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Analysis of Differences in Productivity and Income from Rice Farming Between Subsidized and Non-Subsidized Fertilizer Users in Ahuhu Village, Meluhu Subdistrict, Konawe Regency

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Abstract

This study aims to determine: (1) the level of lowland rice productivity of fertilizer subsidy recipient farmers, (2) the level of income of lowland rice farming of fertilizer subsidy recipient farmers, and (3) the differences in productivity and income between fertilizer subsidy recipient farmers and non-subsidy farmers in Ahuhu Village, Meluhu Subdistrict, Konawe Regency, Southeast Sulawesi Province. The population of this study consisted of all lowland rice farmers in Ahuhu Village, totaling 107 farmers. This research employed a census method, in which the entire population was used as the sample. Data were analyzed using productivity and income formulas, and the mean difference test was conducted using SPSS version 26. The results of this study indicate that the fertilizer subsidy policy has not resulted in a statistically significant difference in the productivity of lowland rice farming. However, fertilizer subsidies have proven to have a positive impact on the income of farmers who receive fertilizer subsidies

Keywords: ***fertilizer subsidy; productivity; farmers' income***

INTRODUCTION

To this day, the agricultural sector remains the backbone of the rural economy in Indonesia, particularly in supporting food security and improving farmers' welfare. One of the primary activities in this sector is farming, which involves managing agricultural production resources using technology to achieve optimal yields. According to Daniel (2001), the success of farming can be seen in increased productivity, which ultimately impacts farmers' income and

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their families' well-being. In this context, irrigated rice farming plays a highly strategic role as it serves as the primary source of livelihood for communities and the main provider of the national staple food.

The success of agricultural development, particularly in the rice paddy sector, is inseparable from the synergy between the government as the policy-maker and farmers as the primary actors. Various policies have been implemented to boost agricultural productivity, one of which is the fertilizer subsidy policy. This policy was first implemented in the 1970s and has undergone continuous refinement until the adoption of the closed-loop distribution system under the Definitive Group Needs Plan (RDKK) in 2009. This system aims to ensure the availability of fertilizer according to farmers' needs, in terms of quantity, type, price, and distribution timing. The types of subsidized fertilizers include Urea, SP-36, ZA, NPK, and organic fertilizers, all of which are under government supervision to ensure the effectiveness of their distribution.

In Southeast Sulawesi Province, the government's commitment to supporting agricultural productivity continues to be strengthened. Data from the Central Statistics Agency indicates an increase in harvested area and rice production in 2024, with a production increase of 73,570 metric tons of paddy or approximately 15.34 percent compared to the previous year. However, the absorption rate of subsidized fertilizer by farmers remains relatively low, reaching only about 50 percent of the total available allocation. This situation indicates a gap between the policies designed and their implementation on the ground, which has the potential to hinder optimal agricultural productivity.

Konawe Regency, as one of the major rice-producing centers in Southeast Sulawesi, makes a significant contribution to regional production. In 2023, rice production in Konawe Regency reached 151,058 tons of paddy, an increase of 14.26 percent compared to the previous year. This contribution accounted for 31.51 percent of Southeast Sulawesi Province's total rice production. Nevertheless, production fluctuations over the past few years indicate that rice productivity still faces various challenges, both from technical and policy perspectives.

More specifically, Meluhu Subdistrict, particularly Ahuhu Village, is an agricultural area highly dependent on the irrigated rice sector. Most residents in this village work as farmers, making the availability of subsidized fertilizer a critical factor in supporting farming activities. The fertilizer distribution system in this region has operated through a fairly well-organized administrative mechanism, such as the use of RDKK data, farmer identity verification, and quota restrictions based on land area. However, in practice, various dynamics persist, such as limited availability of fertilizer types, high farmer dependence on subsidies, and the potential mismatch

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between actual needs and the allocated fertilizer received.

A number of previous studies have shown that fertilizer subsidy policies have varied impacts. Ramadhan's (2024) study found that fertilizer subsidies have a positive effect on farmers' income but are not significant for productivity. Meanwhile, Umaman et al. (2021) state that subsidized fertilizers simultaneously affect irrigated rice productivity, although only urea and NPK fertilizers have a significant effect when analyzed individually. On the other hand, Kholis and Setiaji (2020) reveal that the implementation of fertilizer subsidy policies has not been fully effective, particularly regarding price accuracy, quantity, and distribution. Research by Sembiring et al. (2020) also confirms that fertilizer subsidies contribute to increased national paddy production, while Susila (2010) highlights various structural issues within subsidy policies, such as targeting inaccuracies and budget inefficiencies.

Although numerous studies have examined fertilizer subsidy policies, most remain general in nature or conducted at broader regional scales, and have not specifically compared the conditions of subsidized and non-subsidized farmers at the village level. Therefore, conducting research in Ahuhu Village, Meluhu Subdistrict, Konawe Regency is crucial. This study focuses on analyzing the impact of fertilizer subsidy policies on the productivity and income of irrigated rice farming through a comparative approach between subsidized and non-subsidized farmers. Thus, this study is expected to provide a more comprehensive empirical picture of the effectiveness of fertilizer subsidy policies at the micro level, while also serving as a basis for formulating more targeted agricultural policies in the future.

METHOD

This study was conducted in Ahuhu Village, Meluhu Subdistrict, Konawe Regency, with the location selected purposively based on the consideration that the area has been a recipient of fertilizer subsidies since 2010, has a relatively orderly distribution system through official retailers, and represents the actual conditions of irrigated rice farmers with a clear fertilizer distribution mechanism. The study spanned five months, from September to January 2025. The study population consisted of all paddy farmers in Ahuhu Village, comprising 71 fertilizer subsidy recipients and 36 non-subsidy farmers, for a total population of 107 farmers.

The sampling technique employed a census or saturated sample method, in which the entire population served as research respondents. The types of data used included primary and secondary data; primary data was obtained directly through interviews, observations, and the distribution of questionnaires to farmers. Data collection was conducted through direct interviews to gather information regarding the utilization of fertilizer subsidies, the amount of

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fertilizer used before and after the subsidy, its impact on crop yields and income, as well as farmers' perceptions of the fertilizer subsidy policy; systematic recording was performed on all data obtained during the study; and documentation in the form of photographs was taken as supporting evidence of field research activities.

The first objective of the study was to determine the productivity of irrigated rice fields using subsidized and non-subsidized fertilizers using an analysis based on (Rosyidi, 2014), namely:

$$\text{Farm Productivity} = \frac{\text{jumlah produksi (Kg)}}{\text{Luas Lahan (Ha)}}$$

The second objective of the study was to determine the income from irrigated rice farming using subsidized and non-subsidized fertilizers using the income analysis according to (Soekartawi, 2006) as follows:

$\pi = TR - TC$

Where: TR = P × y TC = TFC + TVC

The third research objective was to determine differences in productivity and income by conducting a productivity and income difference analysis ( ) using *the Independent Samples t-Test*. The *Independent t-Test* was performed on two unpaired datasets using SPSS 26 to compare the differences in the means of two variables, where the data sources originated from different samples. This test of differences in productivity and income was conducted to determine whether there are differences in productivity and income between farmers receiving fertilizer subsidies and those not receiving fertilizer subsidies. With the following significance criteria:

- If t-table < t-calc = Significant, it means there is a difference
- If the t-table value is greater than the t-value, it indicates that there is no significant difference.

The formula for the t-test is as follows:

$$t = \frac{\overline{x_1} - \overline{x_2}}{\sqrt{\frac{(n_1-1)s_1^2+(n_2-1)s_2^2}{n_1+n_2-2}\left(\frac{1}{n_1}+\frac{1}{n_2}\right)}}$$

Notes:

$\bar{X}_1$ = mean of sample 1

$\bar{X}2$ = mean of sample 2

n_1 = sample size 1

n_2 n_2 = sample size of sample 2

s_1 = standard deviation of sample 1

s_2 = standard deviation of sample 2

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RESULTS AND DISCUSSION

Fertilizer subsidies in Ahuhu Village are a government policy aimed at alleviating farmers' production costs and ensuring fertilizer availability during the planting season. Fertilizer subsidies are provided through a price mechanism, where part of the cost is covered by the government and the remainder is paid by farmers. This section presents data on the types of fertilizer used, the prices covered by the government and those paid by farmers, as well as the fertilizer prices for non-subsidized farmers and the amount of fertilizer purchased per planting season. The presentation of this data is expected to provide a clearer picture of farmers' access to and utilization of fertilizer subsidies in Ahuhu Village

Table 1. Overview of Fertilizer Subsidies in Ahuhu Village, Meluhu Subdistrict, 2025

No	Fertilizer Type	Fertilizer Subsidy			Non-Subsidized Fertilizer	
		Average			Average	
		Amount Distributed (kg/MT/ha)	Price Paid by Farmers (Rp/Kg)	Subsidy Value (Rp/kg)	Amount of Fertilizer Used (kg/MT/ha)	Fertilizer Price (Rp/kg)
1.	Urea	100	1,800	5,800	150	7,600
2.	NPK	150	1,840	3,860	150	5,700

Table 1 shows differences in average fertilizer use and prices between subsidized and non-subsidized farmers per hectare per growing season, where both groups applied fertilizer twice but with different dosage compositions, thereby affecting total fertilizer use. Subsidized farmers tend to use a more standardized combination of urea and NPK doses as recommended, whereas non-subsidized farmers have varying doses, which results in differences in the amount of fertilizer used. Additionally, differences are evident in the fertilizer prices paid by farmers, where subsidized farmers pay lower prices due to the price difference covered by the government through a subsidy mechanism based on the Maximum Retail Price (MRP), while non-subsidized farmers must pay the full market price. Thus, the fertilizer subsidy policy not only influences the pattern of production input use ( ), but also plays a role in reducing production costs and supporting the sustainability of irrigated rice farming.

Productivity of Rice Farming

According to Soekartawi (1995), productivity reflects the level of efficiency in the use of inputs to produce agricultural output. The more efficient the use of production inputs, the higher the productivity achieved. In paddy farming, productivity levels are significantly influenced by

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fertilizer availability, farmer skills, and the application of technology and proper irrigation systems.

Table 2. Production Levels and Productivity of Subsidized and Non-Subsidized Fertilizer Users in Ahuhu Village, Meluhu Subdistrict, 2025

No	Description	Average	
		Subsidized Fertilizer	Non-subsidized
1.	Land Area (Ha)	1.04	2.27
2.	Production (kg/MT)	3,883.09	8,852.77
3.	Productivity (kg/ha/MT)	3,733.74	3,899.89

Table 2 shows that the average productivity of farmers receiving fertilizer subsidies was 3,733.74 kg/MT/ha, while that of non-subsidized farmers reached 3,899.89 kg/MT/ha, resulting in a difference of 166.15 kg/MT/ha—or approximately 4.45% higher—for non-subsidized farmers. Although the difference is relatively small, this indicates that productivity is not solely determined by the presence of subsidies but is also influenced by other factors such as the amount and precision of fertilizer application, soil fertility conditions, and the plants' ability to absorb nutrients. Additionally, the flexibility of non-subsidized farmers in determining the type and dosage of fertilizer according to land needs is believed to contribute to higher productivity levels. This finding aligns with Maman's (2021) research, which states that subsidized fertilizer can increase productivity, but the extent of its impact heavily depends on application dosage and agricultural land conditions.

Income from Rice Farming

Rice paddy farm income is the final result obtained by farmers after accounting for all production costs incurred during the farming process as well as the revenue received from the sale of the produce. Therefore, the discussion of farm income begins with an analysis of the production cost structure, followed by farm revenue, and then the calculation of the income received by farmers.

Table 3. Fixed Costs, Variable Costs, and Total Production Costs for Users of Subsidized and Non-Subsidized Fertilizers in Ahuhu Village, Meluhu Subdistrict, 2025

No	Cost Type	Average (Rp/MT/Ha)	
		Fertilizer Subsidies	Non-Subsidized
1.	Fixed Costs		
	a. hoe	5,638.49	5,953.36

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	b. machete	546.71	546.71
	c. tank	18,934.15	18,537.97
	d. land tax	24,999.97	24,999.97
	Total Fixed Costs	50,119.32	50,038.01
2.	Variable Costs		
	a. bags	167,687.78	193,611.11
	b. seeds	610,521.162	610,448.94
	c. NPK fertilizer	276.00	855,000
	d. urea fertilizer	180,000	1,140,000
	e. pesticides	502,852.11	412,294.97
	f. labor	3,556,807.50	3,947,907.416
	Total Variable Costs	5,017,868.55	7,159,262.44
	Total Costs	5,067,987.87	7,209,300.45

Table 3 shows that the total production costs for farmers using subsidized fertilizer are lower than those for non-subsidized farmers, where fixed costs are relatively the same because the types of inputs used are similar, but a striking difference occurs in variable costs. The average variable cost for farmers using subsidized fertilizer is Rp5,017,868.55/MT/Ha, while for non-subsidized farmers it reaches Rp7,159,262.44/MT/Ha, resulting in total production costs of Rp5,067,987.87/MT/Ha and Rp7,209,300.45/MT/Ha, respectively. This indicates that non-subsidized farmers' production costs are higher by Rp2,141,312.58, or approximately 42.26%, due to higher fertilizer purchase costs (particularly urea and NPK) at market prices and a tendency to use larger quantities of fertilizer. Thus, fertilizer subsidies have proven to play a role in reducing production costs and improving farming efficiency, consistent with the findings of Maman et al. (2021), who state that fertilizer subsidies help reduce the cost burden borne by farmers.

Table 4 Rice Farming Income in Ahuhu Village, Meluhu Subdistrict, 2025.

No	Description	Average	
		Subsidy	Non-Subsidy
1.	Productivity (kg/MT/ha)	3,733.74	3,899.89
2.	Price (Rp/kg)	6,500	6,500
3.	Revenue (IDR/MT/ha)	24,269,310	25,349,285

Table 4 shows that the average revenue for farmers using subsidized fertilizer was Rp24,269,310, while non-subsidized farmers earned a higher average revenue of Rp25,349,285,

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resulting in a difference of Rp1,079,975 or approximately 4.45%. This difference is likely influenced by variations in land productivity, input usage patterns, and differing fertilization intensities among farmer groups. Although fertilizer subsidies can reduce production costs, this does not directly lead to a significant increase in income because factors such as productivity, farm management, and crop selling prices play a more dominant role in determining income levels. Non-subsidized farmers who have flexibility in fertilizer use tend to achieve slightly higher production yields, resulting in greater income despite higher expenses. This finding aligns with the research by Wirawan et al. (2022), which states that farmers' income is more influenced by productivity and selling prices, while fertilizer subsidies play a greater role in reducing production costs rather than directly increasing income.

Table 5. Farm Income s for Irrigated Rice Farming in Ahuhu Village, Meluhu Subdistrict, 2025.

No	Description	Average (Rp/MT)
1.	Fertilizer Subsidy	19,201,322.13
2.	Non-Fertilizer Subsidy	18,139,984.55

Table 5 shows that the average income of farmers receiving subsidies is Rp1,061,377.58 higher—or approximately 5.85%—than that of non-subsidized farmers, indicating a fairly significant income disparity between the two groups. This occurs because subsidized farmers benefit from reduced production costs through fertilizer assistance, particularly for variable cost components such as urea and NPK fertilizers, which account for a significant portion of total costs. With lower production costs, the difference between revenue and costs becomes larger, resulting in higher net income for subsidized farmers. This indicates that fertilizer subsidies play a role in improving farming efficiency by reducing production costs, which ultimately leads to increased income, even though productivity and selling prices are relatively similar. This finding aligns with the research by Wirawan et al. (2022), which states that cost efficiency is the primary factor distinguishing net income between subsidized and non-subsidized farmers.

Differences in Productivity and Income Between Rice Farmers in Paddy Fields Receiving Fertilizer Subsidies and Those Without

The differences in productivity and income between farmers using subsidized and non-subsidized fertilizer in Ahuhu Village, Meluhu Subdistrict, are presented as follows. These were analyzed using an *independent sample t-test* to determine whether there were significant differences between the two groups of farmers.

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Table 6. ***Independent Simple T-Test, 2025***

No	Description	Type of Farmer	T	Df	Sig. (2-tailed)
1	Productivity	Fertilizer Subsidy	-1.374	105	0.096
		Non-Subsidy	-1,502	89,105	
2	Revenue	Fertilizer Subsidies	-10,770	105	0.002
		Non-Subsidy	-9,590	52,633	

Based on the statistical test results, a significance value of 0.096 (> 0.05) indicates that there is no significant difference in productivity between farmers using subsidized and non-subsidized fertilizers; this is because fertilizer use is not the sole determinant of production output. This phenomenon occurs because non-subsidized farmers tend to continue applying fertilizer at similar doses and times despite higher costs, while on-farm productivity is more significantly influenced by non-input factors such as soil quality, irrigation systems, cultivation techniques, and farmer experience. Thus, the current fertilizer subsidy policy functions more as an instrument to maintain production stability and ensure the affordability of input costs (a safety net) rather than as a driver of tangible yield increases; therefore, integration with improvements in technical factors and enhanced farmer capacity is necessary to achieve higher productivity.

This finding aligns with the research results of Suryana (2013) and Rahim and Hastuti (2015), who stated that fertilizer subsidies do not always have a significant impact on productivity increases if not accompanied by the application of appropriate cultivation technologies. Susilowati's (2016) study also found that the difference in rice productivity between subsidized and non-subsidized farmers was not significant because non-subsidized farmers were still able to access production inputs of relatively the same quality. Thus, the results of this study reinforce the view that rice farming productivity is more influenced by a combination of technical and managerial factors than solely by the presence of fertilizer subsidies. This finding supports the theory that productivity differences are influenced not only by the type of fertilizer but also by other factors such as cultivation techniques, land conditions, and farmer experience.

The results of statistical analysis using the Independent Sample T-Test showed a significance value of 0.002 (< 0.05), confirming a significant difference in income between farmers using subsidized and non-subsidized fertilizers. This difference is not driven by a large productivity gap but rather by differences in production cost structure efficiency; farmers using subsidized fertilizer bear significantly lower variable costs, resulting in a higher net income

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margin compared to non-subsidized farmers burdened by market prices. Although the subsidy policy has proven effective as an economic protection instrument by ensuring input availability and reducing costs, the income increase of only Rp1,061,337.58 (5.85%) indicates that its impact on farmers' overall well-being remains relatively limited and requires strengthening in other aspects beyond mere price subsidies.

These research findings align with those of Rahim and Hastuti (2015), who stated that farm income is more sensitive to changes in production costs than to changes in productivity. Suryana's (2013) study also confirms that agricultural input subsidies, particularly for fertilizers, significantly contribute to increasing farmers' income through the mechanism of reducing production costs. Furthermore, Susilowati (2016) found that the income difference between subsidized and non-subsidized farmers is significant due to differences in input costs and revenue, even though the resulting productivity is relatively similar. These findings reinforce the results of this study that fertilizer subsidies have a greater impact on income growth than on productivity growth. This income disparity is caused by differences in the volume of production and the value of revenue derived from agricultural output.

CONCLUSION

Based on the analysis results, it can be concluded that rice farm productivity between subsidized farmers (3,733.74 kg/MT/Ha) and non-subsidized farmers (3,899.89 kg/MT/Ha) does not show a statistically significant difference; however, there is a clear income disparity between the two groups. Subsidy-receiving farmers earned a higher average income of Rp19,201,322.13 per growing season, compared to non-subsidy farmers who earned only Rp18,139,984.55. This indicates that although the subsidy intervention has not yet been able to boost harvest volumes beyond those of the non-subsidized group, the policy is highly effective in improving farm profitability through lower production input costs.

Based on this, it is recommended that farmers utilize subsidized fertilizer according to the correct dosage and application timing, as well as implement good cultivation techniques to improve cost efficiency and income. The government is expected to improve the effectiveness of the fertilizer subsidy policy, particularly regarding targeting accuracy, quantity, price, and distribution timing, to maximize benefits for farmers. Meanwhile, future researchers are advised to expand their studies by incorporating additional variables such as soil quality and rice varieties, as well as broadening the geographical scope and research period to obtain more

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