International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Analysis of Factors Affecting Rice Production in Gili Timur Village, Kamal District, Bangkalan Regency Indonesia

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ABSTRACT

Rice is a strategic commodity in national food security that is important for most Indonesian people. The decline in rice harvest area and productivity in East Gili Village, Kamal District, Bangkalan Regency, is a challenge that needs to be overcome to improve the welfare of farmers and regional food security. This study aims to analyze the factors that affect rice production, measure the level of technical efficiency of rice farming, and identify the source of inefficiency. Data was collected through a direct survey using a questionnaire to 35 farmers as respondents. The analysis was carried out using Stochastic Frontier Analysis (SFA). The results showed that the average technical efficiency of farmers was 0.85, with 74% of farmers having an efficiency level above 0.8. Factors such as the use of seeds and urea fertilizers have been proven to be significant in increasing production, while land area and labor have no significant effect. Sources of inefficiency including limitations in age, gender, education, and farming experience did not have a significant effect. The recommendations submitted include the use of seeds and urea fertilizers according to the dosage, namely 30 kilograms per hectare for seeds and 250 kilograms for urea fertilizers. This finding is expected to be used as evaluation material for farmers and support policies that strengthen food security and farmers' welfare in a sustainable manner, especially in East Gili Village.

Keywords: Efficiency, Production Factor, Cobb Douglass SFA

INTRODUCTION

Rice is a food crop commodity that has strategic value and plays an important role in national food security (Sitanggang, 2024). As a staple food for most Indonesians, the availability of rice must always be guaranteed to meet the increasing food needs of the population. According to Sitanggang (2024) said that both rice production and productivity have a negative and significant influence on the Gross Regional Domestic Product (GDP) in 34 provinces of Indonesia. Specifically, an increase in rice production of 1% will cause a decrease in GDP by 10,778%, while an increase in rice productivity of 1% will reduce GDP by 28.38%. According to Tulungen (2024) Rice, which is the basic ingredient of rice, is the main staple food for most Indonesians, although there are some regions that consume other staples. Currently, the level of dependence of the Indonesian people on rice reaches around 95%. Efforts to increase rice production continue to be carried out both through agricultural intensification and extensification programs (Randika et al., 2022).

East Gili Village, located in Kamal District, Bangkalan Regency, is one of the rice-producing areas on Madura Island (Ahdiningtyas et al., 2023). Based on data from BPS East Java, there has been a significant decrease in rice production in the Bangkalan regency area. The harvested area decreased from 44,047.57 hectares in 2020 to 40,240.81 hectares in 2021, or a decrease of 3,806.76 hectares (8.64%). Rice productivity also decreased from 47.06 quintals per hectare in 2020 to 46.18 quintals per hectare in 2021. This decrease in harvest area and productivity has an impact on the decline in total rice production from 207,294.89 tons in 2020 to 185,815.55 tons in 2021, or a decrease of 21,479.34 tons (10.36%). From the 2023 BPS data in Kamal sub-district, there are 3,207 farmers who cultivate agricultural land, this data is relatively small compared to the total number of 157,518 farmers in Bangkalan district who manage agricultural land. Kamal is one of the sub-districts in Bangkalan. According to BPS data in 2013, this sub-district has a rice farming harvest area of 1,608 ha, a production area of 103,169 and a productivity of 642 Kw/ha. In 2023, rice production will drop to 97, 536 and this figure is still relatively small compared to other sub-districts. With this decline, it also affects rice farming in East Gili village, which is one of the villages in Kamal district. The problem of rice farming is caused by several factors ranging from controllable and uncontrollable factors.

Based on the results of the research conducted Karim & Uncle (2023), factors that affect rice production include land area, seeds, labor, urea fertilizer, TSP fertilizer, KCL fertilizer, organic fertilizer, insecticide, herbicide and fungicide. The use of these production factors significantly affects the level of paddy rice production in the area. This shows that the use of these production factors is efficient in producing paddy rice production in the research area. This is in line with the opinion Rahmayani et al. (2022) Factors that affect the efficiency level of rice farming are land area, seeds, compost and urea fertilizer. These variables have a significant effect on rice farming production. However, opinion research Rahmayani et al. (2022) It also found that the use of these production factors has not yet achieved the condition of economic efficiency (optimal inputs), which means that there is still room to optimize the use of these production inputs to increase the productivity of rice farming in the region. Another aspect that is a factor that affects production is labor, which is also supported by Shabirah & Suryana (2022) It also mentions that an important factor in rice farming is the labor used in the production process. In the study, it was stated that labor had a positive effect on production and it was explained that the existence of labor would increase the efficiency of rice farming. This workforce plays a positive role in punctuality in production activities so that the quality of the crops produced is maintained optimally.

Factors that cause inefficiency in rice farming according to Mahmud et al. (2022) There is a significant influence between the age of farmers and the productivity of paddy rice farming. Farmers who are in the productive age category (15-60 years) tend to have higher production yields than farmers under 15 years old or over 60 years old. From the results of the discussion, gender and education factors also affect the productivity of rice farming, the productivity level of rice farming between male and female farmers, where male farmers have higher productivity while at the level of education has a significant effect on the efficiency of the use of production factors in rice farming. Farmers with higher education (high school or higher) will be more efficient in managing production factors than farmers with lower education (elementary or junior high school). According to Indarsari et al. (2024) Higher education for farmers has a positive impact on rice production. Farmers with higher levels of education are usually quicker to adopt modern agricultural technologies and methods that can increase crop yields. In addition, farming experience according to Lestari et al. (2023) that rice farmers who have longer farming experience make their rice farming more efficient.

Based on the description above, considering the importance of the role of efficiency in increasing farmers' productivity and income, this study aims to: 1) analyze the factors that affect rice production in East Gili Village; 2) analyze the level of rice efficiency in East Gili Village; and 3) analyze the sources of rice inefficiency in East Gili Village. Production efficiency analysis can provide an overview of the use of production inputs, identify factors that affect production, and determine the optimal combination of inputs to achieve maximum production output. The results of this study are expected to provide recommendations to improve the efficiency of rice production in East Gili Village, which will ultimately contribute to increasing productivity, farmers' income, and regional food security. In addition, the results of the research can also be considered for the government in formulating a more efficient and sustainable rice farming development policy.

LITERATURE REVIEW

Production can be interpreted as the creation of utility or the ability to create goods or services to meet needs. In its implementation, there are certain production factors that must be considered to produce goods and services. Therefore, production is an economic activity that can combine various types of inputs to produce a product (output) that is in accordance with the desired (Indaka, 2023). Production costs are a collection of costs incurred by a company in producing a good (Khaerunnisa & Pardede, 2021). Production costs can also be interpreted as all costs related to the production process, including direct and indirect costs required in the process of converting raw materials into finished products (Harefa et al., 2022).

Production factors in the context of agriculture are all kinds of activities that are necessary for plants to grow and develop optimally to produce a satisfactory harvest (Handini et al., 2024). The production factor is also known as input and sacrifice in the production process. Production factors in agriculture have an important role in determining the amount of production to be achieved. Crucial aspects in agricultural production are land, labor, seeds, and fertilizers that need attention (Paloka, 2022). The production factors needed to increase production in rice cultivation include the available land area, the use of capital (such as seeds, fertilizers, and pesticides), the labor involved, and optimal tillage and planting techniques. Therefore, it is important to understand the influence of each production factor on rice production, both directly and indirectly. (Hulu & Setiawan, 2022). Several factors that have an influence on the amount of production in rice cultivation include land area, plant seeds, labor, farmer age, farmer education level, and experience in rice cultivation (Parikaes et al., 2021).

Technical efficiency is a way to produce large quantities of production or output with available inputs and technologies or using fewer inputs (Kabeakan et al., 2021). Technical efficiency is the ability to reduce waste by maximizing the number of outputs and minimizing the use of inputs (Arifin et al., 2021). The level of efficiency in rice farming production does not only depend on the amount that can be produced, but also on the production factors in rice farming, such as variety of varieties, size of farmland, labor, level of experience, and use of herbicides (Randika et al., 2022).

Inefficiency is a state in which a system, process, or individual cannot optimally utilize resources to achieve desired results (Rahman & Hriyati, 2023). In the context of agriculture, inefficiencies often arise when farmers do not use inputs such as land, fertilizer, and labor in the most efficient way (Maftuchah et al., 2024). Various factors can lead to inefficiencies, including inappropriate use of inputs, unfavorable environmental conditions, and limited farmers' knowledge and skills. In addition, social and economic factors, such as limited access to markets and technology, also contribute to inefficiencies (Ridwan et al., 2024). Therefore, it is important to identify and understand the causes of inefficiencies in order to increase

the productivity and welfare of farmers in the agricultural system.

The factors that cause this inefficiency are very diverse. One of the main factors is the lack of knowledge and education among farmers. Farmers who have a low level of education tend to lack understanding of effective cultivation techniques, proper fertilizer use, and efficient resource management (Agustina et al., 2023). In addition, farming experience also plays an important role, with more experienced farmers usually better able to manage inputs and face various challenges that arise. Geographical and infrastructure conditions also have a significant impact, where hard-to-reach land locations or poor infrastructure can limit farmers' access to markets, inputs, and technology, reducing efficiency (Maharani et al., 2023).

The impact of inefficiency is not only limited to individual farmers, but also affects a wider scale. Low farmers' incomes due to inefficiencies can result in low well-being, which in turn affects children's education, health, and overall quality of life (Ibn, 2023). In addition, if many farmers experience inefficiencies, this can have an impact on national food production, food security, and regional economic stability (Al Ismani & Hambali, 2024). Therefore, overcoming inefficiencies is very important to improve agricultural productivity and farmers' welfare.

RESEARCH METHODS

Location and Time of Research

This research was conducted in East Gili Village, Kamal District, Bangkalan. This location was chosen deliberately *(purposive)* because it is one of the villages with high rice production in Kamal District. In addition, the location of this research is also based on balance because it can provide insights or findings that can be applied to other areas with similar characteristics. As well as easy access to provide ease of researchers both in terms of transportation and research permits. This research was conducted from October to December 2024.

Types and Data Sources

The data used in this study is using primary and secondary data. Primary data is data collected directly from the source being researched. Meanwhile, secondary data is data obtained through third parties, third parties are data issued by related agencies or through research that has been carried out (Widyantari et al., 2023). In this study, primary data was obtained through direct interviews using a structured and structured questionnaire that was used to explore complete information from the respondents. In addition, direct surveys to farmers in the field and documentation are also carried out to observe and visualize respondents' activities in farming (Pebbyola & Maimunnah, 2024). Meanwhile, secondary data was obtained from related agencies such as the Central Statistics Agency (BPS) and related literature including books and scientific articles that are in accordance with the topic of this research (Riantoni et al., 2023).

Sampling Method

The population in this study is rice farmers in East Gili Village with an unknown number of farmers. The number of samples in this study involved as many as 35 farmers. The determination of the number of samples is based on Sugiyono (2017), where the number of samples that are suitable for use in the study ranges from 30 to 500 samples. The research sample was taken using the *accidental sampling*, where the respondents were farmers who were accidentally encountered and according to the context of the research (Suggestion, 2017).

Data Analysis Techniques

The data analysis techniques used are quantitative descriptive analysis and analysis of the production function of Cobb Douglass Stochastic Frontier using programs or *software* Frontier 4.1. to measure

technical efficiency. The data analysis technique used in this study is the Cobb-Douglass Production Function. The Cobb-Douglass Production Function is a function or equation involving two or more variables where one variable is called the dependent variable that is explained (Y) and the other variable is called the independent variable that is explained (X) (Paloka, 2022). The frontier production function is the most practical production function and represents the maximum output that can be obtained from various combinations of production factors at a certain level of knowledge and technology. The stochastic production frontier model is an extension of the original deterministic model to measure unexpected effects (stochastic effects) within production limits (Kautsar et al., 2020). Cobb-Douglass-Stochastic Frontier Analysis (SFA) Production Function.

$\ln Y = \ln A + \beta 1 \ln X1 + \beta 2 \ln X2 + \beta 3 \ln X3 + \beta 4 \ln X4 + (vi - ui)$ ..... (1)

Where:

lnA = Constant
lnY = Production
B = Coefficient
X1 = Land Area (Ha)
X2 = Seeds (Kg)
X3 = Urea (kg)
X4 = Labor (HOK)
Vi = Components of systematic errors
Ui = Technical inefficiencies

To determine the value of the distribution parameter (μi) the effect of technical inefficiency is stated as follows:

$\mu i = \delta 0 + \delta 1 Z1 + \delta 2 Z2 + \delta 3 Z3 + \delta 4 Z4 + wi$ ..... (2)

Where:

MI = Effects of technical inefficiencies
d0 = Constant
Z1 = Age (Years)
Z2 = Gender (1=male; 2=female)
Z3 = Education (Years)
Z4 = Farming experience (Years)
wi = random normally distributed term error.

RESULTS AND DISCUSSION

Stochastic Frontier Analysis (SFA)

Factors affecting rice production

The Stochastic Frontier Cobb-Douglas model is used to analyze the factors that affect rice production as well as measure the level of technical efficiency of each farmer. After the data was processed using Frontier 4.1 Software, the resulting Stochastic Frontier Cobb-Douglas production function equation was as follows:

$\ln Y = 3.723 + 0.0041X1 + 1.008X2 + 0.197X3 - 0.026X4 + (vi - ui)$ ..... (1)

The calculation results show that the Stochastic Frontier production function model can describe the best performance of rice farmers in East Gili Village, especially related to the use of production inputs and technology. The Stochastic Frontier production function model is said to be good if the log likelihood

function value in MLE must be greater than the log likelihood function value of OLS. Based on the analysis, the MLE log likelihood function value was 24.29, which was greater than the OLS log likelihood function value of 15.49. Therefore, the estimation of this function is carried out using the *Final Maximum Likelihood Estimated* (MLE) method.

Table 1. Results of Estimation of Cobb Douglas Production Function of Rice Farming Using the MLE Method in 2024

Variable	*Maximum Likelihood Estimated*		
	Coefficient	**Std. Error**	**t-ratio**
Constant	3.723	0.395	9.433**
Land	0.041	0.054	0.749Ts
Benih	1.008	0.064	15.654**
Urea	0.197	0.081	2.429*
HOK	-0.026	0.047	-0.550Ts
Σ(Sigma-Squared)	0.061	0.054	1.127Ts
γ (Gamma)	0.964	0.040	24.339**
LR Test	24.295		

Source: Primary Data Processed, (2024)

Information:

** : Significance at α 1% (t table = 2.75)

* : Significance at α 5% (t table = 2.04)

Ts : Insignificant

The table above shows that most of the t-ratio values are positive except for the HOK or labor values. This means that the addition of these variables has an effect on rice production.

1. The land area variable (X1) had a t-count value of 0.749 which was smaller than the t-table value of 2.04 (at a significance level of 5%). In addition, the land area coefficient is only 0.041 with a standard error of 0.054. This indicates that land area does not have a significant influence because farmers with smaller land are able to optimize their land more efficiently. (Nubun & Yuliawati, 2022) that the area of rice land does not have a significant effect on food security in Central Java Province even though it has a positive relationship due to the availability of large land, but the productivity of the land is not always optimal. Meanwhile, the land area has a positive effect on rice yield in East Gili, with a coefficient value of 0.041 and a calculated t of 0.749 which is smaller than t Table 2.042. This shows that assuming other factors do not change, then an increase in land area of 1% will only increase rice production by 0.041%. This situation shows that farmers in the study area do not use their land optimally. This is in contrast to the research conducted by (Rahmi, 2023) which shows that partially the land area has a real effect on rice production in Harapan Village. These findings indicate that farmers in the study area have not used their land optimally. There are several obstacles faced by farmers, including narrow land and insufficient land fertility, which has an impact on the decline in rice production.
2. The use of seeds (X2) had a very significant and positive influence on rice production, with a coefficient value of 1.008 and a calculated t of 15.654 much larger than the table t of 2.75 (at a

significance level of 1%). The explanation is that an increase in seed use by 1% will increase rice yield by 1.008% assuming other factors remain. It can be seen that the quality and quantity of seeds greatly determine the success or failure of rice production in an area. This is in line with research conducted by (Irfan & Lamusa, 2022) shows that the use of seeds still has a significant influence on rice production. This indicates that the quantity and quality of seeds used by farmers are still an important determinant of production success, although it is not optimal due to existing constraints. The seed variable showed a very significant influence with a t-ratio (15,654) which was much larger than the t-table (2,042). This indicates that the use of seeds is very important in increasing productivity. Facts in the field show that rice farmers in East Gili Village use an average of 24 kilograms of seeds per hectare. Recommendations for the use of ideal seeds according to Andriansyah et al. (2024) on the recommendation of the Ministry of Agriculture is 30 kilograms per hectare. The use of seeds that are not in the right dosage will lead to a decrease in production (Nainggolan et al., 2023). This is supported by research Khomsah et al. (2022) that the seed variable has a positive and significant effect on rice production. Therefore, the use of quality seeds will affect the quality and quantity of rice produced.

3. In the fertilizer variable (urea) (X3), the comparison of the value of t-calculation and t-table is 2.042 which is greater than 2.04 (at a significance level of 5%) which means that every 1% increase in urea can increase rice productivity by 0.197%. This shows that the urea variable has a significant effect on rice productivity. This is in line with research (Rivai et al., 2023) Fertilizers are an important factor that significantly affects rice production by providing essential nutrients for plant growth. The use of the right fertilizer can improve the quality and quantity of crops. However, its effectiveness depends on the availability of capital, farmers' knowledge, and environmental conditions such as soil type and climate. Good fertilization management is necessary to achieve optimal production results. Urea affects production to a significant extent by 1% and the coefficient value for the urea variable is 0.197. This means that every 1% addition of urea will increase production by 0.197. According to research (Agriculture, 2022) The use of urea fertilizer significantly affects rice yields. This fertilizer supports plant growth because it contains the element nitrogen (N) that is needed by rice plants, especially before the rice grains begin to form. However, facts in the field show that the average use of urea fertilizer is 211 kilograms per hectare. This is not in accordance with the recommendation from the Ministry of Agriculture that the proper use of urea fertilizer is as much as 250 kilograms per hectare. These findings are supported by Juliansyah et al. (2023) that the use of urea fertilizer must be in accordance with the recommendations that have been set.
4. In the Labor variable (HOK) (X4), the comparison of t-calculated and t-table values is as follows: -0.550 Smaller than 2.04 (at a significance level of 5%). This shows that the labor variable does not have a significant effect on rice production. This is in line with research (Heriyana et al., 2021) Labor does not have a significant influence on rice production. What is more important is to improve the quality of the workforce than just the quantity. In addition, factors such as land area, seed quality, and fertilizer use have a more significant impact. To increase production output, attention needs to be paid to improving workforce skills, applying technology, and managing resources more effectively.

Technical Efficiency Analysis

The level of technical efficiency of rice farming in East Gili Village was calculated using the Stochastic Frontier production function with the distribution of the results of the efficiency analysis shown in the

table. Farming is said to be technically efficient if it has an efficiency level value of ≥ 0.8 (Manurung et al., 2018). The level of efficiency achieved by rice farmers in East Gili Village can be seen in the following table:

Table 2. Technical Efficiency of Rice Farming in East Gili Village in 2024

It	Technical Efficiency Level	Number of Farmers (People)	Percentage (%)
1	< 0.8	9	26%
2	≥ 0.8	26	74%
Sum		35	100%
Average		0.85	
Maximum		0.98	
Minimum		0.54	

Source: primary data processed, (2024)

Based on table 2, it shows that the level of technical efficiency of rice cultivation in East Gili Village shows an interesting agricultural management model. Among the 35 farmers interviewed, there was a significant difference in their efficiency levels. There were 9 farmers with lower technical efficiency with a score of 0.8, which was 26% of the total respondents. On the other hand, most farmers, namely 26 people or equivalent to 74%, showed better performance with a technical efficiency level above 0.8. Overall, the average technical efficiency reached 0.85 which shows that rice farmers in East Gili Village have good farming management skills.

The highest technical efficiency recorded was 0.98, which shows that farmers are very experienced in implementing farming practices. While the lowest value is 0.54 which shows the gap in skills between farmers in East Gili Village. Gaps can occur due to various factors, such as differences in mastery of agricultural technology, differences in access to quality production inputs, levels of education and training received, and differences in farming experience. Based on this, it shows that there is a need for more guidance and training programs to help farmers in East Gili Village who are still inefficient in increasing agricultural productivity. The average result of technical efficiency in East Gili Village is still greater than that of the research Musyafak et al. (2023) in rice farming in Tunjung Village, which is 0.76. Rachmawati et al. (2022) in the analysis of rice farming in Burneh District, Bangkalan Regency by 0.55. And Syahputra et al. (2023) In the analysis of rice farming in Central Kalimantan, it also has a smaller average technical efficiency of 0.51.

Sources of Inefficiencies

The source of the cause of inefficiency in rice farming in East Gili Village is suspected to be caused by several factors, namely Age, Gender, Education and Farming Experience. Here is a model of the source of inefficiency:

$mi = 0.093 - 0.001Z1 - 0.399Z2 + 0.011Z3 + 0.014Z4 + wi$..... (2)

The results of the analysis showed that none of these four variables had a significant influence on the level of rice inefficiency in East Gili Village. However, based on the results of the analysis in table 3 below, a t-ratio y (Gamma) value of 24,339 was obtained which is greater than the t-table 2.75 at a significance level of 5% which indicates that the gamma value is significant to rice production. This shows that most

of the variations in output produced by rice farmers in East Gili Village are more due to technical inefficiencies. This means that there are other inefficiency factors outside the model in farming management that hinder farmers from achieving maximum rice production levels.

Table 3. Sources of Technical Inefficiencies in Rice Farming in East Gili Village in 2024

Variable	*Maximum Likelihood Estimated*		
	Coefficient	**Std. Error**	**t-ratio**
Constant	0.093	0.571	0.163Ts
Age	-0.001	0.012	-0.109Ts
Gender	-0.399	0.349	-0.114Ts
Education	0.011	0.027	0.407Ts
Farming Experience	0.014	0.014	0.984Ts
Σ(Sigma-Squared)	0.061	0.054	1.127Ts
γ (Gamma)	0.964	0.040	24.339**
LR Test	24.295		

Source: primary data processed, (2024)

Information:

** : Significance at α 1% (t table = 2.75)

Ts : Insignificant

1. At Age variable (Z1), it is known that the t-ratio value in the age variable is -0.109, where the t-ratio value in this age variable is lower than the t-table value (-0.109 < 2.042). Based on the results of the analysis, it was shown that the existence of age variables in the rice farming production process in East Gili Village did not have a significant effect on the level of inefficiency in farming production. This is in accordance with the results of observations in the field which states that the majority of farmers in East Gili Village are 45-60 years old, where at that age the farmers are considered to have quite qualified farming experience. This is in line with research conducted by Fusilawati et al. (2021) which states that, the age of the farmer does not affect the technical efficiency, this can happen, because the most important determinant of the efficiency of rice farming is the will of the farmer as well as the tenacity and sufficient capital in farming. Thus, the age variable did not have a significant effect on the level of inefficiency.
2. In the gender variable (Z2), it is known that the t-ratio value at variable Gender is -0.114, where the T-Ratio value in this gender variable is lower than the T-table (-0.144 < 2.042). based on the results of the analysis, it shows that the existence of gender variables in the rice production process in East Gili Village does not have a significant effect on the level of inefficiency in rice farming production. This is in accordance with the results of observations in the field which stated that most of the farmers in East Gili Village are women farmers. Thus, this indicates that both male and female farmers have relatively similar abilities in managing rice farming. This condition shows that gender is not a determining factor in the success of rice farming management in the area. This is in line with research conducted by Musyafak et al. (2023) which states that gender has no effect on farming activities. Male and female farmers are not a benchmark that these farming activities can be efficient or inefficient.
3. In the Education variable (Z3), it is known that the t-ratio value in the age variable is 0.407, where the t-ratio value in this age variable is more low from the t-table value (0.407 < 2.042). Based on the results of the analysis, it was shown that the existence of educational variables in the rice farming

production process in East Gili Village did not have a significant effect on the level of inefficiency in rice production. This is in accordance with the results of observations in the field which state that the majority of farmers' education in East Gili Village is less than 6 years, where education is not the main factor that supports the success of farming. This is in line with the research conducted by Matuankotta et al. (2024) which states that, farmer education does not affect technical inefficiency, this can happen, because the most important determinant of rice farming inefficiency is the efforts made by farmers to find the right way to be sufficient in farming. Thus, the age variable did not have a significant effect on the level of inefficiency.

4. In the Farming Experience variable (Z4), it is known that the t-ratio value in the age variable is 0.984, where the t-ratio value in the farming experience variable is lower than the t-table value (0.984 < 2.042). By result The analysis showed that the existence of farming experience variables in the rice farming production process in East Gili Village did not have a significant effect on the level of inefficiency in farming production. This is in accordance with the results of observations in the field which stated that the majority of farmer education in East Gili Village is more than 5 years, where farming experience is not the main factor that supports the success of farming. This is in line with the research conducted by Mahmud et al. (2022) which states that, the experience of farmers' farming does not affect technical inefficiency, this can occur, because the most important determinant of rice farming inefficiency is the level of adoption of changes that occur such as technological innovation. Thus, the variable of farming experience did not have a significant effect on the level of inefficiency.

Based on the analysis carried out, no independent variables were found that significantly affected the technical inefficiency of rice farming in East Gili Village. This result is evident from the t-count value obtained for each variable tested, namely Age, Gender, Education, and Farming Experience. All t-count values for these variables were smaller than t-table values at the significance level of 1%, 5%, or 10%. This condition shows that the independent variables incorporated into the model are not able to explain the variation in technical inefficiencies that occur. In other words, the factors that affect the technical inefficiency in rice farming in this village may come from other variables that are not included in the analysis. This suggests the presence of important elements that may have been overlooked, which can include aspects such as government policies, access to technology and information, infrastructure conditions, or even broader environmental factors (Rachmawati et al., 2022).

Nonetheless, the analysis also showed that the significant gamma value, with a t-count of 24.339 which far exceeded the t-table value at a significance level of 1% of 2.04, suggests that most of the variation in output produced by rice farmers in East Gili Village is more influenced by the technical inefficiencies themselves. This indicates that there are fundamental problems in farming management that hinder farmers from achieving maximum production levels. This technical inefficiency can be caused by various factors, such as lack of knowledge and skills in modern agricultural techniques, suboptimal use of inputs, or constraints in resource management (Heriyana et al., 2021). Therefore, it is important for stakeholders, including governments and relevant institutions, to carry out appropriate interventions, such as training farmers, providing better access to agricultural technology, and improving supporting infrastructure. These efforts are expected to help rice farmers in East Gili Village overcome the problem of technical inefficiencies and increase their production (Rachmawati et al., 2022).

COVER

This study analyzes the factors affecting rice production in East Gili Village, using the Stochastic Frontier

Analysis (SFA) approach to measure technical efficiency and identify the source of inefficiency. The results showed an average technical efficiency of farmers of 0.85, with 74% of farmers at an efficiency level above 0.8 and the remaining 26% below 0.8. Factors such as seeds and urea fertilizers have a significant and positive influence on rice production, while land area and labor do not have a significant influence on rice production. Sources of inefficiency including age, gender, education and farming experience did not have a significant effect on technical inefficiency. To increase efficiency and productivity, it is recommended to rice farmers in East Gili Village to use certified superior seeds that are adaptive to local environmental conditions along with the use of seeds in accordance with the direction of the Ministry of Agriculture of 30 Kg per hectare. In addition, farmers are recommended to use urea fertilizer in the right dosage according to the direction of the Ministry of Agriculture as much as 250 kilograms per hectare. The results of this study are expected to be an evaluation for farmers and support policies that strengthen food security and farmers' welfare in a sustainable manner, especially in East Gili Village.

BIBLIOGRAPHY

1. Agustina, R. M., Mutisari, R., Nugroho, T. W., & Meitasari, D. (2023). Analysis of Technical Efficiency of Cayenne Pepper Farming in Tuban Regency. *Journal of Agricultural Economics and Agribusiness (JEPA)*, *7*(3), 1189–1200. http://repository.ub.ac.id/id/eprint/210054/
2. Ahdiningtyas, M., Maidatatia, A., Fitri, S., Uyun, S., & Alwi, F. (2023). Technical and Economic Efficiency in Rice Farming in Alang-alang Village, Tragah District, Bangkalan Regency. *Agricultural Socio-Economic Empowerment and Agribusiness Journal*, *1*(2), 59. https://doi.org/10.20961/agrisema.v1i2.62663
3. Al Ismani, M. F., & Hambali, H. (2024). Implementation of Pasuruan Regent Regulation No.50 of 2017 in the Field of Food Security. *Triwikrama: Journal of Social Sciences*, *4*(12), 1–10.
4. Andriansyah, O., Sinoem, I., & Damayanti, U. (2024). *Analysis of Tidal Paddy Rice Farming in Simpang Heran Village, Air Sugihan District, Ogan Komering Ilir Regency*. *1*(2), 24–32.
5. Arifin, A. M., Fariyanti, A., & Tinaprilla, N. (2021). Technical Efficiency of Potato Farming in Gowa Regency, South Sulawesi. *Agribusiness Forum: Agribusiness Forum*, *11*(1), 65–74.
6. Fusilawati, R., Adriani, D., & Wildayana, E. (2021). Identification of Social Factors Affecting the Efficiency of Tidal Rice Production in Tanjung Lago District. *Applied Research and Policy Publications*, *4*(2), 105–111. https://doi.org/10.46774/pptk.v4i2.458
7. Handini, A. S., Kusnendi, F. S., Wibowo, A. R., Sibarani, E. M., Putri, H. A., & Madusari, S. (2024). Initiation and Assistance of Coffee Cultivation in Coffee Farmer Groups in Tamansari District, Bogor Regency. *Agrisevika*, *1*(1), 34–39.
8. Harefa, P. R. A., Zebua, S., & Bawamenewi, A. (2022). Analysis of production costs using the full costing method in the calculation of the cost of production. *Journal of Accounting, Management and Economics*, *1*(2), 218–223.
9. Heriyana, H., Noor, T. I., & Isyanto, A. Y. (2021). Factors Affecting Production in Glutinous Rice Farming in Panyiaran Village, Cikaong District, Tasikmalaya Regency. *Scientific Journal of Agroinfo Galuh Students*, *8*(1), 73. https://doi.org/10.25157/jimag.v8i1.4610
10. Hulu, Y. H., & Setiawan, A. W. (2022). The effectiveness of planting maize (Zea mays L.) and peanut (Arachis hypogaea L.) plants by intercropping method. *Agriland: Journal of Agricultural Sciences*,

10(1), 1–11.

11. Ibnu, M. (2023). Application of Standards and Certification in the Coffee Value Chain: Opportunities and Constraints for Farmers. *Journal of R&D: Information Media Research, Development and Science and Technology*, *19*(1), 1–16.
12. Indaka, M. B. A. (2023). Analysis of Production Factors Affecting Corn Production in DIY in 2017-2021 with the Cobb-Douglass Method. *Growth: Scientific Journal of Development Economics*, *2*(1), 69–76.
13. Indarsari, M., Syafruddin, S., & Suprayitno, A. R. (2024). Analysis of Factors Affecting Paddy Rice Farming Production in Lampuara Village, South Ponrang District, Luwu Regency. *Journal of Global Sustainable Agriculture*, *4*(2), 116–123.
14. Irfan, M., & Lamusa, A. (2022). *EFFICIENCY OF PRODUCTION INPUT USE AT LOWLAND RICE FARMING SYSTEM IN KAMARORA A VILLAGE OF NOKILALAKI SUB DISTRICT OF SIGI DISTRICT Description* . *10*(5), 610–619.
15. Juliansyah, W. A., Zaini, M., Sutarni, S., & Berliana, D. (2023). Analysis of income and factors affecting rice production in Merak Batin Village, Natar District, South Lampung Regency. *Journal of Agricore*, *2*(1), 1–11.
16. Kabeakan, N. T. M. B., Habib, A., & Manik, J. R. (2021). Technical Efficiency of the Use of Production Factors in Corn Farming in Pintu Angin Village, Laubaleng, Karo Regency, North Sumatra, Indonesia. *Agro Bali: Agricultural Journal*, *5*(1), 42–49.
17. Karim, R., & Uncle, U. (2023). Factors Affecting Paddy Rice Production in Nagari Balai Panjang, Lareh Sago Halaban District, Lima Puluh Kota Regency, West Sumatra Province. *Journal of Agricultural Dynamics*, *1*(1), 105–112.
18. Kautsar, M. R., Sofyan, & Makmur, T. (2020). Analysis of Subsidized Fertilizer Scarcity and Its Effect on Rice Productivity (Oryza sativa) in Montasik District, Aceh Besar Regency. Scientific *Journal of Agricultural Students*, *5*(1), 97–107. https://doi.org/article/view/13316
19. Khaerunnisa, A., & Pardede, R. P. (2021). Analysis of the cost of production to determine the selling price of tofu. *Scientific Journal of Unitary Accounting*, *9*(3), 631–640.
20. Khomsah, K., Kamilah, I., Alfen, T. Z. S., Suryawati, G., & Zaifah, K. F. (2022). Analysis of Technical and Economic Efficiency of the Use of Rice Farming Factors in Burneh Village, Burneh District, Bangkalan Regency. *Agricore: Journal of Agribusiness and Agricultural Socioeconomics Unpad*, *7*(1), 57–69. https://doi.org/10.24198/agricore.v7i1.40375
21. Lestari, S. P., Handayani, S., Aryani, E., & Kristina, M. (2023). Technical Efficiency of Organic Rice Farming in Lampung Province. *Journal of Agricultural Economics and Agribusiness*, *7*(3), 1169–1179.
22. Maftuchah, U., Aisyah, D., Ilmu, P., Publik, A., & North, U. S. (2024). Quality of Population Administration Services in the Management of Family Cards at the Population and Civil Registration Office of Deli Serdang Regency. *INNOVATIVE: Journal Of Social Science Research*, *4*(2), 6811–6827.
23. Maharani, I. M., Hanani, N., & Syafrial, S. (2023). How are Farmers in Risk Management? Perception and Behavior of Sugarcane Farmers in East Java. *JSEP (Journal of Social and Agricultural Economics)*, *16*(1), 25. https://doi.org/10.19184/jsep.v16i1.38094

24. Mahmud, H., Rauf, A., & Boekoesoe, Y. (2022). Factors of Paddy Rice Farming Production in Boliyohuto District, Gorontalo Regency. *AGRINESIA: Scientific Journal of Agribusiness*, *6*(2), 96–102. https://doi.org/10.37046/agr.v6i2.15909
25. Manurung, H. A., Asmara, R., & Maarthen, N. (2018). Analysis of Technical Efficiency of Corn Farming in Maindu Village, Montong District, Tuban Regency: Using the Stochastic Frontier Analysis (SFA) Approach. *Journal of Agricultural Economics and Agribusiness*, *2*(4), 293–302.
26. Matuankotta, N. A., Thenu, S. F. W., & Lawalata, M. (2024). Analysis of Organic Vegetable Farming on Household Income (Case Study in South Leitimur District). *AGRILAN : Journal of Islands Agribusiness*, *12*(2), 108–121.
27. Musyafak, M., Lestari, F. E., Setianingrum, K. R., & Widiastuti, S. (2023). Analysis of Rice Production Efficiency in Tunjung Village, Burneh District, Bangkalan Regency Using the Frontier 4.1 Approach. *Agribusiness Media*, *7*(2), 1–12.
28. Nainggolan, J. K., Kapantow, G. H. M., & Dumais, J. N. K. (2023). Factors Affecting Corn Production in Tendeki Village, Matuari District, Bitung City. *Agri-Socioeconomics*, *19*(2), 899–908. https://doi.org/10.35791/agrsosek.v19i2.48330
29. Nubun, P., & yuliawati. (2022). *Agribusiness Pulpit: THE REGRESSION OF PADDY'S HARVESTED AREA, RICE 'S PRODUCTICITY, POPULATIONS AND RAIN INTENSITY TO FOOD SECURITY Polykarvos Nubun*, Yuliawati PENDA*. *8*(2), 583–594.
30. Parikaes, I. S., Pellokila, M. R., & Klau, F. (2021). Analysis of Factors Affecting Peanut Production (Arachis hypogaea L.) in West Kupang District, Kupang Regency. *IMPAS Scientific Bulletin*, *22*(2), 152–161.
31. Pebbyola, R., & Maimunnah, E. (2024). Analysis of Rice Farmers' Income in Candipuro District, South Lampung Regency Due to the Impact of the 2023 El Nino Phenomenon. *Economics and Digital Business Review*, *5*(2), 675–685.
32. Agriculture, J. E. (2022). *1* 1* , 2 , 3*. *6*, 625–634.
33. Pitaloka, S. D. (2022). Analysis of Rice Production Factors in East Java in 2005-2015 Using the Cobb--Douglass Method. *Growth: Scientific Journal of Development Economics*, *1*(2), 93–100.
34. Rachmawati, A. R., Agustina, N. W. D., Rahman, S. N., Oktaviana, T., & Maulidya, W. E. W. (2022). Stochastic Frontier Approach to the Technical and Economic Efficiency of Rice Farming (Oryza sativa L.) In Burneh District, Bangkalan Regency. *Agricore: Journal of Agribusiness and Agricultural Socioeconomics Unpad*, *7*(1), 88–99. https://doi.org/10.24198/agricore.v7i1.40316
35. Rahman, R. Y., & Hariyati, Y. (2023). Estimation of Efficiency and Technical Inefficiencies in People's Cocoa Farming in Banyuwangi Regency. *Agribusiness Media*, *7*(1), 98–106. https://doi.org/10.35326/agribisnis.v7i1.3370
36. Rahmayani, T., Yuzan Wardhana, M., & Arida, A. (2022). Efficiency of Rice Farming (Comparative Between Members and Non-Members of Farmer Groups) in Pante Ceureumen District, West Aceh Regency. *Scientific Journal of Agricultural Students*, *7*(4), 307–314. www.jim.unsyiah.ac.id/JFP
37. Rahmi Azizah Mudaffar. (2023). *Keywords: allocative efficiency, production inputs, rice farming*. *11*(2).
38. Randika, R., Sidik, M., & Peroza, Y. (2022). Analysis of Factors Affecting Paddy Rice Production in Sepang Village, Pampangan District, Oki Regency. *Societa: Journal of Agribusiness Sciences*, *10*(2),

66. https://doi.org/10.32502/jsct.v10i2.4292

39. Riantoni, R., Abdurrahman, A., & Aziz, Y. (2023). Analysis of Pineapple Farming and Marketing in Mekarsari Village, Mekarsari District, Barito Regency, Kuala Frontier Agribusiness. *Journal of Student Final Projects (JTAM), 7*(2), 2023–2267. https://ppjp.ulm.ac.id/journals/index.php/fag
40. Ridwan, M., Suryani, A., & Sudirman, S. (2024). The Influence of Organizational Culture and Work Ethic on Work Productivity Through Work Motivation as an Intervening Variable at PT Makin Group Tbk Tebo Mu'ammar. *J-MAS (Journal of Management and Science), 9*(2), 1106–1116. https://doi.org/10.33087/jmas.v9i2.2043
41. Rivai, Z., Halid, A., & Wibowo, L. S. (2023). *Capital and Labor Factors Influence Capital and Labor Factors Influence Rice Farming Production*. *2*(November), 3–12.
42. Shabirah, P., & Suryana, A. (2022). The influence of female labor on the efficiency of paddy rice farming. *AgribiScience Journal*, *8*(2), 54–66.
43. Sitanggang, G. A. (2024). Agribusiness System Usatahani Paddy Fields, North Barus District, Central Tapanuli Regency. *Sustainability (Switzerland), 11*(1), 1–14. http://scioteca.caf.com/bitstream/handle/123456789/1091/RED2017-Eng-8ene.pdf?sequence=12&isAllowed=y%0Ahttp://dx.doi.org/10.1016/j.regsciurbeco.2008.06.005%0Ahttps://www.researchgate.net/publication/305320484_SISTEM_PEMBETUNGAN_TERPUSAT_STRATEGI_MELESTARI
44. Sugiyono. (2017). *Quantitative, qualitative and R&D research methods*. In Alfabeta (p. 91). Jakarta.
45. Syahputra, A. R., Suharno, S., & Rifin, A. (2023). Technical Efficiency of Rice Farming in Central Kalimantan: A Stochastic Frontier Analysis Approach. *SEPA: Journal of Socio-Economics of Agriculture and Agribusiness*, *20*(2), 203. https://doi.org/10.20961/sepa.v20i2.58310
46. Tulungen, F. R. (2024). Precision Agriculture Technology to Improve Rice Production Efficiency in Indonesia. *Mandalika Light Journal*, *5*(2), 720–727. http://ojs.cahayamandalika.com/index.php/JCM
47. Widyantari, I. N., Loppies, S. H., Maulany, G., & Wiranto, R. (2023). the Use of the Stochastic Frontier Method for Measuring the Performance of Rice Farming in the Frontier, Remote, and Underdeveloped Areas in Merauke Regency, South Papua Province, Indonesia. *Agric*, *35*(2), 181–192. https://doi.org/10.24246/agric.2023.v35.i2.p181-192