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RICE FARMERS' KNOWLEDGE OF FERTILIZERS ORGANIC AND MARKET POTENTIAL IN SUPPORT ORGANIC FARMING DEVELOPMENT (CASE STUDY OF RICE FARMERS IN THE DISTRICT MOTILANGO (GORONTALO REGENCY)

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Abstract

The development of organic farming is one of the efforts to realize a sustainable and environmentally friendly agricultural system. However, the success of its development is greatly influenced by the level of farmer knowledge and the potential of the organic fertilizer market. This study aims to analyze the knowledge of rice farmers regarding organic fertilizer and how the market potential supports the development of organic farming in Mootilango District. This study uses a qualitative descriptive approach with 12 informants, consisting of 10 rice farmers, 1 farmer shop owner, and 1 organic fertilizer producer. Data collection was carried out through in-depth interviews, field observations and documentation, then analyzed using SWOT analysis. The results of the analysis show that the IFAS value is 3.29 which indicates strong internal conditions, while the EFAS value is 3.58. The position of organic farming development is in Quadrant I, which indicates an aggressive strategy. Therefore, the recommended strategy is the SO strategy of optimizing farmer understanding through technological development, organic fertilizer promotion, increasing public awareness; (2) the WO strategy of strengthening the distribution of organic fertilizer, increasing farmer knowledge, increasing farmer skills;ST Strategy Price competitiveness, Organic selling value, Increasing the application of organic fertilizer; WT Strategy Anticipating negative perceptions about organic fertilizer. This strategy is expected to support increased use of organic fertilizers and encourage the development of organic farming in Mootilango District in a sustainable manner.

Keywords: Knowledge, Organic Fertilizer, Market Potential, SWOT Analysis

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INTRODUCTION

The national agricultural sector plays a strategic role in the Indonesian economy as it provides a livelihood for a large portion of the population and contributes to food security (Akbar, 2021; Ahmadian et al., 2021). As public awareness of healthy and environmentally friendly lifestyles increases, organic farming systems are gaining increasing attention as an alternative to conventional farming, which uses extensive inorganic chemicals. Organic farming is considered capable of producing safer food and preserving the environment through a biological approach and sustainable resource management (Prabowo & Wijayanti).

In Gorontalo Province, the agricultural sector, particularly lowland rice farming, is a strategic commodity that supports the regional economy. Data from the Gorontalo Statistics Agency (BPS) (2024) shows that the harvested area of lowland rice increased from 2022 to 2023, including in Gorontalo Regency. However, this increase in harvested area was not accompanied by an increase in productivity; in fact, it decreased. This situation indicates problems in farm management, including fertilization and the application of cultivation technology.

One way to increase productivity while preserving the ecosystem is through the use of organic fertilizers. However, farmers in Mootilango District still face limited access to the organic fertilizer market and limited knowledge of proper application techniques. This lack of understanding of organic farming systems has led to suboptimal implementation and reduced interest in switching to more environmentally friendly farming systems.

Based on these issues, research is needed to analyze the level of knowledge of rice farmers and the potential market for organic fertilizer to support organic farming development in Mootilango District. This study is expected to provide a picture of the current situation and serve as a basis for developing strategies for sustainable organic farming development.

LITERATURE REVIEW

The agricultural sector has always been key and has a very large role in providing food needs for a community, so the sustainability of the agricultural sector needs to receive important attention, especially at the farmer level.(Winarso et al., 2023:32)Farmers' knowledge of agricultural practices and farming is crucial. If a farmer doesn't understand the soil or the crops they're planting, they're likely to experience repeated losses. This knowledge can be

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gained from two sources: formal education in school or through courses, and experience accumulated over years of farming.(Muhtar, 2018:1).

Farmers' ability to manage their land effectively depends largely on their knowledge, skills, and various other characteristics. Given that each farmer has varying levels of expertise, not all farmers employ the same methods. What is certain is that individuals from diverse social backgrounds make up a farming community. Knowledge levels indicate the extent to which an individual or group understands and possesses information about a particular subject or area. This variation in knowledge levels can vary significantly between individuals and groups and can be measured using various methods.

The highest level of knowledge is when an individual or group possesses deep and broad insight into a subject or area. They possess specialized knowledge, practical experience, and expertise to make meaningful contributions to the field. It's important to note that knowledge levels are relative and can change over time through research, learning, and new experiences. Furthermore, knowledge encompasses more than just facts; it also encompasses an understanding of concepts and the ability to apply them in appropriate situations.(Mahdin et al., 2024-57).

RESEARCH METHOD

This type of research employs a mixed methods approach, combining quantitative and qualitative approaches within a single research process. This approach is used to obtain a more comprehensive picture of the problem being studied, as numerical data can be supplemented and deepened through descriptive explanations. This method allows for a broader exploration of the knowledge of rice farmers and the potential market for organic fertilizer in Mootialngo District.

The data types in this study are quantitative and qualitative. The data sources used in this study include primary and secondary data, as follows:

> Primary data is data related to this research, obtained from rice farmers, fertilizer traders, and the Mootilango District government. The primary data collection technique used is interviews with questionnaires to obtain information directly related to the research objectives. Secondary data is supporting data obtained from literature, related books, the internet, and agencies or institutions supporting this research.

To collect data from research objects, the author used the following data collection methods:

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1. Observation

   Observations were made by directly observing conditions in the field, such as farmers' habits in using fertilizer, the process of using fertilizer by rice farmers.

2. matter

   In-depth interviews were conducted with rice farmers, organic fertilizer producers, and fertilizer traders in Mootilango District. The interviews aimed to gather information on farmers' understanding of organic fertilizer, the challenges they face, the availability and use of organic fertilizer, and government support for sustainable agricultural development.

3. Documentation

   The documentation method is used to collect secondary data from this documentation helps strengthen research findings and provide context to the data obtained from observations and interviews.

This study involved several key informants to obtain comprehensive data on the potential of the organic fertilizer market to support the development of organic farming in Mootilango District. They were knowledgeable about the problem and directly involved in the study. The informants in this study were rice farmers, organic fertilizer producers, and organic fertilizer traders. Informants were selected using snowball sampling. According to Lenaini (2021:35), snowball sampling is a method for sampling a population. This sampling technique involves the initial informant recommending the next informant, and the process continues until the data obtained is deemed sufficient or reaches saturation point. Snowball sampling is a sampling technique used in this study to obtain research populations that are difficult to reach, have high sensitivity, or when researchers rely on informal social networks to gather rich and contextual data (Limont et al., 2022:22).

The data analysis technique in this study uses a qualitative descriptive approach that aims to explain and depict phenomena in depth by emphasizing the characteristics, qualities, and relationships between activities. The analysis method used is the SWOT analysis, a strategic planning tool to identify strengths, weaknesses, opportunities, and threats to determine the right strategy for the company.

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RESULTS AND DISCUSSION

Level of Knowledge of Paddy Farmers Regarding Organic Fertilizer

The level of knowledge of organic fertilizers among rice farmers reflects their understanding of the types of organic fertilizers, dosages, application methods, and appropriate timing to support optimal rice plant growth. Understanding organic fertilizers, such as manure and compost, helps farmers adjust their plants' nutritional needs. Furthermore, knowledge of dosages, application methods, and timing allows farmers to avoid nutrient excesses or deficiencies that can impact plant growth and yields. Therefore, a good level of knowledge about organic fertilizers is a crucial factor in increasing rice productivity and supporting the sustainability of organic farming systems in Mootilango District, Gorontalo Regency.

Knowledge of rice farmers about types of organic fertilizers

Rice farmers' knowledge of organic fertilizers reflects their understanding of the various natural fertilizers that can be used to improve soil fertility and crop productivity. Most large rice farmers in Mootilango District, Gorontalo Regency, are familiar with several types of organic fertilizers, such as manure and compost.

According to informants from rice farmers in Mootilango District, Gorontalo Regency, they already have a basic understanding of the types of organic fertilizers, especially manure and compost. Farmers understand that manure comes from livestock waste such as cows or goats, while compost is made from plant residues or other organic materials. Both types of fertilizer are considered beneficial in improving soil fertility and supporting plant productivity. One way to optimize plant growth and productivity is by applying compost. Compost is an organic fertilizer derived from plant residues and animal waste that have undergone a decomposition or decay process.(Ratriyanto et al., 2019:9).

Knowledge of rice farmers regarding organic fertilizer dosage

Rice farmers' knowledge of organic fertilizer dosage refers to their understanding of the appropriate amount of organic fertilizer to apply to their rice fields to ensure optimal rice plant growth. This knowledge encompasses the ability of rice farmers in Mootilango District, Gorontalo Regency, to adjust the fertilizer dosage to meet the needs of their rice plants.

According to informants from rice farmers in Mootilango District, Gorontalo Regency, they understand the importance of organic fertilizer use. However, knowledge about proper dosage is still general and does not adhere to technical standards. The application of measured dosages has a positive impact on increasing productivity and efficiency of organic fertilizer use because the nutrients provided can be optimally absorbed by plants without causing waste.

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Meanwhile, in the studySudiana et al., (2016:663)It's emphasized that fertilizer dosage is a key factor in increasing agricultural production, both in quality and quantity, while remaining safe for the surrounding ecosystem. Furthermore, using the correct dosage helps maintain soil ecosystem balance, improves soil structure, and reduces dependence on chemical fertilizers, thus supporting sustainable agricultural development.

Knowledge of rice farmers about fertilization methods

Rice farmers' knowledge of organic fertilization reflects their understanding of the techniques and procedures for applying organic fertilizer to sustainably improve soil fertility and rice yields in Mootilango District, Gorontalo Regency. This knowledge encompasses how to spread organic fertilizer evenly, adjust the dosage to suit plant needs, and how to bury the fertilizer to ensure optimal nutrient absorption by rice roots.

According to informants, rice farmers in Mootilango District, Gorontalo Regency, already possess basic knowledge of organic fertilization methods, but their application varies. This knowledge contributes to increased soil fertility, nutrient absorption efficiency, and supports environmentally friendly agriculture. Furthermore,Putri et al., (2019:104)emphasizes that fertilization must pay attention to understanding the efficient use of fertilizer, such as the right type, right dose, right time, and right method.

Knowledge of rice farmers regarding fertilization time

Rice farmers' knowledge of fertilization timing reflects their understanding of the appropriate timing for fertilizer application to ensure optimal absorption of the nutrients needed by rice plants. The correct timing of fertilizer application significantly impacts growth, yield, and the efficiency of fertilizer use. Farmers with a good understanding of fertilization timing tend to increase productivity and reduce the risk of nutrient loss due to inappropriate fertilization.

Interviews revealed that farmers have good knowledge of fertilization timing, which has impacted productivity and the efficiency of organic fertilizer use in rice paddies. This finding aligns with research. Putri et al., (2019:104)which states that efficient fertilization not only plays a crucial role in increasing production and farmer income but is also related to the sustainability of the production system. In this context, implementing appropriate fertilization timing can support the sustainability of organic farming, as farmers in Mootilango District, Gorontalo Regency, are able to maintain long-term soil fertility and create an environmentally friendly and sustainable agricultural system.

Table 1.

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Internal Strategy Factor Analysis Matrix (IFAS) Summary

NO	Internal Factors	Weight	Ranking	Score
Strength				
1	The price of organic fertilizer is relatively affordable	0.12	4	0.48
2	Availability of organic fertilizer products in various types of packaging	0.11	4	0.44
3	Organic fertilizer products have obtained official certification	0.12	4	0.48
4	Farmers already understand the benefits of organic fertilizer	0.13	4	0.52
5	The use of organic fertilizer reduces the risk of soil damage.	0.11	3	0.44
Sub-Total				2.36
Weakness				
1	Lack of availability of organic fertilizer in farmer's shops	0.06	3	0.18
2	Farmers are starting to switch to using inorganic fertilizers	0.07	3	0.21
3	Farmers' knowledge about how to apply organic fertilizer is still limited	0.08	3	0.24
4	There are no organic fertilizer producers	0.10	2	0.20
5	Lack of information about organic fertilizers	0.10	1	0.10
Sub-Total				0.93
Total		1.00		3.29

Source: Primary data after processing, 2025

Based on Table 1 above, the total score obtained is 3.29. It can be concluded that the fertilizer market potential to support organic farming in Mootilango District is currently in a strong position because internal conditions are above average. This is in accordance with research by Salim et al., (2025:174) which states that a score obtained from 1.00 to 1.99 indicates a weak internal position. A score of 2.00 to 2.99 indicates average. A score of 3.00 to 4.00 indicates internal strength.

The total IFAS score of 3.29 indicates that the fertilizer market's potential to support organic farming in Mootilango District has a strong internal position. This means that internal strengths can be optimally leveraged to capitalize on

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external opportunities. The dominant strength factors are:Farmers already understand the benefits of organic fertilizerwith the highest score of 0.40. Furthermore, the main weakness in the fertilizer market potential in supporting organic farming in Mootilango District with a score of 0.24, namelyFarmers' knowledge of how to apply organic fertilizer is still limited. This major weakness stems from the lack of standards for knowing the correct fertilizer dosage when applying fertilizer to rice paddies.

Table 2
External Factor Weighting and Rating Results

NO	Internal Factors	Weight	Ranking	Score
Strength				
1	The price of organic fertilizer is relatively affordable	0.12	4	0.48
2	Availability of organic fertilizer products in various types of packaging	0.11	4	0.44
3	Organic fertilizer products have obtained official certification	0.12	4	0.48
4	Farmers already understand the benefits of organic fertilizer	0.13	4	0.52
5	The use of organic fertilizer reduces the risk of soil damage.	0.11	3	0.44
Sub-Total				2.36
Weakness				
1	Lack of availability of organic fertilizer in farmer's shops	0.06	3	0.18
2	Farmers are starting to switch to using inorganic fertilizers	0.07	3	0.21
3	Farmers' knowledge about how to apply organic fertilizer is still limited	0.08	3	0.24
4	There are no organic fertilizer producers	0.10	2	0.20
5	Lack of information about organic fertilizers	0.10	1	0.10
Sub-Total				0.93
Total		1.00		3.29

Source: Primary data after processing, 2025

Based on Table 9 above, the total score obtained is 3.29. It can be concluded that the fertilizer market potential to support organic farming in Mootilango

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District is currently in a strong position because internal conditions are above average. This is in accordance with research by Salim et al., (2025:174) which states that a score obtained from 1.00 to 1.99 indicates a weak internal position. A score of 2.00 to 2.99 indicates average. A score of 3.00 to 4.00 indicates internal strength.

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SWOT diagram

From the results of the IFAS and EFAS Matrix analysis, the X and Y axes can be determined. The way to determine the X-axis coordinates is by subtracting the total score of the strengths factor (Strengths) from the total score of the weaknesses (Weaknesses). Then determine the Y-axis coordinates by subtracting the total score of the opportunities factor (*Opportunity)*with a total threat score (*Threat)* (Hakim & Dzulkifli, 2024:28).

The total value of internal factors for market potential in supporting organizational agriculture in Mootilango District is 3.29 obtained from the strength value of 2.36 and the weakness value of 0.93, meanwhile, the total value of external factors is 3.58 obtained from the opportunity value of 2.59 and the threat value of 0.99. After the calculation, the results of internal and external factors are known.

The calculation results from the SWOT coordinate diagram are positive-positive with both axes getting a score of X = 1.43 and Y = 1.60. From the results of both values, both are positive, this indicates that the suitable strategic position is in quadrant I. There are 4 SWOT quadrant cells, each of which can be explained, namely Quadrant 1 (Positive-Positive), Quadrant2 (Positive-Negative), Quadrant 3 (Negative-Positive), and Quadrant 4 (Negative-Negative)Pramudya et al., (2021). The SWOT diagram for market potential in supporting organic farming in Mootilango District can be seen in the following image:

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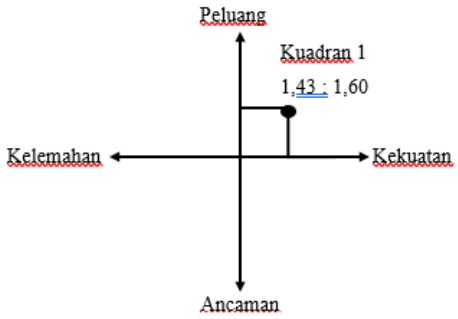

Figure 1
SWOT Diagram

Based on the results of the SWOT analysis obtained on the X and Y axes. The straight line in the diagram above shows the coordinate points in Quadrant 1. Quadrant 1 is a favorable situation for market potential in supporting crop farming in Mootilango District because it has strengths and opportunities that can be utilized so that it is suitable to use the SO or Strength Opportunities strategy to develop the business and is supported by an aggressive growth strategy.

SWOT Matrix

The SWOT matrix is a tool that can be used to compile the company's strategic factors. This SWOT matrix can describe how the external opportunities and threats faced by the company can be adjusted by the company with its strengths and weaknesses. This SWOT matrix produces four sets of possible alternative strategies. In other words, the SWOT matrix can be used to determine the company's strategic decisions or policies (Kamaluddin, 2020:345).

Determining the appropriate strategy to assess market potential to support organic farming development in Mootilango District is through the creation of a SWOT matrix. This SWOT matrix is built based on external and internal factors, including opportunities, threats, strengths, and weaknesses. Based on the SWOT matrix, four main strategies can be developed: SO, WO, ST, and WT. Strategies using the SWOT matrix analysis are shown in Table 3.

Table 3

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SWOT Matrix Analysis

IFAS / EFAS	Strength (S) :	Weaknesses (W) :
	1. The price of organic fertilizer is relatively affordable 2. Availability of organic fertilizer products in various types of packaging 3. Organic fertilizer products have obtained official certification 4. Farmers already understand the benefits of organic fertilizer 5. The use of organic fertilizer reduces the risk of soil damage.	1. Lack of availability of organic fertilizer in farmer's shops 2. Farmers are starting to switch to using inorganic fertilizers 3. Farmers' knowledge about how to apply organic fertilizer is still limited 4. There are no organic fertilizer producers 5. Lack of information about organic fertilizers
Opportunity (O) :	SO Strategy	WO Strategy
1. The increasing development of technology to access information through social media today 2. The increasing use of social media among today's society 3. Availability of abundant local	1. Technological developments can optimize the understanding of organic fertilizer farmers (S4,O1,O2,O5) 2. Technological developments can encourage the widespread promotion of	1. Government support can encourage the emergence of organic fertilizer producers and strengthen distribution in farmer shops (W4,W1,O4) 2. Technological developments act as

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resources such as organic waste 4. There is government support for the development of organic farming 5. Trends in sustainable agriculture and agroecology	organic fertilizers through the benefits of organic fertilizers and the relatively affordable price of organic fertilizers (S1, S5, O1, O2) 3. The use of social media can increase public awareness about organic farming (S5,O2,05)	a medium for information and can increase farmers' knowledge about organic fertilizers (W5, W3, O1, O2) 3. Sustainable agriculture-based training programs can improve farmers' knowledge about organic fertilizer applications (W3, O4, O5, O3)
Threat (T) : 1. Competition with inorganic fertilizers that are easy to obtain 2. Fluctuations in the supply of raw materials such as organic waste 3. The shelf life of organic fertilizer is limited 4. Dominance of inorganic fertilizers	ST Strategy 1. The relatively affordable price of organic fertilizer can be a strategy to compete with inorganic fertilizers (S1, T1, T4) 2. Official certification and the benefits of organic fertilizer can be used as a selling point to compete with the dominance of inorganic fertilizers in the market (S3, T4) 3. Farmers' understanding of the benefits of organic fertilizer can	WT Strategy 1. Limited information and understanding of farmers can anticipate negative perceptions about organic fertilizers (W3, W5, T3)

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	encourage the purchase and use of organic fertilizer in a timely manner and according to needs (S4,T3)	

Source: Primary data after processing, 2025

Strategy Analysis

A. SO (Strength-Opportunity)

1. Advances in information technology have the potential to optimize farmers' understanding of organic fertilizers, particularly through easier access to information and digital dissemination of knowledge. This increased understanding can influence the perceptions and preferences of farmers, as key market players, thereby driving increased interest and demand for organic fertilizers.
2. The development of information technology plays a crucial role in promoting organic fertilizers more broadly and effectively, particularly through the use of digital media as a means of conveying market information. Disseminating information about the benefits of organic fertilizers for soil fertility and agricultural drought relief, coupled with relatively affordable prices, can increase the product's appeal to consumers. Technology-based promotion enables broader market reach, increases farmer awareness and interest, and strengthens the perceived value of organic fertilizers as an economical and environmentally friendly agricultural input. Thus, technological development is a strategic factor in expanding the market potential of organic fertilizers.
3. The use of social media plays a strategic role in raising public awareness of organic farming through the rapid and easily accessible dissemination of information. Social media enables education about the benefits of organic farming, from a health, environmental, and consumer perspective, thereby fostering a positive perception of organic fertilizers among the public. This increased awareness translates into growing interest and demand for organic agricultural products, ultimately strengthening and expanding the potential market for organic farming.

B. WO (Weaknesses-Opportunities)

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1. Through policies and program assistance, the government can create a conducive market for the development of the organic fertilizer industry. This can encourage the emergence of local organic fertilizer producers and strengthen the organic fertilizer distribution system in farmer's stores. The presence of more producers and wider distribution will increase the availability of organic fertilizer products in the market, making it easier for farmers to obtain organic fertilizer. This has the potential to increase farmer trust and interest as consumers, which in turn can expand and strengthen the potential market for organic fertilizer.
2. Technological advancements serve as an effective information platform for increasing farmers' knowledge about organic fertilizers, both in terms of application methods and their impact on soil fertility. This increased knowledge directly impacts the perceptions and preferences of farmers, the primary consumers in the organic fertilizer market. With broader access to technology-based information, the opportunity for organic fertilizer acceptance in the market increases, which ultimately can strengthen and expand the organic fertilizer market potential.
3. Government-supported training programs based on sustainable agriculture play a crucial role in improving farmers' knowledge and skills regarding the proper application of organic fertilizers. This increased understanding can boost farmers' confidence in the effectiveness of organic fertilizers. With increased use of organic fertilizers, market demand for organic fertilizers has the potential to grow sustainably. Therefore, training programs are a strategic factor in supporting the development and expansion of the organic fertilizer market.

C. ST (Strength-Threat)

1. The relatively affordable price of organic fertilizer offers significant potential for market expansion by increasing its competitiveness against inorganic fertilizers, which have historically dominated use among farmers. Competitive pricing can address barriers to adoption by farmers, the primary consumers, and thus drive increased interest and market demand for organic fertilizer. This demonstrates that affordability is not only a product advantage but also plays a strategic role in capturing market share and strengthening the position of organic fertilizer in the competitive agricultural input market.
2. Official certification serves as a guarantee of product quality, safety, and standards, thereby increasing potential consumer confidence in the use of organic fertilizers. Furthermore, the benefits of organic fertilizers in improving

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soil fertility, maintaining ecosystem balance, and supporting sustainable agriculture can be used as a key selling point. By highlighting these aspects, organic fertilizers can compete with the more dominant inorganic fertilizers and can also reduce the long-term dependence of farmers, the primary consumers, on chemical fertilizers.

3. Farmers' understanding of the benefits of organic fertilizer plays a crucial role in encouraging timely purchasing and use decisions, allowing them to avoid losses due to the limited shelf life of organic fertilizers and to utilize them optimally before their quality declines. This not only increases the efficiency of fertilizer use but can also support the cessation of agricultural activities and strengthen farmers' confidence in the use of organic fertilizers.

D WT (Weaknesses-Threats)

1. Farmers' limited information and understanding needs to be addressed to prevent negative perceptions of organic fertilizers. This can be achieved by increasing access to information on organic fertilizers and improving farmer skills, enabling them to gain a proper understanding of organic fertilizers. This can minimize internal weaknesses and external threats, while maintaining farmer trust and interest in organic fertilizer use.

CONCLUSION

1. Rice farmers' knowledge of organic fertilizers is relatively good, particularly in increasing soil fertility and improving soil structure. This knowledge is gained through farming experience and agricultural extension activities. However, farmers' knowledge of determining fertilizer dosages remains limited. Most farmers don't know the correct dosage of organic fertilizer for their crops and land conditions, so fertilizer application is often based on habit or estimation.
2. The potential of the organic fertilizer market in Mootilango District is quite large because it is supported by the vast area of land and high activity of rice farming, increasing awareness of environmentally friendly agriculture, and the strategic position of the SWOT analysis results which are in Quadrant I (aggressive strategy) with an IFAS value of 3.29 and EFAS 3.58, which indicates strong internal conditions and high external opportunities. In addition, the interest of farmers to increase productivity, the role of farmer shops as distribution channels, and strategic support such as increased promotion, education, strengthening distribution, and price competitiveness

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further strengthen the opportunities for developing the organic fertilizer market. However, this potential still needs to be optimized by increasing farmer knowledge, improving market access, and strengthening positive perceptions of the use of organic fertilizers in supporting sustainable agriculture.

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