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Technical Efficiency of Maize Farming Based on Participation Status in The Farmer Corporation Program in Central Lombok Regency

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ABSTRACT

Central Lombok Regency was selected as one of the areas for implementing the farmer corporation program, focusing on maize commodities. The selection of maize aligns with the potential for superior commodities in Central Lombok Regency, which require support through a corporate base approach. This study aims to examine the factors that influence maize farming production, the level of technical efficiency and the factors that are the sources of technical inefficiency of maize farming. The research was conducted in Central Lombok Regency considering that the area is one of the major maize production centers in West Nusa Tenggara. The sample size was determined by quota sampling with 140 farmers. The sampling technique used snowball sampling. The analysis method used the Cobb-Douglas stochastic frontier production function with the maximum likelihood estimation (MLE) approach. The results showed that maize production is influenced by land tenure size, pesticide use, the number of seeds used and the type of seeds planted. The average level of technical efficiency is 0.87. The age factor is known to reduce technical efficiency, while extension services and participant candidate status increase the technical efficiency of maize farming in Central Lombok Regency. Efforts to increase technical efficiency by strengthening farmer groups and expanding access to extension services can be done through increasing the intensity of extension services with relevant, practical and interactive materials so as to attract farmer participation and increase farmer capacity can be achieved.

Keywords: *Efficiency, Stochastic Frontier, Maize Farming*

BACKGROUND

Maize is one of the secondary crops that is widely cultivated by farmers in Indonesia (Remedy, 2015). The need for national corn is currently quite high every year (Dalila et al., 2018). Most of the maize is used as raw material for animal feed. However, as the animal feed industry develops, national maize production has not been able to keep up with the increasing demand (Bobihu et al., 2022). During the period 2000-2022, Indonesia was among the top 10 maize production centers in the world with an average production of 17,152,160.7 tons. In Indonesia, maize is the main food source to replace rice and its production is widespread in various provinces. The demand for maize in Indonesia as animal feed reaches 55% (Suarni, 2013), while the demand for maize for food consumption is only around 30% while for other industrial purposes and seeds it is 15% (Kementrian Pertanian, 2020).

Based on production data for 2023 by the Directorate General of Food Crops, around 91% of corn production in Indonesia is contributed by 12 provinces, one of which is West Nusa Tenggara province. West Nusa Tenggara is one of the corn production centers in Indonesia due to its

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Vol 10(2): 392-411, June 2026

geographical conditions and potential resources that support the growth of corn plants. West Nusa Tenggara ranks fifth with the largest contribution of maize production. However, maize production in West Nusa Tenggara in 2023, which is 2,341,066 tons of dry shelled, has decreased by 190,416 tons when compared to 2022.

Central Lombok Regency is one of the corn production areas in West Nusa Tenggara with a production of 962,166.06 tons during 2017-2023 and an average productivity of 52.31 ku/ha. Central Lombok Regency is one of the regions where the farmer corporation program is implemented, focusing on maize as the main commodity. The farmer corporation serves as an effort to empower farmers by fostering partnerships and collaborations aimed at expanding business scale, utilizing cultivation technology, accumulating capital, and promoting professional farm management (Bawono, 2018).

In 2019, the recorded area of corn harvest in Central Lombok Regency decreased dramatically to 13,973 ha. This was due to the Lombok earthquake tragedy in 2018 which had a significant impact on the agricultural sector. Furthermore, inefficiency in the use of production inputs such as fertilizers, labor, seeds and others is one of the obstacles faced by farmers in Central Lombok Regency. The low knowledge of farmers about the urgency of technological components and farmers' habits in carrying out farming activities that are difficult to change such as in the application of planting distance and fertilization are also crucial problems (Harnisah, Honorita B, 2017; Margaretha & Syuryawati, 2017). As a result, actual maize productivity levels are still below potential productivity levels (Yofa et al., 2021). Increasing productivity is closely related to the ability of farmers to allocate production inputs efficiently so as to achieve the maximum potential point in their farm (Rivanda et al., 2015).

Farm performance that is often an indicator is the level of technical efficiency. A farmer can be said to be more technically efficient than other farmers if he is able to produce more physically using the same amount of production inputs (Soekartawi 1990). However, the presence of inefficiency can reduce the efficiency value of a farm. Increasing the amount of production through increasing production efficiency is an important alternative, because it can increase the potential output of farmers (Kusnadi et al., 2011).

The decline in maize production, which has led to an increase in the volume of maize imports from year to year, is a crucial problem that requires a new breakthrough to increase maize production. Therefore, efforts are made to increase domestic production, especially in areas that have the potential for maize commodities (Sukardi et al., 2023). Based on this premise, it is important to study the factors that influence maize production. In addition, a study of the technical efficiency of maize farming is conducted to determine the level of technical efficiency and the factors that influence the technical inefficiency of maize farming in Central Lombok Regency.

RESEARCH METHODS

The research location was determined by purposive sampling. The research was conducted in Central Lombok Regency with the consideration that Central Lombok Regency is one of the regions with potential maize production in West Nusa Tenggara and there are maize farmers in this region as evidenced by the existence of farmer corporation programs in several sub-Regencys such as Praya Sub Regency (Gonjak Village) and West Praya Sub-Regency (Selong Belanak Village and Mekar

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http://ejournal2.undip.ac.id/index.php/agrisocionomics
Vol 10(2): 392-411, June 2026

Sari Village). The time of data collection in this study was conducted in November-December 2024. The power used in this research is primary data and secondary data. Primary data collection used questionnaires distributed to respondents who became research samples. Secondary data were obtained from relevant agencies such as the Central Statistics Agency (BPS), Food and Agriculture Organization (FAO), Ministry of Agriculture, Agriculture and Plantation Office of West Nusa Tenggara Province. Determination of the number of samples was 140 farmers determined by quota sampling. The sampling technique used snowball sampling. The sample size was 46 maize farmers in Gonjak Village, 47 maize farmers in Selong Belanak Village and 47 maize farmers in Mekar Sari Village.

Data Analysis

Data analysis of factors affecting maize production, the level of technical efficiency and sources of technical inefficiency of maize farming in Central Lombok Regency was conducted using the stochastic frontier function model and the maximum likelihood estimation (MLE) method using the Frontier 4.1c program and One Sample T-Test using SPSS 25.

Production Factor Analysis of Maize Farming

Analysis of the production factors of maize farming was conducted using the Cobb-Douglas production function to determine the effect of the use of production inputs on production outcomes (outputs). The collected data were tabulated using Microsoft Excel and processed using the Ordinary Least Square (OLS) method. The mathematical model used is the Cobb-Douglas production function transformed in the form of natural logarithm, namely:

$$LnY = Ln\beta_0 + \beta_1 LnX_1 + \beta_2 Ln X_2 + \beta_3 Ln X_3 + \beta_4 Ln X_4 + \beta_5 Ln X_5 + \beta_6 Ln X_6 + \beta_7 Ln X_7 + \delta_1 D_1 + \varepsilon_i$$

Description:

Y = maize production (tons)
β_0 = intercept
β_i = estimated parameter
X_1 = land area (ha)
X_2 = organic fertilizer (kg)
X_3 = urea fertilizer (kg)
X_4 = phonska fertilizer (kg)
X_5 = pesticide (liter)
X_6 = labor (HOK)
X_7 = number of seeds (kg)
D_1 = seed type *dummy* (1 = BISI 2; 0 = BISI 18)
δ_i = parameter penduga variabel *dummy*, where i = 1, 2, 3,…n
ε_i = disturbance term error

The ε_i is an error component that is external and internal. $\varepsilon_i = v_i - u_i$, where v_i is a random variable related to factors external to the farm and cannot be controlled by the farmer such as climate, weather, disease spread etc. Furthermore, u_i is a random variable related to factors internal to the farm and can be controlled.

ISSN 2580-0566; E-ISSN 2621-9778
http://ejournal2.undip.ac.id/index.php/agrisocionomics
Vol 10(2): 392-411, June 2026

Technical Efficiency Analysis of Maize Farming

Technical efficiency was analyzed using Frontier 4.1c software and using the Stochastic Frontier Cobb-Douglas production function with the Maximum Likelihood Estimate (MLE) method. The mathematical model used is as follows:

$LnY = Ln\ \beta_0 + \beta_1\ Ln\ X_1 + \beta_2\ Ln\ X_2 + \beta_3\ Ln\ X_3 + \beta_4\ Ln\ X_4 + \beta_5\ Ln\ X_5 + \beta_6\ Ln\ X_6 + \beta_7\ Ln\ X_7 + \delta_1 D_1 + (v_i - u_i)$

Description:

- Y = maize production (tons)
- β_0 = intercept
- β_i = estimated parameter
- X_1 = land area (ha)
- X_2 = organic fertilizer (kg)
- X_3 = urea fertilizer (kg)
- X_4 = phonska fertilizer (kg)
- X_5 = pesticide (liter)
- X_6 = labor (HOK)
- X_7 = number of seeds (kg)
- D_1 = seed type *dummy* (1 = BISI 2; 0 = BISI 18)
- δ_i = variable estimation parameter *dummy*, where i = 1, 2, 3,…n
- v_i = error made due to random sampling (errors caused by things that farmers do not control)
- u_i = technical inefficiency effect

The technical efficiency of each i-th farmer can be measured through the observed output against the frontier output with the formula:

$$TEi = \frac{yi}{yi^*} = \frac{\exp(x_i\beta + v_i - u_i)}{\exp(x_i\beta + v_i)} = \exp(-u_i)$$

Description:

TE_i = technical efficiency score achieved bt the i-th maize farmer
y_i = actual production of the i-th maize farmer
y^* = the estimation production frontier at observation i
v_i = errors made due to random sampling (errors caused by things that are not controlled by farmers)
u_i = technical inefficiency effect

Furthermore, hypothesis testing was cinducted to determine whether corn farming is technically efficient by conducting a one sample T test. One sample T test aims to examine the average value of one sample with the reference value used in the research. The t formula is as follows:

$$t\ count = \frac{\dot{X} - \mu}{s/\sqrt{n}}$$

Description:

$\dot{X}$ = sample mean

ISSN 2580-0566; E-ISSN 2621-9778
http://ejournal2.undip.ac.id/index.php/agrisocionomics
Vol 10(2): 392-411, June 2026

μ = population mean
s = sample standard deviation
n = number of sample data
Pengu The test is based on the P-value or t-table, with the following hypothesis:
H_0 = TE = 1 (maize farming is technically efficient)
H_1 = TE ≠ 1 (maize farming is not technically efficient)
The test criteria are as follows:
P-value < 0,05 or t-count > t-table : reject H_0
P-value > 0,05 or t-count ≤ t-table : fails to reject H_0

Techincal Inefficiency Factor Analysis of Maize Farming

The inefficiency effect model used in this study refers to Coelli et al., (1998). The variables of the inefficiency effect model were then analyzed using Frontier 4.1c software with Maximum Likelihood Estimation (MLE) method. Factors affecting the inefficiency effect were analyzed with the following equation:

$u_i = \delta 0 + \delta_1 \ln Z_1 + \delta_2 \ln Z_2 + \delta_3 \ln Z_3 + \delta_4 D_2 + \delta_5 D_3$

Description :
u_i = technical inefficiency effect
δ_0 = constant
δ_i = coefficient of inefficiency estimator factor
Z_1 = farmer age (year)
Z_2 = education level (age)
Z_3 = farming experience (age)
D_2 = extension *dummy* (1 = participate ; 0 = other)
D_3 = membership status *dummy* (1 = corporate participant candidate ; 0 = other)

RESULT AND DISCUSSION

Production Factor Analysis of Maize farming

The estimator parameter of the stochastic frontier production function shows the value of the frontier production elasticity of the production factors used. The estimation results of the stochastic frontier production function were obtained using the Maximum Likelihood Estimation (MLE) approach and are presented in Table 1.

The estimation results using the MLE method showed three parameters, namely the value of sigma squared (σ2), gamma (y) and log likelihood function MLE. The value of the parameter sigma squared (σ2) is 0.199 and significant at the 99% confidence level, in other words, technical inefficiency or random variables contribute 19% to corn farm production. From the table, the value of gamma (y) is 0.710, indicating that 71% of the error term in the production function is due to the effect of technical inefficiency. The rest is influenced by unpredictable factors such as climate, weather and the spread of disease.

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http://ejournal2.undip.ac.id/index.php/agrisocionomics
Vol 10(2): 392-411, June 2026

Furthermore, the MLE log likelihood function value obtained of -20.828 is greater than the OLS log likelihood function value of -33.318, meaning that the MLE estimation method is better than the OLS method and can represent field conditions (Coelli et al., 2005). These results indicate that the model in the study is said to be good / good enough to describe the actual conditions of corn farming in Central Lombok Regency. The generalized likelihood ratio (LR) value is 24.978 and is greater than the Kodde and Palm table value at the 95% confidence level (24.978 > 13.401). It is mean that the stochastic frontier production function can explain the existence of technical efficiency and inefficiency in the production process.

Table 1. Estimation Results of Stochastic Frontier Production Function MLE Method in Central Lombok Regency 2024

Variables	Expected Sign	Coefficient	Standard Error	t-ratio
Constant	+/-	3,432 ***	0,453	7,572
Land area (X1)	+	4,250 ***	0,146	2,897
Organic fertilizer (X2)	+	0,004 ns	0,004	1,019
Urea fertilizer (X3)	+	-0,006 ns	0,004	-1,437
Phonska fertilizer (X4)	+	0,006 ns	0,007	0,922
Pesticide (X5)	+	0,173 ***	0,055	3,115
Labor (X6)	+	-0,072 *	0,043	-1,680
Number of seeds (X7)	+	0,432 ***	0,139	3,098
Type seed *dummy* (X8)	+	0,218 ***	0,054	4,043
Sigma-Squared (σ^2)		0,199 ***	0,035	5,684
Gamma (y)		0,710 ***	0,084	8,435
Log-likelihood function OLS		-33,318		
Log-likelihood function MLE		-20,828		
LR test of the one-side error		24,978		

Source: Primary Data Analysis, 2024
Description : ***) = significant at 99% confidence level (t-table = 2,6718)
**) = significant at 99% confidence level (t-table = 2,0057)
*) = significant at 90% confidence level (t-table = 1,6741)
ns = not significant

The coefficient of the land area variable has a positive sign and is significant at the 99% confidence level. This indicates that a 1% increase in land area will increase maize production. This result is consistent with the hypothesis that land area has a significant effect on maize production. The positive nature of the land area relationship is in line with research conducted by Ardiansyah et al., (2018); Kune et al., (2016) that land is one of the factors determining the high and low amount of production produced. The larger the land area planted, the greater the opportunity to produce greater production.

The pesticide variable has a positive sign and significant effect on maize production at the 99% confidence level. This means that a 1% increase in pesticides will increase maize production. This result shows that pest control by farmers is quite effective in suppressing potential damage due to attacks by plant pest organisms. Farmers in the study area tend to respond quickly to pest attacks such as rats and caterpillars. This result is in line with research by Tangkowit et al., (2023) which found that the use of pesticides had a significant effect on maize production. Contradictory to the research

ISSN 2580-0566; E-ISSN 2621-9778
http://ejournal2.undip.ac.id/index.php/agrisocionomics
Vol 10(2): 392-411, June 2026

conducted by Santoso et al., (2013) which obtained the result that pesticides have a negative sign and real effect.

The labor variable has a negative coefficient and a significant effect on maize production at the 95% confidence level. This result indicates that a 1% increase in labor will decrease maize production so that to achieve optimal production, the use of labor must be reduced. In line with research conducted by Fadwiwati & Tahir, (2013); Nursan, (2015); Tangkowit et al., (2023); Wahyuningsih et al., (2018) which obtained the result that labor has a significant effect on maize production. However, it is contradictory to the research conducted by Palia et al., (2018) which found that labor has a negative and unreal effect.

The variable number of seeds has a positive sign and is significant at the 95% confidence level, meaning that the number of seeds has an effect on maize production. This reflects that a 1% increase in seed use will increase maize production. The results obtained are in accordance with the hypothesis stating that seeds have a significant effect on maize production. These results are in line with research conducted by Abdulai et al., (2013); Kune et al., (2016); Manurung et al., (2018); Pakasi et al., (2011).

The seed type variable is a dummy variable. It has a positive sign and has a significant effect on maize production at the 99% confidence level. Maize production by farmers using BISI 2 seeds is higher than maize production using BISI 18 seeds. The results of this study are in line with research conducted by Sondakh et al., (2016) which states that the use of BISI 2 seeds has a significant effect on maize production compared to other types of seeds.

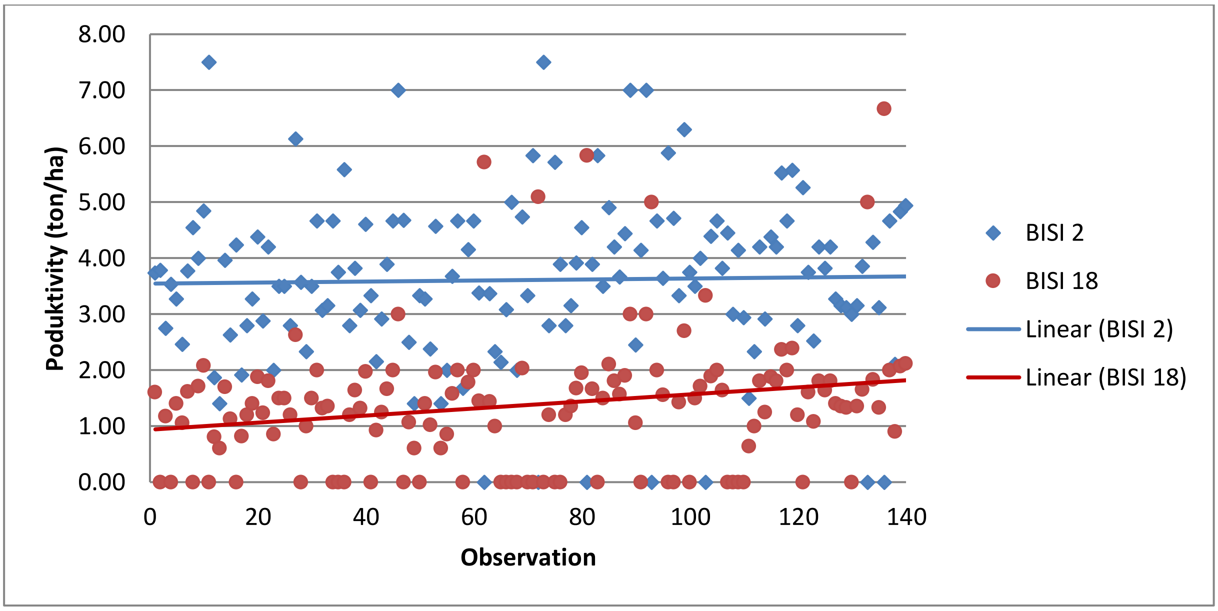

Figure 1. Produtivity Distribution Based on Seed Type
Source: Primary Data Analysis, 2024

From the research results, the average productivity of using BISI 2 seeds was 3.61 tons/ha and BISI 18 seeds was 1,38 tons/ha. When viewed in Figure 1, seed productivity based on the type of seed used shows that BISI 2 seeds have a higher productivity level than BISI 18 seeds. This can be seen from the linear trend line of BISI 2 which is above the trend line of BISI 18 and the distribution of BISI 2 seed productivity data is more evenly distributed. On the other

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http://ejournal2.undip.ac.id/index.php/agrisocionomics
Vol 10(2): 392-411, June 2026

hand, BISI 18 seeds show a lower productivity distribution pattern and some are even close to zero.

This difference in productivity indicates that the use of BISI 2 seeds is generally superior in increasing yields per hectare. According to Asmawati et al., (2025), BISI 2 has excellent adaptability in various types of land, making it suitable for planting in any region. BISI 2 seeds also have the potential to produce 2 equal cobs in each plant.

Technical efficiency Analysis of Maize Farming

The results obtained using the frontier program 4.1c obtained the lowest technical efficiency value for farmers who are not prospective participants of 0.39 and prospective participants of 0.67. The highest technical efficiency value for non-participant farmers is 0.93 and for participant farmers is 0.95. The following are the details of the estimation results of the technical efficiency value of corn farming in Central Lombok Regency.

Table 2. Distribution of Technical Efficiency Values of Maize Farming in Central Lombok Regency 2024

Distribution of Technical Efficinecy Level	Not a Candidate		Participants Candidate		Number of Farmers (people)
	Number of Farmers (people)	Persentage (%)	Number of Farmers (people)	Persentage (%)	
0,31 – 0,40	2	2,86	0	0,31 – 0,40	2
0,41 – 0,50	2	2,86	0	0,00	2
0,51 – 0,60	7	10,00	0	0,00	7
0,61 – 0,69	4	5,71	1	1,43	5
0,70 – 0,80	17	24,29	2	2,86	19
0,81 – 0,90	29	41,43	33	47,14	62
0,91 – 1,00	9	12,86	34	48,57	43
Total	70	100,00	70	100,00	140
Average	0,78		0,89		0,83
Minimum	0,39		0,67		0,39
Maximum	0,93		0,95		0,95

Source: Primary Data Analysis, 2024

Technical efficiency is intended to measure what level of production can be achieved from the potential production that may be achieved by farmers. From Table 2, it was found that the technical efficiency level of non-participant farmers (55 farmers, 78.57%) was more than 0.7 while the remaining 15 farmers (21.43%) had technical efficiency below 0.7. Furthermore, 69 farmers (98.57%) with technical efficiency levels above 0.7 while the remaining 1 farmer (1.43%) has a technical efficiency level below 0.7. The overall average technical efficiency of maize farming is 0.83. With this average efficiency value, farmers still have the opportunity to increase their production by an average of 17%.

ISSN 2580-0566; E-ISSN 2621-9778
http://ejournal2.undip.ac.id/index.php/agrisocionomics
Vol 10(2): 392-411, June 2026

The average level of technical efficiency among prospective participants is higher compared to non-participants. This indicates that prospective participant farmers have relatively better capabilities in allocating inputs to produce outputs, although the difference is not significant. When viewed overall, the technical efficiency scores of both prospective participants and non-participants remain below 1. This means that neither group has achieved an optimal level of technical efficiency.

The average technical efficiency of 83% indicates an inefficiency gap of 17%. In Yusuf, (2015), Sukiyono (2004) revealed that the difference in the level of technical efficiency achieved by farmers indicates the level of mastery and adoption of different farming technology innovations. The different level of mastery of technology is due to managerial factors influenced by the socio-economic conditions of farmers.

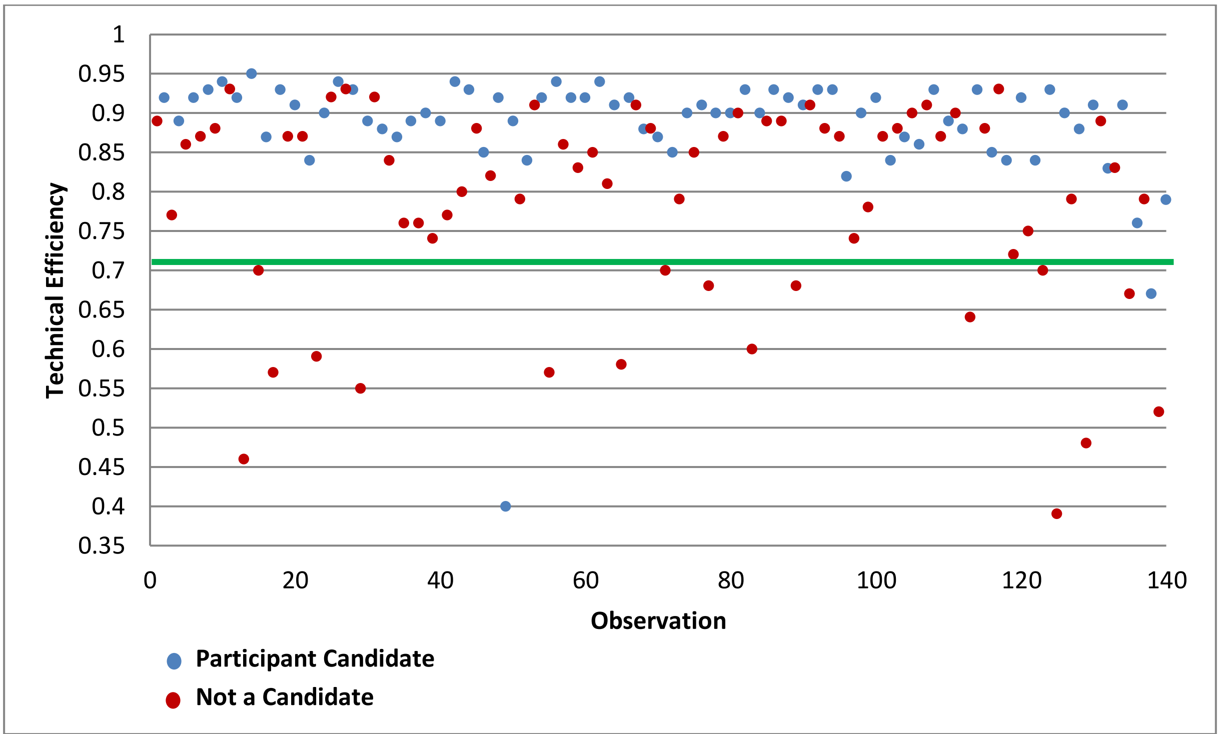

Figure 2. Distribution of Technical Eficiency Levels of Maize farmers in Central Lombok Regency 2024

Source: Primary Data Analysis, 2024

The level of technical efficiency of maize farms of participating and non-participating farmers (Table 2) indicates the difference between the actual production achieved by farmers and the potential production that could have been achieved. Generally, lower technical efficiency indicates higher yield losses. In Table 3, the presence of technical inefficiency potentially leads to an average production gap of 0.85 tons (18.34%) with an average productivity gap of 1.16 tons/ha for non-participant farmers and 0.47 tons (9.99%) and an average productivity gap of 0.60 tons/ha for participant farmers.

ISSN 2580-0566; E-ISSN 2621-9778
http://ejournal2.undip.ac.id/index.php/agrisocionomics
Vol 10(2): 392-411, June 2026

Table 3. Distribution of Production and Productivity Gaps of Maize Farming in Central Lombok Regency 2024

No		Not a Candidate	Participant Candidate	Total
1.	Number (people)	70	70	140
2.	Average technical efficiency	0,78	0,89	
	Maize Farm Production			
3.	Average actual production (tons)	3,79	4,20	8,00
4.	Average potential production (tons)	4,64	4,67	9,31
5.	Production gap (ton) (4-3)	0,85	0,47	1,32
6.	Percentage of production gap (%) (4-3/4 x 100%)	18,34	9,99	
	Maize Farm Productivity			
7.	Average actual productivity (tons)	4,59	5,44	10,03
8.	Average potential productivity (tons)	5,75	6,04	11,79
9.	Productivity gap (ton) (4-3)	1,16	0,60	1,76
10.	Percentage of productivity gap (%) (8-7/8 x 100%)	20,13	9,98	

Source: Primary Data Analysis, 2024

Determining whether maize farming in Central Lombok Regency is technically efficient or not is done with the One Sample t-Test to test the significance of the difference between the average efficiency value obtained and the value of 1. An efficiency value of 1 indicates that maize farming is efficient. The One Sample T-Test results in Table 4 below show that the P-value or Sig. (2-tailed) of 0.000 is smaller than the 10% significance level ($\alpha = 0.1$) or P-value (0.000) < α (0.1). This indicates that the average value of technical efficiency of maize farmers in Central Lombok Regency of 0.78 (not a candidate) and 0.89 (participant candidate) is significantly different from the value of 1, so that maize farming is not technically efficient.

Table 4. T-test Results of Average Technical Efficiency of Maize Farming in Central Lombok Regency 2024

		Test Value = 1				
		N	Mean	Std. Deviation	Sig. (2-tailed)	Mean Difference
TE	Not a candidate	70	0,78	0,137	0,000	-0,218
	Participant candidate	70	0,89	0,046	0,000	-0,107

Source: Primary Data Analysis, 2024

Technical Inefficiency Factor Analysis of Maize Farming

The effect of inefficiency in the stochastic frontier model is indicated by the value of σ2 and y. The y parameter is the ratio of the variance of technical efficiency (ui) to the total variance (εi) (Fadwiwati & Tahir, 2013). The factors that allegedly affect the technical inefficiency of corn farming include age, education level, farming experience, extension dummy and membership status dummy. If a variable is positive and significant, it will increase

ISSN 2580-0566; E-ISSN 2621-9778
http://ejournal2.undip.ac.id/index.php/agrisocionomics
Vol 10 (2): 392-411, June 2026

inefficiency and vice versa, if a variable is negative and significant, it will decrease inefficiency. The results obtained are in Table 5.

Based on the analysis, the age variable has a positive effect with a coefficient value of 2.398 and a significant effect on technical inefficiency at the 99% confidence level. This means that increasing age will increase the technical inefficiency of corn farming. This is because older farmers are less open to the adoption of modern technology or farming techniques and often maintain inefficient traditional farming practices. The age distribution of non-participating and participating farmers can be seen in the following figure:

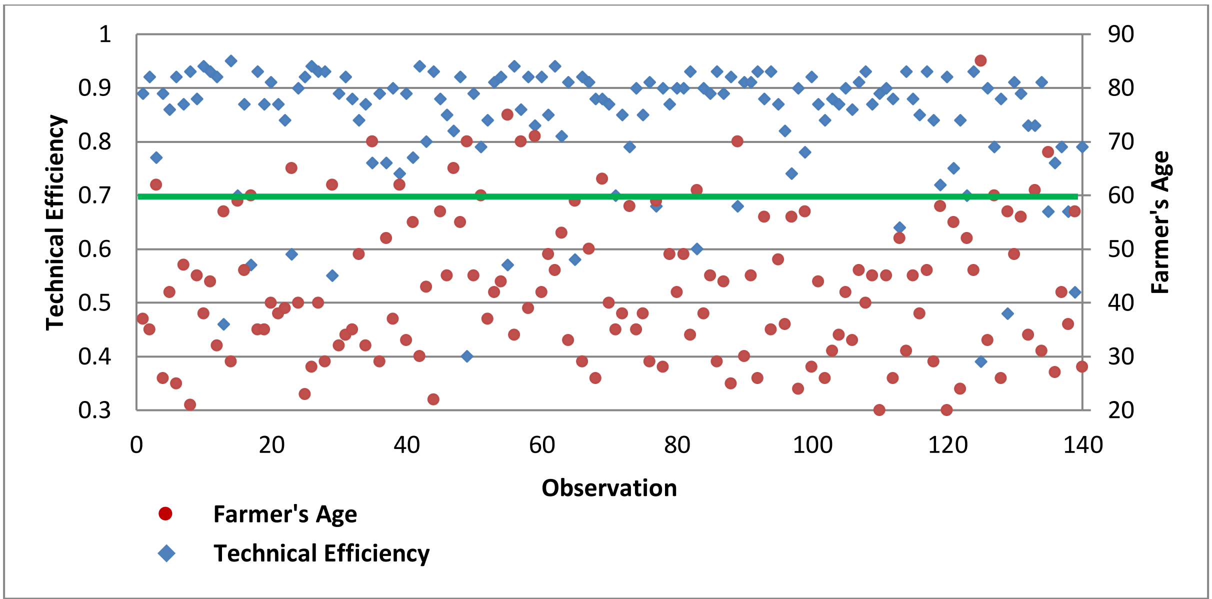

Figure 3. Distribution of Farmer by Age
Source: Primary Data Analysis, 2024

Based on Figure 3, it is known that 129 young farmers of productive age (<65 years) with a percentage of 92.14% with details of 70 participating farmers (100.00%) and 59 non-participating farmers (84.29%) are more likely to have a higher level of technical efficiency in running a maize farm compared to older farmers who are no longer in productive age (>65 years), namely 11 people with a percentage of 7.86% who are non-participating farmers (15.71%). As farmers age, their ability to work tends to decrease and their interest in adopting technology and innovations also decreases, which can affect their level of technical efficiency. According to Hidayati & Jakiyah, (2021), as farmers age, their ability to work will decrease and the desire to apply new innovations will also decrease, which will ultimately have an impact on their efficiency. This result is in line with research conducted by Hidayati, (2018); Hidayati & Jakiyah, (2021); Singh & Sharma, (2011). However, it is different from the research conducted by Nikmah et al., (2013); Suprapti et al., (2014).

In maize farming, the extension variable is negative with a coefficient of -0.255 and significant at the 95% confidence level. This means that farmers who follow extension have the opportunity to increase technical efficiency compared to farmers who do not follow extension.

ISSN 2580-0566; E-ISSN 2621-9778
http://ejournal2.undip.ac.id/index.php/agrisocionomics
Vol 10 (2): 392-411, June 2026

This result is in line with the findings of Bakhsh & Ahmad, (2006); Fadwiwati et al., (2014) which found that extension is able to reduce the effects of technical inefficiency.

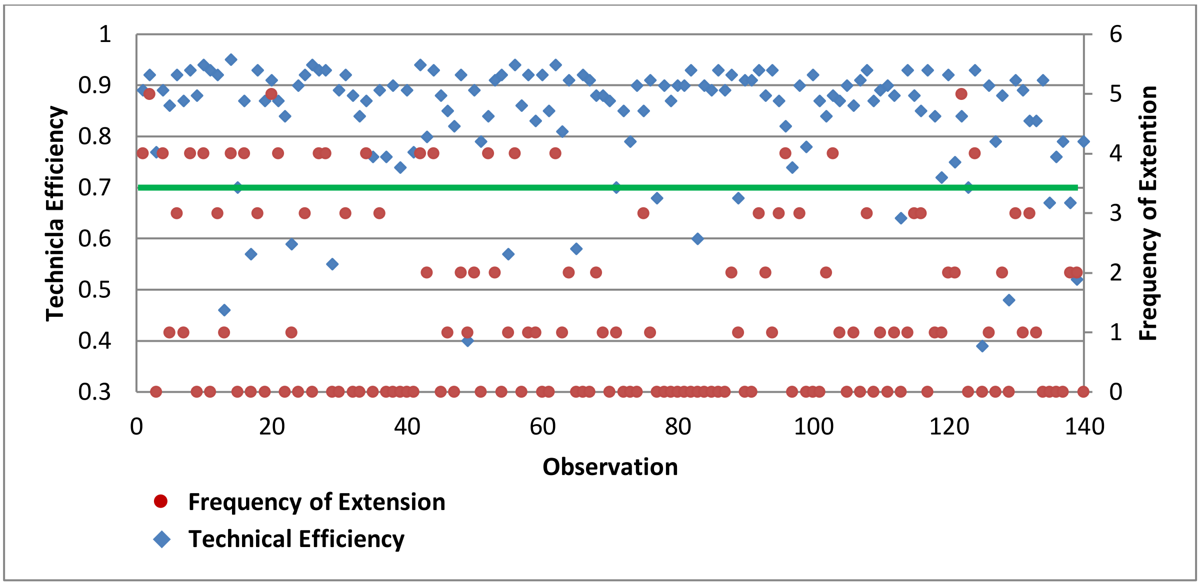

Figure 4. Distribution of farmers based on frequency of attending extension services
Source: Primary Data Analysis, 2024

Fadwiwati et al., (2014) revealed that farmers who follow extension have a better position in allocating available resources with the knowledge gained. Based on Figure 4, it is known that prospective farmers are more active in attending extension services than non-candidate farmers. Non participant farmers are dominated by farmers who have never attended extension services (42 farmers, 60.00%) due to low access to information. On the other hand, prospective farmer participants were dominated by farmers who rarely attended extension services (1 - 3 times) as many as 30 farmers (42.86%).

Farmers who follow extension have a higher level of technical efficiency compared to farmers who do not follow extension. This indicates that extension activities play an important role in improving farmers' knowledge, skills and abilities in managing farm resources optimally. In the research locations, farmers who are active in extension services are generally better able to manage resources effectively and make the right decisions in farming. In addition, extension services provide tangible benefits such as the use of superior seeds and pest control. This has a direct impact on increasing productivity and technical efficiency.

The findings obtained in Central Lombok Regency indicate that extension activities play an important role in improving farmers' knowledge, skills and abilities in managing farming resources optimally. Extension also plays a role in providing access to the latest information and introducing innovations in agriculture that can help farmers manage inputs more optimally and increase productivity. In the research locations, farmers who are active in extension services are generally better able to manage resources effectively and make informed decisions in farming. In addition, extension provides tangible benefits such as the use of improved seeds

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Vol 10(2): 392-411, June 2026

and pest control. This has a direct impact on increasing productivity and technical efficiency. To optimize these positive impacts, extension intensity needs to be increased through several strategic approaches. One of them is by adjusting extension materials to the field conditions and specific needs of farmers, so that the materials presented are relevant and applicable.

The participation status variable has a negative and significant effect at the 90% confidence level with a coefficient value of -0.273. This means that farmers who are prospective corporate participants have a higher level of technical efficiency compared to farmers who are not prospective participants. This finding is consistent with the results obtained by Silitonga et al., (2016); Sumarno et al., (2015); Ulma & Nainggolan, (2020) which states that participant farmers are more efficient than non participant farmers. According to Sumarno et al., (2015), in his research conducted in Gorontalo, the application of PTT in corn farming is able to increase productivity and technical efficiency, as evidenced by higher levels of productivity and technical efficiency compared to non-PTT corn farming.

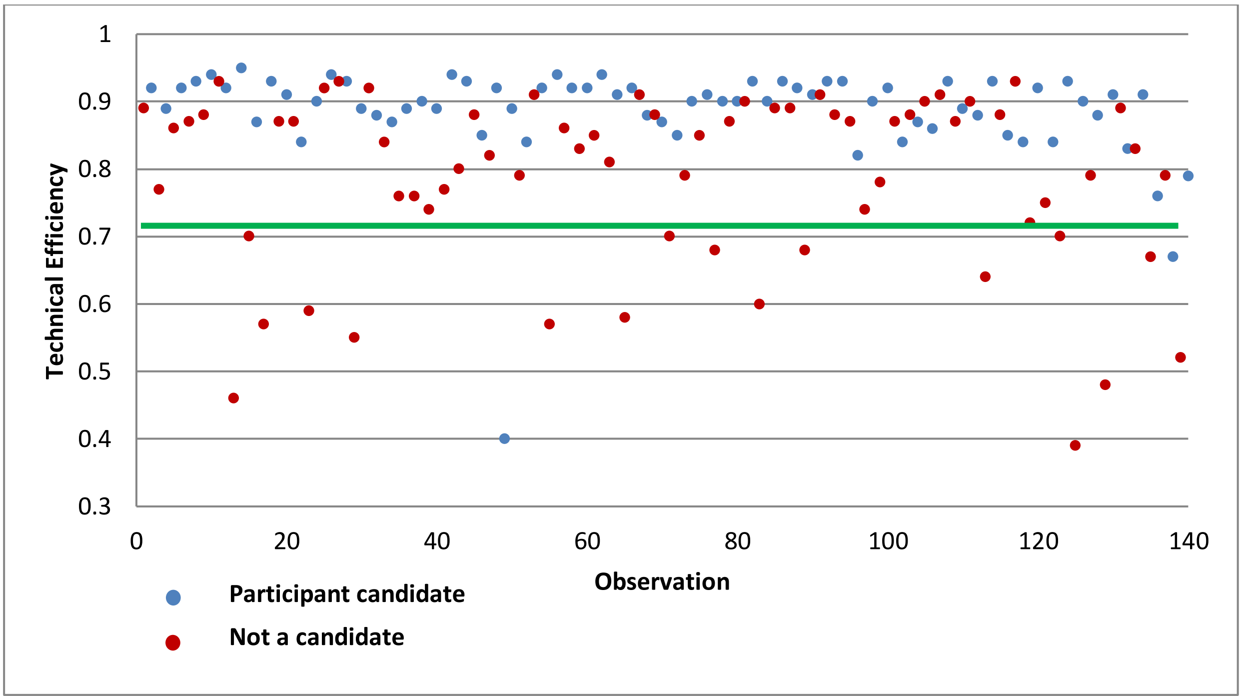

Figure 5. Relationship Between Technical Efficiency Level and Membership Status
Source : Primary Data Analysis, 2024

Based on Figure 5, 69 farmers (98.57%) had technical efficiency levels above 0.7. Furthermore, there are some non-participant farmers with technical efficiency levels below 0.7, namely 15 farmers (21.43%). In the research location, prospective farmers have received various extension activities, although the corporation program as a whole is still in the preparation stage and not yet fully operational.

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Vol 10(2): 392-411, June 2026

Table 5. Factors Affecting Technical Inefficiency of Maize farming in Central Lombok Regency 2024

Variables	Expected Sign	Coefficient	Standard Error	t-ratio
Constant	+/-	-1,002 ***	3,287	-3,048
Age (Z1)	+	2,398 ***	0,775	3,093
Education Level (Z2)	-	-0,003 ns	0,017	-0,205
Farming Experience (Z3)	-	-0,060 ns	0,095	-0,633
Extension *dummy* (D2)	-	-0,255 **	0,126	-2,023
Membership status *dummy* (D3)	-	-0,273 *	0,221	-1,689

Source: Primary Data Analysis, 2024
Description: ***) = significant at 99% confidence level (t-table = 2,6718)
**) = significant at 99% confidence level (t-table = 2,0057)
*) = significant at 90% confidence level (t-table = 1,6741)
ns = not significant

The extension services received by prospective participants had a positive impact on increasing their capacity to manage their farms more efficiently. Armed with the knowledge and information obtained from extension activities, prospective farmers tend to be better prepared to implement good cultivation practices, resulting in increased technical efficiency. In contrast, farmers who are not potential participants have generally not been involved in intensive extension activities, so they have limited information and technical knowledge in cultivation practices and have an impact on low levels of technical efficiency.

CONCLUSION AND SUGGESTION

Conclusion

Factors that can increase maize production in Central Lombok Regency are land tenure size, pesticide use, number of seeds used and type of seeds planted. Maize farming in Central Lombok Regency is not technically efficient with an average technical efficiency value of 0.87. The age factor is known to reduce the technical efficiency of maize farming, while extension and participant candidate status can increase the technical efficiency of maize farming in Central Lombok Regency.

Suggestion

Increasing maize production can be achieved through the utilization of production inputs that are in accordance with established recommendations. Inputs that can still be increased are land tenure, organic fertilizer, phonska fertilizer, pesticides, BISI 2 seeds and BISI 18 seeds. Furthermore, inputs that must be reduced are urea fertilizer and labor. Strengthening farmer groups as an intergenerational collaborative platform is needed. Combination of multigenerational teams by combining young and old farmers. Young farmers support in terms of technology adoption and innovation, while old farmers contribute local knowledge. The difference in the level of technical efficiency between

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Vol 10(2): 392-411, June 2026

prospective participants and non-participants of the corporation reflects the gap in access to extension services. It is important to expand access to extension services in order to increase the capacity of farmers evenly. In addition, the delivery of relevant, practical and interesting materials and interactive approaches are needed to increase farmer participation in extension activities, especially for farmers who were previously less enthusiastic about extension. The frequency of extension services also needs to be increased consistently, by involving more farmers so that the reach is wider and more equitable.

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