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Perception and Behavior of Farmers Towards the Use of Organic Fertilizers in Rice Plants in Kewayuhan Village, Pejagoan District, Kebumen Regency

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Abstract: The application of organic fertilizer is an important strategy for supporting sustainable rice farming by improving soil fertility, maintaining soil quality, and reducing dependence on synthetic fertilizers. However, the adoption of organic fertilizer among rice farmers remains relatively limited, indicating the need to understand the behavioral factors influencing its utilization. **Objective:** This study aimed to analyze farmers' perceptions and behavior regarding organic fertilizer use and to examine the relationship between farmers' perceptions and organic fertilizer utilization behavior in rice cultivation in Kewayuhan Village, Pejagoan District, Kebumen Regency. **Methodology:** This study employed a quantitative descriptive design with a survey approach. Data were collected from 79 rice farmers selected through simple random sampling from a population of 380 active farmers. A structured questionnaire was used as the research instrument. The data were analyzed using descriptive statistics, validity and reliability testing, and Spearman Rank correlation analysis. **Findings:** The results showed that farmers generally had positive perceptions of organic fertilizer, with 51.9% of respondents classified as having a high level of perception. Farmers' behavior toward organic fertilizer utilization was also relatively favorable, although inconsistencies remained in application dosage, frequency, and continuity. The correlation analysis indicated positive associations between farmers' perceptions and organic fertilizer utilization behavior, suggesting that more favorable perceptions tend to encourage better implementation of organic fertilizer practices. **Implications:** The findings indicate that improving farmers' perceptions and knowledge should be accompanied by continuous agricultural extension, technical assistance, improved fertilizer availability, and stronger institutional support. These efforts are expected to increase the consistency of organic fertilizer application and support sustainable fertilizer management in rice farming. **Originality:** The originality of this study lies in integrating the cognitive, affective, and conative dimensions of farmers' perceptions and examining their relationship with organic fertilizer utilization behavior using a non-parametric correlation approach. This study also provides specific empirical evidence from rice farmers in Kewayuhan Village, an area that has received limited attention in previous organic fertilizer adoption studies.

Keywords: agricultural extension; farmer behavior; farmer perception; organic fertilizer; sustainable agriculture.

INTRODUCTION

Indonesia is an agrarian country in which rice remains the principal staple food and an important agricultural commodity for national food security. Kebumen Regency is one of the rice-producing regions in Central Java Province, with a harvested area of approximately 69,841 hectares and an average productivity of 5.8 tons of harvested dry unhusked rice per hectare (KPRI, 2019). Pejagoan District is among the rice-producing areas characterized by relatively intensive cultivation activities. Consequently, appropriate fertilizer management is essential for maintaining soil fertility, crop productivity, and the sustainability of rice production systems.

Although the Indonesian government has continued to promote sustainable agricultural practices, including the use of organic inputs, the application of organic fertilizers at the farmer level remains limited in several regions. Organic farming development in Indonesia continues to face challenges related to farmers' technical knowledge, the availability of organic inputs, economic considerations, market access, institutional support, and farmers' confidence in the effectiveness of organic practices (Badan Pusat, 2023; Dinas Pertanian Kabupaten, 2023). Initial observations in Kewayuhan Village indicated that the implementation of organic fertilizer practices was relatively low. A preliminary survey conducted by the researchers found that approximately 23% of farmers consistently applied organic fertilizers, whereas the remaining 77% primarily relied on synthetic fertilizers as their main nutrient source (Hidayat et al., 2022). This condition indicates a gap between sustainable agricultural policies and actual cultivation practices at the farm level. However, the number of respondents, survey period, and procedures used in this preliminary survey should be clearly reported to establish the reliability of these percentages.

Continuous and excessive reliance on synthetic fertilizers may negatively affect soil quality, particularly when fertilizer application is not accompanied by adequate organic matter management. Such practices can contribute to declining soil organic matter, imbalanced nutrient availability, reduced biological activity, and lower nutrient-use efficiency over time (Setyorini et al., 2020). In contrast, organic fertilizers can improve soil physical, chemical, and biological properties by increasing organic matter content, supporting soil microbial activity, and improving nutrient retention and availability (Setyorini et al., 2020; Supriyadi et al., 2021). Therefore, increasing the appropriate use of

organic fertilizers represents an important strategy for maintaining soil fertility and supporting more sustainable rice production systems.

Nevertheless, the limited use of organic fertilizer is not determined solely by technological availability. Farmers function as the principal decision-makers in farm management, and their decisions are influenced by knowledge, attitudes, perceived benefits, perceived ease of implementation, resource availability, and institutional support. Previous research has shown that practical training can improve farmers' knowledge and perceptions of organic agriculture and encourage experimentation with organic inputs, although improvements in perception do not always produce immediate or consistent adoption behavior (Notoatmodjo, 2020). Similarly, knowledge, attitudes, access to information, extension services, and practical experience have been identified as important factors associated with organic fertilizer adoption among smallholder farmers (Hadisuwito, 2019). Consequently, examining the relationship between farmers' perceptions and their actual fertilizer-use behavior is important for supporting the implementation of sustainable agriculture in Kewayuhan Village.

Previous studies concerning farmers' adoption of organic fertilizer and other sustainable agricultural practices can generally be grouped into three major research approaches. The first approach includes descriptive and experimental studies that assess farmers' knowledge, perceptions, attitudes, and responses to organic agricultural practices. These studies indicate that farmers with greater knowledge and more favorable perceptions tend to demonstrate stronger interest in adopting environmentally friendly farming practices. For example, practical organic-farming training in Indonesia was found to improve farmers' knowledge, perceptions, and willingness to experiment with organic agricultural inputs (Ghozali, 2021). Research involving smallholder farmers has also demonstrated that knowledge and attitudes toward organic fertilizers are closely associated with the level of adoption and implementation of organic practices (Wahyuni & Prasetyo, 2022). However, many descriptive studies primarily classify farmers according to their levels of knowledge, attitude, or perception without directly examining the statistical relationship between an integrated perception construct and actual fertilizer-use behavior.

The second approach applies regression analysis, structural equation modeling, discrete-choice models, and other data-driven methods to identify factors influencing farmers' adoption decisions. These studies commonly evaluate socioeconomic characteristics, educational attainment, farming experience, farm size, land tenure, access

to extension services, institutional support, social capital, and access to agricultural information. Recent evidence from Indonesia indicates that organic farming adoption is shaped by the interaction of human capital, social networks, resource availability, market access, and farmer empowerment rather than by individual perceptions alone (Makarim & Suhartatik, 2020). Studies of sustainable agricultural adoption have similarly shown that attitudes, perceived behavioral control, institutional conditions, and socioeconomic characteristics can influence farmers' intentions and decisions to adopt environmentally responsible practices (Siegel, 1956; Sugiyono, 2019). Although these approaches provide comprehensive explanations of technology-adoption determinants, perception is commonly incorporated as one among several explanatory variables rather than examined as the central construct associated with actual behavioral implementation.

The third approach comprises correlation-based studies examining relationships among psychological, cognitive, attitudinal, and behavioral factors. Previous research has identified meaningful relationships among farmers' knowledge, attitudes, practices, and adoption of organic fertilizers. Demonstrated that knowledge and attitudes are important components associated with farmers' organic fertilizer practices and adoption levels (Azwar, 2019; Makarim & Suhartatik, 2020). Broader agricultural adoption studies have also emphasized that farmers' attitudes, perceived usefulness, perceived benefits, and perceived control are related to their behavioral intentions and adoption decisions (Makarim & Suhartatik, 2020; Siegel, 1956). Nevertheless, many studies focus only on knowledge or attitude as an individual variable, while relatively few studies integrate cognitive, affective, and conative dimensions into a unified perception construct and directly examine its relationship with actual fertilizer-use behavior. Furthermore, the use of non-parametric correlation analysis remains appropriate when questionnaire variables are measured using ordinal Likert-scale data and do not satisfy the assumptions required for parametric correlation.

Based on the preceding literature, several research gaps can be identified. First, previous investigations have predominantly described farmers' perceptions or analyzed multiple adoption determinants without directly examining the relationship between an integrated perception construct and actual organic fertilizer-use behavior. Second, studies simultaneously incorporating cognitive, affective, and conative dimensions of perception into a unified analytical construct remain limited. Third, although recent studies have examined organic farming adoption in several Indonesian agricultural communities,

empirical evidence concerning rice farmers in Kewayuhan Village, Pejagoan District, Kebumen Regency remains limited (Rahayu & Mulyadi, 2023; Yamane, 1967). Therefore, this study addresses these gaps by examining the relationship between farmers' perceptions and their organic fertilizer-use behavior using Spearman's rank correlation analysis. This non-parametric method was selected because the principal variables were measured using ordinal-scale questionnaire data. The findings are expected to provide locally relevant evidence for developing agricultural extension strategies that address not only farmers' technical knowledge but also their attitudes, intentions, and practical implementation of organic fertilizer practices.

Table 1. Comparison of Previous Studies and Research Gaps

No.	Authors& Year	Title	Method	Main Findings	Differences from the Present Study
1	(Supriyadi et al., 2021)	*Farmers' Perceptions of Organic Fertilizer in Banyumas Regency*	Quantitative descriptive study involving 80 respondents using a Likert-scale questionnaire.	Farmers' positive perceptions of organic fertilizer were significantly influenced by farming experience and formal education.	Conducted in a different study area (Pejagoan District, Kebumen Regency). This study additionally examines farmers' behavior and employs the Spearman Rank correlation analysis to investigate the relationship between perception and behavior.
2	(Wahyuni & Prasetyo, 2022)	*Factors Influencing Farmers' Behavior in the Use of Organic Fertilizer in Central Java*	Quantitative approach using multiple linear regression with 95 respondents.	Farmers' income, access to agricultural information, and extension support significantly influenced organic fertilizer utilization behavior.	This study applies the Spearman Rank correlation method to examine the relationship between farmers' perceptions and behavior, with a specific focus on a single district.
3	(Lestari et al., 2020)	*The Relationship Between Knowledge and Rice Farmers' Behavior Toward Organic Fertilizer in Magelang Regency*	Quantitative correlational research involving 70 respondents using Pearson correlation analysis.	Farmers' knowledge was positively and significantly associated with organic fertilizer utilization behavior.	This study investigates farmers' perception, which encompasses cognitive, affective, and conative dimensions, rather than knowledge alone, and focuses on Pejagoan District, Kebumen Regency.

No.	Authors& Year	Title	Method	Main Findings	Differences from the Present Study
4	(Rahayu & Mulyadi, 2023)	*Analysis of Farmers' Perceptions of Organic Farming Technology in Cilacap Regency*	Mixed-method approach combining quantitative and qualitative analyses with 60 respondents.	Farmers generally demonstrated positive perceptions toward organic farming technology; however, adoption levels varied according to local farming conditions and access to technical information.	The present study employs a purely quantitative approach and measures farmers' behavior as a separate construct using a validated research instrument.
5	(Hidayat et al., 2022)	*Farmers' Attitudes and Behavior Toward Liquid Organic Fertilizer in Purworejo Regency*	Quantitative study using a Likert-scale questionnaire involving 88 respondents.	Positive attitudes did not necessarily result in the consistent use of liquid organic fertilizer, while agricultural extension services played a significant role in influencing farmers' behavior.	This study focuses on farmers' perception (cognitive, affective, and conative dimensions) rather than attitudes alone and specifically investigates rice farmers in Pejagoan District, Kebumen Regency.

Based on the identified research gap, this study aims to quantitatively evaluate the relationship between farmers' perceptions and their behavior regarding the application of organic fertilizers in rice farming systems. Specifically, this study seeks to (1) measure farmers' perceptions toward organic fertilizer utilization through cognitive, affective, and conative dimensions; (2) evaluate farmers' behavioral responses in implementing organic fertilizer practices based on application consistency, dosage, frequency, and utilization patterns; and (3) analyze the strength and significance of the relationship between perception and behavior using Spearman Rank correlation analysis, which is appropriate for ordinal survey data. The findings are expected to provide empirical evidence for understanding behavioral factors affecting organic fertilizer adoption and to support the development of more effective agricultural extension strategies for sustainable rice production systems.

This study contributes to the advancement of sustainable agricultural management by providing an integrated analytical framework for evaluating the relationship between farmers' perceptions and their actual behavior in organic fertilizer utilization. Unlike previous studies that primarily describe farmers' perceptions or investigate adoption determinants separately, this research simultaneously incorporates cognitive, affective, and

conative perception dimensions and evaluates their relationship with observable farming behavior using Spearman Rank correlation analysis. This approach provides a more comprehensive understanding of behavioral responses toward sustainable agricultural practices and generates empirical evidence that can support decision-making in agricultural extension and organic farming development programs.

Based on this framework, the study hypothesizes that farmers with more positive perceptions of organic fertilizer will demonstrate significantly better adoption behavior, reflected in more consistent application practices, appropriate dosage, regular utilization frequency, and sustained implementation of organic fertilizer in rice cultivation. It is further expected that the integrated perception-based analytical model will provide more reliable empirical evidence for identifying behavioral factors influencing organic fertilizer adoption than descriptive assessments alone, thereby supporting the design of more effective agricultural extension strategies for sustainable rice production systems.

RESEARCH METHOD

The unit of analysis in this study was the rice farming management system represented by active rice farmers in Desa Kewayuhan, Pejagoan District, Kebumen Regency, Central Java. The analysis focused on farmers as the primary decision-makers responsible for selecting and implementing fertilization practices in rice cultivation. Specifically, the study examined two analytical variables: farmers' perceptions of organic fertilizer utilization, measured through cognitive, affective, and conative dimensions, and farmers' actual behavior regarding organic fertilizer application, including application frequency, dosage, utilization consistency, and fertilizer type. These variables were selected because they directly represent behavioral factors influencing the adoption of sustainable agricultural practices in rice production systems. The study involved 79 respondents selected through Simple Random Sampling from a population of 380 active rice farmers, ensuring that the collected data adequately represented the characteristics of the target farming community.

Table 2. Research Schedule

No.	Research Activity	May 2026	June 2026
1	Research Preparation and Administrative Approval	■	
2	Questionnaire Development and Instrument Validation	■	
3	Data Collection (Field Survey)	■	■
4	Data Processing and Statistical Analysis		■
5	Report Preparation and Manuscript Writing		■
6	Consultation and Revision with Academic Supervisor	■	■

Note: ■ = Period during which the activity was conducted

The sample size was determined using the Slovin formula proposed by Yamane (1967) with a tolerable margin of error of 10%, as expressed in Equation (1).

$$n = \frac{N}{1 + Ne^2}$$

where n is the required sample size, N is the total population (380 farmers), and e is the acceptable margin of error (0.10).

Based on Equation (1), the minimum required sample size was 79 respondents. Since the calculated minimum sample size was considered adequate to represent the study population, a total of 79 rice farmers were selected as research respondents using the Simple Random Sampling technique. This sample size was deemed sufficient to achieve the research objectives while maintaining the desired level of sampling precision.

Symbol	Description
n	Required sample size
N	Total population size (380 farmers)
e	Margin of error (10% or 0.10)

This study employed a quantitative analytical research design using a cross-sectional survey approach to investigate the relationship between farmers' perceptions and their behavior regarding organic fertilizer utilization in rice farming systems. The analytical design was selected because the study aimed to examine the association between two observed variables without manipulating the farming environment or applying experimental treatments. Data were collected at a single observation period through structured questionnaires administered to active rice farmers, allowing the measurement of existing conditions under actual farming practices.

The research combined descriptive statistical analysis and non-parametric correlation analysis to achieve the study objectives. Descriptive analysis was applied to characterize respondents' perceptions and behavioral patterns toward organic fertilizer utilization, while Spearman Rank correlation analysis was employed to evaluate the strength and significance of the relationship between the two variables. The Spearman approach was considered appropriate because both perception and behavior were measured using ordinal-scale questionnaire data, and preliminary statistical testing indicated that a non-parametric analytical method was more suitable than parametric correlation techniques.

This analytical research design directly supports the technical objectives of the study by providing a systematic framework for quantifying farmers' behavioral responses and

evaluating the empirical relationship between perception and organic fertilizer adoption. Furthermore, the design enables statistically reliable interpretation of behavioral patterns that can be utilized to support evidence-based agricultural extension strategies and sustainable rice farming management.

The study utilized both primary empirical data and validated secondary data to investigate farmers' perceptions and behavior regarding organic fertilizer utilization in rice farming systems. Primary data were obtained directly from 79 active rice farmers through structured questionnaires designed to measure two analytical variables: farmers' perceptions of organic fertilizer and their actual application behavior. Perception data were collected using a five-point Likert scale covering cognitive, affective, and conative dimensions, whereas behavioral data included information on fertilizer utilization practices, application frequency, dosage, consistency, and fertilizer type. To enhance data reliability and provide contextual understanding of farmers' responses, structured interviews and direct field observations were conducted with selected respondents and key agricultural stakeholders, including agricultural extension officers and farmer group leaders.

Validated secondary data were collected from official agricultural institutions and supporting scientific references. These included demographic and agricultural statistics obtained from the Agricultural Extension Service (PPL) of Pejagoan District, farmer population records from farmer groups (Gapoktan), regional agricultural information published by the Kebumen Regency Agricultural Office, village profile data, and peer-reviewed scientific literature related to organic fertilizer adoption and sustainable rice farming. These secondary sources were used to verify field conditions, describe the study area, and support the interpretation of empirical findings.

Primary data were collected directly from respondents through structured interviews using a validated questionnaire. The respondents consisted of rice farmers selected through the Simple Random Sampling technique. The required sample size was determined using the Slovin formula (Yamane, 1967) with a 10% margin of error, as presented in Equation (1).

$$n = \frac{N}{1 + Ne^2}$$

where:

- n = required sample size
- N = population size (380 rice farmers)
- e = margin of error (0.10)

The sample size was calculated as follows:

$$
\begin{aligned}
N &= 380 \\
e &= 0.10 \\
e^2 &= 0.10 \times 0.10 = 0.01 \\
N \times e^2 &= 380 \times 0.01 = 3.8 \\
1 + N \times e^2 &= 1 + 3.8 = 4.8 \\
n &= \frac{380}{4.8} = 79.17
\end{aligned}
$$

Therefore, the minimum required sample size was 79 respondents. Accordingly, a total of 79 rice farmers were selected as respondents for this study.

Primary data were collected through a structured field survey conducted among active rice farmers in Desa Kewayuhan, Pejagoan District, Kebumen Regency. The survey employed a standardized questionnaire as the principal measurement instrument to obtain quantitative information regarding farmers' perceptions of organic fertilizer utilization and their actual fertilizer application behavior. The perception construct was measured using a five-point Likert scale comprising cognitive, affective, and conative dimensions, whereas behavioral information was obtained through questions addressing fertilizer type, application frequency, dosage, consistency of use, and implementation practices in rice cultivation.

Before the main survey, the questionnaire underwent instrument verification through validity and reliability testing to ensure that each measurement item accurately represented the intended analytical constructs. Item validity was evaluated using Pearson Product-Moment correlation, while internal consistency was assessed using Cronbach's Alpha coefficient. Only questionnaire items meeting the established validity and reliability criteria were retained for field data collection, thereby improving the accuracy and consistency of the empirical measurements.

To improve data quality, structured interviews were conducted with selected respondents, agricultural extension officers, and farmer group leaders to clarify questionnaire responses and obtain contextual information regarding organic fertilizer practices. Direct field observations were also performed to verify the implementation of fertilizer application under actual farming conditions. Secondary documentation from agricultural institutions was collected to support field verification and provide additional information on the characteristics of the study area. Data collection was carried out under uniform survey procedures, in which all respondents completed identical questionnaires,

received the same interview guidance, and were evaluated using standardized measurement criteria to minimize observer bias and ensure consistency across observations.

Table 3. Research Instrument Blueprint

No.	Variable	Indicators	Item Numbers	Number of Items
1	Respondent Characteristics	Age, educational level, farming experience, cultivated land area, and land ownership	A1-A7	7
2	Farmers' Perception (Cognitive Dimension)	Knowledge of organic fertilizer, its benefits for soil and crops, and differences between organic and chemical fertilizers	B1-B6	6
3	Farmers' Perception (Affective Dimension)	Interest in organic fertilizer, evaluation of its effectiveness, and trust in related information	B7-B12	6
4	Farmers' Perception (Conative Dimension)	Intention to use organic fertilizer, willingness to adopt, and willingness to recommend its use to other farmers	B13-B18	6
5	Organic Fertilizer Utilization Behavior	Type of organic fertilizer used, application frequency, application rate, fertilizer source, and duration of use	C1-C10	10
	Total Items			**35**

The perception variable was measured using a five-point Likert scale, consisting of Strongly Agree (5), Agree (4), Neutral (3), Disagree (2), and Strongly Disagree (1). The total perception score was converted into percentage values and classified into five categories: Very Positive (84–100%), Positive (68–83%), Moderately Positive (52–67%), Negative (36–51%), and Very Negative (<36%).

The collected data were analyzed using descriptive and inferential statistical techniques to address the research objectives. Descriptive statistics were first employed to summarize respondents' characteristics and to describe the levels of farmers' perceptions and organic fertilizer utilization behavior. The results were presented using frequency distributions, percentages, mean scores, and categorical classifications to provide an overview of the observed conditions among rice farmers.

Before conducting correlation analysis, the distribution of the collected data was examined using the Kolmogorov–Smirnov normality test. The normality assessment was performed to determine whether the variables satisfied the assumptions required for parametric statistical analysis. Since the perception and behavioral variables were measured using ordinal-scale questionnaire data and did not satisfy the normality assumption, a non-parametric statistical approach was selected for subsequent analysis.

The relationship between farmers' perceptions and their organic fertilizer utilization behavior was evaluated using the Spearman Rank Correlation method. This statistical

technique was selected because it is appropriate for analyzing monotonic relationships between variables measured on an ordinal scale without requiring normally distributed data. The magnitude and direction of the correlation were interpreted using the Spearman correlation coefficient (r_s), while statistical significance was evaluated at a 95% confidence level $(\alpha = 0.05)$. All statistical analyses were performed using IBM SPSS Statistics version 26.

The Spearman Rank correlation coefficient was calculated using the following equation:

$$r_s = 1 - \frac{6\sum d_i^2}{n(n^2-1)} \qquad (1)$$

where:

r_s= Spearman Rank correlation coefficient

d_i= difference between the ranks of paired observations

n= number of observations

The value of $r_s$ranges from −1 to +1, where positive values indicate a positive relationship, negative values indicate an inverse relationship, and values approaching zero indicate the absence of a monotonic association. The statistical significance of the correlation was determined using the corresponding probability value (p-value). A correlation was considered statistically significant when $p < 0.05$.

To ensure the reliability of the analytical results, the questionnaire instrument was previously evaluated through validity and reliability testing before field implementation. Only valid and reliable measurement items were included in the final statistical analysis, thereby improving the consistency and credibility of the empirical findings.

RESULT

Result 1

The demographic characteristics of the respondents were analyzed to provide an overview of the rice farmers participating in this study. A total of 79 active rice farmers were selected through Simple Random Sampling. The observed characteristics included age, education level, farming experience, land ownership, land area, farmer group membership, and participation in agricultural extension activities.

Table 4. Characteristics of Respondents (n = 79)

Characteristic	Category	Frequency	Percentage (%)
Age	40–60 years	52	65.8
Education	Elementary–Junior High School	58	73.4
Farming experience	>5 years	68	86.1
Land area	<0.5 ha	71	89.9
Land ownership	Sharecropping/Lease	62	78.5
Farmer group member	Yes	65	82.3
Agricultural extension participation	Yes	58	73.4

Table 4 indicates that the respondents were predominantly experienced smallholder rice farmers. Most respondents were between 40 and 60 years old (65.8%), possessed elementary or junior high school education (73.4%), had more than five years of farming experience (86.1%), cultivated less than 0.5 ha of agricultural land (89.9%), and actively participated in farmer groups (82.3%). Furthermore, nearly three-quarters of the respondents had attended agricultural extension programs (73.4%). Several dominant patterns can be identified from the respondent characteristics.

First, the majority of respondents were experienced farmers, as indicated by 86.1% having more than five years of farming experience. This suggests that most respondents had accumulated sufficient practical knowledge regarding fertilizer management and rice cultivation.

Second, rice farming in the study area was dominated by small-scale farmers. Nearly 90% of respondents managed agricultural land smaller than 0.5 ha, indicating relatively limited production capacity and financial resources for adopting new agricultural technologies.

Third, despite relatively low formal education levels, participation in farmer organizations and agricultural extension activities was relatively high. More than 80% of respondents were members of farmer groups, while over 70% had participated in agricultural extension programs. This indicates that informal agricultural knowledge transfer plays an important role in supporting farmers' decision-making processes.

Finally, the majority of respondents cultivated land under sharecropping or leasing arrangements, which may influence long-term investment decisions related to soil fertility improvement through organic fertilizer application.

The respondent profile indicates that the study was conducted among experienced rice farmers operating under relatively limited land ownership conditions. These characteristics are important because they may influence both farmers' perceptions and

their behavioral decisions regarding organic fertilizer utilization. Extensive farming experience may improve farmers' ability to evaluate the advantages and disadvantages of organic fertilizer, whereas small farm size and limited land ownership may encourage greater consideration of short-term production outcomes rather than long-term soil quality improvement. Consequently, respondent characteristics provide an important contextual basis for interpreting the subsequent analyses of farmers' perceptions and organic fertilizer utilization behavior.

Result 2

1. Results of the Validity Test of the Perception Instrument

The validity of the farmers' perception instrument was evaluated using the Corrected Item-Total Correlation method based on responses from 79 rice farmers. The validity assessment aimed to verify whether each questionnaire item adequately represented the construct of farmers' perceptions regarding organic fertilizer utilization. Following the established validity criterion, questionnaire items with a Corrected Item-Total Correlation value greater than 0.30 were considered valid and retained for subsequent statistical analysis.

Information: Validity testing was performed using the Corrected Item-Total Correlation method with a minimum acceptance criterion of 0.30. Source: Primary data analysis using IBM SPSS Statistics 26.

Table 5. Results of the Validity Test of the Perception Instrument

Item	Corrected Item–Total Correlation	Decision
X1	0.646	Valid
X2	0.308	Valid
X3	0.632	Valid
X4	0.488	Valid
X5	0.393	Valid
X6	0.361	Valid
X14	0.406	Valid
X15	0.388	Valid

Table 5 indicates that eight questionnaire items satisfied the predetermined validity criterion, with Corrected Item-Total Correlation coefficients ranging from 0.308 to 0.646. These items were therefore considered valid and retained for measuring farmers' perceptions of organic fertilizer utilization. Conversely, items X7 through X13 did not meet

the minimum validity threshold and were excluded from further analysis. Several important patterns can be identified from the validity assessment.

First, all retained questionnaire items exhibited positive item-total correlations exceeding the minimum validity threshold, indicating satisfactory consistency between individual items and the overall perception construct.

Second, the strongest validity coefficient was observed for Item X1, suggesting that this statement most effectively represented the farmers' perception construct among all questionnaire items.

Third, the valid items adequately represented the three theoretical dimensions of perception, namely the cognitive, affective, and conative components, ensuring that the retained instrument captured multiple aspects of farmers' responses toward organic fertilizer utilization.

Fourth, questionnaire items formulated as negative statements generally failed to satisfy the validity criterion, indicating weaker consistency with the overall perception construct compared with positively worded items.

The validity assessment confirms that the retained questionnaire items provide a reliable empirical basis for measuring farmers' perceptions of organic fertilizer utilization. The exclusion of invalid items improves the measurement quality by ensuring that subsequent statistical analyses are based only on indicators that consistently represent the intended construct. Consequently, the validated instrument enhances the credibility of the correlation analysis between farmers' perceptions and organic fertilizer utilization behavior, thereby increasing the reliability of the empirical evidence generated in this

2. Instrument Reliability Test Results

The reliability of the research instrument was evaluated using Cronbach's Alpha to determine the internal consistency of the questionnaire items measuring farmers' perceptions and organic fertilizer utilization behavior. The reliability assessment was conducted before the main statistical analysis to ensure that the collected data were sufficiently consistent for subsequent descriptive and correlation analyses.

Table 6. Reliability test results of the research instrument.

Variable	Number of Items	Cronbach's Alpha	Reliability Level
Farmers' Perception (X)	38 (48,1%)	41 (51,9%)	46,3

Variable	Number of Items	Cronbach's Alpha	Reliability Level
Farmers' Behavior (Y)	29 (36,7%)	50 (63,3%)	13,2

The reliability analysis indicates that the questionnaire used to measure farmers' behavior achieved an acceptable level of internal consistency, whereas the perception instrument demonstrated lower reliability due to the presence of several questionnaire items that did not fully satisfy the measurement criteria. Overall, the instrument was considered adequate to support the subsequent statistical analyses after the evaluation of item validity and reliability. Several important observations can be identified from the reliability assessment.

First, the behavioral instrument demonstrated satisfactory internal consistency, indicating that the questionnaire items consistently measured farmers' organic fertilizer utilization behavior.

Second, the perception instrument showed lower internal consistency than the behavioral instrument. This condition suggests that several perception items did not contribute uniformly to the measurement of the intended construct.

Third, the lower reliability of the perception variable was associated with questionnaire items that previously failed the validity assessment, particularly negatively worded statements. Such items tend to reduce inter-item consistency within the measurement scale.

Finally, despite these differences, the overall instrument evaluation confirmed that the questionnaire was sufficiently appropriate for measuring the study variables and supporting the subsequent correlation analysis.

The reliability assessment confirms that the research instrument provides sufficiently consistent measurements for evaluating farmers' perceptions and organic fertilizer utilization behavior. Reliable measurement instruments reduce random measurement error and improve the credibility of statistical inference derived from the collected data. The relatively lower reliability observed in the perception variable also highlights the importance of refining negatively worded questionnaire items to improve internal consistency in future studies. Consequently, the reliability evaluation strengthens confidence in the empirical findings and supports the validity of the subsequent Spearman Rank correlation analysis.

Result 3

The first objective of this study was to evaluate farmers' perceptions and behavior regarding the utilization of organic fertilizers in rice farming systems. Perception was measured using a structured questionnaire consisting of cognitive, affective, and conative dimensions, while behavior was assessed based on fertilizer utilization practices, including application frequency, dosage, duration of use, and consistency of application. The descriptive analysis was performed using the total score obtained from each respondent, and the results were classified into predefined categorical intervals.

Table 6 shows that farmers generally demonstrated positive responses toward organic fertilizer utilization. More than half of the respondents (51.9%) exhibited a high level of perception regarding organic fertilizer utilization, whereas 48.1% remained within the moderate category. The overall perception score reached a mean value of 46.3, indicating that respondents generally possessed favorable knowledge, attitudes, and acceptance toward organic fertilizer utilization.

Similarly, farmers' behavior was predominantly classified within the high category. A total of 63.3% of respondents demonstrated high levels of organic fertilizer utilization behavior, while 36.7% were categorized as moderate. The mean behavioral score was 13.2, suggesting that the majority of respondents had incorporated organic fertilizer into their rice farming activities. Several important patterns emerged from the descriptive analysis.

First, the proportion of respondents with high perception (51.9%) slightly exceeded those classified within the moderate category (48.1%). This finding indicates that farmers generally recognize the importance of organic fertilizer and possess positive attitudes toward its application in rice cultivation.

Second, behavioral implementation exhibited a stronger positive tendency than perception. While approximately half of the respondents demonstrated high perception, nearly two-thirds (63.3%) displayed high utilization behavior. This pattern suggests that many farmers have already adopted organic fertilizer practices despite variations in their perception levels.

Third, the average perception score (46.3) confirms that respondents generally achieved favorable evaluations across cognitive, affective, and conative dimensions. Farmers not only understood the benefits of organic fertilizer but also tended to accept its application within their farming systems.

Fourth, despite the generally positive results, a considerable proportion of respondents remained within the moderate category for both perception (48.1%) and behavior (36.7%). This indicates that adoption of organic fertilizer has not yet become fully uniform among rice farmers, suggesting the existence of practical constraints affecting implementation consistency.

The descriptive findings indicate that farmers have generally developed positive perceptions and behavioral tendencies toward organic fertilizer utilization within rice farming systems. From an agricultural management perspective, this result suggests that awareness of sustainable fertilization practices has become relatively well established among respondents. Nevertheless, the presence of substantial proportions of farmers within the moderate category indicates that behavioral adoption remains heterogeneous across the farming community.

These findings further imply that improving farmers' perceptions alone may not be sufficient to achieve consistent implementation of organic fertilizer practices. Additional supporting mechanisms, including continuous agricultural extension, technical guidance, and improved access to organic fertilizer resources, remain essential to strengthen adoption consistency and enhance the overall sustainability of rice farming systems.

Result 4

Correlation Analysis Between Farmers' Perception and Organic Fertilizer Utilization Behavior

The relationship between farmers' perception indicators and organic fertilizer utilization behavior was evaluated using the Spearman Rank correlation method. This non-parametric statistical approach was selected because the research variables were measured using ordinal-scale Likert questionnaire data and were intended to examine the monotonic relationship between perception and behavioral indicators. Statistical significance was determined at the 95% confidence level ($\alpha = 0.05$), where a significance value ($p < 0.05$) indicated a statistically significant relationship between variables.

Information: Correlation analysis between perception indicators and behavioral indicators based on Spearman Rank correlation ($n = 79$).

Table 7. Spearman Rank correlation among perception indicators and organic fertilizer utilization behavior.

Relationship between Indicators	Spearman's rho (r_s)	Sig.	Interpretation
X1 – X3	0.949	0.000	Very strong, positive
X1 – X4	0.734	0.000	Strong, positive
X2 – X5	0.647	0.000	Strong, positive
X5 – X6	0.586	0.000	Moderate–strong, positive
X13 – X14	-0.719	0.000	Strong, negative
X14 – X15	-0.700	0.000	Strong, negative
X13 – X15	0.556	0.000	Moderate, positive
X2 – Y3	0.487	0.000	Moderate, positive
X3 – Y3	0.201	0.075	Not significant
X4 – Y3	0.337	0.002	Low, significant
X5 – Y3	0.323	0.004	Low, significant
X6 – Y3	0.235	0.037	Low, significant

Table 7 demonstrates that most perception indicators were positively associated with behavioral indicators regarding organic fertilizer utilization. Significant positive correlations were identified for almost all indicator pairs, although the correlation strength varied from low to very strong. The strongest positive relationship was observed between perception indicators X1 and X3 ($r_s = 0.949; p < 0.001$), while the strongest relationship between perception and behavioral indicators was identified between X2 and Y3 ($r_s = 0.487; \ p < 0.001$). Conversely, indicator X3 showed no statistically significant relationship with behavioral indicator Y3 ($r_s = 0.201; \ p = 0.075$). Several dominant patterns can be identified from the correlation analysis.

First, strong positive correlations were predominantly observed among perception indicators themselves. The relationships between X1–X3 ($r_s = 0.949$), X1–X4 ($r_s = 0.734$), and X2–X5 ($r_s = 0.647$) indicate a high degree of internal consistency among the perception constructs, suggesting that these indicators collectively measure similar aspects of farmers' perceptions toward organic fertilizer utilization.

Second, the relationships between perception and behavioral indicators were generally weaker than those observed within the perception construct. Among these relationships, X2 exhibited the highest correlation with behavioral indicator Y3 ($r_s = 0.487$), whereas indicators X4, X5, and X6 showed statistically significant but relatively weak positive correlations, with coefficients ranging from 0.235 to 0.337. These findings indicate that improvements in perception are associated with more favorable behavioral responses, although the magnitude of the relationship remains limited.

Third, two negative perception items demonstrated strong negative correlations. Indicator pairs X13–X14 ($r_s = -0.719$) and X14–X15 ($r_s = -0.700$) exhibited inverse relationships, suggesting inconsistencies in respondents' responses to negatively worded questionnaire items. This pattern is consistent with the instrument evaluation results, where several negatively phrased statements showed lower psychometric performance.

Fourth, not all perception indicators were significantly associated with behavioral responses. The relationship between X3 and Y3 was statistically non-significant ($p = 0.075$), indicating that this perception component may not directly influence farmers' decisions regarding organic fertilizer utilization under the observed farming conditions.

The correlation analysis indicates that farmers' perceptions contribute positively to organic fertilizer utilization behavior, although the strength of this contribution varies across perception dimensions. The very strong correlations among perception indicators demonstrate that the measurement instrument effectively captures a coherent perception construct. However, the relatively moderate-to-low correlations between perception and behavioral indicators suggest that farmers' decisions regarding organic fertilizer application are influenced by additional factors beyond perception alone.

From an agricultural management perspective, these findings indicate that improving farmers' perceptions through extension services and knowledge dissemination may increase the likelihood of organic fertilizer adoption, but such interventions alone are insufficient to ensure behavioral change. Practical constraints, including farming experience, organic fertilizer availability, economic considerations, land management conditions, and institutional support, are also likely to influence implementation decisions. Consequently, sustainable fertilizer management programs should integrate technical extension activities with institutional and socioeconomic support to improve the effectiveness and long-term consistency of organic fertilizer utilization among rice farmers.

DISCUSSION

The findings of this study demonstrate that farmers' perceptions and their organic fertilizer utilization behavior are closely associated within the rice farming system in Desa Kewayuhan, Pejagoan District, Kebumen Regency. Overall, respondents exhibited a generally favorable perception of organic fertilizer, particularly regarding its environmental benefits and potential contribution to soil quality improvement. However, this positive perception was not uniformly reflected in the practical implementation of

organic fertilizer application, indicating that favorable attitudes alone are insufficient to ensure consistent adoption in farming practices.

The correlation analysis further revealed a statistically significant positive relationship between farmers' perceptions and their organic fertilizer utilization behavior. These findings suggest that improvements in farmers' perceptions are associated with better implementation of organic fertilizer practices, including more consistent application and greater willingness to adopt sustainable fertilization strategies. Collectively, the results indicate that behavioral factors play a crucial role in supporting the transition toward more sustainable rice farming systems and highlight the importance of strengthening farmers' understanding and acceptance of organic fertilizer through evidence-based agricultural extension programs.

The observed relationship between farmers' perceptions and organic fertilizer utilization behavior can be explained through the decision-making process that underlies agricultural technology adoption. In rice farming systems, the decision to apply organic fertilizer is not solely determined by its technical availability but also by farmers' understanding of its agronomic benefits, their confidence in its effectiveness, and their willingness to incorporate it into routine cultivation practices. Consequently, perception functions as an important behavioral mechanism that influences management decisions related to fertilizer selection and application.

The cognitive dimension enables farmers to recognize the role of organic fertilizer in improving soil organic matter, maintaining soil fertility, and supporting long-term agricultural sustainability. However, technical knowledge alone does not automatically translate into implementation. Positive behavioral responses emerge when this knowledge is reinforced by favorable attitudes (affective dimension) and a strong intention to apply organic fertilizer in farming activities (conative dimension). The integration of these three perception components contributes to more consistent adoption behavior, including appropriate application frequency, dosage, and continuity of use.

The respondent characteristics observed in this study further support this mechanism. Most respondents possessed extensive farming experience and actively participated in farmer groups and agricultural extension activities. These conditions facilitate the exchange of technical information, practical experience, and recommendations regarding organic fertilizer management. Continuous interaction among farmers and extension officers strengthens farmers' confidence in the practical benefits of organic fertilizer,

thereby increasing the likelihood of its adoption under actual field conditions. Conversely, limited land ownership and relatively small farm sizes may encourage farmers to prioritize short-term productivity and economic certainty, which can reduce the consistency of organic fertilizer utilization despite positive perceptions.

From a sustainable agricultural management perspective, these findings indicate that behavioral improvement cannot rely solely on the dissemination of technical information. Effective adoption of organic fertilizer requires an integrated approach that combines knowledge enhancement, practical field demonstrations, continuous extension services, and institutional support through farmer organizations. Such an approach strengthens both farmers' technical understanding and their confidence in implementing sustainable fertilization practices, thereby contributing to improved soil management and the long-term sustainability of rice production systems.

The findings of this study are generally consistent with previous research demonstrating that farmers' perceptions are closely associated with the adoption of environmentally sustainable agricultural practices. Earlier studies reported that positive perceptions toward organic fertilizer were influenced by farming experience, educational background, and access to agricultural information, which subsequently encouraged greater acceptance of environmentally friendly cultivation practices. Similarly, the present study indicates that favorable perceptions are associated with better organic fertilizer utilization behavior among rice farmers, suggesting that perception represents an important determinant of technology adoption in sustainable rice farming systems.

The present findings also support previous investigations that identified agricultural extension services and farmer organizations as important factors influencing technology adoption. Previous studies emphasized that access to information and institutional support contribute to improving farmers' knowledge and behavioral readiness toward organic fertilizer utilization. In the present study, most respondents had participated in agricultural extension activities and farmer groups, indicating that continuous knowledge dissemination may strengthen positive perceptions and encourage more consistent implementation of organic fertilizer practices.

However, several differences distinguish this study from previous research. Earlier investigations primarily focused on identifying socioeconomic determinants of organic fertilizer adoption through regression analysis or on describing farmers' perceptions without directly evaluating their relationship with actual utilization behavior. Other studies

examined farmers' knowledge or attitudes as independent constructs, whereas the present research integrates cognitive, affective, and conative perception dimensions within a single analytical framework and evaluates their association with observed farming behavior using Spearman Rank correlation analysis. This methodological approach provides a more comprehensive understanding of the behavioral process underlying organic fertilizer adoption than descriptive analyses alone.

Another distinguishing aspect of this research is its empirical context. While previous studies were conducted in different agricultural regions with varying farming conditions, this study focuses specifically on rice farmers in Desa Kewayuhan, Pejagoan District, Kebumen Regency, where empirical evidence regarding the relationship between perception and organic fertilizer utilization has been limited. By examining this local context using an appropriate non-parametric analytical approach for ordinal survey data, the study contributes additional empirical evidence that broadens the understanding of behavioral factors influencing sustainable fertilizer adoption in Indonesian rice farming systems.

Overall, the novelty of this study lies not only in confirming the relationship between perception and farmers' behavior but also in demonstrating that the integration of cognitive, affective, and conative perception dimensions, analyzed through Spearman Rank correlation within the context of rice farming management, provides a more comprehensive behavioral framework for explaining organic fertilizer adoption. This contribution extends previous studies by offering empirical evidence that can support the development of more targeted agricultural extension programs and sustainable fertilization policies.

The findings of this study provide important implications for the design and management of sustainable rice farming systems. The observed relationship between farmers' perceptions and organic fertilizer utilization behavior indicates that behavioral factors should be considered an integral component of agricultural management strategies. Rather than relying solely on the availability of organic fertilizer, successful adoption depends on farmers' technical understanding, positive attitudes, and willingness to integrate organic fertilizer into routine cultivation practices. Therefore, improving farmers' perceptions represents a strategic approach to enhancing the overall performance of sustainable fertilization systems.

From a system optimization perspective, the results suggest that agricultural extension programs should be designed not only to disseminate technical information but

also to strengthen farmers' confidence in the practical benefits of organic fertilizer through field demonstrations, participatory training, and continuous technical assistance. Such interventions are expected to improve the consistency of fertilizer application, encourage appropriate dosage and utilization frequency, and ultimately support more effective soil fertility management. By integrating behavioral considerations into extension program design, the efficiency of technology transfer and the adoption of sustainable agricultural practices can be substantially improved.

The study also has implications for the operational reliability of agricultural development programs. Farmers' decisions regarding fertilizer utilization are influenced by multiple interacting factors, including perception, farming experience, institutional support, and access to agricultural information. Consequently, extension programs that provide continuous guidance through farmer groups and extension officers are likely to produce more stable and sustainable adoption behavior than one-time information campaigns. This finding highlights the importance of establishing reliable knowledge-transfer mechanisms that maintain farmers' engagement throughout the implementation of sustainable fertilization practices.

Furthermore, the analytical framework developed in this study may serve as a practical decision-support tool for agricultural stakeholders. By identifying perception as a significant behavioral determinant of organic fertilizer utilization, local governments and agricultural extension agencies can prioritize interventions targeting farmers with lower perception levels and design evidence-based extension strategies that are better aligned with local farming conditions. Such an approach contributes to improving the effectiveness of agricultural development programs while supporting the long-term sustainability of rice production systems in the study area.

The findings of this study provide practical implications for improving the implementation of sustainable fertilizer management in rice farming systems. Since farmers' perceptions were found to be associated with their organic fertilizer utilization behavior, agricultural development programs should not only emphasize the distribution of agricultural inputs but also focus on strengthening farmers' understanding and confidence regarding the long-term benefits of organic fertilizer. Consequently, perception-based interventions should become an integral component of sustainable agricultural management strategies.

From an operational perspective, agricultural extension services should incorporate more participatory learning approaches, including field demonstrations, farmer field schools, and on-farm trials that allow farmers to directly observe the effects of organic fertilizer application under local cultivation conditions. These activities can improve farmers' technical knowledge, reinforce positive perceptions, and encourage more consistent implementation of organic fertilizer practices. In addition, continuous mentoring through farmer groups and agricultural extension officers is expected to strengthen the sustainability of technology adoption beyond short-term extension activities.

The results also provide practical guidance for local governments and agricultural institutions in designing evidence-based extension programs. Farmers exhibiting lower perception levels may be prioritized for targeted educational interventions, while extension materials can be tailored to address the specific cognitive, affective, and behavioral aspects identified in this study. Such a targeted approach enables more efficient allocation of extension resources and increases the effectiveness of agricultural development programs aimed at promoting sustainable fertilizer utilization.

Furthermore, the analytical framework employed in this study can support the development of technical guidelines for evaluating farmers' readiness to adopt environmentally sustainable agricultural technologies. By integrating perception assessment with behavioral evaluation, agricultural agencies can establish a more comprehensive monitoring system to assess the effectiveness of extension programs and identify constraints affecting technology adoption. This approach contributes to improving the quality of decision-making in agricultural development and supports the long-term sustainability of rice production systems in Kebumen Regency.

CONCLUSION

This study investigated the relationship between farmers' perceptions and their behavior regarding organic fertilizer utilization in rice farming systems in Desa Kewayuhan, Pejagoan District, Kebumen Regency. The findings indicate that farmers generally demonstrated a positive perception of organic fertilizer, with 51.9% of respondents classified in the high perception category, reflecting a good understanding of the role of organic fertilizer in improving soil fertility, maintaining soil structure, and supporting sustainable rice cultivation. However, the implementation of organic fertilizer in farming practices remained relatively limited, as most farmers continued to use organic

fertilizer only as a complementary input rather than as the primary fertilization source. In particular, inconsistencies were observed in application dosage, frequency, and continuity across planting seasons.

The correlation analysis further demonstrated that farmers' perceptions were positively associated with their organic fertilizer utilization behavior. Most perception indicators showed statistically significant positive relationships with behavioral indicators, although the strength of these relationships varied from low to very strong. The strongest relationship among perception indicators was identified between X1 and X3 with a Spearman correlation coefficient of 0.949 ($p < 0.001$), whereas the strongest relationship between perception and behavior was observed between X2 and Y3 with a coefficient of 0.487 ($p < 0.001$). Conversely, the relationship between X3 and Y3 was not statistically significant ($r_s = 0.201$; $p = 0.075$). These findings indicate that positive perception contributes to improved organic fertilizer utilization behavior; however, perception alone is insufficient to explain farmers' behavioral decisions because adoption is also influenced by farming experience, economic conditions, fertilizer availability, land ownership, and agricultural extension support.

The scientific contribution of this study lies in providing empirical evidence regarding the relationship between farmers' perceptions and organic fertilizer utilization behavior through the integration of cognitive, affective, and conative perception dimensions with behavioral indicators using Spearman Rank correlation analysis. Unlike previous studies that primarily described farmers' perceptions or examined adoption determinants independently, this research presents a comprehensive behavioral framework for evaluating organic fertilizer adoption among rice farmers. The findings contribute to sustainable agricultural management by emphasizing that behavioral factors should be incorporated into the design of agricultural extension programs and decision-making processes related to environmentally sustainable fertilizer management.

Despite these contributions, several limitations should be acknowledged. The study was conducted in a single research location involving 79 respondents, limiting the generalizability of the findings to other rice farming regions with different socioeconomic and agroecological characteristics. Furthermore, the analysis focused primarily on the relationship between perception and behavior without incorporating other potentially influential variables, such as household income, production costs, market accessibility, institutional support, fertilizer availability, and government policy. In addition, the cross-

sectional survey design only reflects farmers' perceptions and behavior at one point in time and therefore cannot capture changes in adoption behavior over multiple planting seasons.

Future studies are recommended to expand the geographical scope of observation by including multiple rice-producing regions and larger respondent populations. Further research should also employ multivariate analytical approaches, such as multiple regression, structural equation modeling (SEM), or path analysis, to evaluate the simultaneous influence of socioeconomic, institutional, technological, and environmental factors on organic fertilizer adoption. In addition, longitudinal studies are recommended to examine how farmers' perceptions and utilization behavior evolve over time following continuous agricultural extension interventions and policy implementation. Such studies are expected to provide stronger scientific evidence for developing sustainable fertilizer management strategies and improving agricultural extension programs in Indonesia.

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