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Comparative Advantage, Technical Efficiency and Risks Production of Inpari Unsoed 79 Agritan Farms in Saline Soil, Pemalang Regency

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ABSTRACT
One of the efforts to increase rice production is using marginal land, such as saline soil. The advantages of Inpari Unsoed 79 Agritan seeds are tolerance of saline soil, leafhoppers, and high productivity. This study aims to: Analyze the comparative advantage of Inpari Unsoed 79 Agritan on saline soil, Analyze the technical efficiency of Inpari Unsoed 79 Agritan farming on saline soil, and analyze the factors that influence the risk production. The research method used descriptive quantitative. The research was conducted in Nyamplungsari village in October 2019 - March 2020. The census method used to collect data with a population of 43 farmers. The analytical method used PAM, stochastic production frontier, coefficient of variation, and the just n Pope Risk function. The analysis results show that farming has a comparative advantage with a technical efficiency value of 0.863. Factors that influence technical inefficiency are farmers' age, education, and the number of household members. The production risk level is 41.23%, while seeds and pesticides affect the risk.

***Keywords**: Inpari Unsoed-79 Agritan, Risk Production, Saline Soil, Stochastic Frontier, Technical Efficiency.*

1. INTRODUCTION

One of the efforts to increase rice production is using marginal land, such as saline soil. Saline soil is a soil with a high dissolved salt content (NaCl, Na2CO3, Na2SO4), thus affecting plant growth and development [1]. Many saline soils are found in the Pantura region (North Coast of Java). The occurrence of saline soils in the Pantura region is due to seawater's entry into the land through the land surface or seepage (intrusion). So far, the saline soil in the coastal area of Pantura has not been used optimally. Farmers usually plant rice crops only in tthe rainy season, while the land will be left uncultivated in the dry season. During the dry season, paddy fields in coastal areas cannot be planted with rice because of the increase in salinity (salt content) in the irrigation canals. The rice varieties commonly planted by farmers are Ciherang, Situ Bagendit, and others. However, saline soil conditions with high salinity inhibit the growth of rice seeds so only a few plants can be harvested. Seeing these conditions, it is necessary to have quality rice seeds that can grow well on saline soils and provide high yields.

One of the saline tolerant varieties is Inpari Unsoed 79 Agritan. This variety first released as a superior variety to the public starting in 2014. The release of this variety to the public based on the Decree of the Minister of Agriculture No. 1251/KPTS/SR.120/12/2014, December, 5 2014. Inpari Unsoed 79 Agritan rice is the result of a cross between Cisadane and Atomita-2 rice [2]. The superiority of Inpari Unsoed 79 Agritan seed is tolerant to saline soil, tolerant to leafhoppers and high productivity. In 2017 UNSOED obtained the Higher Education Technology Innovation Downstream Program from the Directorate General of Strengthening Innovation, Kemenristekdikti. The implementation of the program is in the form of Seed Production and Development of Copy Tolerant Superior Rice Varieties “Inpari Unsoed 79 Agritan”` in four regency (Cilacap, Kebumen, Tegal and Pemalang) with a total area of 400 hectares. The selected area in Pemalang Regency is Nyamplungsari Village, Petarukan District. The rice cultivation of Inpari Unsoed 79 Agritan in Nyamplungsari village has given very good results with an average tile yield of 8 tons of GKP per hectare. With these results, the Inpari Unsoed 79 Agritan has the opportunity to be developed. The development is for export, seeing the potential saline soils in Indonesia is very large. The area of saline soils in Indonesia is approximately 20 million hectares and the utilization is unoptimal so it’s the potential to be used as agricultural land to compensate for the reduced productive land on the island of Java [3].

The very competitive international trade conditions encourage Indonesia to increase further the comparative and competitive advantage of rice farming in Inpari Unsoed 79 Agritan. If the superior varieties of saline land are competitive, then Indonesia has the opportunity to export and increase per capita income. A commodity is said to be competitive when it can be produced at an efficient cost in terms of domestic resource costs. The results of the research by [4] show that rice farming in Susukan Village, Semarang Regency has a comparative and competitive advantage from the PCR and DRCR values of less than 1, but the DRCR value of 0.935 means that farming is feared to no longer have a comparative advantage if there is no interference from government policy. [5] Research in Jambi also shows that rice farming has competitiveness. This shows that rice farming in Indonesia has an export opportunity.

Inpari Unsoed 79 Agritan rice has been cultivated in Pemalang Regency since 2017. Inpari Unsoed 79 Agritan seeds are expected to increase the productivity of saline soils that are not yet optimal. Increasing rice productivity is one indicator of achieving production efficiency. Measurement of production efficiency is important because it can provide information for decision-making related to farming development. In addition to production efficiency, another important thing to consider in farming is a risk. Risk in farming can be caused by the influence of climate and other factors beyond the farmer's control. The existence of risk can affect farm production and can also affect the behavior of farmers in conducting their farming. This study aims are analyze the comparative advantages, analyze the technical efficiency, and analyze production risk and the factors that influence production risk of Inpari Unsoed 79 Agritan rice farming.

2. MATERIAL AND METHODS

2.1. Research Locations and Sampling Design

The research was conducted in Nyamplungsari Village, Petarukan District, Pemalang Regency, Central Java Province. Determination of the research location is done purposively. [6] States that the purposive method is a method for determining the place of research based on specific goals or considerations. Nyamplungsari Village was chosen as the research location, considering that the village is a village with saline land and some farmers grow Inpari Unsoed 79 Agritan rice.

The respondents' determination was carried out using the census method with the consideration of 43 farmers who planted Inpari Unsoed 79 Agritan rice in Nyamplungsari Village, Petarukan District, Pemalang Regency. The research was carried out in May – July 2020. The data used was the planting season data from October 2019 to March 2020. The data was collected by direct observation and interviews using a semi-structured questionnaire. The observation method is carried out by making direct observations during research activities to obtain information and supporting data from farmers, extension workers, or government officials. In addition, interviews were conducted with parties related to Inpari Unsoed 79 Agritan rice farming in the research area.

2.2. Analytical Framework

The analytical method used in this research is descriptive analysis, PAM (Policy Analysis Matrix) to assess competitive and comparative advantage, stochastic production frontier, coefficient of variation, and the Just n Pope risk function. Descriptive analysis is a method of researching a group of people, an object, a set of conditions, a system of thought or a class of events in the present.

2.2.1. Policy Analysis Matrix (PAM)

PAM analysis provides indicators of comparative advantage and competitiveness. Comparative advantage can be seen from the DRCR value. While the competitiveness variables include PCR, NPCO, and NPCI values. The tabulation of the policy analysis matrix is presented in Table 2.1.

Table 2.1. Policy Analysis Matrix (PAM)

Information	Income	Cost		Benefit
		Input Tradable	Input Non-Tradable	
Private Cost	A	B	C	D=A-B-C
Social cost	E	F	G	H=E-F-G
Divergensi	I = A-E	J = B-F	K = C-G	L=D-H=I-J-K

Source: [7]

Explanation

Private Benefit	(D)	=	A-(B+C)
Social Benefit	(H)	=	E – (F+G)
Transfer Output	(I)	=	A – E
Transfer Input	(J)	=	B – F
Transfer Faktor	(K)	=	C – G
Transfer Total	(L)	=	D – H = I – (J+K)
Private Cost Ratio	(PCR)	=	C/(A – B)
Domestic Cost Ratio	(DRCR)	=	G / (E – F)
Coefficient Proteksi Output Nominal	(NPCO)	=	A/E
Coefficient Proteksi Input Nominal	(NPCI	=	B/F

a. Benefit Analysis

Private Profitability (PP) = Private Income – (Cost of input tradable private + Cost of input non-tradable privat)

Social Profitability (SP) = Social Income – (Cost of input tradable social + Cost of input non-tradable social)

b. Comparative and Competitive Analysis

Private Cost Ratio (PCR) =

$$\frac{Cost\ of\ input\ non\ tradable\ privat}{Income\ private - Cost\ of\ tradable\ input\ private} \quad (1)$$

$$DRCR = \frac{Cost\ of\ input\ non\ tradable\ sosial}{Social\ Income - Cost\ of\ input\ tradable\ social} \quad (2)$$

c. Government Policy Impact Analysis

Input Policy Impact

$$TI = Cost\ of\ input\ tradable\ privat - Cost\ of\ input\ tradable\ social \quad (3)$$

$$NPCI = \frac{Cost\ of\ input\ tradable\ privat}{Cost\ of\ input\ tradable\ social} \quad (4)$$

2.2.2. Technical Efficiency

Technical efficiency, according to [8] is described as a proportion or comparison between the observed output (Yi) with the output that should be or the highest (Yi*) at the level of technology available. Therefore, the general form of the measurement of the technical efficiency of paddy farming is as follows:

$$TE_i = \frac{E(Y\ |U_i, X_i)}{E(Y^*\ |U_i=0, X_i} = E\left[\frac{\exp(-U_i)}{\varepsilon_i}\right] \quad (5)$$

Where the value of TE_i lies between 0 and 1 or $0 < TE_i < 1$.

Explanation:

TEi	:	technical efficiency of farmer
Yi	:	actual output function (without error term)
Yi*	:	potential output function
Ui	:	a random variable that describes technical inefficiency and is only used for functions that have a certain number of inputs and outputs (cross-section data)

The empirical model of the Cobb Douglass frontier stochastic production function used in this study is the rice production function per farm.

$$ln\ ln\ Y_i = \beta_0 + \beta_1 lnX_1 + \beta_2 lnX_2 + \beta_3 lnX_3 + \beta_4 lnX_4 + \beta_5 lnX_5 + \beta_6 lnX_6 + \beta_7 lnX_7 + (v_i - u_i) \quad (6)$$

Explanation:

Y_i	:	Production yield (kg)
X_1	:	Land area (ha)
X_2	:	Seeds (kg)
X_3	:	Phonska fertilizer (kg)
X_4	:	Manure (kg)
X_5	:	Dolomite (kg)
X_6	:	Pesticide (liter)
X_7	:	Labor (HOK)
v_i	:	error term caused by external factors (weather, pests disease)

u_i	:	Error term caused by internal factors or frequent. This is called the technical inefficiency factor in production
$\beta_1 - \beta_7$	:	expected regression coefficient value > 0

Determination of the level of technical efficiency, whether efficient or not, refers to the average value of technical efficiency obtained and compared with the value of 1. If the value of technical efficiency equals 1 (one), then the use of inputs (production factors) is efficient. On the other hand, if the value of technical efficiency is less than 1 (one), then the use of inputs (factors of production) is not efficient [9].

2.2.3. Technical Inefficiency

[10] Stated that the variable *i* used to measure the effect of technical inefficiency is assumed to be independent and has a half-normal distribution. Therefore, the empirical model used to determine the factors influencing technical inefficiency are:

$$\mu_i = \delta_0 + \delta_1 \ln Z_1 + \delta_2 \ln Z_2 + \delta_3 \ln Z_3 + \delta_4 \ln Z_4 + \delta_5 D_1 \quad (7)$$

Explanation:

μ_i	:	technical inefficiency
Z1	:	farmer's age (years)
Z2	:	formal education of farmers (years)
Z3	:	experience in rice farming (years)
Z4	:	number of household members (person
D1		dummy job outside rice farming D1 = 0, does not have a job outside of rice farming D1 = 1, has a job outside of rice farming
$\delta_1 - \delta_5$	:	expected parameter < 0

2.2.4. Risk Analysis

The magnitude of the production risk of Inpari Unsoed 79 Agritan rice farming was analyzed by production risk analysis. To determine the importance of the production risk is analyzed using the coefficient of variation (CV). [11] E xplains that variant is a measure of the risk unit of an investment project which describes the magnitude of the deviation that occurs, while the standard deviation is a measure of the slightest risk unit. Therefore, the level of production risk can be calculated by finding the percentage of production risk to the average production using the coefficient of variation analysis. [12] write the equation as follows.

$$\sigma^2 = \frac{\sum(Yi - Y)^2}{n} \quad (8)$$

Explanation:

σ^2	= variant (kg)
Yi	= production yield in the i-th growing season (kg)
Y	= average production yield (kg)
n	= number of samples

$$\sigma = \sqrt{\sigma^2} \quad (9)$$

Explanation:

σ = standard deviation (kg)

$$CV = \frac{\sigma}{Y} x\ 100\% \quad (10)$$

Explanation:

CV = coefficient of variation (%)

2.2.5. Factors Affecting Production Risk

The magnitude of the effect of input use on production risk was analyzed using multiple linear regression using the heteroscedastic method. The heteroscedastic model used is a multiplicative heteroscedasticity model with maximizing the likelihood function (Just and Pope in [13], [14]). The regression model for the effect of input use on production and production risk is generally written as follows:

Production function:

$$\ln Y_i = \beta_0 + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \beta_5 \ln X_5 + \beta_6 \ln X_6 + \beta_7 \ln X_7 + \varepsilon_1 \quad (9)$$

Production risk function:

$$\ln[\varepsilon_1^2] = \theta_0 + \theta_1 \ln X_1 + \theta_2 \ln X_2 + \theta_3 \ln X_3 + \theta_4 \ln X_4 + \theta_5 \ln X_5 + \theta_6 \ln X_6 + \theta_7 \ln X_7 + \varepsilon_2 \quad (10)$$

Explanation:

Y_i	:	Production yield (kg)
ε_1	:	Production risk
X_1	:	Land area (ha)
X_2	:	Seeds (kg)
X_3	:	Phonska fertilizer (kg)
X_4	:	Manure (kg)
X_5	:	Dolomite (kg)
X_6	:	Pesticide (liter)
X_7	:	Labor (HOK)
β0	:	production yield intercept
$\beta_1 - \beta_7$	:	estimated parameter coefficients X1 – X_7

θ0	:	production risk intercept
$\theta_1 - \theta_7$	:	estimated parameter coefficients X1 – X_7
ε_2	:	Error term

3. RESULTS AND DISCUSSION

3.1. PAM (Policy Analysis Matrix)

Inpari Unsoed 79 Agritan seed is a new high-yielding rice seed variety that is assembled to grow on saline soil and provide high yields. In 2017, a planting experiment was carried out in Nyamplungsari Village, Petarukan District, Pemalang Regency and succeeded in delivering high yields of 8 tons of harvested dry grain/hectare. Inpari Unsoed 79 Agritan 80.2% yield is more significant than other varieties such as Ciherang and Cimalaya with an output of 78% [15]. Farming costs consist of variable costs and fixed costs. Variable costs incurred in rice farming Inpari Unsoed 79 Agritan are costs incurred to buy fertilizers (phonska & manure), dolomite, seeds, pesticides and labor. The components of fixed costs include payment of land rent and depreciation of equipment. Table 3.1. shows the analysis of rice farming Inpari Unsoed 79 Agritan.

Comparative and competitive advantage is the ability obtained through the characteristics and resources of a company to have a higher performance than other companies in the same industry or market. The approach used to measure the competitiveness of a commodity can be seen from its competitive and comparative advantages. One of the analytical tools used to determine the competitiveness of a commodity (competitive advantage and comparative advantage) is the Policy Analysis Matrix, or PAM. PAM is compiled based on private and social prices, revenues, production costs, and other costs calculated based on financial prices (private) and economic shadow prices (shadow or social).

Tabel 3.1. Inpari Unsoed 79 Agritan Farming Analysis in Nyamplungsari Village, Petarukan District, Pemalang Regency

No.	Description	Cost (IDR)	%
	Fix Cost		
1	Depresiasion	10,200.00	0.20
2	Land	5,074,419.00	99.80
	A. Total Fix Cost	**5,084,619.00**	
	Variable Cost		
1	Seed	89,209.00	1.75
2	Phonska	885,248.00	17.40
3	Pupuk Kandang	1,370,535.00	13.47
4	Dolomit	253,216.00	4.98
5	Pesticide	140,140.00	1.38
6	Labor	2,348,837.00	46.17
	B. Total Variable Cost	**5,087,198.00**	
	C. Total Cost	**10,171,817.00**	
	Revenue	11,622,093.00	
	Profit	1,450,276.00	

Source: Primary data is processed, 2019

Tabel 3.2. Policy Analysis Matrix

Component	Income	Cost		Benefit
		Input *Tradeable*	Input *Non-Tradeable*	
Privat	23.244.186	5.298.304	15.045.328	2.900.554
Sosial	27.110.352	3.596.436	18.664.061	4.849.855
Divergensi	-3.866.166	1.701.868	-718.179	-1.949.301
PCR = 1,01 DRCR = 0,79				

Source: Primary data processed, 2019

Competitive advantage is whether the farm can compete with domestic producers with the private costs incurred and the output received. It can be seen from the private profit and private cost ratio (PCR) to measure competitive advantage. The private profit of the farming business is IDR 2,900,554/Ha. Farming profits can be higher if the use of production inputs is more efficient. Some of the components that result in high costs are fertilizers. Competitive advantage can be seen from the PCR value. If the PCR value of rice farming < 1, then the commodity system has a competitive advantage. The smaller of the PCR value, the l ower of the domestic cost based on the actual price to produce the issued output. This indicator seeks to show the proportion of domestic costs used for commodities. Expenditures or increases in domestic costs are expected to be accompanied by private income, so it is hoped that the smaller the better in this indicator. The greater value of the PCR indicator means that the commodity is not competitive because the high domestic costs are not followed by income. Private profits have a positive value, meaning that the farm gains profits in conditions where there are government policies. PCR (Private Cost Ratio) = 1.01 means that your tradable input system does not have a competitive advantage. This means that to obtain an additional output value of IDR 1.000.000,-, an additional domestic factor cost of IDR 1.010.000, - is required. PCR value of more than 1 is caused by high domestic costs that are not followed by an increase in farmers' income. Inpari Unsoed 79 Agritan seed is a new high yielding rice seed variety that is assembled to be able to grow on saline soil and provide high yields. In 2017 the seeds of Inpari Unsoed 79 Agritan were sold at IDR 5,000/kg by a seed breeder, CV Gemilang Karya Sentosa. The low price is due to subsidies from Government. But after harvesting in April 2017 the Inpari Unsoed 79 were sold at a price IDR 8,000/kg. Inpari 79 has a comparative advantage because of the suitability of growing conditions with saline soil conditions. Inpari 79 does not have a competitive advantage due to the high domestic costs incurred by farmers, especially farm labor costs

If PCR is calculated in private prices, then DCR is calculated in social prices. This indicator is commonly referred to as comparative competitiveness. [16] Says that the DRCR describes competitiveness in efficient (undistorted) market conditions, while the PCR value describes competitiveness in actual market conditions. Actual market conditions can be a distorted market or an efficient market. If the actual market conditions are efficient, then the DRCR and PCR values are less than one. In reality, the market is not in an efficient state. The domestic and international markets are still distorted, marked by the existence of protective policies, for example, the imposition of import tariffs by a country so that goods from other countries are challenging to enter the country concerned.

Another example is the provision of domestic subsidies and export subsidies which cause goods from the country cheaper, making it easy for them to enter other countries. Comparative advantage is a measure of the competitiveness of a business in a perfectly competitive market. In a perfectly competitive market, government policy factors, especially subsidies, are eliminated. With the elimination of the subsidy factor, the benefits obtained are based on social benefits. Based on the above data, farming is profitable at the social price level. The social advantage of farming is IDR 4,849,855/Ha. The value of social benefits that shows a number more than zero means that rice farming will be profitable without government policies. Apart from being seen from the social advantage, comparative advantage can also be seen from the value of DRCR. If the DRCR value is less than 1, the farm has a comparative advantage because it can finance domestic factors at prevailing social prices. Social benefits are positive. DRCR (Domestic Resources Cost Ratio) of 0.79 means that farming has a comparative advantage. According to [4], it shows that farming has competitive and comparative advantages seen from the PCR and DRCR values of less than 1. DRCR value of 0.79 means that it has a comparative advantage. This value indicates the ability of the commodity system to finance domestic factors at social prices. DRCR value of 0.79 means to obtain an added value of IDR

1.000.000 additional domestic factor fee of IDR 790,000. This figure shows that nationally, the Inpari Unsoed 79 Agritan commodity is quite efficient in using domestic economic resources. This means that Inpari Unsoed 79 Agritan farming carried out by farmers is economically efficient and has a comparative advantage.

3.2. Technical Efficiency Level of Inpari Unsoed 79 Agritan Rice Farming

The value of technical efficiency achieved by Inpari Unsoed 79 Agritan rice farmers in Nyamplungsari Village, Petarukan District, Pemalang Regency is shown in Table 3.3. The distribution value of technical efficiency of Inpari Unsoed 79 Agritan rice farming in Nyamplungsari Village ranges from 38.50 percent to 98.30 percent with an average of 0.863 or 86.30 percent. This shows that the average rice farmer in the research location has only reached 86.30 percent of the maximum production potential that can be produced in that location. Increased production can be done through improved farm management in combining the use of production factors better.

The difference in technical efficiency achieved by farmers is caused by different levels of technological mastery. The technology here is the use of inpari unsoed rice seeds 79 purple label agritan. Farmers use certified seeds because this type of seed is able to provide higher production. Potential seeds of Inpari Unsoed 79 Agritan purple label has a potential yield of 8 tons of dry grain harvested per hectare. Meanwhile, the average yield of rice produced by farmers is 6 tons per hectare. The productivity of rice produced by farmers is lower than its potential, so that the technical efficiency achieved by farmers is still below 1. One of the reasons is the use of rice seeds which are still less than the standards of the Ministry of Agriculture. The standard use of rice seed per hectare is 25 kg. The data on the use of rice seeds at the farmer level varies between 22 kg to 25 kg per hectare.

Table 3.3. The Distribution of technical efficiency Inpari Unsoed 79 Agritan rice farming in the Nyamplungsari Village, Petarukan Distrik, Pemalang Regency

Technical efficiency	Number of farmers (person)	Proportion (%)
0,30 – 0,40	1	2,32
0,41 – 0,50	1	2,32
0,51 – 0,60	1	2,32
0,61 – 0,70	2	4,65
0,71 – 0,80	5	11,63
0,81 – 0,90	7	16,28
0,91 – 0,99	26	60,47
Total	**43**	**100,00**
Minimum **0,385**		
Maximum **0,983**		
Average **0,863**		

Source: Primary data processed, 2019

3.3. Factors Affecting Technical Inefficiency

The factors that affect the level of technical efficiency of farmers are analyzed using the inefficiency effect model of the stochastic frontier production function. Suppose the technical inefficiency parameter has a positive sign. It can be interpreted that the variable increases technical inefficiency or in other words, it will reduce technical efficiency. If the inefficiency parameter has a negative sign, it can be interpreted that this variable reduces technical inefficiency or in other words, increases technical efficiency. The results of the analysis of inefficiency factors in Inpari Unsoed 79 Agritan rice farming in Nyamplungsari Village can be seen in Table 3.4.

Table 3.4. shows that 5 variables that are thought to have a significant effect on technical inefficiency, 3 variables have a negative effect (according to the expected sign), namely farmer age, education level, and number of household members significantly, while experience and dummy work outside of rice farming have no effect The farmer age variable has a significant effect ($\alpha = 1\%$) on inefficiency and has a negative sign. This shows that the age of the farmer will reduce the inefficiency or in other words the age of the farmer will increase the technical efficiency of the Inpari Unsoed 79 Agritan rice farming. Farmer's age is related to work ability, fighting power in business, willingness to take risks and willingness to implement innovation. As farmers get older, their ability to work, fighting power in business, willingness to take risks, and desire to implement innovation also increases. Adult farmers are thirsty for technology and innovation to be practiced in

their farming. In addition, with increasing age, the experience and knowledge of farmers related to their production activities will increase. The education variable has a significant (α=5%) and negative effect on the technical inefficiency of Inpari Unsoed 79 Agritan rice farming, which means that the higher the education, the lower the inefficiency. This means that education is an important variable that can increase efficiency. The conditions in the field indicate that farmers' education is relatively low, so it becomes a problem inefficiency. This can be the basis for government policies to improve farmers' education and management. Educated farmers tend to be more responsive in adopting technology, and high education is a farmer's capital in carrying out farming activities. [17] Stated that the longer the farmer's education, the less inefficiency. Formal education tends to increase the ability to manage information [18]. Education can increase production efficiency because it improves information management and decision-making [19]. The level of formal education of farmers will affect the level of knowledge, insight, and policy in making decisions on the use of inputs for rice farming Inpari Unsoed 79 Agritan. The length of education makes farmers more open and more receptive to the latest innovations and technologies, especially in the agricultural sector. These results are in line with research conducted by ([20], [21]), who states that education can reduce technical inefficiency in corn plants. The implications of this study support the statement that increasing human capital in rural households can improve farm management and ultimately obtain high productivity. Investment in education can be used as a strategy to increase agricultural productivity.

The regression coefficient of the variable number of household members has a negative sign, has a significant effect, and is by the expected sign. This means that the more energy devoted to the management of Inpari Unsoed 79 Agritan rice farming, will reduce technical inefficiency or increase the technical efficiency of the farming. The more workers available, the more intensive the plant care will be. Less intensive and late treatment can cause a decrease in rice crop productivity. The results of this study are by the research that has been carried out by [22] on rice farming in South Kowane Regency, and [23] on watermelon farming in Bangladesh.

Table 3.4. Factors that affect the technical inefficiency of rice farming Inpari Unsoed 79 Agritan in Nyamplungsari Village, Petarukan District, Pemalang Regency

Variable	Sign of Hope	Coefficient		T-Ratio
Intercept	+/-	-0.167	***	-18.179
Age	-	-0.281	***	-3.835
Education	-	-0.146	**	-2.574
Experience	-	-0.395		-0.810
Dummy Jobs outside of farming	+/-	0.510		0.703
Number of household members	-	-0.381	***	-4.835

Source: Primary data processed, 2019

Explanation:
***) = Significant level of α = 1% (t-tabel = 2,701)
**) = significant at the level of α = 5% (t-tabel = 2,019)
*) = significant at the level of α = 10% (t-tabel = 1,682)

3.4. Risk Analysis

Risk analysis is done by calculating the coefficient of variation (CV). The coefficient of variation (CV) is a measure of relative risk obtained by dividing the standard deviation by the expected value [24]. The CV value is directly proportional to the risks faced by rice farmers, meaning that the greater the CV value obtained, the greater the risk that farmers must bear. Vice versa, the lower the CV value received, the smaller the risk that the farmer must bear. The risk analysis results of Inpari Unsoed 79 Agritan rice farming in Nyamplungsari Village, Petarukan District, Pemalang Regency, obtained a CV value of 41.23%. The complete results of the Agritan rice risk analysis are presented in Table 3.5.

Based on Table 3.5. It can be seen that the production risk value of Inpari Unsoed 79 Agritan rice farming in Nyamplungsari Village, Petarukan District, Pemalang Regency is 919.64 Kg or 41.231% of the average production. Thus the production fluctuation or the amount of production risk experienced by farmers is 919.64 Kg from the average production, meaning that farmers who carry out Inpari Unsoed 79 Agritan rice farming can increase or decrease by 919.64 Kg from the average production obtained.

Table 3.5. Production Risk Value per Ha Inpari Unsoed Rice Farming 79 Agritan in Nyamplungsari Village Petarukan District, Pemalang Regency

No	Description	Value
1.	Productivity (kg/ha)	2,230.23
2.	Standard deviation	919.64
3.	Coefficient of Variation	0.41
4.	CV (%)	41.23

Source: Primary data processed, 2019

The comparison between the magnitude of the risk faced and the average production obtained is 41.23% of the average production obtained, meaning that for every 1 kilogram of production obtained, there is a risk of 0.4123 kg. So that in Inpari Unsoed Agritan 79 rice farming carried out by farmers, the production obtained fluctuated or increased and decreased by 41.23% of the average production. Seeing the value of production risk, which is not too large, which is <50%, it can be concluded that Inpari Unsoed 79 Agritan rice farmers are still protected from losses in their rice farming. [25] States that if the CV > 0.5, then the risk of farming production borne by the farmer is greater, while the CV value 0.5 means that the farmer will consistently profit or break even. The results of the analysis show that the risk of farmers' production is classified as low risk. The risk value of Inpari Unsoed 79 Agritan rice farming is greater than the risk value of rice farming on the coast of Lake Tempe (CV=4.6%) [26], organic rice farming in Rowosari village, Jember (CV=10.1%) [27], lowland rice farming in Bali (CV=13.6% for the rainy season; CV=7.8% for the dry season; CV=11.4% for non-owned land status; CV=5.8% for own land) [28].

3.5. Factors Affecting Production Risk of Inpari Unsoed Rice Farming 79 Agritan

The production risk of farming activities comes from the production factors used. If a specific production factor becomes a source of production risk, then the use of that production factor can be controlled to reduce the risk. The production risk function of Inpari Unsoed 79 Agritan rice farming is estimated using the Cobb-Douglas Just and Pope production function to obtain the disturbance error ($\varepsilon 1$) as a production risk proxy. The next step is to regress the production function so that the risk function is obtained. The results of the analysis of the factors that affect the risk of rice production in Inpari Unsoed 79 Agritan are presented in Table 3.6.

Table 3.6 Factors Affecting the Risk of Inpari Unsoed 79 Agritan in Nyamplungsari Village, Petarukan District, Pemalang Regency

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.913794	3.590149	1.368688	0.1798
Land Area	0.169950	0.712918	0.238387	0.8130
Seeds	1.090338**	0.335692	3.248028	0.0026
Phonska Fertilizer	-0.049830	0.756224	-0.065894	0.9478
Manure	0.358202	0.250947	1.427401	0.1623
Dolomite	-0.094968	0.289747	-0.327763	0.7450
Pesticide	-1.445545***	0.368442	-3.923399	0.0004
Labor	-0.068516	0.087665	-0.781563	0.4397

R-squared	0.446902	Mean dependent var	0.150754
Adjusted R-squared	0.336282	S.D. dependent var	0.121618
S.E. of regression	0.099081	Akaike info criterion	-1.619527
Sum squared resid	0.343593	Schwarz criterion	-1.291862
Log likelihood	42.81983	Hannan-Quinn criter.	-1.498694
F-statistic	4.039982	Durbin-Watson stat	1.772465
Prob(F-statistic)	0.002436***		

Source: Primary data processed, 2019

The results of the risk function analysis show the coefficient of determination (R^2) of 0.4469, and this means that 44.69% of the variation of the risk of Inpari Unsoed 79 Agritan rice production can be explained by variations of the independent variables in the model, in other words 44.69% of the independent variables together affect production risk and the remaining 55.31% is influenced by other variables outside the model, including the influence of weather, pests and diseases and others. [29] *cited in* [28] suggest that production risk due to natural disasters, pests and plant diseases, fires, and other factors that can be taken into account physically can be overcome by purchasing agricultural production insurance policies. However, this has not been implemented in the research area. The risk of possible decline in production quality can be overcome by applying appropriate cultivation and post-harvest technology. Cultivation technology includes seed selection and treatment (seed treatment), land processing and washing, nurseries, planting, fertilization, HPT control, and harvesting [30]. Based on the results of the analysis presented in Table 3.6. it is known that the calculated F value ($\alpha = 1\%$) of 4.039 has a significant effect, meaning that the independent variables together have a significant effect on the risk of rice production in Inpari Unsoed 79 Agritan.

The results of the t-test on the independent variables showed that the independent variables that had a significant effect on production risk were seeds and pesticides. Seeds have a significant effect on =5% and have a positive sign. This means that seeds increase the risk of production of Inpari Unsoed 79 Agritan rice farming, meaning that increasing seeds will increase the risk of production of Inpari Unsoed 79 Agritan rice farming. The seeds used by farmers today are derived seeds or stored seeds from previous harvests. The quality of the seeds produced by farmers has not been tested for quality. To produce quality seeds, farmers must pay attention to aspects of cultivation starting from land preparation to harvesting, including spacing, fertilization, irrigation, protection against pests, roguing and harvesting.

Pesticides have a significant effect on =1% and have a negative sign. This means that pesticides affect reducing the risk of rice farming production in Inpari Unsoed 79 Agritan. The results of this study are in line with the results of research by [31] that the use of herbicide production inputs affects reducing the risk of lowland rice production. In general, rice farmers use pesticides as a preventive measure. In other words, control decisions tend to be more directed at anticipating the risk of pest attacks and at the same time, dealing with actual pest attacks. According to [32] *cited in* [28] the efficiency of pest control depends on random events, namely the presence or absence of pest attacks. If there is no pest attack, then the input will not affect production. It may even cause waste and cause resistance and surgery to certain pests. The results of field observations also show that farmers use chemical pesticides to control pest attacks. This means that in facing risks in rice farming, farmers rely more on chemical pesticides.

4. CONCLUSION

1) Padi Inpari Unsoed 79 Agritan has a comparative advantage but does not have a competitive advantage
2) The results showed that the average level of technical efficiency achieved by farmers in rice farming Inpari Unsoed 79 Agritan in Nyamplungsari Village was 0.863 or less than 1.00 so it can be said that rice farming in Indonesia is still not technically efficient. Factors that affect the technical inefficiency of rice farming are age, farmer, formal education, and number of workers.
3) The production risk of Inpari Unsoed 79 Agritan rice farming is included in the low category with a CV value of 41.23%. The factors that influence the production risk of Inpari Unsoed 79 Agritan rice farming are seeds and pesticides. Seed is a factor that increases the risk, while pesticides are a factor that reduces the risk.

SUGGESTION

1) For the government, the policy of providing subsidies for fertilizers and seeds is continued so that farming businesses can be competitive, but the use of fertilizers by farmers should be reduced so that it is following the recommendations from the Department of Agriculture.
2) Rice farming has not been efficient. Therefore, it is necessary to increase the knowledge and skills of farmers through counseling, mentoring, and training to increase the outpouring of quality workers in managing their businesses intensively and efficiently.
3) Farmers should use quality seeds. Farmers can produce quality seeds by applying good cultivation aspects, from land preparation to harvesting, including spacing, fertilization, irrigation, protection against plant-disturbing organisms, roguing and harvesting.

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