variable can change the dependent variable in a relationship (Firdaus, 2011).

The value of the coefficient of determination (R^2) ranges from 0 < R^2< 1, with the test criterion being R^2 which is getting higher (close to 1) shows that the model formed is able to explain the diversity of the dependent variables, and vice versa.

The f value is used to determine whether the variables of land area production factors (X_1), seeds (X_2), organic fertilizers (X_3), inorganic fertilizers (X_4), herbicides (X_5), and labor (X_6) used together have a significant effect on the variable of agricultural production (Y) of JH 37 corn seeds in Tanah Laut Regency.

Hypothesis:

- H_0 = The variables of production factors (X_1, X_2, X_3, X_4, X_5, X_6) together affect the production of JH 37 corn seeds in Tanah Laut Regency;
- H_1 = Variable production factors (X_1, X_2, X_3, X_4, X_5, X_6) affect agricultural production (Y) of JH 37 corn seeds in Tanah Laut Regency.

Based on significance value (α= 0.05):

- If the significance value is ≥ α then H0 is accepted;
- If the significance value < α then H0 is rejected.

If the significance value is < α, the variables of land area (X_1), seeds (X_2), organic fertilizers (X_3), inorganic fertilizers (X_4), herbicides (X_5), and labor (X_6) simultaneously affect corn farming production (Y) and vice versa if the significance value is > α then the variables of land area (X_1), seeds (X_2), organic fertilizers (X_3), inorganic fertilizers (X_4), herbicides (X_5), and labor (X_6) simultaneously have an insignificant effect on corn farming production (Y).

The t test is a partial test that shows the effect of the independent variable (free) on the dependent variable (bound) and is used to determine whether the independent variable partially has a real effect or not on the dependent variable. The level of significance (α) used in social sciences is 5% (Firdaus, 2011).

Research hypothesis:

- H_0 = The variable of production factors (X_1, X_2, X_3, X_4, X_5, X_6) partially has an insignificant effect on agricultural production (Y) of JH 37 corn seeds in Tanah Laut District;
- H_1 = The variable of production factors (X_1, X_2, X_3, X_4, X_5, X_6) partially has a significant effect on agricultural production (Y) of JH 37 corn seeds in Tanah Laut Regency.

Based on significance value (α= 0.05)

- If the significance value is ≥ α then H0 is accepted;
- If the significance value is < α then H0 is rejected.

If the significance value is < α, the variables of land area (X_1), seeds (X_2), organic fertilizers (X_3), inorganic fertilizers (X_4), herbicides (X_5), and labor (X_6) partially have a significant effect on agricultural production (Y) of JH 37 corn seeds in Tanah Laut Regency and vice versa if the significance value is > α then the variable land area (X_1), seeds (X_2), organic fertilizers (X_3), inorganic fertilizers (X_4), herbicides (X_5), and labor (X_6) have a partial insignificant effect on agricultural production (Y) of JH 37 corn seeds in Tanah Laut District.

The method used to answer the second goal is to determine the level of efficiency of a production factor which is tested by efficiency analysis. Efficiency tests are used to see whether corn farming is efficient or not. Efficiency tests include technical efficiency.

This study used *stochastic frontier* using the *Maximum Likelihood* (MLE) estimation method. The independent variables of this production function are: land area (X_1), seeds (X_2), organic fertilizers (X_3), inorganic fertilizers (X_4), herbicides (X_5), and labor (X_6). The character of the technical efficiency test based on this frontier test tool is that the closer to 1, the data is considered technically efficient. Estimation results received using the help of *Software Frontier Version 4.1.* The following models the production function using the *stochastic frontier* function.

$$LnY = \beta 0 + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \beta_5 \ln X_5 + \beta_6 \ln X_6 + (v_i - u_i)$$

Where: Y = Production (kg); b_o = Constant; b_1, b_2, b_3, b_4, b_5, b_6 = Regression Coefficient X_1, X_2, X_3, X_4, X_5, X_6; X_1 = Land area (ha); X_2 = Seed (kg); X_3 = Organic fertilizer (kg); X_4 = Inorganic fertilizer (kg); X_5 = Pesticide (liters); X_6 = Manpower (HOK); $v_i - u_i$ = *error term* (u_i) effect of technical inefficiencies in the model.

Analysis of the level of technical efficiency can be measured using the following formula: Battese and Coelli (1998):

$$T_i = \frac{Yi}{Yi*}$$

Where: Tei = technical efficiency achieved by the i-th observation; Yi = actual output of seed corn crop (kg); Yi* =output limit (potential) of seed corn crop (kg).

The value of technical efficiency is inversely related to technical inefficiencies and is only used for functions that have a certain number of outputs and inputs (cross section data). The efficiency value of farmers is categorized as quite efficient if it is > 0.7 and categorized as inefficient if it is ≤ 0.7. The inefficiency effect model used in this study refers to the inefficiency effect model developed by Battese and Coelli (1998). The ui variable, which is used to measure the effects of technical inefficiencies, is assumed to be free and its distribution normal with $N(\mu_{it}, \sigma^2)$.

The effect of technical inefficiency is expressed as follows:

$$\mu_{it} = \delta_0 + \delta_1 Z_1 + \delta_2 Z_2 + \delta_3 Z_3 + \delta_4 Z_4 + \delta_5 Z_5 + \delta_6 Z_6$$

Where: μ_{it} = effect of inefficiency of seed corn production; Z_1 = farmer's age (years); Z_2 = farmer education (years); Z_3 = number of peasant family members (people); Z_4 = farming experience (years); Z_5 = Dummy Non-formal education (1 = never attended formal education, 0 = Never attended non-formal education); Z_6 = Dummy Land ownership status (1 = own land, 0 = non-owned land); d_0 = constant.

The expected parameter marks are δ_1, δ_2, δ_3, δ_4, δ_5, $\delta_6 < 0$.

To be consistent, the estimation of production function parameters and inefficiency functions is carried out simultaneously with the frontier program. Testing of *stochastic frontier* parameters and the effects of technical inefficiencies is carried out in two stages. The first stage is parameter estimation using the OLS method. The second stage is the estimation of all parameters β_0, β_j, variance u i and v_i using the *Maximum Likelihood* (MLE) method, at a confidence level of α 5%.

The results of the frontier program processing will provide an estimated value of variance in the form of parameterization as follows:

$$s^2 = + \sigma_v^2 \sigma_u^2$$

$$\Upsilon = \frac{\sigma_v^2}{\sigma_u^2}$$

The parameter of this variance can find the value ϒ, therefore 0 ≤ ϒ ≤ 1. The value of the parameter ϒ is the contribution of technical efficiency in the total residual effect.

RESULTS AND DISCUSSION

Analysis of *frontier stochastic* production functions and technical efficiency using the FRONTIER Version 4.1 program requires the availability of three files in *text format*, namely

(a) data file (pro-dta.txt) (dependent and independent variables have been transformed into *logged*), (b) instruction file (pro-ins.txt), and (c) output file to accommodate analysis results (pro-out.txt). In the instruction file, the *Technical Efficiency Effects Frontier* (a.k.a *TE Effects Model*) was selected (Battese and Coelli, 1993) so that at the same time information was obtained about (a) estimation of the *stochastic frontier* production function model, both by OLS method and MLE method, factors (sumbe r-source) managerial capacity that affect technical efficiency, (c) and technical efficiency estimates, both per individual and average (*mean efficiency*).

The results of estimating the production function of *stochastic frontier* which uses six production factors consist of land area, seeds, solid fertilizers, liquid fertilizers, pesticides and labor. The estimation results illustrate the best performance of JH 37 corn seed farmers in Tanah Laut District at the existing technology level. Estimation is done with the *Maximum Likelihood* (MLE) model. The output results of the alleged parameters of the *stochastic frontier* production function with the MLE method in JH37 corn seed farming in Tanah Laut District can be seen in Table 1.

Table 1 – Parameters of the *alleged stochastic frontier* production function with the MLE method

Variable	Parameter	Coefficient	t count	*Itself.*
Constant	b_0	3.2963	4.4606**	0.000
Land Size (X_1)	b_1	0.2825	2.3886**	0.021
Seed (X_2)	b_2	0.1673	2.4672**	0.018
Solid fertilizer (X_3)	b_3	0.1933	2.1384*	0.039
Liquid fertilizer (X_4)	b_4	0.2458	2.8700**	0.006
Pesticides (X_5)	b_5	-0.0960	2.3960**	0.021
Labor (X_6)	b_6	0.1976	2.8025**	0.007
log likelihood function = 94,4752				
LR test of the one-sided error = 14,6680				

Source: Primary Data Processing, 2023.
*Note: ** $t_{0,025}$ = 2.3022db = 57 ; significant α = 5%; * $t_{0,05}$ = 2,0025db = 57 ; significant α = 10%.*

Model goodness testing with the MLE approach can be done by comparing the LR test of the one-sided error with the value *of the mixed chi-square distribution*, χ2. If the *LR test value of the one-sided error* is greater than the value of the *mixed chi-square distribution*, χ2 means that the model can be said to be good or appropriate to use. Based on the results of data analysis shows that, *LR test of the one-sided error of* the *stochastic frontier* production function model is 14.6680 and greater than the value of the *mixed chi-square distribution*, χ2 (0.05; 6) = 12.592 listed in the table *Upper and Lower Bound for The Critical Value for Jointly Testing Equality and Inequality Restrictions* (Kodde and. Palm, 1986). So it can be said that regression estimation is appropriate using the MLE approach. When viewed from partial testing, it shows that all production factors, namely land area production factors, seeds, organic fertilizers, inorganic fertilizers, pesticides and labor, affect the production of JH37 corn seeds in Tanah Laut Regency at a real test level of 5%.

The significant positive effect of Table 7 on the production of JH37 corn seeds is shown by the calculated t value (2.3886) which is greater than the t table (t 0.05) ($_{2.0025}$). The value of the regression coefficient (β 1) of land area of 0.2825, means that when there is an increase in land area by 1%, it will give an increase in production 28.25%.

The corn seeds used are mall and klin varieties. This corn seed has a positive effect on the production of JH37 corn seeds, this is indicated by the calculated t value (2.4672) which is greater than the t table (t 0.0 2 $_5$) (2.0025). The value of the seed coefficient of 0.1673, means that when there is an addition of seeds by 1%, it will give an increase in production 16.73%.

The organic fertilizer used in JH37 corn seed activities is in the form of manure. The results of testing with MLE show that organic fertilizer has a significant influence on the production of JH37 corn seeds, with a calculated t value (2.1384) that is greater than the table t (t 0.0 2 $_5$) (2.0025). The value of the organic fertilizer coefficient of 0.1933, means that when there is an increase in the use of organic fertilizer by 1%, it will give an increase in production 19.33%.

This type of inorganic fertilizer used in JH37 corn seed business activities consists of urea fertilizer and NPK fertilizer. The use of this inorganic fertilizer has a significant effect on seed production, this is indicated by the calculated t value (2.8700) which is greater than the t table (t 0.05) ($_{2.0025}$). The value of the inorganic fertilizer coefficient of 0.2458, means that when there is an addition of inorganic fertilizer by 1%, it will provide an increase in production of 24.58%.

Pesticides used in JH37 corn seed farming activities in Tanah Laut Regency consist of systemic herbicides, contact herbicides, fungicides and insecticides. The use of this pesticide has a significant effect on the production of JH37 corn seeds, this is indicated by the calculated t value (2.3960) which is greater than the t table (t 0.05) ($_{2.0025}$). The value of the pesticide coefficient of 0.0960, means that when there is an addition of pesticides by 1% it will give an increase in production 9.60%.

The workforce consists of labor within the family and labor outside the family. Based on the results of testing the production function with the MLE method shows that it has a positive influence on the production rate of JH37 corn seeds, this is indicated by the calculated t value (2.8025) which is greater than the t table (t 0.05) ($_{2.0025}$). The value of the labor coefficient of 0.1976, means that when there is an increase in labor by 1% it will give an increase in production before 19.76%.

Technical efficiency is analyzed using the *stochastic frontier* production function model with an output-side approach. This output-side approach focuses on comparing the output actually produced by a unit of production with output that can be achieved using the same resources under ideal or efficient conditions. The distribution of technical efficiency of the model can be seen in Table 2.

The distribution of technical efficiency in Table 2 below shows that most JH37 corn seed farmers have been technically efficient because the average level of technical efficiency has been achieved more than 0.7 (ET ≥ 0.7) with an average technical efficiency of 0.7826. Referring to (Coelli et al. 2005) that a farm is said to have been efficient if its efficiency is greater than or equal to 0.70. The number of farmers who are on the technical efficiency scale of more than 0.8 is 31.25% farmers, is on a scale of more than 0.7 to 0.8 as many as 65.53% farmers, while those who are still below 0.7 are 3.13% farmers. Thus, especially for farmers who are still classified below the minimum technical efficiency scale (TE=0.70), it needs to be improved again.

Table 2 – Distribution of technical efficiency of respondent farmers

Technical Efficiency	Number of Respondents	%level (%)
< 0,7	2	3.13
>0,7 ≤ 0,8	42	65.63
>0,8	20	31.25
Total	64	100.00
Average	0.7826	
Minimum	0.6615	
Maximum	0.9622	

Source: Primary Data Processing, 2023.

Factors affecting the level of technical efficiency of respondent farmers using the inefficiency effect model of *the stochastic frontier* production function. The results of the technical inefficiency effect model estimation can be seen in Table 9. The results of the technical inefficiency effect model estimation in Table 9 show that the factors of formal education, number of family members, experience, non-formal education, and activeness in extension services have a real effect on α 5% in explaining technical inefficiencies in the production process of respondent farmers. This is in line with the value of σ_s^2 which does not differ markedly (Table 4). The value of $\sigma_s^2 = 0.0030$, indicates the variation in corn production contributed by technical efficiency of 0.3%.

The results of the technical inefficiency effect model estimation in Table 9 show that age, number of family members and land ownership status have a significant effect on the technical inefficiency of JH37 corn seed business in Tanah Laut District.

Table 3 – Estimation of the effects of technical inefficiencies of *the stochastic frontier* production function

Variable	Parameter	Coefficient	t count	*Itself.*
Constant	d_0	0.1164	0.5673	0.577
Age of farmer (Z_1)	d_1	0.0030	1.8425*	0.074
Formal farmer education ($_{Z2}$)	d_2	-0.0036	-1.1903	0.242
Number of peasant family members (Z_3)	d_3	0.0169	1.8036*	0.080
Farming experience (Z_4)	d_4	-0.0006	-0.4226	0.676
Non-formal education (Z_5)	d_5	-0.0330	-1.6219	0.113
Land tenure status (Z6)	d_6	-0.0640	-3.3058**	0.002

Source: Primary Data Processing, 2023.
*Note: ** $t_{0,025}$ = 2,0025db = 57; significant α = 5%; * $t_{0,05}$ = 1,6720db = 57 ; significant α = 10%.*

Age variables were included in the technical inefficiency effect model with the alleged positive effect on farmers' technical inefficiencies. The results in Table 9 show that age has a real effect on farmers' technical inefficiency to the level of α = 10%, but at the testing level α = 5% age does not have a significant effect. The older the farmer, the less efficient the farmer is technically. This is because along with the increase in the age of farmers, there is a decrease in their ability to work, fighting power in trying, the desire to bear risks, and the desire to implement new innovations.

The variable number of family members shows a significant influence on the technical inefficiency of JH37 corn seed farming, this is indicated by the calculated t value (1.8036) which is greater than the table t (1.6720) at the real test level α = 10%, but this variable does not have a significant effect if testing is carried out at the real test level α = 5%. The influence of the number of family members is directly proportional to the level of technical inefficiency, this is assumed because the large number of family members of children and the elderly makes the workforce for agricultural activities cannot be maximized because they have to take care of these family members. So that the more the number of family members, the level of technical efficiency will decrease. Based on data on the number of family members, that the workforce in the family that helps agricultural activities other than the head of the family is the wife, but with the addition of family members (children), it will certainly make the wife's working hours to assist in farming activities reduced, because they have to take care of children. This of course can reduce technical efficiency in JH37 corn seed farming activities.

Dummy variables (1 = own land and 0 = non-owned land) land ownership status have a significant influence on the technical inefficiencies of JH37 corn seed farming. Based on Table 9, it shows that t count is more (-3.3058) greater than t table (2.0025). *Dummy's* effect on land tenure status is inversely proportional to technical inefficiencies. Farmers with non-own land ownership status tend to be more technically inefficient compared to farmers who own their own land. Or in other words, farmers whose land ownership status is owned by themselves will be more technically efficient than farmers whose land is not their own. This means that to improve technical efficiency, farmers who cultivate JH37 corn seeds will be better off if they do farming on land with their own land status.

This variance describes the extent to which the actual output of production (*output*) may vary from the expected or ideal result (*stochastic frontier*). While the γ value describes the extent to which the actual output of production is lower than the expected result under efficient conditions (*stochastic frontier*). The variance values and γ parameters of the technical inefficiency model of *the stochastic frontier* production function of JH37 corn seed farming can be seen in Table 10.

Table 4 – Variances and γ parameters of the stochastic frontier production function technical inefficiency model

Variable	Parameter	Coefficient	Standard deviation	t count
Sigma-squared	σ_s^2	0.0030	0.00052	4.2894*
Gamma	C	0.9999	2.8283	0.3536

Source: Primary Data Processing, 2023. Note: $t_{0,05}$ = 2,0025db = 57 ; significant α = 5%.*

A low *sigma-squared* (σ^2) value (0.0030) in Table 10 indicates that *the error term* inefficiency (u_i) is normally distributed. Statistically, the value obtained is real at α = 0.05.

Further it can be explained that the parameters γ the effect model of technical inefficiency of the *stochastic frontier* production function. From Table 10 it can be seen that the parameter γ guess, which is the ratio of the variance of technical efficiency (u i) to the variance of total production (ε_i), is obtained as 0.9999 with a standard deviation of 2.8283. The gamma value (γ) shows that 99.99% of the error variables in the production function describe the technical efficiency of farmers or 99.99% of the yield variation among respondent farmers is due to differences in technical efficiency and the remaining 0.01% is due to *stochastic* effects such as climate, weather, pest attack and modeling errors.

The production process of agricultural commodities is usually more influenced by the role of stochastic effects (v_i) that are not represented in the model than non-stochastic effects such as the effects of technical inefficiencies. This phenomenon proves that almost all variations in output from production limits are considered as a result of the level of technical achievement of efficiency related to managerial problems in farm management. This means that there is a role of managerial variables that influence the achievement of technical efficiency carried out in JH37 corn seed farming activities.

CONCLUSION

Factors that have a real influence on the production of JH37 corn seeds are influenced by land area, seeds, organic fertilizers, inorganic fertilizers, pesticides and labor. JH 37 corn seed farmers have been technically efficient because the average level of technical efficiency has been achieved more than 0.7, which is an average technical efficiency of 0.7826. Farmers whose efficiency score was above average as much as 62.5%, the remaining 37.5% below average. The variable number of family members and the status of agricultural land ownership have a significant effect on the technical inefficiency of the JH37 corn seed business in Tanah Laut Regency.

There is an opportunity to improve technical efficiency to be fully efficient by paying attention to factors that have a real influence on technical inefficiencies. Age, number of family members and land ownership status had a significant effect on technical inefficiencies, while formal education, farming experience and non-formal education had no real effect. The existence of agricultural extension workers has an important effect in improving technical efficiency, especially in handling natural risks which are variables outside the model such as pests and diseases that can reduce yields with the use of pesticides.

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