PARTNERSHIP PATTERNS AND PRODUCTION FACTORS IN RICE FARMING
(Case Study: PT Ortani Mitra Sejahtera in Ponorogo Regency)

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ABSTRACT

Ponorogo Regency is one of the rice centers in East Java. However, farmers in Ponorogo Regency face challenges regarding limited capital for their agricultural activities and difficulties in obtaining fertilizers. PT Ortani Mitra Sejahtera is a company that partners with farmers in Ponorogo Regency to provide the necessary facilities. Therefore, this study aims to analyze (1) the partnership pattern between PT Ortani Mitra Sejahtera and partner farmers in Ponorogo Regency and (2) the factors influencing the production of partner rice farming. This research was conducted at PT Ortani Mitra Sejahtera in Ponorogo Regency from December 2023 to March 2024. This study used a mixed-method research design. A sample of 33 respondents was determined using purposive sampling method. Data analysis was performed using Maximum Likelihood Estimator (MLE) with frontier 4.1c software. The results showed that the partnership pattern between PT Ortani Mitra Sejahtera and farmers in Ponorogo Regency is Agricultural Operational Cooperation (KOA). Factors such as land area, ANR fertilizer, organic fertilizer, and pesticides significantly influence rice production. However, seeds, liquid organic fertilizer, and labor do not significantly affect rice production. It is recommended that PT Ortani Mitra Sejahtera establish a clear partnership framework through transparent written contracts to minimize risks. Farmers are advised to focus on managing factors that significantly influence rice production, such as land area, ANR fertilizer, organic fertilizer, and pesticide use, while evaluating other factors such as seeds, liquid organic fertilizer, and labor to improve rice production.
Keywords: partnership patterns, farming, rice.

ABSTRAK

Kabupaten Ponorogo merupakan salah satu sentra padi di Jawa Timur. Meskipun begitu, petani di Kabupaten Ponorogo mengalami kendala mengenai keterbatasan modal untuk menjalankan usahataninya dan kesulitan mendapatkan pupuk. PT Ortani Mitra Sejahtera merupakan perusahaan yang menjalin kemitraan dengan petani di Kabupaten Ponorogo untuk memfasilitasi sarana yang dibutuhkan petani. Oleh karena itu, penelitian ini bertujuan untuk menganalisis (1) pola kemitraan antara PT Ortani Mitra Sejahtera dengan petani mitra di Kabupaten Ponorogo dan (2) faktor-faktor yang mempengaruhi produksi usahatani padi mitra. Penelitian ini dilakukan di PT Ortani Mitra Sejahtera di Kabupaten Ponorogo selama bulan Desember 2023 sampai Maret 2024. Jenis penelitian ini adalah penelitian metode campuran. Penentuan sampel sebanyak 33 responden menggunakan metode purposive. Analisis

data menggunakan Maximum Likelihood Estmator (MLE) menggunakan software frontier 4.1c. Hasil penelitian menunjukkan pola kemitraan yang terjalin antara PT Ortani Mitra Sejahtera dengan petani Kabupaten Ponorogo adalah Kerjasama Operasional Agribisnis (KOA). Faktor luas lahan, pupuk ANR, pupuk hayati dan pestisida secara signifikan berpengaruh terhadap produksi padi. Sedangkan benih, pupuk organic cair dan tenaga kerja tidak berpengaruh signifikan terhadap produksi padi. Disarankan agar PT Ortani Mitra Sejahtera membangun kerangka kerja kemitraan yang jelas melalui kontrak tertulis transparan untuk meminimalisir resiko. Petani disarankan agar fokus pada pengelolaan faktor-faktor yang secara signifikan berpengaruh terhadap produksi padi seperti luas lahan, pupuk ANR, pupuk hayati, dan penggunaan pestisida, sambil mengevaluasi faktor lain seperti benih, pupuk organic cair, dan tenaga kerja untuk meningkatkan produksi padi.

***Kata kunci:** pola kemitraan, usahatani, padi.*

A. INTRODUCTION

Rice is the largest food crop commodity in Indonesia, with production reaching 55.67 million tons-GKG (BPS Indonesia, 2023). Indonesia is the fourth largest global rice-consuming country, consuming 35.3 million metric tons in 2022 (USDA, 2023). This happens because it is influenced by population, rice consumption, and rice production (Azzahra *et al.*, 2021). To meet domestic needs and reduce imports, the development of rice commodities is very important (Inayati, Suhartini, & Nugroho, 2022).

East Java as a province has the largest amount of rice harvest area, reaching around 1.698 million hectares in 2023 (BPS Jatim, 2023). Ponorogo Regency as one of the rice production centers in East Java province, has great potential for the development of rice farming due to its favorable topography and climate (BPS Ponorogo, 2022). Production figures for rice commodities in Ponorogo Regency have also fluctuated in the last five years as shown by the following data.
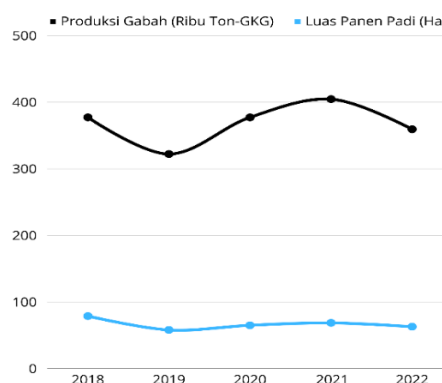
Source: (BPS Ponorogo, 2022) *data processed*

Figure 1. Grain Production and Rice Harvest Area in Ponorogo Regency 2018-2022

Fluctuating rice productivity can be influenced by various factors such as inappropriate crop cultivation technology, the use of inappropriate varieties, unbalanced fertilization, unwise use of pesticides, as well as disturbances from plant disruptors and the

impact of climate change such as floods and droughts (Maman, Aminudin, & Novriana, 2021). According to Heady & Dillon (1969), productivity is the ratio of total output and inputs used in production. Small-scale farms in Ponorogo Regency face several constraints, including the availability of agricultural raw materials such as fertilizers, seeds, pesticides, and medicines (Hank & Priyanto, 2018). Fluctuations in rice productivity indicate the production risks being faced by Ponorogo Regency farmers, including pest and disease disturbances, weather and climate uncertainty, inappropriate use of production factors, as well as socioeconomic factors such as age, education, capital, and family dependents that influence farmers' decisions in managing production risks (Haryadin & Hindarti, 2019). Production factors in farming include land area, seeds, fertilizers, and labor (Saeri, 2018).

Farmers in Ponorogo Regency face several common problems, including low productivity, limited availability of subsidized fertilizers, and financial constraints in purchasing agricultural inputs. The low productivity is attributed to farmers' limited ability to allocate production factors according to the conditions of their land (Anggiyanti, 2023). The limitation of subsidized fertilizers has arisen since the implementation of government policy regulations that only provide subsidies for Urea and NPK types. Financial constraints also arise due to the low productivity and reduction in subsidized fertilizer types, forcing farmers to purchase non-subsidized fertilizers at higher prices. Rice production in farming faces complex challenges because it is influenced by various production factors. The presence or level of suboptimal production factors can hinder overall rice production (Walis, Setia, & Isyanto, 2021).

The solution to overcome the problems in running the farm is through partnerships between farmers and institutions or companies providing agricultural production factors (Hafsah, 2000). A partnership pattern is established within a business to manage relationships among stakeholders. Partnership development offers benefits and advantages, including creating added value through collaboration with other organizations (Barusman, Gultom, & Redaputri, 2019). According to Waal (2010), some of the benefits of partnerships and value creation include reduced costs and improved quality of products and services through knowledge exchange and economies of scale. The success of partnering in value chains and value creation depends on strong relationship management, which includes structural aspects such as organizational design, conflict control, and conflict management, as well as behavioural aspects such as trust, commitment, coordination, dependability, and communication. To develop effective partnerships and value creation, it is important to create an environment where diversity is recognized and valued as each partner has different characteristics and will bring different contributions to the collaboration. This is in line with the research results Dewi (2021) that partnerships make it easier for farmers to obtain production costs used for cultivation and provide certain market guarantees with distribution according to mutual agreements. In line with research (Harisman, 2017) (Ilham, Hilma Meilani, & Tri Astutiningsih, 2022) (Intiaz, Subhan Prasetyo, & Prayoga, 2022) (Gusti, Gayatri, & Prasetyo, 2022) and (Ulpah, 2018) that the principle of this partnership is expected to increase farm production, be mutually

beneficial, increase technical efficiency, encourage the adoption of the latest technology, and expand business scale. PT Ortani Mitra Sejahtera is a company that establishes partnerships with farmers in Ponorogo Regency, providing various production input needs such as fertilizers, pesticides, working capital loans, alsintan facilities, farm shops and technical assistance. Membership in farmer organizations is important because farmers can obtain various facilities such as training, cheap fertilizer, and others. Through this partnership, it is expected that the problems faced by farmers can be resolved. The convenience and facilities provided by the company are expected to increase farmers' productivity after establishing a partnership (Zakaria, 2015).

Productivity is closely related to the use of production factors because productivity concerns how much output is produced for each unit of input (Rahim & Hastuti, 2008). With the proper use of production factors, it is expected to achieve optimal production and maximum profit for farmers (Maman *et al.*, 2021). This study is in line with the findings of previous research (Permatasari, 2020) (Budi, Wardah, & Zamzami, 2022) (Abdillah, Tinaprilla, & Adhi, 2022) (Hilary, Kibwika, & Sseguya, 2017) and (Aenunnisa, Hasan, Maulida, Ayomi, & Semarang, 2022) which indicate that partnerships can benefit farmers' agriculture. Although having advantages, research Kartika, Wijayanti, Zulkifli, & Novia (2023) states that partnerships have several weaknesses, such as excessive profit-taking by partner companies in marketing and product processing, the occurrence of monopsony, and the lack of a third-party role in problem-solving. For this reason, this research needs to be carried out to analyze the formulation of problems that occur about; (1) the partnership pattern between PT Ortani Mitra Sejahtera and partner farmers in Ponorogo Regency and (2) the factors influencing the production of partner rice farming in Ponorogo Regency.

B. RESEARCH METHOD

This research used mixed methods, qualitative and quantitative. The location in Ponorogo Regency was chosen purposively because it is a rice production center in East Java and PT Ortani Mitra Sejahtera is a company that establishes partnership programs with farmers in Ponorogo Regency. Data was obtained from primary data, which was conducted by direct interviews with farmers and key informants of the company using a structured questionnaire. This study also used secondary data, obtained from company data and the Central Bureau of Statistics. The sample of this study was taken using a purposive method involving 33 respondents, consisting of the team manager (1 person), field team (2 people), and partner farmers (30 people). The type of data taken is cross-section data. This data was collected from December 2023 to March 2024.

Analysis of the partnership pattern between PT Ortani Mitra Sejahtera and partner farmers was carried out descriptively. The second objectives were analyzed using the stochastic frontier production function method. The Cobb Douglass stochastic frontier production function (Debertin, 1986) was used for several reasons: (1) it is homogeneous; (2) it is simple; and (3) problems are rare. The first step of model formation is to determine the research variables. Seven independent variables were included in the following linear equation according to (Coelli & Battese, 1995):

$$LnY = Ln\beta0 + \beta1LnX1 + \beta2LnX2 + \beta3LnX3 + \beta4LnX4 + \beta5LnX5 + \beta6LnX6 + \beta7LnX7 + (Vi-Ui)$$
$$............(1)$$

Where: Y = total grain production (Kg); X1 = land area (ha); X2 = seed (Kg); X3 = ANR chemical fertilizer (Kg); X4 = biological fertilizer (Kg); X5 = Liquid Organic Fertilizer (liter); X6 = pesticide (liter); X7 = labor (HOK); $\beta0$; intercept; i: i-th respondent farmer; and β= estimated parameters; vi -ui : technical inefficiency effects in the model.   Sign and magnitude of expected parameters: $\beta i > 0$.

C. RESULTS AND DISCUSSION

Partnership Pattern

The characteristics of the respondent farmers in this study are on average 58 years old with an average education level of SMA (12 years), the average age of their rice farming is 34.4 years. The land ownership status of partner farmers is 70% owned land and the rest is rented. Most farmers have partnered with PT Ortani Mitra Sejahtera for the last one to three growing seasons. The average number of family members is four. This study shows that 90% of the farmers have been involved and active in mentoring activities.

PT Ortani Mitra Sejahtera has partnered with rice farmers in Ponorogo Regency since 2020. Initially, PT Ortani Mitra Sejahtera focused on product development research, so the partnership was not widely spread across all districts of Ponorogo Regency. Starting from early 2023, PT Ortani Mitra Sejahtera began to expand, covering all districts in Ponorogo Regency. This partnership does not involve written contractual agreements but rather relies on oral agreements. The company believes that oral contracts are simpler, easier to understand, and easier to implement with farmers in Ponorogo Regency. PT Ortani Mitra Sejahtera also prioritizes a synergistic partnership based on openness and trust. The partnership between PT Ortani Mitra Sejahtera and rice farmers is built on trust and openness between both parties. This trust arises from mutual need and benefit between them, so the rules applied are informal and always emphasized to partner farmers.

The agreements made jointly in the cooperation contract generally include setting the purchase price per quintal, quality, continuity of results, payment systems, and marketing of products. These agreements have been made by PT Ortani Mitra Sejahtera and partner farmers, but verbally. PT Ortani Mitra Sejahtera collaborates with relevant government agencies, such as the Department of Agriculture and Agricultural Extension Offices (BPP) in Ponorogo Regency. The process of recruiting prospective partners is conducted during program socialization in areas recommended by the local BPP. Prospective partners are selected through screening and land surveys by the company's team. Once prospective partner farmers and their land are deemed suitable and meet the requirements, they will be registered as partner members and enter into oral contracts with the company regarding SOPs and other provisions.

Prospective partner farmers are required to have commitment, honesty, and trustworthiness as the main requirements in carrying out the partnership. The land

requirements for prospective partner farmers include normal soil pH conditions, adequate water availability, and locations free from natural disasters such as floods or landslides. The minimum land area required is one plot or approximately 1,400m2. Good cooperation requires commitment from both parties to maintain trust. Benefits for partner farmers include easy access to post-harvest paid capital, market guarantees for crop yields, increased bargaining power in negotiations, and the establishment of close relationships. PT Ortani Mitra Sejahtera obtains benefits in the form of grain supply according to standards and quality, which will be processed into packaged rice, creating added value. Although partnerships provide several benefits, the weaknesses include the absence of risk sharing between both parties, so each risk must be borne individually. The partnership formed between partner farmers and PT Ortani Mitra Sejahtera is based on rights and obligations conveyed orally, with the following criteria:

1. Rights and Obligations of Partner Farmers

Partner farmers in agricultural practices will prepare their own production equipment and facilities such as land, labor, seeds, as well as other agricultural tools and equipment needed in the production process. Partner farmers are provided with ease in obtaining loan capital for production operations and ease of purchasing inputs such as fertilizers, nutrients, medicines, or pesticides to be paid when harvest arrives. Farmers who do not have harvesting machines on their premises can also use harvesting machines owned by the company. In addition, farmers have the right to receive technical assistance from the IFS team of PT Ortani Mitra Sejahtera, which periodically monitors and evaluates the condition of rice plants in the partner farmers' land in Ponorogo Regency. As part of the cooperation, farmers have the responsibility to follow the SOPs established by the company and are able to provide grain according to the company's demand with agreed-upon standards and quality.

2. Rights and Obligations of PT Ortani Mitra Sejahtera

PT Ortani Mitra Sejahtera is responsible for purchasing harvested rice from partner farmers at an agreed price. This price is determined by PT Ortani Mitra Sejahtera by adjusting market prices at that time. The price of rice may vary daily depending on market conditions. Payment to farmers is made according to the weight of the harvested yield that has been weighed, and payment is made in cash directly after harvesting. However, not all partner farmers sell their produce to PT Ortani Mitra Sejahtera. This can pose challenges in repaying capital loans from the company, especially if funds are used for other needs. The company has the right to receive quality harvests or grains. Criteria for quality grains include a moisture content of around 25%, physiologically ripe (not too old or too young), and quantity in accordance with company standards.

The cooperation pattern between PT Ortani Mitra Sejahtera and farmers does not involve written contracts to regulate the agreement between both parties in the partnership. Instead, agreements are made verbally and informally. The pricing is adjusted by referring to the market price of dry harvested rice at that time. Quality standards are clearly defined after passing quality control. The arrangement of rice delivery is the

responsibility of PT Ortani Mitra Sejahtera. Government support in this regard comes through cooperation with the Department of Agriculture and Agricultural Extension Services in Ponorogo Regency. The cooperative relationship in the partnership between the company and partner farmers is based on a high level of trust and openness, enabling agreements to be reached even without a written contract. Regarding partnership risks, farmers are responsible for production-related risks, including the risk of crop failure due to pests or natural disasters, which are not the responsibility of PT Ortani Mitra Sejahtera. This partnership covers several aspects such as access to capital, fulfillment of rice supply according to specific standards and criteria, quality control, as well as grain storage and marketing. In implementing this partnership, the company also has a cooperation program called "Kawan Ortani." This program involves the Ortani IFS team with the leaders of farmer groups or farmers who have communities. Farmers who become Kawan Ortani play a role in assisting the IFS team in collecting partner candidate documents and helping to convey the current conditions related to the cultivation of partner farmers' land to field team officers. Kawan Ortani is obliged to recommend partnership programs to their community members. In addition, Kawan Ortani also has the right to receive Kawan Ortani fees per unit area per planting season, free agricultural training for their community, membership in the Kawan Ortani community, and the opportunity to receive Corporate Social Responsibility (CSR) programs from the company. This partnership benefits both parties, with increased income being one of the outcomes while maintaining sustainable business continuity.

The results of identifying partnership patterns between PT Ortani Mitra Sejahtera and partner farmers are closer to the Agribusiness Operational Cooperation (KOA) partnership pattern. The KOA partnership pattern usually involves role division between partner farmers and partner companies. Partner farmers provide land, labor, production equipment, and production facilities such as seeds, while the company provides production input facilities such as fertilizers, capital, machinery, and other production inputs, as well as technical assistance. The Agribusiness Operational Cooperation (KOA) partnership conducted by the company with farmers benefits the farmers by providing production facilities such as easy access to production inputs like fertilizers, nutrients, pesticides, technical assistance, and even financial assistance in the form of loans for farmers. Thus, this partnership can be advantageous for farmers. The KOA partnership pattern between PT Ortani Mitra Sejahtera and farmers in Ponorogo Regency can be depicted as shown in the following diagram.
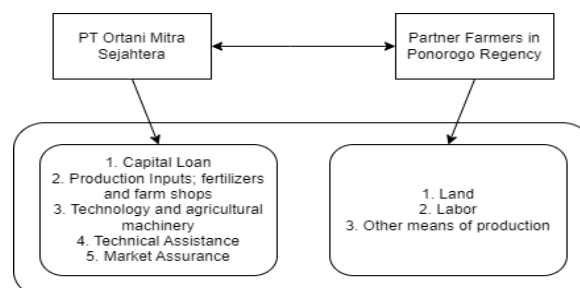

Figure 2. PT Ortani Mitra Sejahtera Partnership Pattern with Partner Farmers

The advantages of the Agribusiness Operational Cooperation (KOA) partnership pattern in rice farming include the company offering agricultural loans, benefiting farmers with limited capital. The company provides production facilities in the form of easy-to-access production input services where farmers can simply place orders and have them delivered to their homes. Other facilities such as technical assistance are also highly beneficial for farmers as they enable knowledge transfer and eliminate the hassle of obtaining production facilities and extension services. If farmers experience crop failure, the company will conduct field surveys and provide guidance to the farmers. However, there are also weaknesses in the KOA pattern, such as potential disputes if one of the parties fails to fulfill their agreed rights and obligations. The research results indicate that partnering with PT Ortani Mitra Sejahtera greatly benefits farmers in meeting their production input needs, especially fertilizers, which are a major issue for farmers in Ponorogo Regency. The partnership between PT Ortani Mitra Sejahtera and partner farmers in Ponorogo Regency serves as one solution to the current challenges faced by farmers, including difficulties in accessing fertilizers, funding issues, and market uncertainties. Additionally, the company does not burden the farmers, resulting in a relatively good social bond between the company and the farmers.

Factors Affecting Rice Production

Stochastic frontier analysis using the Maximum Likelihood Estimator (MLE) approach was analyzed with the help of frontier 4.1c software. In the first stage, classical assumption tests such as multicollinearity, normality, and heteroscedasticity were conducted. Estimation of the production function with the OLS method shows that the data model does not experience deviations and is suitable for use. Furthermore, model evaluation must be carried out, namely the coefficient of determination or R-Square test and the F test. The results of the adjusted R-Square test show the results of independent variables can explain rice production by 88.1% as a whole, the rest is influenced by factors outside the model. The F test shows significant results. Therefore, it can be concluded that the independent variables in the model affect rice paddy production of PT ORTANI MITRA SEJAHTERA partner farmers simultaneously. The next step is to estimate the production function with the MLE method using Frontier 4.1c software. The results are summarized in

Table 1. Estimation results of the frontier stochastic production function MLE method

Variable	Parameter	Coefficient	Standar error	t hitung
Constant	α	4,005	0.499	8,013
Land area	β_1	1,079***	0,175	6,143
Seed	β_2	0,011	0,062	0,189
ANR Chemical Fertilizer	β_3	0,192*	0,105	1,831
Biofertilizer	β_4	0,107**	0,045	2,376
Liquid Organic Fertilizer	β_5	0,019	0,038	0,499
Pesticide	β_6	-0,117*	0,044	-2,614
Labor	β_7	0,060	0,254	0,236
Sigma squared		0,071**		2,504
Gamma (γ)		0.907***		7,962

Log likelihood OLS	27,015
Log likelihood MLE	53,734
LR test of one side error	53,436
$\sum \beta_i$	0,966

Source: Primary Data, Processed (2024)

Note: *** : significant at α = 1%; ** : significant at α = 5%; * : significant at α = 10%

Table 1. depicts that the log likelihood value using the MLE method (53.734) is higher than the log likelihood value using the OLS method (27.015), indicating that the production function using the MLE method is good and suitable for the conditions of the partner farmers' farming in Ponorogo Regency (Imas Minarsih & Waluyati, 2019). The resulting sigma square value approaches zero, specifically 0.071. This indicates that the distribution of the error term of technical inefficiency (ui) tends to be normal. The gamma (γ) value approaching one, namely 0.907, shows that the majority (90.7%) of the error term originates from inefficiency (ui). Meanwhile, the remaining small portion (0.093) is due to noise (vi), such as weather, climate, diseases, and other factors unrelated to inefficiency (Monica, Hartati, & Wijayanti, 2021). If the γ value approaches zero, then most of the error term will be considered as noise (vi), which may render the coefficient parameter of inefficiency meaningless. The resulting Generalized Likelihood Ratio (LR) value is 53.436, exceeding the value in the table Kodde & Palm (1986) at α = 0.05, which is 33.333. This indicates that production is influenced by the efficiency and technical inefficiency factors of the respondent farmers. The value of $\sum \beta_i = 0.966$ indicates that the simultaneous use of production factors in the rice farming of partner farmers in Ponorogo Regency experiences the phase of Decreasing Returns to Scale. This finding aligns with the study by Anggiyanti (2023), which shows that each addition of one percent of the same input proportion results in a progressively decreasing increase of 0.966 percent.

The average production achieved by farmers is 7,610 kg/ha per planting season, while based on the estimation results of the production frontier, it should be able to reach up to 10,933 kg/ha per planting season. Table 4.10 shows that the elasticity of the land area production factor is positively valued at 1.079 (β1 > 0), and the t-value of the land area production factor is 6.143 > the critical T-value at α (0.01). This indicates at a 99% confidence level, the land area production factor (X1) has a significant influence on the production of partner farmers' rice farming. Assuming ceteris paribus, every 1% increase in land area production factor will result in a 1.079% increase in rice production. This is consistent with the statement by Soekartawi (1994) which asserts that an increase in land area is positively correlated, meaning that by expanding the land, production will increase. With increased production, farmers' income will rise, leading to an increase in the profits obtained as well.

The seed production factor (X2) has a positively signed elasticity value of 0.011 (β2 > 0). The t-value of the seed production factor is 0.189 < the critical t-value at α (0.10). This implies that the seed factor does not significantly influence rice production, a finding consistent with the study by Anton, Yurisimthae, & Dolorosa (2020). It means that neither

the variety nor the quantity of seeds used by farmers significantly affects rice production. The positive elasticity value of the seed variable indicates that a one percent increase in the seed factor (X2) will lead to a 0.189 percent increase in rice production, assuming all other variables remain constant (ceteris paribus).

The elasticity value of the ANR fertilizer variable (β3) is positively signed at 0.192. The t-value of the ANR fertilizer variable (X3) is 1.831 > the critical T-value at α (0.10). Thus, partially, the ANR fertilizer production factor significantly influences rice production. The positively signed elasticity value means that an increase in the use of ANR fertilizer by 1% will increase rice production by 0.192% assuming other factors remain constant. Therefore, increasing the use of ANR fertilizer is necessary to increase production. This is consistent with the findings of the study conducted by Putra, Widayaningsih, & Binardjo (2021) which stated that fertilizer application has a significant impact on rice farming productivity. Therefore, these results indicate the need to increase the use of ANR fertilizer to improve production yields. Based on the Standard Operating Procedure (SOP) established by PT Ortani Mitra Sejahtera, the application of ANR fertilizer in each land plot should ideally be 100 kilograms per plot or equivalent to 700 kilograms per hectare of rice fields. However, in the context of this research, partner farmers on average only used 691 kilograms per hectare of ANR fertilizer for rice farming.

The elasticity value of the biofertilizer variable (β4) is positively signed at 0.107. The T-value of the biofertilizer variable (X4) is 2.376 > the critical T-value at α (0.05). Thus, partially, it significantly influences rice production. The positively signed elasticity value means that a 1% increase in the use of biological fertilizer will increase rice production by 0.107% assuming other factors remain constant (ceteris paribus). Therefore, increasing the use of biological fertilizer is necessary to increase production. Therefore, this indicates that the use of biofertilizers needs to be increased to enhance production. According to the Standard Operating Procedure (SOP) of PT Ortani Mitra Sejahtera, the application of biofertilizers in each land plot should be 1 kilogram per plot or equivalent to 7 kilograms per hectare of rice fields. However, in the research area, partner farmers on average only used 6.77 kilograms per hectare of biofertilizers for rice farming.

The elasticity value of the Liquid Organic Fertilizers variable (β5) is positively signed at 0.019. The t-value of the Liquid Organic Fertilizers variable (X5) is 0.499 < the critical t-value at α (0.10). This means that partially, the Liquid Organic Fertilizers production factor does not significantly affect rice production. This is likely due to the rice already being sufficiently nourished by chemical fertilizers and biofertilizers, resulting in the insignificant effect of liquid organic fertilizer on rice production. The positive elasticity value of the liquid organic fertilizer variable indicates that every one percent increase in liquid organic fertilizer production input would increase rice production by 0.019 percent, assuming all other variables remain constant (ceteris paribus). This aligns with the findings Salam, Sarker, & Sharmin (2021), which state that fertilizer application influences rice farmer productivity. According to the Standard Operating Procedure (SOP) of PT Ortani Mitra Sejahtera, the application of liquid organic fertilizer in each land plot should be 1.25 liters

per plot or approximately 8.75 liters per hectare of rice fields. However, in the research area, partner farmers on average used 11.24 liters per hectare of liquid organic fertilizer for rice farming.

The pesticide variable (X6) has a negatively signed elasticity value of 0.117 or β6 > 0. The t-value of the pesticide variable is 2.614 > the critical t-value at α (0.05). This indicates that, partially, the use of pesticides has a significant impact on rice production at a confidence level of 95 percent. The negative elasticity value of the pesticide variable indicates that every 1 percent increase in pesticide use will reduce production by 0.117 percent, assuming all other factors remain constant (ceteris paribus). Pesticides are one of the production factors that reduce production risk. This is consistent with the findings of Moonik, Kaunang, & Lolowang (2020), stating that pesticide use has a negative and significant impact on rice productivity. Continuous use of chemical pesticides tends to kill pests and natural predators, and controlling them with pesticides has a slower reaction compared to pest growth. Therefore, pesticide use no longer has a significant impact on production output.

The labor variable elasticity value ($\beta7$) is positively signed at 0.060. The t-value of the labor variable (X7) is 0.236 < the critical t-value at α (0.10), which is 1.72. This implies that, to some extent, the labor factor (X7) does not significantly impact rice production. This aligns with Oktavia (2018), which concluded that labor does not have a significant effect on rice productivity. This assumption may be because many partner farmers have adopted agricultural machinery and equipment in their operations. Thus, the use of labor, whether in large or small quantities, does not significantly affect rice production. However, the positive elasticity value of the labor factor suggests that a one percent increase in labor usage would increase rice production by 0.060 percent, assuming other factors remain constant (ceteris paribus). An increase in the number of laborers will result in increased output.

Based on the estimation of parameters of the stochastic production frontier function, land area, ANR fertilizer, and biological fertilizer have a significant and positive influence on rice production. Meanwhile, pesticides have a negative and significant effect on rice production. These inputs are production factors that can shift the production function towards its limit or frontier.

D. CONCLUSION

The research findings indicate that the partnership pattern between farmers and PT Ortani Mitra Sejahtera follows the pattern of Operational Agribusiness Cooperation (KOA), where the company provides easy access to production inputs, agricultural machinery, farm supply stores, market guarantees, and loans, while farmers provide land, labor, and other facilities. Production factors such as land area, ANR fertilizer, and organic fertilizers have a positive and significant impact on rice production, while pesticide use has a negative and significant impact. However, factors like seeds, liquid organic fertilizers, and labor do not significantly affect rice production. A suggestion for this partnership is to implement clear written contracts, including risk-sharing within the partnership framework, to reduce uncertainty and build trust between both parties. Additionally, farmers are

advised to focus more on optimizing important factors such as land area, ANR fertilizer, organic fertilizers, and pesticide use, and to continually evaluate other factors such as seed quality, liquid organic fertilizers, and labor to improve rice production.

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