



Farmers' Risk Behavior in Organic and Inorganic Rice Farming

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(Received December 2024/Accepted December 2025)

ABSTRACT

The purpose of this study was to compare the productivity, income, and risk-taking behaviors of organic and non-organic rice farmers in Serdang Bedagai Regency, North Sumatra Province. The study took a descriptive-quantitative approach, surveying 62 rice producers (31 organic and 31 non-organic). The analysis included measures of productivity, income, production, and income risk, as well as a sensitivity analysis to analyze the impact of price and cost changes. The results demonstrate that organic rice productivity (1,924 kg/ha) was lower than non-organic rice (4,668 kg/ha); however, overall net income for organic farming (IDR 32.15 million/ha) was higher than non-organic farming (IDR 27.28 million/ha) due to more stable and higher rice prices. Production and income risks are better managed in organic farming, with lower variation coefficients than in non-organic systems. The sensitivity analysis shows that even with a 20% fall in selling price or a 20% rise in production expenses, organic rice cultivation still earns a profit. Most organic farmers are risk averse, whereas non-organic farmers are more willing to take risks. These data support the claim that organic rice cultivation is more economically viable and environmentally sustainable than conventional systems.

Keywords: income, organic rice, risk behavior, sensitivity analysis, sustainability

INTRODUCTION

Organic farming is a production method founded on the concepts of ecology, health, fairness, and caring, with the goal of preserving natural balance, increasing soil fertility, and ensuring environmental sustainability (FiBL & IFOAM 2024). This idea is consistent with European Union Regulation (EU) 2018/848, that organic farming aims to balance economic productivity with ecosystem sustainability and rural community wellbeing (European Union 2024). In Indonesia, the organic farming system emerged in the 1980s as a response to the Green Revolution's negative consequences, such as decreased soil fertility, reliance on chemical fertilizers, and increasing production costs (Fritz *et al.* 2021). As public awareness of the need for food sustainability grew, the government improved its environmentally friendly agricultural policies by establishing pilot sites in several locations, including North Sumatra Province, which has a high potential for developing organic farming systems.

Serdang Bedagai Regency in North Sumatra Province is one of the areas where organic farming has been effectively implemented, particularly in the villages of Pematang Setrak, Lubuk Bayas, and Tanah Merah. These three villages have been certified by the Seloliman Organic Certification Agency (LeSOS) and

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will serve as pilot locations for applying rigorous organic farming requirements, such as reducing pesticides and synthetic fertilizers. Furthermore, an efficient agribusiness structure and institutional support for farmers have aided in the implementation of this system (Annajmi *et al.* 2024).

Empirically, organic systems differ from inorganic systems. Several international studies show that organic systems improve soil fertility, ecological efficiency, and environmental sustainability, despite their lower productivity due to organic fertilizer limitations, high labor costs, and limited access to agricultural inputs (Amirahmadi *et al.* 2022; Mahmood & Gheewala 2023; Tigre & Heshmati 2022). These factors generate two types of risk: production risk (uncertainty in yield due to weather and pests) and revenue risk (price swings and fluctuating production expenses). However, organic systems generally outperform inorganic systems in terms of risk management, as organic farmers tend to use more stable local resources, implement careful cultivation practices, and receive institutional support and fixed-price contracts, which help reduce income volatility. Organic farmers typically rely on local resources and have more solid sales contracts, lowering their revenue risk. In contrast, inorganic farmers frequently rely on free markets with volatile input and output prices. In this setting, organic farmers are more risk-averse, whereas inorganic farmers are more willing to take chances to maximize productivity (FAO 2017; Banotra *et al.* 2022).

According to Expected Utility Theory, farmers' risk preferences have a significant influence on their production system decisions. This theory is the foundation for assessing risk behavior in agriculture, since it defines how farmers evaluate choice alternatives based on the balance between projected profits and the level of uncertainty associated with the outcomes (Hardaker *et al.* 2015). Risk-averse farmers will select stable but lower revenues, whereas risk-takers are willing to accept uncertainty in exchange for higher potential returns. Empirical research in Kenya have demonstrated that smallholder farmers' risk attitudes have a major impact on business diversification and adoption of climate-smart agricultural technologies (Musyoki *et al.* 2022). Meanwhile, research in Ethiopia reveals that smallholder farmers face high input and production risks while managing their income and company sustainability (Tigre & Heshmati 2022).

In organic farming systems, the presence of specialized markets, institutional support, and sustainable production principles is thought to reduce income risk while increasing farmers' economic resilience (Jahantab *et al.* 2023). Thus, this study hypothesizes that organic and inorganic rice farms produce and earn significantly different amounts, and that organic farmers are more risk-averse than inorganic farmers. This study's findings are expected to contribute scientifically to the development of risk behavior theory in the context of tropical farming, as well as provide an empirical foundation for the construction of local sustainable agricultural risk management policies.

METHODS

The research sites were purposively chosen, with an emphasis on villages that had implemented organic farming practices, including Pematang Setrak Village, Lubuk Bayas Village, and Tanah Merah Village. These places were chosen based on the number of adoption of organic farming techniques and the compatibility of the area's ecological circumstances, as was the case in a similar study conducted by Kawu and Abdulsalam (2025). The research data were gathered through interviews with farmers, field observations, and the collection of secondary data from relevant institutions such as the agricultural office and extension agencies.

Production and Production Risks of Organic and Inorganic Rice

• Organic and Inorganic Rice Production

Production analysis was performed to estimate productivity levels and input efficiency. Production value was determined in kg of dry grain per hectare.

The average productivity was determined using the following formula:

$$Y_i = \frac{Q_i}{A_i}$$

Where:

Y_i = Productivity (kg/ha)

Q_i = Total harvest

A_i = Land area

• Production Risk of Organic and Inorganic Rice

Production risk was quantified to determine the degree of unpredictability in yields between farms and planting seasons. The indicators utilized were variance (σ^2), standard deviation (σ), and coefficient of variation (CV):

$$CV = \frac{\sigma}{Y} \times 100\%$$

Farmers who face high production uncertainty tend to have greater risk preferences (Lien 2023).

Income, Income Risk, and Income Sensitivity of Organic and Inorganic Rice

• Income from Organic and Inorganic Rice

Farmer income was calculated by subtracting total revenue from total farming costs:

$$\pi_i = TR_i - TC_i$$

where:

π_i = Total revenue

TR_i = Total costs (fixed + variable)

TC_i = Net income per hectare

This analysis illustrates the economic efficiency and profit potential of each system.

• Income Risk of Organic and Inorganic Rice

Income risk was assessed using the Expected Utility Theory (Hardaker *et al.* 2015). The Certainty Equivalent (CE) value was used to quantify farmers' risk preferences for revenue.

$$CE = E(W) - \frac{1}{2}A\sigma^2$$

where:

$E(W)$ = Expected income

σ^2 = Income variance

A = Risk coefficient ($A = 2c/b$)

• Sensitivity of Organic and Inorganic Rice Income

A sensitivity analysis was carried out to examine farmers' income's resistance to changes in external variables such as selling price and production cost

fluctuations. This analysis simulated scenarios in which grain prices fall by 10%, 15%, and 20%, while production costs rise at the same rate. This methodology was consistent with Aribi's (2025) strategy, which used sensitivity-based simulations to analyze the impact of external shocks on agricultural income and farming system resilience.

Comparison of Income and Production of Organic and Inorganic Rice Farming

Independent *t*-test samples were used to examine whether there was a statistically significant difference in productivity between the two systems. The test value was computed as follows:

$$t = \frac{Y_1 - Y_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

Where:

\bar{Y}_1 and \bar{Y}_2 = Average production and income of organic and inorganic rice

s_1^2 and s_2^2 = The variances

n = Sample size

Risk Behavior of Organic and Inorganic Rice Farmers

Farmers' risk behavior was analyzed using the Expected Utility Theory (EUT) approach as developed by Moscardi & de Janvry (1977) and Hardaker *et al.* (2015). A quadratic utility function was used to calculate the Certainty Equivalent (CE) value and risk coefficient ($A = 2c/b$) of each respondent. Based on the CE value and income expectation $E(W)$, farmer behavior was classified into three categories: (1) Risk Averse ($CE < E(W)$ or $A > 0$); (2) Risk Neutral ($CE = E(W)$ or $A = 0$); and (3) Risk Neutral ($CE > E(W)$ or $A > 0$). This approach allows for a more in-depth investigation of how farmer traits and farming systems influence their responses to output and income volatility.

RESULTS AND DISCUSSION

Organic and Inorganic Rice Production Levels

Organic rice production averaged 1,924 kg with a standard deviation of 1,087.8 kg, while inorganic rice yielded 4,668 kg with a standard variance of 2,749.6 kg (Table 1). The variance values for organic rice (1,183,509.8) and inorganic rice (7,560,674.7) show a wide range of data around the average production. Amirahmadi and Ghorbani's (2025) research indicated that conventional farming methods have larger crop output fluctuation than organic systems, particularly in terms of land intensification and synthetic fertilizer use.

Production Risks of Organic and Inorganic Rice

Organic rice poses a larger production risk than inorganic rice (Mardiyah 2020). The coefficient of variation (CV) for organic rice was 0.57, while for inorganic rice it was 0.59, showing that both systems have a high level of production risk; however, organic rice has a lower risk than inorganic rice. This finding is comparable to that of Istitanti and Saputra (2024), that high CV values occur during the manufacture of transition-organic rice.

The lower limit of organic rice production (251 kg/ha) was higher than that of inorganic rice (831 kg/ha), implying a lower minimal risk in organic systems. This demonstrates that organic rice farming is more stable due to improved soil management and ecosystem balance, which reduces pests and diseases. Organic rice production is more sustainable due to integrated nutrient management (Banotra *et al.* 2022). In contrast, the high risk of inorganic rice is worsened by its reliance on subsidized fertilizers, which are sometimes scarce and expensive on the market.

Income Levels for Organic and Inorganic Rice

Table 2 reveals that the average revenue from organic rice was IDR 8,043,201, with a standard deviation of IDR 5,570,104.3, while inorganic rice yielded IDR 18,587,478, with a standard deviation of

Table 1 Comparative risk indicators of organic and inorganic rice production

Description	Organic rice	Inorganic rice
Mean production (Qi)	1,924	4,668
Variance (V^2)	1,183,509.8	7,560,674.7
Standard deviation (SD)	1,087.8	2,749.6
Coefficient of variation (CV)	0.57	0.59
Lower limit (L)	-251	-831

Table 2 Income risk of organic and inorganic rice farming

Description	Organic rice	Inorganic rice
Mean production (Qi)	8,043,201	18,587,478
Variance (V^2)	3,20603	4.41573
Standard deviation (V)	5,570,104.3	12,675,768.03
Coefficient of variation (CV)	1	1
Lower limit (L)	-3,097,008	-6,764,058

IDR 12,675,768.03. However, the coefficient of variation (CV) indicates that organic rice income is more volatile, making this system more susceptible to price and input cost changes. According to Heryadi *et al.* (2025), while organic rice farmers can save on input costs and sell at better prices, these advantages are heavily reliant on consistent access to premium markets.

Income Risk of Organic and Inorganic Rice

Income risk is greater in traditional farming systems than in organic farming (Mardiyah 2020). Table 2 demonstrates that income risk is lower in organic rice growing than in inorganic rice farming. This is because using fewer external inputs stabilizes production costs and reduces income swings (Sulili *et al.* 2021). Risk-averse organic farmers prioritize long-term income stability with low profit margins, whereas risk-taking inorganic farmers want to maximize profits through input intensification, despite the accompanying increased risks (Anderson & Dillon 1992; Hardaker *et al.* 2015). The use of organic fertilizers and pesticides minimizes not just reliance on external inputs, but also variability in production costs and the influence of market price variations (Sulili *et al.* 2021). Furthermore, organic farmers are more cautious (risk-averse) in their business methods, prioritize yield sustainability, and preserve long-term soil fertility, all of which contribute to production and income stability (Hardaker *et al.* 2015; Triyono 2024).

According to Table 2, a coefficient of variation (CV) value of 1 indicates that when income risk arises, there is a danger of losing one rupiah for every IDR earned. A CV higher than 0.5 indicates a high amount of income risk for organic and inorganic rice. The risk in organic systems originates from restricted inputs and unpredictability in productivity, but the risk in semi-organic systems is greater due to variations in the price of chemicals and transition costs. This is consistent with the findings of Novitaningrum *et al.* (2025), that the coefficient of variation is a key indicator in measuring production risk, with excessive use of synthetic inputs

such as nitrogen fertilizers increasing yield variability, whereas the use of high-quality seeds and potassium fertilizers can reduce this risk.

The sensitivity analysis (Table 3) shows that, despite a 10%, 15%, and 20% drop in selling prices, organic and inorganic rice farming still generates a profit. Organic rice income decreased from IDR 32.15 million to IDR 22.43 million per hectare, while inorganic rice income dropped from IDR 27.63 million to IDR 21.95 million per hectare. Despite lower profit margins, organic rice generates higher income due to more stable selling prices and input cost efficiency. These findings are consistent with those of Savoini *et al.* (2025), that while the revenue difference between conventional and organic systems was not statistically significant, organic systems were more stable and superior in terms of long-term sustainability.

The *t*-test results (Table 4) reveal that a 20% decline in selling price (Scenario 1) created a significant difference in income between organic and inorganic rice farming (Sig. = 0.019 < 0.05), demonstrating that organic farmers' revenue stays significantly greater despite falling prices. In Scenario 2 (increased manufacturing costs), the significance value of 0.723 was more than 0.05, indicating that the two are not significantly different. These findings are consistent with the findings of Savoini *et al.* (2025), that, while revenue differences between agricultural systems are not always statistically significant, organic systems are more resilient in the face of external pressures such as price changes and input costs.

Increasing production costs by 10–20% did not significantly reduce farmers' profitability, whether in organic or inorganic systems. Organic rice farm income dropped from IDR 32.15 million to IDR 31.03 million/ha, while inorganic income fell from IDR 27.63 million to IDR 26.53 million/ha (Table 5). Organic rice income declined by just around 3.5% when costs increased by 20%, however inorganic income fell by more than 4%. These findings are supported by Judijanto and Lestari (2025), that despite rising production costs, the

Table 3 Sensitivity analysis scenario 1: Income of organic and inorganic rice farming

Description	Organic (IDR/ha)	Inorganic (IDR/ha)
Initial revenue	48,588,259	40,694,545
Revenue (10% price decrease)	43,729,433	39,785,727
Revenue (15% price decrease)	41,300,020	37,575,409
Revenue (20% price decrease)	38,870,607	35,365,091
Costs		
– Cash cost	12,676,660	10,141,109
– Non-cash cost	3,763,235	2,927,219
Total cost	16,439,895	13,068,327
Net income over cash cost	35,911,599	30,553,437
Initial net income over total cost	32,148,364	27,626,218
Net income (10% price decrease)	26,998,849	26,368,409
Net income (15% price decrease)	24,860,125	24,158,554
Net income (20% price decrease)	22,430,712	21,948,236

Table 4 Income results under 20% selling price decrease

Rice farming		Independent samples test				
		Levene's test for equality of variances		t-test for equality of means		
		F	Sig.	t	df	Sig. (2-tailed)
Income of organic and inorganic rice farming (Scenario 1)	<i>Equal variances assumed</i>	1.072	0.303	-2.388	108	0.019
	<i>Equal variances not assumed</i>			-2.388	102.627	0.019
Income of organic and inorganic rice farming (Scenario 2)	<i>Equal variances assumed</i>	1.232	0.269	-0.356	108	0.723
	<i>Equal variances not assumed</i>			-0.356	99.8	0.723

Table 5 Sensitivity analysis scenario 2: Income of organic and inorganic rice farming

Description	Organic (IDR/ha)	Inorganic (IDR/ha)
Initial revenue	48,588,259	40,694,545
Costs		
– Initial cash cost	12,676,660	10,141,109
– Cash cost (10% production cost increase)	13,236,537	10,777,694
– Cash cost (15% production cost increase)	13,516,529	10,971,394
– Cash cost (20% production cost increase)	13,796,486	11,165,094
– Non-cash cost	3,763,235	2,927,219
Initial total cost	16,439,895	13,068,327
Net income over cash cost	35,911,599	30,553,437
Net income (production cost +10%)	35,351,686	29,916,852
Net income (production cost +15%)	35,071,729	29,723,152
Net income (production cost +20%)	34,791,773	29,529,452
Initial net income over total cost	32,148,364	27,626,218
Net income (production cost +10%)	31,236,537	26,890,290
Net income (production cost +15%)	31,308,494	26,696,590
Net income (production cost +20%)	31,028,538	26,529,452

profitability of organic systems remains stable since input efficiency is a critical feature in the economic sustainability of organic farming.

Income and Cost Structure of Organic and Inorganic Rice Farming

The entire cost of organic rice generated IDR 32,148,364/ha every cropping season, whereas inorganic rice generated IDR 27,277,691/ha per cropping season. The higher selling price of organic grain accounted for most of the IDR 4,870,673 income difference per hectare. The average price of dried organic rice grain at the research location was IDR 7,800/kg, while inorganic rice costs just IDR 6,400/kg, representing a 21.9% difference. This price differential resulted in more income from organic rice (Rp 48,588,259) than inorganic rice (Rp 40,695,545), despite higher production expenses (Table 6). The premium price reflects the increased value of organic products, which are promoted to farmers and health-conscious consumers. This finding is consistent with Putri *et al.* (2020), that price stability and long-term market support allow organic farmers to earn larger net incomes than those in inorganic systems.

The *t*-test results indicate that the revenue difference between organic and inorganic rice was not statistically significant ($t = 0.872$; $p = 0.385 > 0.05$). Economically, the income differential was IDR 4.87 million/ha because of the variances in grain selling prices. Thus, the first hypothesis, claiming that there is a difference in income between organic and inorganic farming, is not significantly supported; nonetheless, the data trend indicates that organic systems tend to give greater earnings due to premium prices and more stable production risks. According to Table 7, although the R/C ratio of inorganic rice farming (2.03) was slightly higher than that of organic rice farming (1.96), both systems are economically viable with R/C values larger than one.

This revenue disparity stems mostly from disparities in cost structure and selling pricing. Organic rice farming was more (IDR 16,536,886/ha) than inorganic rice (IDR 13,068,327/ha) per planting season. However, the greater price of organic grain maintains its net profitability high. Behera and Bhoi (2021) further showed that, while using organic fertilizers raises total costs, this system is sustained by consistent product sales values and a premium market orientation. As seen in Table 8, organic rice cultivation assigned a

Table 6 Comparison of organic and inorganic rice farming income per planting season

Description	Organic (IDR/ha)	Inorganic (IDR/ha)	t-Value	p-Value (Sig. 2-tailed)	Remarks
Revenue	48,588,259	40,695,545	0.872	0.385	Not Significant
Total cost	16,439,895	13,416,855	–	–	–
Net income over total cost	32,148,364	27,277,691	0.872	0.385	Not Significant

Table 7 R/C ratio of organic and inorganic rice farming

Type of rice farming	Total revenue (TR) (IDR)	Total cost (TC) (IDR)	R/C ratio
Organic rice	48,588,259	16,439,895	1.96
Inorganic rice	27,277,691	13,416,855	2.03

Table 8 Cost structure of organic and inorganic rice farming per hectare per planting season

Cost components	Organic rice		Inorganic rice	
	Value (IDR/ha)	Percentage (%)	Value (IDR/ha)	Percentage (%)
A. Cash costs				
<u>Fixed costs</u>				
- Land tax	313,637	1.91	253,211	1.89
<u>Variable costs</u>				
- Irrigation	608,327	3.70	490,582	3.66
- Seeds	329,247	2.00	279,764	2.09
- Organic fertilizer	3,498,193	21.28	0	0
- Chemical fertilizer	0	0	2,981,287	22.22
- Organic pesticide	1,771,692	10.78	0	0
- Chemical pesticide	0	0	612,950	4.57
- Chemical pesticide	6,155,564	37.44	5,772,500	43.02
- Hired labor				
Total cash costs	12,773,651	77.11	10,141,109	77.44
B. Non-cash costs				
<u>Variable costs</u>				
- Equipment depreciation	103,129	0.63	69,743	0.52
- Family labor	3,660,106	22.26	2,956,818	22.04
Total non-cash costs	3,763,235	22.89	2,297,219	22.56
Total costs	16,536,886	100	13,068,327	100

higher share of expenditures to organic fertilizers and insecticides, highlighting its reliance on ecologically friendly but input-intensive practices.

Descriptively, the revenue-cost ratio (R/C) for organic rice was 1.96, somewhat lower than that for inorganic rice (2.03), showing that the inorganic system is slightly more cost-effective. However, the organic system continues to outperform in terms of revenue stability and agricultural sustainability. This data supports the interpretation of Table 7, demonstrating that more cost efficiency does not always imply greater income resilience.

Furthermore, organic rice required substantially more pesticides, particularly 75 L of plant-based insecticides per hectare. In contrast, inorganic rice required 4 L liquid pesticides and 250 g of solid pesticides per hectare. The cost share of organic pesticides was 10.78%, compared to 4.57% for chemical pesticides in inorganic farming (Table 8). Organic pesticides were more expensive (10.78%) than chemical pesticides (4.57%), but they were also used more frequently. This is related to the nature of

organic pesticides, which disintegrate swiftly and leave no hazardous residues (Liu 2012); hence, they must be applied repeatedly at large dosages. Chemical pesticides, on the other hand, are employed in small quantities but have longer residual effects, posing long-term ecological and health dangers despite their efficiency. Thus, while inorganic rice growing is marginally more cost-effective, the organic approach offers advantages in terms of revenue stability and farming resilience. These benefits are driven by increased grain prices and institutional backing, which strengthen organic farmers' negotiating power in the market. As a result, the organic system might be deemed more sustainable in the long run since it can strike a balance between economic rewards, social stability, and environmental preservation.

The Behavior of Organic and Inorganic Rice Farmers in Facing Risk

Rice farmers in Serdang Bedagai Regency can be classified as risk takers, risk neutrals, or risk averse, based on their risk coefficient (τ_2) values. Table 9

Table 9 Distribution of risk behavior among organic and inorganic rice farmers

Farmer's risk behavior	Organic farmers	Inorganic farmers
Risk taker	14	19
Risk neutral	4	5
Risk averse	13	7
Total	31	31

demonstrates that of the 31 respondents, 14 organic rice farmers and 19 inorganic rice farmers were risk takers ($\tau^2 > 0$), proving their boldness in facing uncertainty in production and income. The statistics indicate that most farmers, both organic and conventional, undertake riskier actions in the expectation of increasing yields. In practice, this risk-taking behavior is mirrored in agricultural input consumption. Inorganic farmers who take risks tend to use more chemical fertilizers and pesticides to boost yields and are more likely to employ intensification technologies such as the usage of short-maturing, superior cultivars. Organic farmers that are willing to take risks, on the other hand, tend to expand their farmed land and intensify their usage of manure and compost, even if this necessitates more labor. This activity demonstrates a link between input use decisions and risk coefficient measurements: the higher the risk-taking, the more likely farmers are to increase inputs with the potential to boost productivity (Murtadlo 2023).

In contrast, 13 organic farmers and seven inorganic farmers were risk averse ($\tau^2 < 0$), indicating prudence when making farming decisions. Organic farmers are more likely to avoid risk since their agricultural techniques rely heavily on natural phenomena such as the availability of organic materials, weather, and soil biological activity, all of which are beyond their control. This attitude is compatible with the anticipated Utility theory, that people who are risk-averse choose specific outcomes over risky events with the same anticipated value (Hardaker *et al.* 2015). This finding is also consistent with the research of Banotra *et al.* (2022), that organic farmers are cautious due to significant production unpredictability and low market support. Although they are more careful, organic farmers' risk-averse behavior does not contradict the notion of sustainability. In fact, this approach reflects their attempts to ensure ecosystem stability and long-term production continuity by reducing reliance on external inputs and controlling environmental risks proactively.

Four organic farmers and five inorganic farmers had a risk-neutral posture ($\tau^2 = 0$). Farmers in this category are fairly adaptable to risk variations and can balance prospective gains and losses. Support from farmer groups, as well as access to information and training, play a significant role in shaping a risk-neutral mindset (Rangga *et al.* 2024). Overall, inorganic farmers are more likely to take risks, whereas organic farmers are more likely to avoid risks. This situation can be ascribed to changes in production orientation and the risk

sources encountered. Organic rice growers are less inclined to take risks than inorganic rice farmers. This is due to the employment of advanced technologies and more agricultural experience, which improves their capacity to control risk. In contrast, the greater number of organic farmers who are risk-averse may be impacted by their reliance on natural processes that are more susceptible to environmental changes. Mamen (2022) revealed that farmers with more than ten years of agricultural experience have a higher risk tolerance because they have built risk mitigation mechanisms through experience and continual field learning.

Crop diversity, the use of local organic fertilizers, and farmer group cooperation to preserve supply stability are all popular risk mitigation measures used by organic farmers. These techniques demonstrate the social and economic resilience that distinguishes sustainable agricultural systems (Thakur *et al.* 2022; Jahantab *et al.* 2023). Thus, while no formal inferential tests were performed, these findings support the hypothesis that organic farmers are more risk-averse than inorganic farmers, which is proven by the descriptive results of the behavior distribution in Table 9.

CONCLUSION

This study confirms that organic and inorganic rice farming systems differ fundamentally in terms of revenue structure, risk levels, and farmer decision-making. Organic systems have been found to generate superior economic returns due to stable selling prices and increased input efficiency, despite lower production. In terms of risk, organic farmers suffer more output uncertainty due to the limited use of synthetic inputs, but they are more resistant to price and production cost volatility than conventional farmers. Behaviorally, organic farmers are risk-averse, whereas inorganic farmers range from risk-neutral to risk-taker.

Theoretically, these findings support the Expected Utility Theory concept, that market structure and production system influence farmers' risk preferences. Practically, these findings highlight the need for policies that promote the availability of high-quality organic fertilizers, increase access to the organic rice market, and give farmers with technical help to better long-term farm risk management.

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