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Investigating Risk of Organic Rice Production in Kapanewon Prambanan: Comparative Study with Non-Organic Rice Farming

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ABSTRACT

The transition from conventional farming to organic is continuously increasing over time. Organic farming, particularly rice production is becoming more popular among farmers due to higher prices and increased consumer demand for organic food products. Despite the significant increase, the transition from conventional farming is followed by the occurrence of risk during production. Therefore, this study aimed to investigate the factors influencing production and risk of organic and non-organic rice farming in Sleman Regency. A total of 45 farmers data were obtained using purposive sampling and data collection was carried out through interview method. The Just and Pope method was used in analyzing the determinants of production and risk factors. The results showed that the membership period in farmer groups, land area, education, and manure significantly affected farming production. Based on the analysis, organic rice farming was proven to produce higher production than non-organic. The factor that significantly increased production risk was the length of membership period in farmer groups, as those who joined groups had the potential to face a higher risk. Consequently, the government is expected to provide support by empowering farmer groups to support organic rice farming. Intensive assistance can also be carried out to ensure that the role of the chairperson and members functions optimally.

INTRODUCTION

Organic farming is becoming an attractive agricultural system, including for rice farmers due to increased consumer demand (Yu et al., 2021; Hazra et al., 2018). This is supported by the current consumer demand for organic rice, particularly in urban areas, which has increased awareness of the need for healthy food, the importance of maintaining environmental quality and biodiversity (Sulistyana et al., 2014). Organic farming is considered a solution to various problems in the agricultural sector for the long term. In terms of cultivation, agricultural systems that transitioned from inorganic to organic

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raises several problems, including decreased production (Wibowo et al., 2019). This is caused by the habit of conventional farming using chemical inputs such as fertilizers to support production and chemical pesticides that play a role in the process of protecting plants from various types of pests and diseases. Sacco et al ., (2015) confirmed that the use of chemical inputs has reduced yield in the initial phase of organic farming adoption due to the lower soil nutrients in organic fertilizers. This shows that organic farming offers a higher risk of production, particularly in the initial year of adoption compared to non-organic rice farming. Furthermore, obstacles in organic rice farming arise from the limited availability of fertilizers, infrastructure, and difficult access to credit (Noormansyah & Cahrial, 2020: Nuzulianur Puteri & Fauzi, 2020: Sujianto et al., 2022).

Several different perceptions have been observed between organic and non-organic farmers in terms of production, quality, health and safety, price and market, environmental concerns, as well as certification. However, these farmers have more positive perceptions than non-anorganic (Sujianto et al., 2022). Rahayu et al., (2021) conducted risk of production study but excluded the socio-economic characteristics of farmers. This shows the need for investigation of the factors of both inputs and socio-economic aspects. Therefore, this study aimed to determine the differences in the factors influencing production and its risk in organic and non-organic farming. Previous comparison studies have only focused on the efficiency and perceptions of farmers toward organic farming. Furthermore, the risk of organic and non-organic rice production is generally influenced by several factors such as land area, seed quantity, farmers' education and age, farming experience, including the use of fertilizers and pesticides.

METHODS

This study was conducted in Gamparan Hamlet, Sumberharjo Village, Kapanewon Prambanan, Sleman. The location was selected because of the existence of different farmer groups that carry out organic and non-organic rice farming, while having similarities in terms of topography. The primary data was obtained through interviews with 20 organic and 25 non-organic farmers selected by random sampling. The basis for determining the sample size was determined using the purposive sampling method, referring to the availability of farmers who met the criteria for respondents. Before analyzing risak factors, there is a need to perform a regression analysis to determine the factors influencing rice production. The Cobb-Douglas production theory is the basis for preparing the regression model. The first model used in this study is as follows:

$$Prod = \beta_0 + \beta_1 Seed + \beta_2 Liqu + \beta_3 OFer + \beta_4 Chem + \beta_5 Land + \beta_6 Fare + \beta_7 Fami + \beta_8 Exgro + \beta_9 Educ + \beta_{10} Ages + \beta_{11} D_1 + \beta_{12} D_2 + \beta_{13} D_3 + \varepsilon_1 \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

where Prod shows rice production, β_0 is a constant and β_1-β_{13} refers to the coefficient of independent variables describing farming inputs. These include seed (seed), liquor (POC), OFer (manure), Chem (chemical fertilizer), and land (land area). Socio economic factors of farmers are also used as variables consisting of Fare (farming experience), Family (number of family members), Exgro (membership period in farmer groups), education error term. In this model, there are three three dummy variables, namely D_1. D_2, and D_3 which respectively show engangement in farmer groups (1 = member, 0 = not member), the agricultural system applied by farmers (1 = organic, 0 = non-organic) and refugia planting (1= refugia, 0 = no refugia). This model is used to determine the factors that influence rice production.

Analysis of the factors affecting risk of organic and non-organic rice production is based on Cobb-Douglas production using the OLS regression method. This study used Ordinary Least Squares (OLS) model because it applies the Cobb-Douglass production function, which is a component of the Just and Pope risk model (Just & Pope, 1979. OLS defines risk function assuming that the inputs increase or decrease production risk measure in terms of output variance. To carry out rice production risk analysis, OLS regression must be performed by making rice production the dependent variable to obtain squared error value. This model has been applied in previous studies (Guttormsen & Roll, 2014; Kasim et al., 2019), with the equation expressed as follows.

$$\varepsilon_1^2 = a_1 + a_1 Seed + a_2 Liqu + a_3 OFer + a_4 Chem + a_5 Land + a_6 Fare + a_7 Fami + a_8 Exgro + a_9 Educ + a_{10} Ages + a_{11} D_1 + a_{12} D_2 + a_{13} D_3 + \mu_1 \ldots\ldots\ldots\ldots (2)$$

where shows risk of rice production, a_0 is a constant and a_1-a_9 refers to the coefficient of each independent variable. Meanwhile, the independent variables used in this model seed (seed), liquor (POC), OFer (manure), Chem ε_1^2 (chemical fertilizer), and land (land area). Socio-economic factors of the farmers are also used as variables consisting of Fare(Farming experience), Family (number of family members), Exgro (membership period in farmer groups), Educ(Education), and Ages (age of farmers), where ε_1 stands for the error term. In this model, there are three dummy variables, namely D1, D2, and D3, which respectively show engagement in farmer groups (1 = member, 0 = not member), the agricultural system applied by farmers (1= organic, 0 = non-organic) and refugia planting (1= refugia, 0 = no refugia).

RESULT AND DISCUSSION

Summary statistics

Organic rice farming is a promising business for farmers due to high selling price, the need for relatively cheap inputs, and contribution to environmental preservation. In a previous study, Juni et al., (2022) stated that organic

Table 1. Summary statistics of organic and non-organic rice farming

Variable description		Organic (N= 20)		Non-Organic (N=25)		All (N=45)	
		Mean	St.dev	Mean	St.dev	Mean	St.dev
PROD	Production (kg)	466.77	551.54	234.45	190.07	337.71	406
AGES	Ages (year)	54.6	12.76	52.88	11.63	53.64	12
FAMI	Family	2.4	0.99	3.04	1.4	2.76	1.26
EDUC	Education (year)	6.5	3. 99	9.12	4.06	7.96	4.19
FARE	Farming experience (year)	27.5	15.56	25.34	17.35	26.3	16.4
LAND	Land (m2)	1619.9	1330.37	1133.2	783.7	1349. 51	1077
SEED	Seed (kg)	5.23	1.61	7.1	4.2	6.27	3.41
LIQU	Liquid	1372.5	3712.02	80	400	654.44	2541
CHEM	Chem	0	0	34	30.14	18.89	28.1
OFER	Manure (kg)	1350.95	1686.67	190.2	419.34	706.09	1290
MEMB	Farmers group	0.95	0.22	0.76	0.44	0.84	0.37
EXGRO	Experience in farm group (year)	7.3	6.7	7.44	5.8	7.38	6.14
PRODV	Productivity (kg/m2)	0.25	0.1	0.22	0.1	0.23	0.1

Source: Primary data analysis (2023)

farming had a significantly higher income compared to non-organic. Therefore, promoting organic farming may be an attempt to help small-scale farmers become more profitable and maintain sustainable production of healthier food for the environment and consumers. Increasing public awareness of the importance of healthy food can also motivate consumers. Table 1 shows summary statistics regarding the variables used in the comparative study of organic and non-organic rice farming in Kapanewon Prambanan, Sleman, Indonesia.

Based on the comparison, the productivity of organic farming shows higher results. This is supported by a study from Lien et al., (2022) where organic rice farmers produce higher amounts of grain than non-organic farmers. On average, the age of non-organic farmers who were respondents was younger. However, organic farmers have longer experience, which is directly proportional to the ability to manage farming.

Regarding the use of inputs, the data in Table 1 shows that the average use of seeds by organic farmers is lower. Similarly, Heryadi et al., (2021) found that a selection was made based on the seeds to be planted in organic rice farming. This caused the seeds to focus more on the quality than the quantity (Siswanti et al., 2021). Additionally, it shows the replacement of chemicals with organic liquid fertilizer and manure. Sholihah et al., (2018) stated that the use of manure focused on improving plants resistance to attacks by pest and diseases.

Puteri & Fauzi, (2020) stated that organic farming had a higher risk of crop failure due to the presence of weeds, pests, and diseases, particularly during transition. This is one of the factors contributing to the slow development of organic farming businesses. Moreover, farmers are unable to benefit from higher prices due to the inability to manage the packaging of organic rice. This leads to the selling of crops in the form of harvested dry unhusked rice to the Kompagyo farming cooperative.

Figure 1 shows where the agricultural harvest from non-organic rice farming is sold. However, some farmers decid enot to sell their crops, as the entire harvest is for consumption by family members comprising 40% non-organic and 10% organic farmers. Most of the harvest is sold to middleman, accounting for 44% and 55% of non-organic and organic farmers, resepectively. The significant difference is observed in middlemen, where non-organic farmers sell their crops to the nearest traditional market (8%) and mills (8%).

Figure 2 shows that 35% of organic farmers have agreed to sell their crops to the Kompagyo agricultural cooperative. The fact that fewer organic farmers sell their grain to cooperatives than to middlemen is quite unfortunate. This is because cooperatives are established to support the sustainability of organic

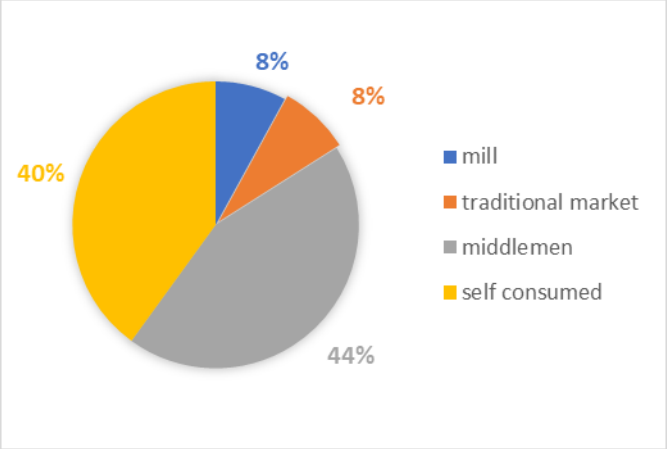

Figure 1. Sales objective of non-organic rice farming
Source: Primary Data Analysis (2023)

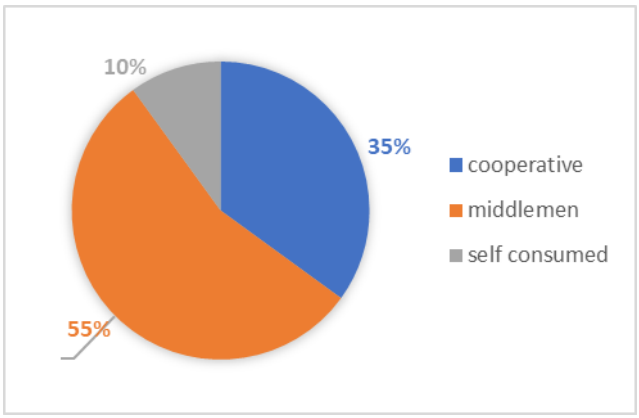

Figure 2. Sales objective of organic rice farming
Source: Primary Data Analysis (2023)

agriculture in terms of marketing, access to information, and capacity to increase production(Bachke, 2019: Zhong et al., 2018). To overcome this challenge Mojo et al., (2017) recommended the development of useful mechanisms to contribute to agricultural cooperatives by building more meaningful, attractive price, and sustainable groups. Moreover, certification of organic farming is beneficial in offering higher selling prices and non-financial benefits through better management and more resilient cooperation(Snider et al., 2017). It can also increase the ability to manage risk during organic rice production.

Factors affecting rice production

Rice farming is affected by several factors, such as climatic, socio -economic, and technical factors as shown in Table 2. In this study, the technical factors used were the inputs while socio-economic factors consists of farmer groups and farming system. Based on the regression analysis, there are seven variables that have a significant effect on rice production in Gamparan Hamlet. These variables are the quantity of liquid organic fertilizer, manure, land area, time period as members of farmer groups, education, dummy farmer groups, and dummy organic farming system.

Liquid Organic Fertilizer (POC) has a negative and significant effect on rice production, where adding 1 ml of POC will reduce production by 0.02 kg. Similarly, Mardiana (2021) stated that the addition of 0 mL POC produced the highest rice weight per plot for the Logawa rice variety, while 20 mL POC yielded the lowest compared to other treatments. The results showed that the addition of 1 kg of manure caused an increase in rice production by 0.11 kg. Organic fertilizers have the ability to enhance soil nutrients by acting as a plagrowth regulator and biodiversity; thus, (Walis et ai., 2021: Irfan et al., 2019)in their previous studies shown that the use of organic fertilizers in accordance

Table 2. Factor estimates of average production and risk function of organic and non-organic rice farming

Variables	Coefficient	Std error
Mean Production Function		
C	-315. 97	235.28
SEED	2.82	8.08
LIQU	-0. 02**	0.01
OFER	0.11***	0.03
CHEM	0.63	0.93
LAND	0.20***	0.03
FARE	-0. 91	1.93
FAMI	25.64	19.86
EXGRO	15.27***	5.48
EDUC	13.15*	7.33
AGES	1.86	3.59
MEMB	-163. 60**	69.66
ORGANIC	136.62*	70.71
REFUGIA	9.20	44.13
Risk Function		
C	-19119. 00	26186.25
SEED	1220.09	899.46
LIQU	-0. 99	0.89
OFER	1.28	2.95
CHEM	-41. 25	104.05
LAND	1.36	3.37
FARE	-10. 70	214.66
FAMI	-3320. 90	2210.73
EXGRO	-1155. 12*	609.38
EDUC	705.76	816.06
AGES	413.08	399.17
MEMB	15491.48*	7753.14
ORGANIC	-8726. 53	7869.38
REFUGIA	-834. 84	4911.45

***Significant at 1% level, ** significant at 5% level, * Significant at 10% level

Source: Primary data analysis (2023)

with the recommended amount required significant consideration to be applied in order to optimize the potential for rice production (Hazra et al., 2018). According to Gao et al., 2023), manure derived from animals is more effective than plant fertilizers (Hou et al., 2023).

Land area also has a positive and significant effect on rice production. When land area increases by 1 $m^{2,}$ production rises by 0.20 kg, in other words, showing a significant rise of 2 tons for every 1 hectare. It is also a determining factor in rice production, as a larger area corresponds to

greater production (Aenunnisa et al., 2022; Defriyanti, 2019).

Based on social-economic factors, farmer groups membership significantly affects rice production. The regression results showed that farmers who were members tend to have lower production. However, the length of time significantly contributed to the increase in rice production. In this case, an increase in membership period for one year can improve production by approximately 15.27 kg. Varieties of farmers' motivations in joining farmer groups are assumed to play a role in shaping this condition. This is because some join the groups to obtain subsidies for farming inputs and are not actively engaged in activities related to cultivation methods to increase production. Besides, the adoption to innovation also depends on the type of technology being disseminated and extension officer (Ainembabazi et al., 2017).

Group members who have been joining for a long time have different motives, as the main motivation is to share knowledge and increase production. Therefore, a longer length of time increases the tendency for a rise in production. Study conducted by Abdul-Rahaman & Abdulai, (2018) in Ghana showed that participation in farmer groups was associated with increased yields and technical efficiency. Additionally, the gap in results and efficiency between group members and non-members increased significantly. Farmer groups also play a role in decision-making by increasing selection and facilitating the development of insight into the consequences (Nalle et al., 2023).

Farmer education has a positive and significant effect on rice production. This is because educated farmers show a significant relationship with higher capability in adopting innovations through several media resources (Sapbamrer & Thammachai, 2021). Education plays an important role in improving efficiency and gaining knowledge through participation in local groups/associations (Van Vu et al., 2019). Therefore, efficient farming will tend to produce optimal production.

Based on regression analysis, farming system applied shows a significant effect on production. This is due to the high production observed among organic farmers compared to non-organic. Irfan et al., (2019) stated that organic rice production was higher than non-organic due to cultivation on freshwater ecotoxicity, terrestrial acidification, ozone creation (human health), and fine particle formation (Mahmood & Gheewala, 2023). According to Smith et al., (2012), there is a need to consider high yield variability in organic farming. This shows that better risk management is essential for organic farmers to manage the variability.

Factors affecting rice farming production risk

Table 2 shows the results of the analysis of production risk function. In this context, he influencing factor is significantly related to the membership in farmer groups. The

analysis results confirm that farmers who are included in farmer groups significantly show higher production risk. This is supported by Rahayu et al., (2021), where membership significantly and positively affects farmers' needs for farming risk management strategies. Therefore, the existence of farmer groups must be met to support the implementation of organic farming system (Irham et al., 2020). Farmers who are members have access to subsidies from the government. Consequently, come farmers join groups only to gain access to subsidized assistance from the government in the form of farming inputs.

The length of time in farmer groups significantly reduces risk of farming production. This confirms that longer participation correlates with more knowledge and skill from agricultural extension workers or related agencies. These skills have a positive impact on farmers in reducing production risk. In line with the study by Dalmiyatun et al., (2018), support from groups is a significant contributor to the cultivation of organic agriculture. Farmers who receive adequate information and training are more proficient in dealing with various dynamic challenges, particularly climate change. Therefore, the existence of farmer groups should be supported to expand social networks in transferring knowledge, thereby facilitating active and strong risk management (Utaranakorn & Yasonobu, 2016). To achieve this objective, support from the government, collaboration between the study team, farmers, and agricultural extension workers are needed for continuous development of innovations that can strengthen the organization and existence of organic farming (Begum et al., 2023).

CONCLUSION AND SUGGESTION

In conclusion, this study investigated the factors influencing production and risk from organic and non-organic rice farming. The investigation was carried out to provide an overview of essential factors that should be considered in formulating policies to support the development of sustainable agricultural system. The analysis results showed that factors influencing rice production included liquid fertilizer, manure, land area, farmer groups membership, experience, and farming system. Meanwhile, factors influencing risk of rice farming production were experience in farmer groups and membership. The policy implication of this study showed that the roles of institutions were related to farming, such as farmer groups and agricultural cooperatives. These institutions should be supported by various empowerment programs, such as training and assistance to optimize the benefits of the existence of farming institutions as pillars of the sustainability of organic rice farming in Kapanewon Prambanan, Sleman.

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REFERENCE

Abdul-Rahaman, A., & Abdulai, A. (2018). Do Farmer Groups Impact on Farm Yield and Efficiency of Smallholder Farmers? Evidence from Rice Farmers in Northern Ghana. *Food Policy, 81, 95–105.* https://doi.org/10.1016/j.foodpol.2018.10.007

Aenunnisa, N.-, Hasan, Z., & Ayomi, N. M. S. (2022). The Economic Efficiency of Rice Farming Production Factors in Karawang Region. *Agro Ekonomi, 33(2), 67.* https://doi.org/10.22146/ae.66704

Ainembabazi, J. H., van Asten, P., Vanlauwe, B., Ouma, E., Blomme, G., Birachi, E. A., Nguezet, P. M. D., Mignouna, D. B., & Manyong, V. M. (2017). Improving the Speed of Adoption of Agricultural Technologies and Farm Performance through Farmer Groups: Evidence from the Great Lakes Region of Africa. *Agricultural Economics (United Kingdom),* 48(2),241-259. https//doi.org/10.1111/agec.12329

Bachke, M. E. (2019). Do Farmers' Organizations Enhance the Welfare of Smallholders? Findings from the Mozambican National Agricultural Survey. *Food Policy, 89.* https://doi.org/10.1016/ j.foodpol.2019.101792

Begum, R., Sharmin, S., Mitra, S., Akhi, K., Deb, L., Kamruzzaman, M., & Khan, M. A. (2023). Production Risk and Technical Onefficiency of bean (Phaseolus vulgaris) Cultivation in Bangladesh: Do Socio-Economic Factors Matter? *Social Sciences and Humanities Open, 7(1).* https://doi.org/10.1016/ j.ssaho.2023.100417

Dalmiyatun, T., Eddy, B. T., Sumekar, W., & Mardiningsih, D. (2018). Motivation of Farmers to Cultivate Organic Rice in Central Java. *IOP Conference Series: Earth and Environmental Science, 102(1).* https://doi.org/10.1088/1755-1315/102/1/1/012043

Defriyanti, W. T. (2019). The Effect of Rice Field Area and Planting Area on Rice Production in South Sumatra through Regression Analysis. *Publikasi Penelitian Terapan Dan Kebijakan, 2(2),* 122–124.

Gao, P., Zhang, T., Lei, X., Cui, X., Lu, Y., Fan, P., Long, S., Huang, J., Gao, J., Zhang,Z., & Zhang,H. (2023). Improvement of Soil Fertility and Rice Yield after Long-term Application of Cow Manure Combined with Inorganic Fertilizers. *Journal of Integrative Agriculture.* https://doi.org/10.1016/j.jia.2023.02.037

Guttormsen, A. G., & Roll, K. H. (2014). Production Risk in a Subsistence Agriculture. *Journal of Agricultural Education and Extension,* 20(1), 133-145. https:// doi.org/10.1080/1389224X.2013.775953

Hazra, K. K., Swain, D. K., Bohra, A., Singh, S. S., Kumar, N., & Nath, C. P. (2018). Organic Rice: Potential Production Strategies, Challenges and Prospects. *Organic Agriculture (Vol. 8, Issue 1,* pp. 39 -56). Springer

Netherlands. https://doi.org/10.1007/s13165-016-0172-4

Heryadi, D. Y., Rofatin, B., & Noormansyah, Z. (2021). Semi-organic Rice Farming as a Transition Period to Organic Rice Farming. *Paspalum: Jurnal Ilmiah Pertanian, 9(1),* 53. https://doi.org/10.35138/paspalum.v9i1.277

Hou, Q., Ni, Y., Huang, S., Zuo, T., Wang, J., & Ni, W. (2023). Effects of substituting chemical fertilizers with manure on rice yield and soil labile nitrogen in paddy fields of China: A meta-analysis. *Pedosphere, 33 (1),* 172–184. https://doi.org/10.1016/j.pedsph.2022.09.003

Irfan, Nuraeni, & Salim, M. (2019). Analisis Komparasi Usahatani Padi Organik dan Usahatani Padi Konvensional. *Wiratani, 2 (2), 92-105.*

Irham, Wahyu Widada, A., Nurhayati, A., Anantasari, E., Yustika Devi, L., & Subejo. (2020). Indonesian Organic Farmers : The Long Journey of Farmers' Groups towards Organic Farming Sustainability (A Case Study in Rukun Farmers Groups, Yogyakarta). *IOP Conference Series : Earth and Enviromental Science,* 518(1). https://doi.org/10.1088/1755-1315/518/1/012030

Juni, J., Rini Efrianti, & Fifian, F. P. S. (2022).). Comparative Analysis Of Rice Farming Incomeorganic And Non-Organic In East Oku Regency. *International Journal of Social Science,* 2(2), 1375–1378. https://doi.org/10.53625/ijss.v2i2.2740

Just, R. E., & Pope, R. D. (1979). Production Function Estimation and Related Risk Considerations. *In Source: American Journal of Agricultural Economics* (Vol. 61, Issue 2)

Kasim, N. A., Megawati, M., Arifah, A., & Hidayati, W. (2019). Production Risk of Seaweed Cultivation in South Sulawesi: Comparison between Cobb-Douglas and Just-Pope Production Function. *International Journal of Agriculture System,* 7(2), 127. https://doi.org/10.20956/ijas.v7i2.2090

Lien, G., Kumbhakar, S. C., Mishra, A. K., & Hardaker, J.B. (2022). Does Risk Management Affect Productivity of Organic Rice Farmers in India? Evidence from A Semiparametric Production Model. *European Journal of Operational Research, 303(3),* 1392–1402. https://doi.org/10.1016/j.ejor.2022.03.051

Mahmood, A., & Gheewala, S. H. (2023). A Comparative Environmental Analysis of Conventional and Organic Rice Farming in Thailand in A Life Cycle Perspective Using a Stochastic Modeling Approach. *Enviromental Research,* 235. https://doi.org/10.1016/j.enves.2023.116670

Mardiana, Y. (2021). Efektivitas Aplikasi POC pada Pertumbuhan dan Produksi Beberapa Varietas Padi (Oryza Sativa L). Jurnal Multidisiplin Madani (MUDIMA), 1(3), 355-366.

Mojo, D., Fischer, C., & Degefa, T. (2017). The Determinants and Economic Impacts of Membership in Coffee Farmer Cooperatives: Recent Evidence from Rural Ethiopia. *Journal of Rural Studies, 50, 84-94.* https://doi.org/10.1016/j.jrurstud.2016.12.010

Nalle, M. N., Asa, M. L. M., & Indrasti, R.. (2023).The Role of Farmer Groups In Increasing of Rice Farmers In Lakekun Village, Kobalima Sub-District, Malaka District East Nusa Tenggara Province. *IOP Conference Series :Earth and Enviromental Science,* 1153(1). https://doi.org/10.1088/1755-1315/1153/1/012022

Noormansyah, Z., & Cahrial, E. (2020). Efficiency of Production Factors and Constraints of Organic Rice Farming at Rainfed Rice. *IOP Conference Series: Earth and Environmental Science, 466(1).* https://doi.org/10.1088/1755-1315/466/1/012027

Nuzulianur Puteri, L., & Fauzi, M. (2020). Comparative Analysis of Organic and Inorganic Rice Farming In Swampy Land of Babirik District. *IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS), 13(7),* 16–20. https://doi.org/ 10.9790/2380-1307031620

Rahayu, H., Dewi, M., & Febrianti, T., (2021). Farmers' Choice to Risk Management Strategies of Corn Farming in Sigi District Central Sulawesi. *E3S Web of Conferences, 232.* https://doi.org/10.1051/e3sconf/202123202016

Sacco, D., Moretti, B., Monaco, S., & Grignani, C. (2015). Six-Year Transition from Conventional to Organic Farming: Effects on Crop Production and Soil Quality. *European Journal of Agronomy, 69,* 10–20. https://doi.org/10.1016/j.eja.2015.05.002

Sapbamrer, R., & Thammachai, A. (2021). A Systematic Review of Factors Influencing Farmers' Adoption of Organic Farming. Sustainability (Switzerland), 13 (7). https://doi.org/10.3390/su13073842

Sholihah, E., Irham, I., & Masyhuri, M. (2018). Production Risk Management of Organic Rice in Special Region of Yogyakarta. *Habitat*, 29(3), 92–98. https://doi.org/10.21776/ub.habitat.2018.029.3.11

Siswanti, D. U., Maryani, Rachmawati, F. Y., Niken, A., Agustin, R. V., & Wulansari, N. (2021). Grain Quality of Rice (Oryza sativa l.)'Menthik Wangi' of Organic Farming Yields. *Hayati Journal of Biosciences,* 28(2), 105–109. https://doi.org/10.4308/hjb.28.2.105

Smith-Spangler, C., Brandeau, M. L., Hunter, G. E., Clay Bavinger, J., Pearson, M., Eschbach, P. J., Sundaram, V., Liu, H., Schirmer, P., Stave, C., Olkin, I., & Bravata, D. M. (2012). Are Organic Foods Safer or Healthier than Conventional Alternatives?: *A Systematic Review in Annals of Internal Medicine* (Vol. 157, Issue 5, pp. 348–366). American College of Physicians. https://doi.org/10.7326/0003-4819-157-5-201209040-00007

Snider, A., Gutiérrez, I., Sibelet, N., & Faure, G. (2017). Small Farmer Cooperatives and Voluntary Coffee Certifications: Rewarding Progressive Farmers of Engendering Widespread Change in Costa Rica? Food Policy, 69, 231-242. https://doi.org/10.1013/j.foodpol.2017.04.009

Sujianto, Gunawan, E., Saptana, Syahyuti, Darwis, V., Ashari, Syukur, M., Ariningsih, E., Saliem, H. P., Mardianto, S., & Marhendro. (2022). Farmers' Perception, Awareness, and

constraints of organic rice Farming in Indonesia. Open Agriculture, 7(1), 284–299. https://doi.org/10.1515.opag-2022-0090

Sulistyana, P., Mulyo, J.H., & Jamhari. (2014). Konsumsi Beras Organik pada Tingkat Rumah Tangga Kota Yogyakarta di Kota Yogyakarta (The Consumption of Organic Rice in the Household Level at Yogyakarta City. *Agro Ekonomi, 25(1),* 25-34.https://doi.org/10.22146/agroekonomi.17357

Utaranakorn, P., & Yasunobu, K. (2016). The Mutual Influence of Managerial Ability and Social Networks of Farmers on Participation in An Organic Vegetable Group in Khon Kaen province, Thailand. Kasetsart *Journal of Social Sciences, 37 (3),* 127–131. https://doi.org/10.1016/j.kjss.2016.08.001

Van Vu, H., Ho, H., & Le, Q. H. (2019). Impact of Farmer Education on Production Efficiency: The Case of Rice Farms in Vietnam. *Management Science Letters, 9 (11),* 1909–1918. https://doi.org/10.5267/j.msl.2019.6.002

Walis, N. R., Setia, B., & Isyanto, A. G. (2021). Faktor- Faktor yang Berpengaruh terhadap Produksi Padi di Desa Pamotan Kecamatan Kalipucang Kabupaten Pangandaran*. Jurnal Ilmiah Mahasiswa AGROINFO GALUH, 8(3),* 648–657.

Wibowo, R. P., Raihan, A., Sumono, & Gunawan, D. (2019). Comparative Analysis of Technical Efficiency between Organic and Non-organic Rice Farming in North Sumatera Indonesia. *IOP Conference Series: Materials Science and Engineering, 648(1).* https://doi.org/10.1088/1757-899X/648/1/012038

Yu, Y., He, Y., & Zhao, X. (2021). Impact of Demand Information Sharing on Organic Farming Adoption: An Evolutionary Game approach. *Technological Forecasting and Social Change, 172.* https//doi.org/10.1016/j.techfore.2021.121001

Zhong, Z., Zhang, C., Jia, F., & Bijman, J. (2018). Vertical Coordination and Cooperative Member Benefits: Case Studies of Four Dairy Farmers' Cooperatives in China. *Journal of Cleaner Production, 172,* 2266–2277. https://doi.org/10.1016/j.jclepro.2017.11.184