Mimbar Agribisnis: Jurnal Pemikiran Masyarakat Ilmiah Berwawasan Agribisnis
P-ISSN: 2460-4321, E-ISSN: 2579-8340
Volume 12, Nomor 2, Juli 2026: 1426-1434

Factor in Farmers' Decision-Making in Adopting Certified Seed as a Strategy to Mitigate Environmental Squeeze

Faktor yang Memengaruhi Pengambilan Keputusan Petani dalam Mengadopsi Benih Bersertifikat sebagai Strategi untuk Mengurangi Tekanan Lingkungan

Neng Elmi Salehah[1*], Trisna Insan Noor[2], Reny Sukmawani[3]

[1]Department of Agricultural Social Economics, Faculty of Agriculture, Universitas Padjadjaran Sumedang, West Java, Indonesia, Indonesia
[2]Department of Agribusiness, Faculty of Agriculture, Padjadjaran University Jatinangor, Indonesia, Indonesia
[3]Faculty of Agriculture, Universitas Muhammadiyah Sukabumi
Jl. R Syamsudin SH No 50, Jawa Barat
*Email: neng23006@mail.unpad.ac.id
(Diterima 07-01-2026; Disetujui 27-04-2026)

ABSTRACT

The use of certified seed in rice farming system has a significant contribution to increase crop productivity. Farmers would have a result in greater harvest yield by using high-quality seed compared with farmers who used uncertified seed. In contemporary society, as the challenge in environment grow rapidly, farmers are required to make adaptive and strategic choices. The use of certified seed represents a strategic choice since it possesses more reliable genetic and physiological quality. This research intended to identify the use of certified seed among farmers and to analyze the factors affecting farmers' decisions to use certified seed. This research was conducted in Gegerbitung District, Sukabumi Regency, West Java. The method used by this research is quantitative descriptive with dual linear regression analysis, as the preliminary survey, it results there are 76% farmers in Gegerbitung District who already used the certified seed, the rest of the percentage, used uncertified seed with the distribution of varieties including Inpari 32 (59%), Ciherang (14%), Inpari 49 (2%) dan Local (24%). In greater detail, this study demonstrates the decision-making in the use of certified seed is significantly influenced by farming experience, whereas age, educational background, family dependent, and land size do not have a significant effect on the decision to use certified seed.

Keywords: Certified Seed, Decision-making, Environment Squeeze

ABSTRAK

Penggunaan benih bersertifikat dalam sistem pertanian padi memberikan kontribusi signifikan untuk meningkatkan produktivitas tanaman. Petani akan memperoleh hasil panen yang lebih besar dengan menggunakan benih berkualitas tinggi dibandingkan dengan petani yang menggunakan benih tidak bersertifikat. Dalam masyarakat kontemporer, seiring dengan meningkatnya tantangan lingkungan, petani dituntut untuk membuat pilihan adaptif dan strategis. Penggunaan benih bersertifikat merupakan pilihan strategis karena memiliki kualitas genetik dan fisiologis yang lebih andal. Penelitian ini bertujuan untuk mengidentifikasi penggunaan benih bersertifikat di kalangan petani dan menganalisis faktor-faktor yang memengaruhi keputusan petani untuk menggunakan benih bersertifikat. Penelitian ini dilakukan di Kecamatan Gegerbitung, Kabupaten Sukabumi, Jawa Barat. Metode yang digunakan dalam penelitian ini adalah deskriptif kuantitatif dengan analisis regresi linier ganda. Berdasarkan survei pendahuluan, ditemukan bahwa 76% petani di Kecamatan Gegerbitung telah menggunakan benih bersertifikat, sedangkan sisanya menggunakan benih tidak bersertifikat dengan distribusi varietas termasuk Inpari 32 (59%), Ciherang (14%), Inpari 49 (2%), dan Lokal (24%). Secara lebih rinci, penelitian ini menunjukkan bahwa pengambilan keputusan dalam penggunaan benih bersertifikat sangat dipengaruhi oleh pengalaman bertani, sedangkan usia, latar belakang pendidikan, tanggungan keluarga, dan luas lahan tidak memiliki pengaruh signifikan terhadap keputusan untuk menggunakan benih bersertifikat.

Kata kunci: Benih Bersertifikat, Pengambilan Keputusan, Tekanan Lingkungan

INTRODUCTION

The agricultural sector holds an important role in national development, not only as a food provider but also a place in creating employment opportunities, reducing poverty, and encouraging economic growth, especially in rural areas. In the National Medium-Term Development Plan (2025–2029), the agricultural sector is still imposed as a priority to accomplish national food security, which is an essential prerequisite for social and economic stability. Moreover, in facing climate change phenomena and achieving Sustainable Development Goals (SDGs) number 2, which stated as ending hunger, achieving food security and improved nutrition, and promoting sustainable agriculture.

The development of the agricultural sector in Indonesia, rice comodity plays such a crucial role to hold a main power in food security. According to (Sukmawani *et al., 2025),* Rice as a staple food deserves greater attention compared to other nutritional sources because it has a significant source of carbohydrates. Rice farming production in Indonesia faces various complex challenges that often pressure farmers from many aspects, including environmental pressure marked by climate change, pests and diseases, and land degradation. According to Hidayati and Suryanto (2015), climate change negatively affects water availability and tends to decrease harvest quality. Uncertainty of weather patterns such as increased frequency of droughts and floods can disrupt planting seasons and water resource management, which also affect lowland rice production. Climate change phenomena not only trigger global warming and sea level rise, but also threaten food security and have negative impacts on the agricultural sector, especially in the form of crop yield losses (Rozci, 2023).

Seed is a very important production in the implementation of lowland rice farming. Seed selection strongly determines production success. According to Usman (2023), the use of certified seed in lowland rice farming has a significant contribution to increasing crop yields. Farmers who use certified seed are proven to obtain higher yields compared to those using uncertified seed.

Certified seed known for the long process of production that have been examined through formal certification procedures in accordance with established quality standards, including field inspection and laboratory testing to ensure and maintain genetic purity, psychological quality, and physical quality of seed (BBPPM, 2024). The purpose of seed certification is to maintain seed quality so that crop productivity can be increased, including rice commodities.

The process of applying for certified seed:

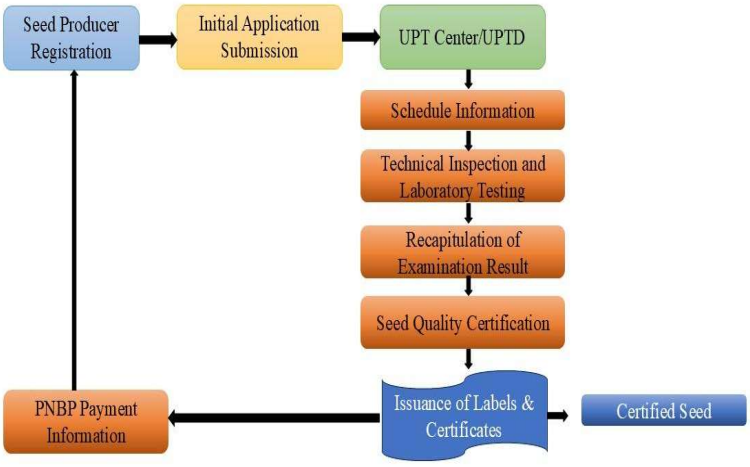

Figure 1. Process of Applying Certified Seed
Source: Seed Directorate

Seed certification becomes one of the key components in improving seed productivity, as it helps maintain seed vigor and uniform crop growth. Based on the research from Anggi et al. (2025), 50% of farmers felt that certified seed have good quality and positively impact production results. Rice seed certification is regulated under SNI 6233:25 which establishes rice quality requirements as the main raw material, this regulation aims to ensure rice quality that is safe, qualified, and feasible (BSN, 2015). According to BRMP Bali (2025), the physical characteristics and packaging of certified seed include the presence of certification labels indicated by certain colors (blue), serial numbers and

seed class information, as well as percentage of purity, germination rate, and expiration date on the seed packaging.

The use of certified seed provides significant benefits, as certified seed become an initial determinant of rice productivity. The research by Amaliah et al. (2022) explains that certified seed is able to ensure higher productivity level compared to uncertified seed, because certified seed can maintain varietal purity and seed viability. However, the adoption level of certified seed usage has not been evenly implemented by rice farmers in all regions. Most farmers still use local uncertified seed. Based on a preliminary survey in Gegerbitung District, Sukabumi Regency, 76% of farmers have used certified seed, while the remaining 24% still use uncertified seed.

Gegerbitung District is one of the centers of lowland rice production in Sukabumi Regency. In addition to rice as its main superior commodity, Gegerbitung District also has potential in food crop farming, plantations, livestock, fisheries, and forestry. The leading commodity potential is lowland rice which is distributed across seven villages (BPP Gegerbitung District, 2024).

Based on the explanation above, decision-making process becomes one of the fundamental aspects in the implementation of lowland rice farming, because every decision taken will determine productivity levels, cost efficiency, and the sustainability of farming activities. In lowland rice farming processes, decisions not only involve technical factors but also influenced by environmental conditions. According to Simon (1977), decision-making is a process of selecting the best alternative under limited information and uncertainty conditions. In decision-making, influence mechanisms include information processing and knowledge structures, emotional processes related to affect, goal-oriented processes related to motivation, and unique constellations, all of which function as significant intervening variables in the decision-making process (Abraham & Pingali, 2020).

Currently, farmers are faced with increasing environmental pressures. Climate change has become a threat to farming activities, characterized by extreme weather that makes planting and harvesting seasons difficult to predict. Rockström and Karlberg (2010) expanded the concept of pressures faced by farmers known as the quadruple squeeze, which includes environmental pressures in four aspects such as climate change, ecosystem degradation, population growth, and social inequality.

In agriculture, these pressures are interrelated and affect food production systems, such as crop failures due to extreme climate, while at the same time food demand increases due to population growth. In addition, based on reports from Santander, land squeeze or land limitation is also part of the pressures faced by farmers. Farmers often face structural pressures because land demand for non-agricultural sectors such as housing and industrial expansion continues to increase, while farmers are forced to remain productive on increasingly limited land areas (Santander, 2023). IPES-Food (2024) states that the current global agricultural crisis is marked by structural pressure or land squeeze, where agricultural policies often prioritize industrial expansion and land conservation without considering land access for smallholder farmers.

Amid these challenges and environmental pressures, farmers are required to make adaptive decisions. The use of certified seed becomes one form of highly strategic decision because certified seed have more assured genetic and physiological quality. According to Soekarwati (2003), factors influencing decision-making include: (1) social factors (family dependent), (2) personal or individual factors (age, educational background, and farming experience), and (3) situational factors (land size). Based on these conditions, research is needed regarding factors influencing farmers' decision-making in using certified seed as an effort to mitigate environmental pressure in Gegerbitung District.

MATERIALS AND METHODS

In this research, the object of this study is the lowland rice farmers and was conducted in the paddy rice production center of Gegerbitung District, Sukabumi Regency. The location was chosen based on prior identification that Gegerbitung District is one of the areas with a high contribution for rice production commodity in Sukabumi Regency. This study employed a quantitative descriptive research method, in which descriptive analysis was used to explain quantitative findings in order to identify the decision-making process of farmers in Gegerbitung Regency in the use of certified seed.

Data analysis in this study employed multiple linear regression due to the number of independent variables acting as predictors is more than one. Multiple linear regression analysis was used to examine the factors that influenced farmers' decision-making in the use of certified seed in lowland rice farming in Gegerbitung District. Parameter estimation was conducted using SPSS software and Microsoft Office Excel, with the model specified as follows:

$$\mathbf{Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4\ X_4 + b_5\ X_5 + \boldsymbol{e}}$$

Description:

Y = Decision-Making in the Use of Certified Seed

b = Regression Coeffisient

X_1 = Age

X_2 = Educational Background

X_3 = Farmig Experience

X_4 = Family dependent

X_5 = Land Size

e = Error term

The primary data in this study was gained straightly from the field through questionnaire, observation, and structured interview with the respondent. Whereas the secondary data was taken from literary study from scientific publications, supporting data from relevant institutions including the Department of Agriculture, Agricultural Extension Centers (BPP), and the Central Bureau of Statistics (BPS), previous studies, and relevant supporting books.

Sampling was conducted using a cluster random sampling technique, whereby four farmer groups in Gegerbitung District were randomly selected as sample representatives. Random sampling technique is a sampling technique in which the population is divided into several smaller and heterogeneous clusters due to the large size of the overall population (Subhaktiyasa, 2024). The sample size determination method used in this study was the Krejcie and Morgan formula (1970).

The Krejcie and Morgan formula is applied to calculate the minimum sample size required from a defined population, with a confidence level of 95% and a margin of error of 5%. The Krejcie and Morgan formula is presented as follows:

$$S = \frac{X^2 NP\ (1-P)}{d^2(N-1) + X^2P(1-P)}$$

$$S = \frac{3{,}841\ x\ 365\ x\ 0{,}5\ (1-0{,}5)}{0{,}5^2\ (150-1) + 3{,}841\ x\ 0{,}5\ (1-0{,}5)}$$

$$S = \frac{3{,}841\ x\ 365\ x\ 0{,}25}{0{,}0025\ x\ 364 + 3{,}841\ x\ 0{,}25}$$

$$S = \frac{350{,}4}{0{,}91 + 0{,}96025}$$

$$S = \frac{350{,}4}{1{,}870}$$

$$S = 187$$

Description:

S : Sample value

N : Population value

X^2 : The chi-square value at a 95% level of confidence for the relevant degree of freedom (3.841)

P : Population Proportion (0,5)

d : *Margin of error* (generally 0,05)

P-ISSN: 2460-4321, E-ISSN: 2579-8340
Volume 12, Nomor 2, Juli 2026: 1426-1434

The number of respondents determined through the sampling procedure in this study was 187 lowland rice farmers.

RESULT AND DISCUSSION

This study was conducted in Gegerbitung District with 187 lowland rice farmers as respondents. Characterization of the respondent in this research were classified into some categories, as follows:

Table 1. Respondent Characteristic

No	Characteristic	Category	Total	Precentage
1	Gender	Male	147	79
		Female	40	21
		Total	187	100
2	Age	30 - 44	21	11
		45 – 54	44	24
		55 – 64	63	34
		> 64	59	32
		Total	187	100
3	Educational Background	Didn't complete elementary school	13	7
		Elementary School	54	29
		Junior High School	89	48
		Senior High School	30	16
		Higher Education	1	1
		Total	187	100
4	Farming Experience	<5 Years	0	0
		5 - 15 Years	34	18
		15 - 25 Years	55	29
		> 25 Years	98	52
		Total	187	100

Based on the above table, it can be explained that 147 respondents, as the same as 79%, were male farmers while 40 respondents or 21% were female farmers. The data shows that male farmers dominated the lowland rice farming in Gegerbitung District. The age range of respondents in this study was dominated by the 55–64 age group, comprising 63 respondents (34%), followed by those aged over 64 years with 59 respondents (32%), the 45–54 age group with 44 respondents (24%), and the 34–44 age group with 21 respondents (11%). It can be concluded that the age profile of lowland rice farmers in Gegerbitung District is predominantly composed of older farmers, particularly those within the 55–64 age range.

The educational background of lowland rice farmers in Gegerbitung District was predominantly junior high school level, a total of 89 respondents or 48%, followed by elementary school graduates with 54 respondents or 29%, senior high school graduates with 30 respondents or 16%, respondents who did not complete elementary school with 13 respondents or 7%, and higher education graduates with 1 respondent or 1%. Farming experience among lowland rice farmers in Gegerbitung District was dominated by more than 25 years of experience, comprising 98 respondents (52%), followed by 15–25 years with 55 respondents (29%), and 5–15 years with 34 respondents (18%).

Distribution of Certified Seed Use

The use of seed among lowland rice farmers in Gegerbitung District remains varied, and not all farmers have fully adopted certified superior seed. The distribution of certified seed usage is presented as follows.

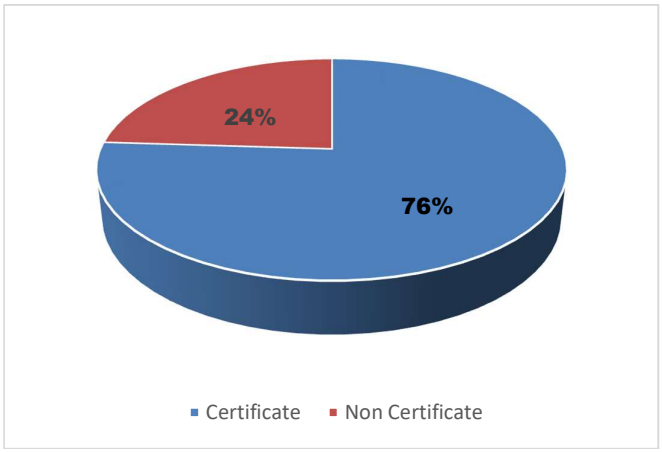

Figure 2. Distribution of Certified Seed Use

Based on the figure above, 76% of rice farmers used certified seed, while 24% used uncertified seed, with variety distributions as shown in Figure 2.

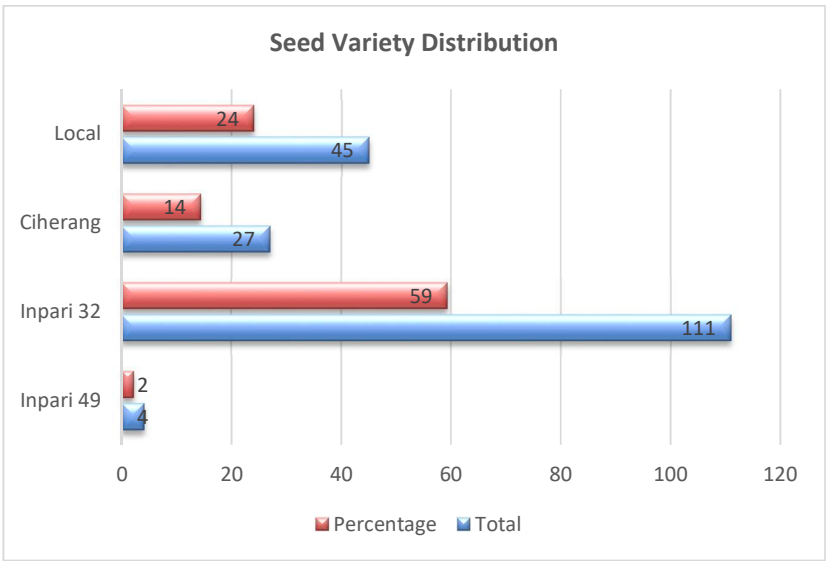

Figure 3. Seed Variety Distribution

The distribution graph of rice seed varieties used by lowland rice farmers in Gegerbitung District indicates that Inpari 32 was the most widely used variety. The high level of adoption of this variety suggests that Inpari 32 is the primary choice among farmers. Local varieties ranked second, used by 45 respondents (24%), indicating that lowland rice farmers in Gegerbitung District have not yet fully adopted certified seed. This was followed by the Ciherang variety, used by 27 respondents (14%), and Inpari 49, used by 4 respondents (2%).

The Decision-Making Factors Among Farmers in The Use of Certified Seed.

In this study, there are 5 variables to find out what factors that could affect in decision-making process for farmers to use certified seed in Gegerbitung Regency. 5 variables namely as 1) age, 2) educational background, 3) farming experience, 4) family dependent, and 5) others (land size). The result of multiple linear regression test is shown in table 2.

P-ISSN: 2460-4321, E-ISSN: 2579-8340
Volume 12, Nomor 2, Juli 2026: 1426-1434

Table 2. Test Result of Multiple Linear Regression

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5.197	.920		5.650	.000
	Age	-.018	.012	-.163	-1.516	.131
	Educational Background	.047	.042	.089	1.122	.263
	Farming Experience	.356	.149	.250	2.390	.018
	Family dependent	.003	.144	.002	.022	.982
	Land Size	-.495	.262	-.137	-1.887	.061

a. Dependent Variable: Decision-making

Based on the result it can be explained that:

1) Age variable (X_1) has significance values of 0,131 > 0,05, indicating that age does not have a significant effect on decision-making in the use of certified seed.
2) Educational background (X_2) has significance values of 0,263 > 0,05, suggesting that educational background does not associate with decision-making in the use of certified seed.
3) Farming experience (X_3) has level of significance 0,018 < 0,05, showing that farming experience has significant impact in taking the decision-making process in using the certified seed.
4) Family dependent (X_4) has significance values of 0,982 > 0,05, indicating that family dependent is not a significant determinant of decision-making in adopting certified seed.
5) Land Size (X_5) has a significance level of 0,061> 0,05, implying that land size does not play a significant role in the decision-making process related to certified seed use.

Discussion

Based on the results presented in Table 2, the variable that significantly influenced decision-making was farming experience (X3), with 52% of farmers in Gegerbitung District having more than 25 years of farming experience. Moreover, the result shows that farming experience can guide decision-making process in using the certified seed. In line with the research conducted by Rahmawati et al., (2018) shows that farming experience becomes a key determinant in decision-making process to use the certified seed in Bantul District. Learning by doing theory gives more explanation that repeating experience can help farmers to be more rational and selective in choosing the input production including the use of certified seed as one of the effective strategies in reducing the production risk and crop failure (OECD), 2019).

Variable of age, educational background, family dependent, and land size do not really affect in decision-making process for farmers to use the certified seed. The analysis of the age variable (X_1) shows a significance value of 0,31 > 0,05, indicating that differences in farmers' age do not constitute a distinguishing factor in the use of certified seed. In general, the adoption of certified seed is more strongly determined by technical considerations and farming experience than by age characteristics. This finding is consistent with the study by Kurniawati et al. (2025), which states that age does not influence farmers' decisions to adopt agricultural innovations, as information and extension services are relatively evenly accessible across all age groups.

The education background variable (X_2) did not have a significant effect on decision-making in the use of certified seed, with a significance value of 0,263 > 0.05. This finding is in line with the study by Setyono (2018), which explains that formal education level is not always a strong determinant in decision-making regarding seed use.

In principle, family dependent does not directly encourage rice farmers to make decisions regarding the use of certified seed. Based on the analysis, the family dependent variable did not show a significant effect, with a value of 0,982 > 0,05. This result is consistent with the findings of Putri and Syafrual (2022), who stated that the number of family dependents does not significantly influence decision-making because it is not directly correlated with productivity improvement or the ability to invest in agricultural inputs.

The land size variable (X_5) also showed an insignificant result, as indicated by a significance value of 0,061 > 0,05. This finding suggests that farmers with both small and large landholdings tend to exhibit similar behavior in seed use. The study by Nazizah et al. (2023) likewise reported that land size does not significantly affect decision-making in the adoption of modern agricultural inputs, as decisions are generally made rationally based on perceived benefits rather than land size.

CONCLUSION

Based on the results and discussion presented above, 76% of rice farmers in Gegerbitung District have used certified seed, while 24% continue to use non-certified seed. The distribution of seed varieties includes Inpari 32 (59%), Ciherang (14%), Inpari 49 (2%), and local varieties (24%). The decision-making process in the use of certified seed is significantly influenced by farming experience, whereas age, education level, family dependents, and land size do not have a significant effect on farmers' decisions to adopt certified seed in Gegerbitung District.Therefore, the use of certified seed should be positioned as part of government policy aimed at adaptation and mitigation of environmental pressures, such as climate change, soil quality degradation, and production risks. Such policies may include the integration of certified seed distribution with farm resilience and agricultural risk management programs

REFERENCES

Abraham, M., & Pingali, P. (2020). Transforming Smallholder Agriculture to Achieve the SDGs. *The Role of Smallholder Farms in Food and Nutrition Security*, 173–209. https://doi.org/10.1007/978-3-030-42148-9

Amaliah, I., Banten, P. P., & Banten, P. (2022). *Rice Seeding System in Banten Province*. *4*(2), 457–466.

Anggi et. al. (2025). *User Preferences for Certified Seed in Rice Production in Pangloang Village, Sidenreng Rappang Regency*. Perbal: Sustainability Agriculture Journal *13*(3).

BBPPM. (2024). *Certified Rice Seed Quality Standards.*

BPP Gegerbitung District. (2024). *Agricultural Extension Program of Gegerbitung District*.

Hidayati, I. N., & Suryanto, S. (2015). *The effect of climate change on agricultural Production and adaptation strategies on drought prone land*. Journal of Economics & Development Studies., *16*(1), 42–52.

IPES-Food. (2024). *Land Squeeze: What is driving unprecedented pressures on farmland and what can be done to achieve equitable access to land?* 86pp. https://ipes-food.org/wp-content/uploads/2024/05/LandSqueeze.pdf

Nazizah, F., Shoimus, M., & Umah, H. (2023). *Factors Affecting the Income of Certified Rice Farmers in Bukek Village, Tlanakan District, Pamekasan Regency*. *7*(1), 29–36. https://doi.org/10.51589/ags.v7i1.1433

OECD, O. for E. C. and D. (2019). *Innovation, productivity and sustainability in food and agriculture: Main policy lessons from selected OECD country reviews*. OECD Publishing.

Rahmawati, et all (2018). *Factors affecting farmers in the selection of certified seed in rice farming in Bantul Regency*. 122–136.

Rockström, J., & Karlberg, L. (2010). The Quadruple Squeeze: Defining the Safe Operating Space for Freshwater use to Achieve a Triply Green Revolution in the Anthropocene. *AMBIO: A Journal of the Human Environment*, *39*(3), 257–265. https://doi.org/https://doi.org/10.1007/s13280-010-0033-4

Rozci, F. (2023). *The Impact of Climate Change on the Rice Agriculture Sector*. *Jurnal Ilmiah Sosio Agribis*, *23*(2), 108–116.

Santander. (2023). *Underestimating the global land squeeze*. https://www.santander.com/content/dam/santander-com/es/contenido-paginas/landing-pages/santander-x-xperts/do-xperts-Whitepaper-Global Land Squeeze-en.pdf

Simon, H. A. (1977). *The New Science of Management Decision*. New York University.

Soekarwati, H. (2003). *Introduction to agricultural economics*. Bumi Aksara.

Subhaktiyasa, P. G. (2024). *Determining Population and Sample: Methodological Approaches in Quantitative and Qualitative Research*. *9*, 2721–2731.

Sukmawani, R., Ratnasari, J., Astutiningsih, E. T., Salehah, N. E., & Suminar, N. (2025). *Identification of Alternative Local Food Potentials to Support Food Security in Disaster-prone Areas*. *43*(12), 173–182.

Usman, A. (2023). *Correlation analysis of the use of certified and non-certified seed on rice productivity in Sidrap Regency*. *Jurnal Agroteknologi*, *12*(2), 77–86.