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THE EFFECTIVENESS OF SUBSIDIZED FERTILIZER DISTRIBUTION ON RICE PRODUCTIVITY IN TIDAL SWAMP LANDS

EFEKTIVITAS DISTRIBUSI PUPUK BERSUBSIDI TERHADAP PRODUKTIVITAS PADI DI LAHAN RAWA PASANG SURUT

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Abstract

The agriculture sector plays a strategic role in the national economy and is highly dependent on fertilizer availability on support crop productivity. This study aimed to analyze the effectivenss of subsidized fertilizer distribution and its impact on rice productivity in the tidal lowland areas of Tanjung Lago District, Banyuasin Regency. The research employed both quantitative and qualitative descriptive approaches using a stratified random sampling method involving 60 farmers who received subsidized fertilizer and 30 farmers who did not reveive subsidizer fertilizer. The effectiveness of subsidizer fertilizer distribution was evaluated using a likert scale based on the Six Appropriateness Principles, while the impct on rice productivity was analyzed by comparing the productivity levels of the two farmer groups. The findings showed that the distribution of subsidized fertilizer was generally categorized as moderately effective, with an average effectiveness score of 71,33%. The price compliance indicator was classified as highly effective (91,66%), while location suitability was categorized as effective (81,00%). Meanwhile, quantity appropriateness, fertilizer type suitability, and timeliness of distribution were categorized as moderately effective. The findings showed that the distribution of subsidized fertilizer was generally categorized as moderately effective, with an average effectiveness score of 71.33%. The price compliance indicator was classified as highly effective (91.66%), while location suitability was categorized as effective (81.00%). Meanwhile, quantity appropriateness, fertilizer type suitability, and timeliness of distribution were categorized as moderately effective. In contrast, the fertilizer quality suitability indicator was still considered ineffective, with an effectiveness score of 55%. The use or subsidized fertilizer also contributed positively to rice productivity. Farmers receiving subsidized fertilizer achieved an average rice productivity of 3.77 ton ha^{-1}, whereas farmers who did non receive subsidized fertilizer produced an average productivity of 3.20 ton ha^{-1}. This resulted in a productivity defference of 0.57 ha^{-1}.. equivalent to approximately 17.81%.

Keywords : Fertilizer Distribution, Effectiveness, Rice Productivity, Subsidized Fertilizer, Tidal Swamp Land.

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Abstrak

Sektor pertanian memainkan peran strategis dalam perekonomian nasional dan sangat bergantung pada ketersediaan pupuk untuk mendukung produktivitas tanaman. Penelitian ini bertujuan untuk menganalisis efektivitas distribusi pupuk bersubsidi dan dampaknya terhadap produktivitas padi di daerah dataran rendah pasang surut Kecamatan Tanjung Lago, Kabupaten Banyuasin. Penelitian ini menggunakan pendekatan deskriptif kuantitatif dan kualitatif dengan metode pengambilan sampel acak bert stratified yang melibatkan 60 petani penerima pupuk bersubsidi dan 30 petani yang tidak menerima pupuk bersubsidi. Efektivitas distribusi pupuk bersubsidi dievaluasi menggunakan skala Likert berdasarkan Enam Prinsip Kesesuaian, sedangkan dampaknya terhadap produktivitas padi dianalisis dengan membandingkan tingkat produktivitas kedua kelompok petani. Hasil penelitian menunjukkan bahwa distribusi pupuk bersubsidi secara umum dikategorikan cukup efektif, dengan skor efektivitas rata-rata 71,33%. Indikator kepatuhan harga diklasifikasikan sangat efektif (91,66%), sedangkan kesesuaian lokasi dikategorikan efektif (81,00%). Sementara itu, kesesuaian kuantitas, kesesuaian jenis pupuk, dan ketepatan waktu distribusi dikategorikan cukup efektif. Hasil penelitian menunjukkan bahwa distribusi pupuk bersubsidi secara umum dikategorikan cukup efektif, dengan skor efektivitas rata-rata 71,33%. Indikator kepatuhan harga diklasifikasikan sangat efektif (91,66%), sedangkan kesesuaian lokasi dikategorikan efektif (81,00%). Sementara itu, kesesuaian kuantitas, kesesuaian jenis pupuk, dan ketepatan waktu distribusi dikategorikan cukup efektif. Sebaliknya, indikator kesesuaian kualitas pupuk masih dianggap tidak efektif, dengan skor efektivitas 55%. Penggunaan pupuk bersubsidi juga memberikan kontribusi positif terhadap produktivitas padi. Petani yang menerima pupuk bersubsidi mencapai produktivitas padi rata-rata 3,77 ton ha^{-1}, sedangkan petani yang tidak menerima pupuk bersubsidi menghasilkan produktivitas rata-rata 3,20 ton ha^{-1}. Hal ini menghasilkan perbedaan produktivitas sebesar 0,57 ha^{-1}, setara dengan sekitar 17,81%.

Kata Kunci : Distribusi Pupuk, Efektivitas, Produktivitas Padi, Pupuk Bersubsidi, Lahan Rawa Pasang Surut.

1. INTRODUCTION

The agricultural sector plays a highly strategic role in the national economy because it not only contributes to the formation of gross domestic product but also provides employment opportunities, supports food security, and supplies raw materials for industrial activities. In rural areas, this sector serves as the primary source of livelihood for many communities, making its development essential for promoting economic growth and improving public welfare. Efforts to enhance agricultural sector performance can fundamentally be achieved through increasing productivity and optimizing the utilization of available local resources (Panahi et al., 2018). Within the national agricultural structure, the food crops subsector occupies a particularly important position due to its role in supplying staple foods while simultaneously absorbing a large labor force (Tuminem et al., 2018). Therefore, strengthening the food crops subsector is essential for maintaining national food security and stability. Therefore, strengthening the food crops subsector is crucial for maintaining national food stability.

Among various food crop commodities, rice is the most important and strategically significant commodity because it serves as the staple food for the majority of the Indonesian population. Along with population growth and increasing public consumption, the demand for rice continues to rise over time (Nasir et al., 2025). This condition places rice production enhancement as a top priority in efforts to maintain national food secu rity. However, increasing rice production cannot be separated from the availability of agricultural inputs, particularly fertilizers, which are essential factors in optimizing agricultural productivity.

Fertilizers play a crucial role in modern agricultural systems by supplying essential nutrients required for plant growth, increasing crop productivity, improving harvest quality, and sustaining soil fertility over time (ALnaass et al., 2021). Therefore, the government seeks to ensure fertilizer

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availability through a subsidized fertilizer program that enables farmers to obtain fertilizers at affordable prices. This policy is expected to reduce production costs while supporting the sustainability of farming activities. In addition, fertilizer subsidies serve as an important instrument in maintaining national food production stability through the strengthening of distribution systems and the simplification of regulatory procedures (Pupuk Indonesia, 2025).

Each year, the government allocates a fertilizer subsidy budget as a policy intervention aimed at increasing agricultural productivity. In its implementation, the distribution of subsidized fertilizers is expected to comply with the six appropriateness principles, namely timely distribution, appropriate quantity, appropriate type, appropriate location, appropriate quality, and appropriate price (Direktorat Jenderal Prasarana dan Sarana Pertanian, 2023). Nevertheless, various challenges are still encountered in practice, including delays in distribution, fertilizer shortages during planting seasons, limited quotas, price discrepancies at the retailer level, and the potential misuse of subsidized fertilizers. These conditions prevent some farmers from obtaining fertilizers according to their actual needs, forcing them to purchase non-subsidized fertilizers at higher prices. As a consequence, production costs increase and the efficiency of agricultural input utilization becomes less optimal (Kasiami, 2020).

Disruptions in fertilizer distribution can hinder farming activities because delays in fertilizer application prevent crops from receiving nutrients according to their growth stages, thereby reducing rice productivity. Banyuasin Regency is one of the main rice production centers in South Sumatra, with a harvested area of 230,280 hectares, total production of 1,177,649 tons, and productivity reaching 5.11 tons per hectare, contributing 32.47% to the province's total rice production (BPS Sumatera Selatan, 2025). To support this production, the distribution of subsidized fertilizers reached 5,791,546 kg, consisting of 2,025,608 kg of Urea fertilizer and 3,765,938 kg of NPK fertilizer. Of this amount, 286,450 kg, or 4.95%, was distributed in Tanjung Lago, comprising 95,450 kg of Urea and 191,000 kg of NPK fertilizer. The dominance of NPK fertilizer distribution indicates the high demand among farmers for compound fertilizers to support farm productivity. Therefore, the success of rice production is strongly influenced by the effectiveness of subsidized fertilizer distribution (Dinas Pertanian Tanaman Pangan dan Hortikultura Sumatera Selatan, 2025)

Although Tanjung Lago has considerable agricultural potential, particularly in its tidal lowland areas, the distribution of subsidized fertilizers still faces various challenges. There are indications that farmers' access to subsidized fertilizers has not been evenly distributed, while the demand for fertilizers in the field remains high. The characteristics of tidal lowlands, which differ from irrigated rice fields, make fertilizer requirements more specific and highly important for supporting rice growth. However, several issues, including lengthy distribution channels, limited fertilizer stocks at the retailer level, fertilizer shortages during planting seasons, and price discrepancies in the market, indicate that the distribution of subsidized fertilizers has not yet been fully effective or equitable.

Based on these conditions, the urgency of this study lies in the need to evaluate the effectiveness of subsidized fertilizer distribution on rice production. Differences in access to subsidized fertilizers are suspected to influence variations in the use of production inputs, farming costs, and production levels between farmers who receive subsidized fertilizers and those who do not. Nevertheless, studies specifically comparing rice production between these two groups of farmers in tidal lowland areas remain relatively limited, even though such information is essential for assessing the extent to which the fertilizer subsidy program is truly capable of improving agricultural productivity. Based on the foregoing discussion, this study entitled *"The Effectiveness of Subsidized Fertilizer Distribution on Rice Productivity in Tidal Swamp Lands"* is important to undertake. This research is expected to provide empirical evidence regarding the effectiveness of subsidized fertilizer distribution while also analyzing differences in rice production between farmers who receive subsidized fertilizers and those who do not. The findings of this study are expected to serve as valuable input for the government in

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improving the subsidized fertilizer distribution system so that it becomes more targeted, more effective, and better able to support sustainable increases in rice productivity and farmers' welfare.

2. RESEARCH METHOD

This study was conducted in Tanjung Lago District, Banyuasin Regency, South Sumatra. The research location was selected purposively because the area is recognized as one of the major rice-producing centers in South Sumatra Province. Data collection and processing were carried out from September to October 2024.

The sampling technique employed in this study was *Non-Proportionate Stratified Random Sampling*. The research sample consisted of 60 farmers who used subsidized fertilizer and 30 farmers who did not use subsidized fertilizer.

The study utilized both primary and secondary data. Primary data were collected through direct interviews with respondents using structured questionnaires, while secondary data were obtained from the Agricultural Extension Center of Tanjung Lago and other related institutions.

Data analysis was conducted using a quantitative descriptive approach. The effectiveness of subsidized fertilizer distribution was assessed using an index value based on farmers' perceptions of the six accuracy indicators, namely timeliness, quantity accuracy, type suitability, location accuracy, quality suitability, and price appropriateness. Respondents' perceptions were measured using a Likert scale, which according to Sugiyono (2011) is suitable for evaluating attitudes and perceptions. The index value was calculated using the following formula:

$$\text{Index value (\%)} = \frac{Total\ Score}{Highest\ Score\ x\ Number\ of\ Respondents} x100\%$$

The percentage results were used to determine the level of effectiveness of subsidized fertilizer distribution. Based on Bakkra (2014) cited in Harahap (2018) the effectiveness criteria are classified as follows:

- Highly ineffective ($k \leq 40\%$)
- Ineffective ($40\% < k \leq 60\%$)
- Moderately effective ($60\% < k \leq 80\%$)
- Effective ($80\% < k \leq 90\%$)
- Highly effective ($k > 90\%$)

The impact of subsidized fertilizer distribution on rice production was analyzed descriptively by comparing the average production and productivity levels between farmers who used subsidized fertilizer and those who did not. The production difference between the two groups was calculated using the following formula:

$$\Delta P = Ps - Pns$$

notes:

- ΔP = Difference in rice production between subsidized fertilizer users and non-users
- PsP_sPs = Average rice production of farmers using subsidized fertilizer
- PnsP_{ns}Pns = Average rice production of farmers not using subsidized fertilizer

The percentage change in production was calculated using the production growth formula proposed by produksi (Moedasir, 2022)

$$\%\Delta P = \frac{Ps - Pns}{Pns} x\ 100\%$$

The interpretation of the results was defined as follows:

- If $\Delta P > 0$, subsidized fertilizer has a positive effect on rice production.
- If $\Delta P = 0$, subsidized fertilizer has no effect on rice production.
- If $\Delta P < 0$, subsidized fertilizer has a negative effect on rice production.

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3. RESULT AND DISCCUSSION

The distribution of subsidized fertilizer involves farmers, farmer groups, agricultural extension officers, retailers, distributors, and the government through the e-Allocation system, which begins with the preparation of the Definitive Group Needs Plan (RDKK) by farmer groups under the guidance of agricultural extension officers as the basis for determining fertilizer allocations. After verification, the e-Allocation data are used by authorized retailers to distribute subsidized fertilizer to registered farmers using their identity cards, while fertilizer stocks are supplied to retailers by distributors based on estimated weekly demand. In this mechanism, farmer groups act as intermediaries between farmers and retailers, while extension officers assist with administrative processes and ensure the accuracy of fertilizer requirement data. Although the distribution process has generally operated according to the established procedures and demonstrated coordination among stakeholders, several administrative constraints remain, including delays in RDKK preparation and the absence of the Farmer Card system as required by government regulations. Therefore, improvements in administrative management, timeliness, and distribution procedures are still necessary to ensure that subsidized fertilizer distribution becomes more targeted, transparent, and efficient. These findings are consistent with the study conducted Saputri et al., (2022) by Saputri et al., which reported that subsidized fertilizer distribution had generally followed existing regulations but continued to face challenges related to timeliness, implementation of the Farmer Card system, and distribution monitoring at the field leve.

Effectiveness of Subsidized Fertilizer Distribution

The effectiveness of subsidized fertilizer distribution in Banyuasin Regency was evaluated using six distribution indicators, namely quantity appropriateness, location suitability, fertilizer type suitability, price compliance, timeliness of distribution, and fertilizer quality suitability. The assessment was carried out using a Likert scale based on farmers' perceptions. The results of the effectiveness index analysis are presented in Table 2.

Table 2. Effectiveness of Subsidized Fertilizer Distribution in Banyuasin Regency

No	Indicator	Subsidized fertilizer distribution index score value.							
		1	2	3	4	5	Total Score	Percentage (%)	Category
1	Quantity Appropriateness	4	22	30	76	80	212	70.66	Moderately Effective
2	Location Suitability	2	10	24	72	135	243	81,00	Effective
3	Fertilizer Type Suitability	10	22	33	40	90	195	65,00	Moderately Effective
4	Price Compliance	0	2	15	48	210	275	91.66	Highly Effective
5	Timeliness of Distribution	11	22	27	44	90	194	64.66	Moderately Effective
6	Fertilizer Quality Suitability	16	24	36	44	45	165	55,00	Ineffective
	Average	43	17	27,5	54	108,3	214	71,33	Moderately Effective

Note: 1 = very inappropriate; 2 = inappropriate; 3 = moderately appropriate; 4 = appropriate; 5 = highly appropriate.

Based on Table 2, the overall implementation of subsidized fertilizer distribution in Banyuasin Regency can generally be categorized as moderately effective. Among the evaluated indicators, price compliance showed the highest level of effectiveness and was classified as highly effective.

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Meanwhile, quantity appropriateness, fertilizer type suitability, and timeliness of distribution were categorized as moderately effective. In contrast, fertilizer quality suitability was considered ineffective, indicating that fertilizer quality remains one of the major constraints experienced by farmers.

1. Quantity Appropriateness

The evaluation of the quantity appropriateness indicator produced an index score of 212, equivalent to 70.66%, which was categorized as moderately effective. In general, farmers considered that the amount of subsidized fertilizer distributed was in accordance with the official allocation procedures and was still able to support rice farming activities. Nevertheless, the quantity received was insufficient to fully meet crop nutrient requirements, leading farmers to purchase non-subsidized fertilizers to compensate for shortages during the planting season.

Interview findings showed that the average Urea fertilizer requirement for rice cultivation in tidal lowlands was approximately 200 kg ha^{-1}, whereas farmers generally received only around 150 kg ha^{-1} of subsidized Urea fertilizer. This difference indicates that although fertilizer distribution has complied administratively with allocation procedures, the quantity distributed has not yet fully matched the actual fertilizer requirements of farmers in the field.

According to agricultural extension officers, the limited availability of subsidized fertilizer is closely associated with the e-Alokasi system, which is based on fertilizer recommendation standards established by the Indonesian Agency for Agricultural Research and Development (Balitbangtan) under the Ministry of Agriculture. Fertilizer allocations are determined according to standardized soil nutrient requirements; however, these standards have not fully considered the diverse characteristics of tidal lowland areas in different regions. In addition, fertilizer distribution is strictly regulated based on e-Alokasi data, preventing retailers from increasing fertilizer quotas beyond the predetermined allocation. As a result, when fertilizer demand exceeds the allocated quota, farmers are compelled to purchase non-subsidized fertilizers at higher market prices.

The findings suggest that the effectiveness of quantity appropriateness is influenced not only by compliance with administrative distribution procedures, but also by the extent to which the allocated fertilizer fulfills actual crop nutrient demands. Limited fertilizer quotas, variations in fertilizer requirements among farmers, and the inflexibility of the allocation system have contributed to fertilizer shortages experienced by some farmers, despite proper implementation of distribution procedures (Lilis et al., 2025). Furthermore, inaccuracies in farmer data collection and the limited adjustment of allocations to actual field conditions have reduced the effectiveness of implementing the “six appropriateness” principle in subsidized fertilizer distribution (Akadji et al., 2025). On the other hand, policies aimed at reducing dependence on mineral fertilizers and promoting the use of organic fertilizers may provide an alternative strategy to decrease reliance on subsidized chemical fertilizers. However, the successful implementation of such policies requires investment support, improvements in farm management practices, and supportive government policies to encourage effective adoption by farmers (Jones & Deuss, 2024).

Overall, the quantity appropriateness indicator in subsidized fertilizer distribution can still be classified as moderately effective. Although the distribution process has generally complied with administrative regulations, the quantity of fertilizer received by farmers has not fully satisfied farming requirements. Therefore, improvements in farmer data collection, evaluations of fertilizer recommendation standards, and stronger coordination among the government, agricultural extension officers, distributors, and farmers are needed to ensure that subsidized fertilizer allocations are better aligned with farmers’ actual needs.

2. Location Suitability

The evaluation of the location suitability indicator resulted in an index score of 243, equivalent to 81.00%, which was categorized as effective. This finding indicates that most farmers considered the distribution points for subsidized fertilizer to be appropriate and consistent with government regulations, as fertilizers were distributed through officially authorized retailers or kiosks. From a

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spatial perspective, the distribution system has functioned effectively, enabling farmers to access subsidized fertilizers relatively easily, particularly during the planting season. However, the effectiveness of location suitability is not determined solely by the availability of authorized kiosks. It is also strongly influenced by the distribution management system within farmer groups. In practice, collective fertilizer purchases coordinated by farmer group leaders often create delays because the collection of funds from all group members requires additional time. In some cases, group leaders are also required to temporarily cover fertilizer purchase costs when certain members postpone payments or withdraw their fertilizer allocation after the purchasing process has been completed.

Interviews with agricultural extension officers revealed that subsidized fertilizer distribution has been implemented in accordance with administrative regulations through official kiosks and the use of the e-Alokasi system to minimize the risk of distribution leakage. Nevertheless, administrative compliance alone does not automatically ensure efficient distribution at the field level. The effectiveness of fertilizer distribution is also influenced by the managerial capacity, coordination, and organizational performance of farmer groups. This finding suggests that the success of subsidized fertilizer distribution depends not only on government policy, but also on the institutional capacity of farmer organizations at the local level (Raharjo, 2025; Wijayanti et al., 2024).

In addition, the implementation of the "six appropriateness" principle still requires further improvement, particularly in terms of supervision and distribution mechanisms at the operational level. This condition demonstrates that the effectiveness of location suitability is not merely reflected by the availability of official retailers, but also by the ability of the distribution system to ensure that fertilizers are delivered efficiently and accurately to individual farmers without significant obstacles (Tyas et al., 2024).

Based on these findings, the location suitability indicator in subsidized fertilizer distribution can be categorized as effective in terms of the physical availability of distribution points. However, operational constraints are still encountered in the distribution process within farmer groups. Therefore, strengthening internal coordination among farmer groups, improving transparency in fertilizer distribution, and simplifying fertilizer redemption procedures are necessary to create a distribution system that is more efficient, timely, and better targeted.

3. Fertilizer Type Suitability

The evaluation of subsidized fertilizer distribution based on the fertilizer type suitability indicator produced an index score of 195, equivalent to 65.00%, which was categorized as moderately effective. These findings indicate that although the subsidized fertilizer distributed generally corresponded to farmers' needs, its implementation in the field has not yet been fully optimal. Most respondents stated that the types of fertilizer received were appropriate for rice cultivation; however, several farmers reported that the available fertilizer varieties were still insufficient to meet overall crop nutrient requirements. This condition reflects a discrepancy between fertilizer subsidy policies and the actual fertilizer needs of farmers in the field.

Field observations showed that the subsidized fertilizers commonly distributed to farmers consisted mainly of Urea and NPK fertilizers. Meanwhile, some farmers still required SP-36 fertilizer to support optimal rice growth and development. Since SP-36 fertilizer has no longer been included in the subsidized fertilizer program since mid-2022, several farmers perceived that the available fertilizer types were less suitable for the nutrient characteristics of their soils. This policy change refers to the Regulation of the Minister of Agriculture (Permentan) No. 10 of 2022, which limited subsidized fertilizer types to Urea and NPK fertilizers only. The regulation was introduced as part of government efforts to improve budget efficiency and encourage balanced fertilization practices, based on the assumption that phosphorus availability in the soil could already be sufficiently supplied through NPK fertilizer applications.

The findings indicate that limitations in the types of subsidized fertilizers distributed have directly affected both fertilization effectiveness and farmer satisfaction. The restricted availability of fertilizer types has reduced farmers' ability to apply fertilizers according to crop nutrient requirements

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and specific soil conditions, which may potentially limit optimal rice productivity. In addition, variations in fertilizer requirements among regions demonstrate that local soil characteristics and nutrient deficiencies strongly influence farmers' perceptions regarding the suitability of the fertilizers distributed (Foeh et al., 2022; Saputra et al., 2022).

Agricultural extension officers explained that subsidized fertilizer allocation is strictly determined based on e-Alokasi data to improve targeting accuracy and strengthen distribution control. However, because the subsidized fertilizer program currently provides only limited fertilizer types, farmers who require SP-36 fertilizer are forced to purchase non-subsidized products at higher market prices, thereby increasing production costs. This condition suggests that the effectiveness of subsidized fertilizer distribution is influenced not only by the smoothness of the distribution system, but also by the extent to which the fertilizer types distributed are aligned with farmers' actual agricultural needs (Hendrawan et al., 2011; Manalu & Sinaga, 2025).

Within the framework of the "six appropriateness" principle, the suitability of fertilizer types represents an important component in ensuring the success of fertilizer subsidy policies. The findings demonstrate that effective fertilizer distribution involves not only guaranteeing fertilizer availability, but also ensuring that the fertilizer types distributed are compatible with farmers' needs and local agroecosystem conditions (Lilis et al., 2025). Therefore, a more adaptive evaluation of fertilizer subsidy policies and a stronger role for agricultural extension officers in providing site-specific fertilizer recommendations are needed to improve the effectiveness of subsidized fertilizer distribution.

4. Price Compliance

The evaluation of the price compliance indicator resulted in an index score of 275, equivalent to 91.66%, which was categorized as highly effective. Most respondents stated that the redemption price of subsidized fertilizers was consistent with government regulations and remained affordable for farmers. This finding indicates that subsidized fertilizer prices in the study area generally complied with the government-established Highest Retail Price (HET), reflecting effective supervision and coordination among the government, distributors, and authorized fertilizer retailers.

Affordable fertilizer prices play an important role in supporting farm sustainability because they help farmers reduce production costs and maintain appropriate fertilizer application rates to achieve optimal crop productivity. The prices of subsidized fertilizers are regulated under the Regulation of the Minister of Agriculture (Permentan) No. 10 of 2022. Under this regulation, the Highest Retail Price (HET) for subsidized fertilizers was set at IDR 2,250 kg^{-1} for Urea fertilizer, IDR 2,300 kg^{-1} for NPK fertilizer, IDR 3,300 kg^{-1} for specialized NPK fertilizer formulations, and IDR 800 kg^{-1} for organic fertilizer.

Despite this, field findings revealed that the actual prices paid by farmers were occasionally slightly higher than the official HET due to additional operational costs, such as transportation expenses, loading and unloading costs, and fertilizer redemption fees incurred by retailers. To compensate for these operational expenditures, retailers sometimes added small additional charges to the selling price. Nevertheless, farmers generally considered these price differences acceptable because subsidized fertilizers remained available and accessible when needed. This condition indicates that transportation access and distribution logistics significantly influence the implementation of price compliance at the farm level (Rigi et al., 2019).

The findings of this study differ from several previous studies reporting that the price compliance indicator was less effective because fertilizer prices frequently exceeded the official government price ceiling. Such differences suggest that the effectiveness of price compliance is strongly influenced by distribution infrastructure, transportation costs, price monitoring systems, and the geographical characteristics of the study area (Octalia & Primalasari, 2025). Therefore, the price compliance indicator in this study can be considered highly effective because fertilizer prices generally remained within the limits established by government regulations and were still economically

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affordable for farmers, thereby supporting farming sustainability and stabilizing agricultural production costs.

5. Timeliness of Distribution

The evaluation of the timeliness of distribution indicator produced an index score of 194, equivalent to 64.66%, which was categorized as moderately effective. This finding indicates that subsidized fertilizers were generally distributed close to the period when farmers required them, particularly before the planting season. However, the implementation of fertilizer distribution in the field has not yet operated optimally. Although most farmers reported receiving fertilizers in accordance with their planting schedules, several respondents still experienced delays in fertilizer delivery, which affected the timing of fertilizer application. This condition suggests that the effectiveness of fertilizer distribution scheduling has not been evenly achieved across all regions and farmer groups.

Interview results revealed that delays in fertilizer distribution were caused by several factors, including disruptions in fertilizer supply from producers to distributors, limited fertilizer stocks at retail kiosks, and administrative constraints during the fertilizer redemption process. In addition, the sharp increase in fertilizer demand at the beginning of the planting season often caused available stocks to be depleted rapidly, forcing farmers to wait for the next fertilizer shipment. These delays consequently disrupted fertilizer application schedules, potentially reducing nutrient absorption efficiency and affecting crop productivity.

Timely fertilizer distribution is an important factor in supporting farming success because fertilizer application that coincides with crop growth stages can improve nutrient use efficiency. Conversely, delays in fertilizer availability may force farmers to postpone or reduce fertilizer application rates, thereby lowering fertilizer effectiveness and potentially reducing agricultural output. The success of timely fertilizer distribution is therefore strongly influenced by distribution management systems, coordination among distribution agencies, and the adequacy of fertilizer stocks available in the supply chain availability (Arias-Granada & Ricker-Gilbert, 2025)..

Furthermore, the long distribution chain, limited fertilizer inventories, weak coordination among institutions, and the sharp increase in fertilizer demand during planting periods remain major constraints in the subsidized fertilizer distribution system (Hendrawan et al., 2011; Lilis et al., 2025; Sudjono, 2011). Based on these findings, the timeliness of distribution indicator can be classified as moderately effective because, although most farmers received fertilizers near the required planting period, delays in distribution were still frequently encountered. Therefore, improvements in supply chain management, more accurate fertilizer demand forecasting, and optimization of digital systems such as e-RDKK are necessary to ensure that subsidized fertilizers are available at the right time according to farmers' needs.

6. Fertilizer Quality Suitability

Based on the evaluation of the fertilizer quality suitability indicator, the effectiveness index score reached 165, equivalent to 55.00%, which was categorized as moderately effective. These findings indicate that farmers' perceptions regarding the quality of subsidized fertilizer were still diverse and had not been entirely satisfactory. Several farmers perceived that subsidized fertilizers were less effective than non-subsidized fertilizers because larger application rates were required to achieve comparable crop growth performance. This perception was reflected in crop conditions after fertilizer application, where rice plants treated with subsidized fertilizers were considered to exhibit yellowing leaves more rapidly than those treated with non-subsidized fertilizers.

Agricultural extension officers explained that subsidized and non-subsidized Urea fertilizers essentially contain similar nutrient compositions, with the primary differences related to packaging and distribution systems. However, differences were observed in NPK fertilizer formulations, where the nutrient content of subsidized NPK fertilizer was considered relatively lower than that of non-subsidized NPK products. Retailers also stated that the subsidized fertilizers distributed to farmers originated from officially authorized distributors and had complied with established quality standards.

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Therefore, the fertilizer quality suitability indicator can still be classified as moderately effective because, although subsidized fertilizers meet official quality standards, several farmers continue to perceive their field performance as less optimal based on crop response and production outcomes.

Farmers' perceptions of fertilizer quality are strongly influenced by farming experience, crop performance, and harvest results. In general, fertilizer quality is commonly assessed through indicators such as leaf color, plant growth, and crop productivity, indicating that farmers evaluate fertilizer quality not only from nutrient composition but also from field performance and fertilizer effectiveness (Wijayanti et al., 2024). In addition, land characteristics, the accuracy of fertilizer application, farm management capacity, and the effectiveness of fertilizer distribution systems also influence farmers' perceptions regarding the quality of subsidized fertilizers (Saputri et al., 2022).

Furthermore, agricultural policies encouraging the use of organic fertilizers demonstrate that fertilizer quality and effectiveness are important factors in supporting agricultural sustainability (Jones & Deuss, 2024). Based on these findings, the fertilizer quality suitability indicator can still be considered moderately effective because, although subsidized fertilizers comply with government quality standards, many farmers continue to perceive their effectiveness as lower than that of non-subsidized fertilizers. Therefore, greater efforts are required to improve farmers' knowledge regarding appropriate fertilizer use, strengthen fertilizer quality supervision, and provide more intensive technical assistance so that fertilizer application becomes more efficient and better suited to crop nutrient requirements.

B. The Impact of Subsidized Fertilizer Use on Rice Productions

The use of subsidized fertilizer plays an important role in supporting rice farming productivity because it enables farmers to obtain fertilizers at lower prices, thereby improving nutrient availability for crops and influencing differences in production performance among farmers. The findings of this study showed differences in rice productivity between farmers who used subsidized fertilizers and those who did not. The comparison is presented in Table 1.

Table 1. Average Rice Productivity of Farmers Using and Not Using Subsidized Fertilizer

Farmer Category	Average Production (ton ha^{-1})	Description
Farmers using subsidized fertilizer	3,77	Higher productivity
Farmers not using subsidized fertilizer	3,20	Lower productivity
Productivity difference	0,57	Difference between subsidized and non-subsidized groups
Percentage difference (%)	17,81	Productivity gap level

Based on Table 1, the average rice productivity of farmers using subsidized fertilizer reached 3.77 ton ha^{-1}, whereas farmers who did not use subsidized fertilizer achieved an average productivity of 3.20 ton ha^{-1}. This result indicates a productivity gap of 0.57 ton ha^{-1}, equivalent to approximately 17.81%. These findings suggest that the use of subsidized fertilizer contributes positively to increasing rice productivity.

The higher productivity achieved by farmers receiving subsidized fertilizer is likely associated with easier access to fertilizers at more affordable prices, enabling farmers to apply fertilizers according to crop nutrient requirements. These findings are consistent with previous studies showing that balanced fertilization using NPK fertilizer can increase rice yields by approximately 19–41% compared with incomplete fertilization practices. Balanced fertilizer application improves the availability of essential nutrients for crops, particularly nitrogen, which is one of the primary limiting factors in rice production (Yousaf et al., 2017). The distribution of productivity levels among farmer groups is presented in Table 2.

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Table 2. Distribution of Rice Productivity Among Farmers Receiving and Not Receiving Subsidized Fertilizer

Rice Productivity (ton ha^{-1})	Farmer groups based on subsidized fertilizer allocation			
	Farmers Receiving Subsidized Fertilizer		Farmers Not Receiving Subsidized Fertilizer	
	Number	Percentage (%)	Number	Percentage (%)
0,0-2,0	4	6.67	7	23.33
2,1-4,0	39	66.67	16	53.33
4,1-6,0	7	10,00	4	13.33
6,1-8,0	10	16.67	3	10,00
Total	60	100,00	30	100,00

Based on Table 2, differences in rice productivity were observed between farmers who received subsidized fertilizer and those who did not. Farmers receiving subsidized fertilizer generally achieved higher productivity levels, as indicated by the lower proportion of farmers producing only 0.0–2.0 ton ha^{-1}, accounting for 6.67%, compared with 23.33% among farmers who did not receive subsidized fertilizer. In contrast, the proportion of farmers achieving relatively high productivity levels of 6.1–8.0 ton ha^{-1} was greater among subsidized fertilizer recipients (16.67%) than among non-recipients (10.00%). These findings indicate that subsidized fertilizer distribution contributes positively to rice productivity because it enables farmers to obtain fertilizer inputs at more affordable prices, thereby supporting more appropriate fertilizer application and improving farming productivity.

The variation in productivity distribution is likely associated with farmers' ability to meet crop nutrient requirements according to recommended fertilizer application rates. Farmers receiving subsidized fertilizer had easier access to fertilizers at relatively affordable prices, allowing fertilization practices to be implemented more effectively. The availability of essential nutrients, particularly nitrogen (N), phosphorus (P), and potassium (K), plays an important role in supporting leaf formation, root development, panicle growth, and grain filling, thereby improving crop growth and yield performance (Yakup et al., 2024). This finding is supported by previous studies showing that complete fertilizer application increased rice productivity by 38.69%, from 4.42 ton ha^{-1} on unfertilized land to 6.13 ton ha^{-1} on land receiving complete fertilizer treatment (Misran, 2014). Other studies have also demonstrated that NPK fertilizer application positively affects plant growth, the number of productive tillers, grain weight, and rice yield per hectare because higher NPK application rates provide more adequate nutrient availability for crops (Widyaningsih, 2023).

In contrast, farmers who did not receive subsidized fertilizer often faced difficulties in accessing fertilizers due to the relatively high prices of non-subsidized fertilizers. As a result, these farmers tended to reduce fertilizer application rates, leading to inadequate fulfillment of crop nutrient requirements. This condition contributed to lower productivity levels, whereas effective fertilizer distribution has been shown to significantly improve both agricultural productivity and farmers' income (Apriyani et al., 2025).

The findings of this study demonstrate that the subsidized fertilizer program plays an important role in supporting rice farming productivity. However, agricultural productivity is also influenced by several other factors, including seed quality, irrigation availability, cultivation techniques, pest and disease control, and climatic conditions. Therefore, the use of subsidized fertilizer should be complemented by appropriate cultivation technologies and efficient fertilizer management practices. Previous studies have shown that the combined use of NPK fertilizer and biofertilizers can reduce inorganic fertilizer use by up to 25% without significantly decreasing rice productivity (Pardede & Sudiarso, 2024).

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4. CONCLUSION

Based on the research findings and data analysis, several conclusions can be drawn as follows:

1. The distribution of subsidized fertilizer in Tanjung Lago District was generally categorized as moderately effective. Specifically, the indicators of quantity appropriateness, fertilizer type suitability, and timeliness of distribution were classified as moderately effective. Meanwhile, the location suitability indicator was categorized as effective, and the price compliance indicator was classified as highly effective.
2. Subsidized fertilizer distribution had a positive effect on rice productivity, as reflected in the productivity differences between farmers who received subsidized fertilizer and those who did not. The productivity gap reached 0.57 ton ha^{-1}, equivalent to approximately 17.81%. Farmers receiving subsidized fertilizer achieved an average rice productivity of 3.77 ton ha^{-1}, whereas farmers who did not receive subsidized fertilizer produced an average of only 3.20 ton ha^{-1}.

Recommendations

Based on the conclusions above, several recommendations are proposed to improve the effectiveness of subsidized fertilizer distribution:

1. The government should further evaluate and improve the subsidized fertilizer distribution system, particularly for indicators that are still categorized as moderately effective, including quantity appropriateness, fertilizer type suitability, and timeliness of distribution. These improvements are necessary to ensure that subsidized fertilizer distribution is implemented more accurately and in accordance with established regulations and farmers' actual needs.
2. Further studies are recommended to examine the impact of subsidized fertilizer use on farm income and farming efficiency in rice production systems located in tidal lowland areas.

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