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Economic Efficiency of Regular Rice Farming and *Mina Padi* Production Factors

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Abstract

Economic efficiency analysis is used to determine the level of efficiency from economic perspective. Economic efficiency analysis is carried out by determining the equivalence value between Marginal Product Value and Marginal Sacrifice Cost. The objectives of this research are analyzing the impact of the use of inputs on the resulting output, comparing the amount of production, analyzing economic efficiency, and calculating income. The location of this research was determined purposively. The method used in the sampling process was probability sampling with cluster random sampling technique. The number of samples was 60 respondents, consisting of 30 members from two different types of farming. The data analysis used was influence test, independent difference test, one sample t-test, multiple linear regression, economic efficiency analysis, and farm income. The results show that there is a simultaneous influence on the use of inputs on farm output. There is a partial effect of the use of land and seed inputs on output; however, fertilizers, the amount of labor, and variables have no effect. There is no difference in the yield obtained between regular rice farming and *mina padi* combined farming (A form of combined farming that utilizes stagnant water from the planted rice fields as a pond for fish cultivation that maximizes the yield of rice fields). Economic efficiency cannot be achieved in rice farming, as well as the use of production factors in *mina padi*. Rice farming produces a lower average income than *mina padi*.

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INTRODUCTION

Rice is the staple food of Indonesian people and is closely related to food security. The government has made several efforts to meet the demand for rice both by extensification and intensification. According to Monzote et al. (2012) integration in agriculture is one of the best alternatives to increase land productivity. Integration is a combination of agriculture with animal husbandry or fisheries. The integration of rice farming can be carried out with fish or shrimp farming activities which are commonly referred to as *mina padi* farming.

Mina padi (A form of combined farming that utilizes stagnant water from the planted rice fields as a pond for fish cultivation that maximizes the yield of rice fields) is considered more profitable than regular rice farming since it produces two types of output, rice and fish, so that it can increase land productivity and farmers' income (Dang, 2020). Association of Farmer Group *Tani Mandiri* is one of the farmer groups that apply this agricultural system. Based on the yields obtained, *mina padi* has succeeded in increasing rice productivity in Association of Farmer Group *Tani Mandiri*, Tawangsari District, Sukoharjo Regency in 2018.

Tsuruta et al. (2011) stated that fish plays an important role in rice cultivation by facilitating the control of weeds and pests. The presence of additional nutrients or fertilizers from fish manure maintains the balance of the rice field ecosystem and increases production. The weakness of this research is the absence of other farm comparators. The comparison aims to facilitate the understanding of the advantages of *mina padi* compared to regular rice farming.

The novelty of this research is comparison between regular rice farming and *mina padi* from the production side, economic efficiency, and farm income. The objectives of this study are (1) to analyze the impact of differences in the number of inputs used on the total output simultaneously and in part, (2) to compare the yields of regular rice farming and *mina padi*, (3) to analyze the economic efficiency of using production factors, and (4) analyze the income of regular rice farming and *mina padi*.

RESEARCH METHOD

The direct observation technique was carried out in this qualitative research. The research was carried out in November-January 2019 at Association of Farmer Group *Tani Mandiri*, Tawangsari District, Sukoharjo Regency. The location was determined purposively. Probability sampling with cluster random sampling technique was the method used in the sampling process. The number of samples was 60 respondents consisting of 30 members that performed regular rice farming and 30 respondents that performed *mina padi*. Two types of data were used, namely primary and secondary data. Primary data consisted of land ownership data, total seeds, fertilizers, and labor used which were obtained through direct interviews with farmers. Secondary data were in the form of area data based on the land use in Dalangan Village acquired through literature reviews. The data obtained were processed using the following analysis.

1. Influence Test
   The impact of using different inputs on the resulting output can be analyzed using the influence test. This effect test can be done simultaneously by using F test analysis and partially with t test analysis (Alderdice et al., 2019; Daud et al., 2019).
2. Independent sample t-test.
   Regular rice farming and *mina padi* each produce output. These two outputs can be tested whether there is a difference in the amount produced. Independent sample t-test is the test used to determine differences in these production results (Siddeswari et al., 2017).
3. Economic efficiency analysis.
   The level of economic efficiency in the use of production factors is known by carrying out economic efficiency analysis. Economic efficiency analysis is carried out by determining the value of the equivalence between Marginal Product Value and Marginal Sacrifice Cost (Singh, 2018).
4. Farming Income Analysis
   Farming income or profit can be determined using farming income analysis by subtracting the income obtained from the sale of products from the funds spent on farming activities (Chang et al., 2017).

RESULTS AND DISCUSSION

Characteristics of Respondents

The diversity of respondents can be seen from various sides. In this study, the diversity of respondents was seen in terms of age, latest education, family dependents, and length of farming. Based on the age, most of the farmers are in the range of productive age, 15-64 years old (Panggabean et al., 2016). Farmers aged 15-64 years old have good physical work ability and psychological maturity compared to farmers older than 64 years old, so that the decision making process and farming activities can run well. The level of formal education for farmers is at moderate level. Most of them are elementary school graduates. Apart from formal education, the farmers also receive non-formal education from farmer group training activities. These training activities are carried out with the aim of increasing the knowledge and abilities of the farmers.

According to Timbulus (2015), based on the number of family dependents, most farmers have a moderate number of dependents, consisting of 4-5 family members. The number of dependents in this family can affect the number of labor for farming activities as well as the consumption burden on the household. A high number of dependents will increase the family workforce on farming and the consumption burden on the household. Majority of farmers have more than 20 years of farming experience. It affects the great amount of knowledge and experience of the farmers. Details of the characteristics of the respondents in this study are shown in Table 1.

Table 1. Number and Percentage Based on the Respondent Characteristics of Regular Rice Farming and *Mina Padi* in Association of Farmer Group *Tani Mandiri*

Description	Number (person)		Percentage (%)	
	Regular Rice Farming	*Mina Padi*	Regular Rice farming	*Mina Padi*
Age (year)				
- < 15	0	0,00	0	0,00
- 15 – 64	21	70,00	26	86,70
- > 64	9	30,00	4	13,30
	30	100,00	30	100,00
Latest Education				
- Kindergarten /No Formal education	4	13,33	2	6,67
- Elementary	17	56,67	11	36,67
- Middle School	1	3,33	4	13,33
- High School	3	10,00	11	36,67
- Diploma	0	0,00	1	3,33
- Undergraduate	5	16,67	1	3,33
	30	100,00	30	100,00
Number of Dependents (person)				
- Small (2 – 3)	13	43,33	11	36,67
- Moderate (4 – 5)	10	33,33	16	53,33
- Large (> 5)	7	23,33	3	10,00
	30	100,00	30	100,00
Farming Experience (year)				
- 1 – 5	0	00,00	5	16,67
- 6 – 10	6	20,00	2	6,67
- 11 – 15	4	13,33	4	13,33
- 16 – 20	1	3,33	1	3,33
- > 20	19	63,33	17	56,67
	30	100,00	30	100,00

Source: Processed Primary data (2020)

Effect of the Use of Production Factors on Production

1. Simultaneous effect test (F Test)

The effect can be identified simultaneously by using F test analysis. Based on this test, a significance value of 0.000 is obtained which is smaller than the significance level of 0.05, meaning that the null hypothesis is rejected and the working hypothesis is accepted. In the opinion of Alderdice et al. (2019), the rejection of the null hypothesis and acceptance of the work hypothesis indicate that there is an influence between the independent and dependent variables simultaneously. Land use, total seeds, amount of fertilizer and labor, as well as dummy variables have an influence on production results.

2. Partial Effect Test (t Test)

The following is the analysis of the partial effect test data:

Table 2. The Results of t test Analysis

Variable	t	Sig
Land	3,754	0,000*
Seeds	2,035	0,047*
Fertilizer	-0,095	0,925ns
Labor	-0,357	0,723ns
Dummy variable	1,303	0,198ns

Source: Processed primary data (2020)

Information:

*) = Has a significant effect with the level of 95%

ns = Has no significant effect

The t-test significance value of the use of land and seed production factors of 0.000 and 0.047 has a significant partial effect on rice production both in regular rice farming and *mina padi*, while the significance values of the factor of fertilizer production, labor, and dummy variables are 0.925; 0.723; and 0.198. They have no significant effect partially. This condition is in accordance with the theory of Daud et al. (2019) that the t test acceptance criteria can be done by looking at the probability level, if the probability level is <0.05 then it has a partial effect and if the probability level> 0.05 indicates no partially significant effect.

Comparison of Rice Production in Regular Rice Farming and *Mina Padi*

Based on the research activities, the results of regular rice farming and *mina padi* productions are as follows:

Table 3. Regular Rice Farming and *Mina Padi* Production per hectare In the Association of Farmer Group *Tani Mandiri*

Farming Type	Production (Kg)	Land (Ha)	Average (Kg/Ha)
Regular Rice farming	4454,50	0,5767	7.724,12
Mina Padi	3084,73	0,3692	8.355,17

Source: Processed primary data (2020)

Rice production per hectare is obtained by calculating the comparative value between the average production and the average land area. Based on the comparison results as listed in Table 3, the average rice production per hectare is 7,724.12 kg / ha in regular rice farming, which is smaller than 8,355.17 in *mina padi*. This result is caused by several additional nutrients for plants that come from fish manure, feed residues, and algae which can increase rice production in *mina padi*. Production results were also analyzed using the independent sample t-test in order to compare the yields of the two farming types. Based on this test, the significance value obtained is 0.434. According to the theory put forward by Siddeswari et al. (2017) a significance value> 0.05 shows that there is no difference in the amount of rice production in the two farms.

Economic Efficiency

Based on the research results and economic efficiency analysis, the following results were obtained:

Table 4. Economic Efficiency of the Use of Regular Rice Farming and *Mina Padi* Production Factors per Respondent in the Association of Farmer Group *Tani Mandiri*

Variable	Economic Efficiency		Difference Test	
	Regular Rice Farming	*Mina Padi*	Regular Rice Farming	*Mina Padi*
Land Area (X1)	2,404	3,479	0,000*	0,000*
Seeds (X2)	19,489	24,332	0,000*	0,000*
Fertilizer (X3)	-1,005	-1,242	0,000*	0,000*
Labor (X5)	-1,623	-2,087	0,000*	0,000*

Source: processed primary data (2020)
Information:
*) = Has a significant effect with the level of 95%
ns = Has no significant effect

The economic efficiency values shown in Table 4 indicate that the use of fertilizer production factors and labor is less than 1. This indicates that there is no efficient use of production factors economically. The economic efficiency value of land area and seeds in regular rice farming and *mina padi* is more than 1 which indicates that the use of these production factors is not economically efficient. According to Singh (2018), economic efficiency is achieved if input is added to inefficient production factors and reduces input to inefficient production factors.

The value of economic efficiency can be seen through the one sample t-test difference test by comparing the efficiency criteria, i.e. 1. The results of the analysis of the difference test obtain a significance result of 0.000, meaning that there is a difference between the economic efficiency value and the predetermined criteria so that the use of production factors consisting of land area, seeds, fertilizers, and labor are not economically efficient.

Farming Income

Based on the analysis of farm income, the following details are obtained:

Table 5. Calculation of Farm Income per Planting Period in the Association of Farmer Group *Tani Mandiri*

Cost Types	Regular Rice Farming (IDR)	*Mina Padi* (IDR)
Production cost		
Fixed cost	9.040.500,00	6.348.000,00
Variable cost	2.548.416,67	4.474.666,67
Total Production cost	11.588.916,67	10.822.666,70
Revenue		
Rice Production	21.381.600,00	20.050.766,67
Fish Production	0,00	1.718.600,00
Income	9.792.683,33	10.946.700,00

Source: Processed primary data (2020)

Based on Table 5, it can be seen that the income obtained per planting period for an area of 5,767 m2 in regular rice farming was IDR 9,792,683.33 and IDR 10,946,700.00 for *mina padi* for an area of 3,692 m2. The average income

earned for 1 ha of land was IDR 16,980,550.26 for regular rice farming and IDR 29,059,463.76 for *mina padi*. According to Dang (2020) *mina padi* is a new alternative to regular rice farming as it is considered more profitable. The income earned by *mina padi* for the same average area of land is higher. The farmers' welfare will increase as well as the productivity of agricultural land since *mina padi* produces two kinds of output, rice and fish.

CONCLUSION

There is a simultaneous influence on farm output on the use of inputs (land, total seeds, amount of fertilizer, total labor, and dummy variables). There is a partial effect of the use of land input and the total seed on the output produced, while the use of fertilizer input, the number of labors, and variables do not have a partial effect. There is no difference in the yield obtained between regular rice farming and *mina padi*. Economic efficiency cannot be achieved in regular rice farming, as well as the use of production factors in *mina padi*. Regular rice farming produces a lower average income than *Mina Padi*.

RECOMMENDATION

Mina padi is a new alternative that is suggested to increase agricultural production and land use efficiency. With the combination of the right input, the economic efficiency of the use of production factors will be obtained so that farmers' income can also increase. This research only analyzes efficiency from economic point of view. Further researchers should conduct technical and allocative efficiency analysis to determine overall efficiency.

REFERENCES

Alderdice, F., Henderson, J., Opondo, C., Lobel, M., Quigley, M., & Redshaw, M. (2019). *Psychosocial Factors that Mediate the Association Between Mode of Birth and Maternal Postnatal Adjustment: findings from a population-based survey*. https://doi.org/10.1186/s12905-019-0738-x

Chang, T., Takahashi, D., & Yang, C. K. (2017). *Profit Efficiency Analysis of Rice Production in Taiwan. China Agricultural Economic Review*, *9*(1), 32–47. https://doi.org/10.1108/CAER-04-2016-0059

Dang, H. D. (2020). S*ustainability of the Rice-Shrimp Farming System in Mekong Delta, Vietnam: a Climate Adaptive Model. Journal of Economics and Development*. https://doi.org/10.1108/jed-08-2019-0027

Daud, R. O., Tulung, J. E., Gunawan, E. M., & Program, M. (2019). *Delivering Service Convenience to Enhance Customer Satisfaction: Quantitative Analysys on Shopee*. *Jurnal EMBA: Jurnal Riset Ekonomi, Manajemen, Bisnis Dan Akuntansi*, *7*(4), 5674–5683.

Monzote, F. R. F., Bello, R., Alvarez, A., Hernández, A., Lantinga, E. A., & Van, K. H. (2012). *Identifying Agroecological Mixed Farming Strategies for Local Conditions in San Antonio de Los Baños, Cuba. International Journal of Agricultural Sustainability*, *10*(3), 208–229. https://doi.org/10.1080/14735903.2012.692955

Panggabean, M. T., Amanah, S., & Tjitropranoto, P. (2016). Persepsi Petani Lada terhadap Diseminasi Teknologi Usahatani Lada di Bangka Belitung. *Jurnal Penyuluhan*, *12*(1), 61–73.

https://doi.org/10.25015/penyuluhan.v12i1.11321

Siddeswari, G.K., Sailaja, V., Satya Gopal, P.V., & Prasad, S. V. (2017). *Impact of Farmer Field Schools on Profitability of the Participant and Non-Participant Rice Farmers*. *Jurnal Res. Angrau*, *45*, 58–63.

Singh, P. (2018). *Economic Efficiency of Input Use in Peach Cultivation in North Western Himalayas*. *Economic Affairs*, *63*(3). https://doi.org/10.30954/0424-2513.3.2018.2

Timbulus, C. S. (2015). Kontribusi Usahatani Salak Terhadap Pendapatan Keluarga Petani Di Wilayah Pangu Kecamatan Ratahan Timur. *Cocos*, *6*(9).

Tsuruta, T., Yamaguchi, M., Abe, S., Ichiro, & Iguchi, K. (2011). *Effect of Fish in Rice-Fish Culture on the Rice Yield*. *Fisheries Science*, *77*(1), 95–106. https://doi.org/10.1007/s12562-010-0299-2

Varsha, A. V, Goerge, G., & Sahajanandan, R. (2019). *Lutembacher Syndrome: Dilemma of Doing a Tricuspid Annuloplasty Abstract*. *Annals of Cardiac Anaesthesia*, *22*(1), 1–5. https://doi.org/10.4103/aca.ACA