

The Effect of Fertilizer Subsidy on Farmers' Income in Rice Farming in Pilang Village, Wonoayu District, Sidoarjo

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ABSTRACT

The subsidy policy for fertilizers aims to reduce production costs and increase the income of rice farmers. However, problems in allocation in the field often make farmers who get subsidized fertilizers that do not meet the ceiling have to be forced to buy non-subsidized fertilizers. The study analyzed the effect of fertilizer subsidies on farmers' income by using dummy variables to determine whether farmers who got fertilizer according to the ceiling and those who did not in Pilang Village, Wonoayu District, Sidoarjo. The location of the study is determined by purposive means. Sampling was carried out using a stratified random sampling method involving 38 petanits, divided into farmers who received subsidies according to the ceiling (Strata 1) and those who did not according to the ceiling (Strata 2). The data were analyzed descriptively, quantitatively, and through Multiple Linear Regression. The results showed that the average net income of Strata 2 farmers (Rp27. 289. 461/Ha) was much higher when compared to Strata 1 (Rp7. 475. 311/Ha) due to better productivity. Simultaneously (Test F), the variable cost of seeds, urea, ponska, pesticides, and subsidized dummies had a significant effect on income (Sig. 0.000). Individually (t-test), only the cost of urea fertilizer (X2) showed a positive and significant effect, while the cost of pesticides (X4) had a significant negative effect. The cost of urea fertilizer is the most dominant factor with a Beta value of 0.710. Meanwhile, the subsidy allocation dummy variable (D1) did not show a significant effect on income (Sig. 0.392), so Hypothesis 2 was rejected. A Coefficient of Determination value (r^2) of 0.828 indicates that independent variables can explain changes in income of up to 82.8%.

Keywords: Waxy Corn, Marketing Strategy, SWOT Analysis, Agribusiness.

INTRODUCTION

Indonesia is widely recognized as an agrarian country, where agriculture remains one of the most important sectors supporting national economic development. Besides serving as the primary source of food production, agriculture provides employment opportunities for a large proportion of the rural population and contributes significantly to national food security (Manaroinsong et al., 2023). Among various agricultural commodities, rice is the most strategic crop because it is the staple food for the majority of Indonesians. Consequently, maintaining sustainable rice production has become a national priority to ensure food availability while improving farmers' welfare.

Rice farming productivity is strongly influenced by the availability and efficient use of production inputs, including seeds, fertilizers, pesticides, labor, and land management. Among these inputs, fertilizer plays a critical role in maintaining soil fertility and increasing crop productivity (Dianti & Sari, 2024). However, the continuously increasing price of agricultural inputs often raises production costs, reducing farmers' profits and limiting their capacity to invest in future production. To address this issue, the Indonesian government has implemented a fertilizer subsidy policy designed to provide fertilizers at lower prices, thereby reducing production costs and improving farmers' incomes.

The fertilizer subsidy program is implemented through a regulated distribution system based on the Definitive Plan for Group Needs (Rencana Definitif Kebutuhan Kelompok/RDKK), where eligible farmers receive subsidized fertilizers according to predetermined quotas. Ideally, this



policy enables farmers to obtain sufficient fertilizer at subsidized prices to meet the nutritional requirements of their crops. If implemented effectively, the subsidy program is expected to increase agricultural productivity, reduce production expenses, strengthen national food security, and improve the economic welfare of farming households.

Despite its intended objectives, the implementation of fertilizer subsidies frequently encounters practical challenges. In many farming areas, the quantity of subsidized fertilizer received by farmers does not correspond to the actual fertilizer requirements based on cultivated land area. Consequently, farmers are often required to purchase non-subsidized fertilizers at substantially higher market prices to compensate for the shortage (Larasati et al., 2022). This situation increases production costs and potentially reduces farm income, despite farmers officially participating in the subsidy program. Therefore, the effectiveness of fertilizer subsidies should not only be evaluated based on farmers' participation but also on whether the allocated fertilizer adequately satisfies their actual production needs.

This issue is clearly observed in Pilang Village, Wonoayu District, Sidoarjo Regency, one of the important rice-producing areas in East Java. Most farmers in this village are registered as beneficiaries of the subsidized fertilizer program through local farmer associations (Gapoktan). However, field observations indicate that many farmers receive subsidized fertilizer quantities below the actual requirements of their cultivated land. For example, a farmer cultivating two hectares of rice fields may receive subsidized fertilizer sufficient for only one and a half hectares, forcing the farmer to purchase commercial fertilizers for the remaining area. As a result, production costs increase considerably, reducing the expected economic benefits of the subsidy policy.

Previous studies have generally reported that fertilizer subsidies contribute positively to agricultural productivity and farmers' income. Nevertheless, most existing research evaluates fertilizer subsidies as a general policy variable or measures the quantity of subsidized fertilizer used without explicitly examining whether the allocated subsidy matches farmers' actual fertilizer requirements. Several studies also employ dummy variables to distinguish subsidy recipients from non-recipients. However, limited attention has been given to measuring differences among subsidy recipients themselves, particularly between farmers who receive fertilizer allocations according to their actual needs and those who experience allocation shortages. This limitation represents an important research gap in understanding the effectiveness of fertilizer subsidy policies at the farm level.

To address this gap, this study introduces a dummy variable representing the adequacy of subsidized fertilizer allocation rather than merely subsidy participation. Farmers receiving fertilizer allocations consistent with their actual land requirements are classified differently from those receiving insufficient allocations (Putri & Fahira, 2022). This approach allows the study to evaluate whether allocation adequacy has a measurable influence on farm income while simultaneously considering other important production cost components, including seed costs, urea fertilizer costs, NPK fertilizer costs, pesticide costs, and labor costs through a multiple linear regression model.

Therefore, this research aims to analyze rice farming income in Pilang Village, examine the effects of production costs and subsidized fertilizer allocation on farmers' income, and identify the most influential production factor affecting farm income. The findings are expected to provide empirical evidence regarding the effectiveness of fertilizer subsidy allocation and offer policy recommendations for improving the distribution mechanism to enhance both agricultural productivity and farmers' welfare.

RESEARCH METHODS

This research was conducted in Pilang Village, Wonoayu District, Sidoarjo Regency. The location was selected purposively because Pilang Village is one of the potential rice-producing areas in Sidoarjo and has experienced problems related to the gap between subsidized fertilizer allocation and farmers' actual fertilizer needs. The research was carried out from September to November 2025.

This study used a quantitative approach with descriptive and explanatory research methods. The descriptive method was used to describe rice farming revenue and income, while the explanatory method was applied to analyze the effect of production costs and subsidized fertilizer allocation on farmers' income.

The population of this study consisted of all rice farmers in Pilang Village who were members of farmer groups and received subsidized fertilizer. The total population was 60 farmers. The sampling technique used was stratified random sampling because the population was divided into two groups based on the suitability of subsidized fertilizer allocation. The first group consisted of farmers who received subsidized fertilizer according to the allocation ceiling, while the second group consisted of farmers who received subsidized fertilizer below the required ceiling. The sample size was determined using the Slovin formula with a 10% error tolerance, resulting in 38 respondents. Each stratum consisted of 19 farmers.

The data used in this study consisted of primary and secondary data. Primary data were collected directly from respondents through structured interviews using questionnaires. The information collected included farmer identity, land area, production input costs, fertilizer use, production volume, selling price, revenue, and farming income. Secondary data were obtained from related institutions, including village monographs, farmer group documents, RDKK data, and relevant literature.

Data collection techniques included interviews, direct field observation, and document analysis. Interviews were conducted to obtain quantitative data related to production costs and income. Field observation was used to verify rice farming conditions and fertilizer use in the study area. Document analysis was conducted to support and validate data related to subsidized fertilizer allocation.

The data were analyzed using farm income analysis and multiple linear regression. Farm revenue was calculated by multiplying total rice production by the selling price, while farm income was calculated by subtracting total production costs from total revenue. The regression model was used to analyze the effect of seed cost, urea fertilizer cost, NPK Phonska fertilizer cost, pesticide cost, labor cost, and subsidized fertilizer allocation dummy variable on farmers' income.

RESULTS AND DISCUSSIONS

A total of 38 rice farmers from Pilang Village, Wonoayu District, Sidoarjo Regency participated in this study. Respondents were selected using a stratified random sampling technique and classified into two equal groups based on the adequacy of subsidized fertilizer allocation. The first group consisted of farmers who received subsidized fertilizer according to the government allocation ceiling, whereas the second group comprised farmers whose fertilizer allocation was below their actual production requirements. Consequently, farmers in the latter group were required to purchase additional non-subsidized fertilizer at market prices. This classification enabled the study to examine not only the influence of production inputs on farm income but also the effectiveness of fertilizer subsidy allocation in supporting rice farming profitability.

The demographic profile of the respondents indicates that most farmers were between 55 and 60 years old, suggesting that rice farming in the study area is largely managed by experienced farmers. Although extensive farming experience generally contributes to better decision-making and resource management, the aging farming population may also reduce labor productivity due

to declining physical capacity. This condition reflects the broader demographic trend observed in Indonesian agriculture, where younger generations are becoming less involved in farming activities.

The analysis of subsidized fertilizer allocation revealed that the distribution system has not fully met farmers' actual fertilizer requirements. Although farmers were officially registered as subsidy recipients through the electronic Definitive Plan for Group Needs (e-RDKK), many respondents received fertilizer quantities below those required according to their cultivated land area. As a result, these farmers compensated for the shortage by purchasing commercial fertilizers, increasing their production costs. This finding indicates that the current subsidy policy has not completely achieved its objective of reducing production costs, despite successfully improving farmers' access to fertilizer.

Differences in production costs among respondents primarily resulted from variations in fertilizer expenditures. Farmers experiencing insufficient subsidized fertilizer allocation incurred higher production costs because of additional purchases of commercial fertilizers. Nevertheless, higher production costs did not necessarily reduce farm profitability. The average net income of farmers who received insufficient subsidized fertilizer reached IDR 27,289,461 per hectare, considerably exceeding the average income of IDR 7,475,311 per hectare earned by farmers who received fertilizer according to the allocation ceiling.

This seemingly unexpected result suggests that farmers receiving insufficient subsidized fertilizer were able to maintain higher crop productivity by replacing unavailable subsidized fertilizer with commercial fertilizer. Consequently, the additional production costs were compensated by higher yields and greater gross revenue. These findings support production theory, which states that farmers behave as rational decision-makers by adjusting input use to maximize profits rather than merely minimizing production costs. As long as the marginal return obtained from additional fertilizer exceeds its marginal cost, farmers remain willing to invest in commercial fertilizer to sustain production.

The multiple linear regression analysis further demonstrated that production inputs collectively exerted a significant influence on rice farming income. The F-test showed that seed cost, urea fertilizer cost, NPK Phonska fertilizer cost, pesticide cost, labor cost, and the fertilizer subsidy allocation dummy variable simultaneously affected farmers' income (Sig. = 0.000). This result indicates that farm income is determined by the interaction of several production factors rather than by any single input. Efficient resource allocation across all production components therefore becomes essential for maximizing farm profitability.

The partial regression analysis provides a more detailed understanding of the contribution of each production factor. Among all explanatory variables, only urea fertilizer cost exhibited a positive and statistically significant effect on farmers' income. Moreover, urea fertilizer was identified as the most influential variable, with the highest standardized coefficient (Beta = 0.710). This finding confirms the fundamental role of nitrogen fertilizer in rice cultivation. Adequate nitrogen application stimulates vegetative growth, increases tillering, and ultimately enhances grain production, resulting in higher farm income. From an economic perspective, expenditure on urea fertilizer should therefore be regarded as a productive investment rather than merely an additional production cost.

In contrast, pesticide cost showed a significant negative relationship with farm income. Higher expenditure on pesticides reduced farmers' net income because the additional costs were not accompanied by proportional increases in production. This finding may also indicate that farmers facing severe pest infestations require greater pesticide application while simultaneously experiencing lower productivity. Consequently, increasing pesticide use alone cannot guarantee higher profitability. Instead, integrated pest management practices should be promoted to reduce excessive pesticide dependence while maintaining crop productivity.

Meanwhile, seed cost, NPK Phonska fertilizer cost, and labor cost did not individually have a significant effect on farmers' income. One possible explanation is the relatively homogeneous use of these production inputs among respondents. Because most farmers adopted similar production practices and input combinations, the variation in these variables was insufficient to generate statistically significant differences in income. Nevertheless, these variables remain important production components because they contribute collectively to the overall production process, as demonstrated by the significant simultaneous regression results.

One of the major objectives of this study was to evaluate whether the adequacy of subsidized fertilizer allocation significantly influences farmers' income. Surprisingly, the regression results showed that the fertilizer subsidy allocation dummy variable did not have a statistically significant effect on income (Sig. = 0.392). Therefore, the hypothesis stating that fertilizer subsidy allocation would become the dominant determinant of farmers' income was rejected. Although insufficient subsidy allocation increased production costs, farmers generally responded by purchasing commercial fertilizer to maintain crop productivity. Consequently, differences in subsidy allocation alone were insufficient to explain variations in farm income.

This finding differs from several previous studies reporting that fertilizer subsidies directly increase farmers' income. The discrepancy may be explained by the operationalization of the subsidy variable. Previous research commonly compared subsidy recipients with non-recipients or measured the quantity of subsidized fertilizer used. In contrast, this study distinguished between farmers receiving fertilizer according to their actual production requirements and those experiencing allocation shortages. The results indicate that allocation adequacy itself does not directly determine farm income when farmers retain the financial capacity to substitute subsidized fertilizer with commercial alternatives.

Finally, the coefficient of determination ($R^2 = 0.828$) indicates that approximately 82.8% of the variation in farmers' income can be explained by the variables included in the regression model, while the remaining 17.2% is attributable to other factors beyond the scope of this study, including weather conditions, irrigation availability, soil fertility, seed quality, farm management skills, and fluctuations in rice prices. This high explanatory power demonstrates that production cost variables remain reliable predictors of rice farming income.

Overall, the findings suggest that improving farmers' income requires more than expanding fertilizer subsidy coverage. Increasing production efficiency through appropriate fertilizer management, particularly optimal urea application, appears to be more important than merely ensuring subsidy allocation. Therefore, future agricultural policies should focus not only on improving the accuracy of subsidized fertilizer distribution but also on strengthening extension services, promoting balanced fertilizer application, and enhancing farmers' technical capacity to maximize input efficiency and farm profitability.

CONCLUSIONS

This study examined the influence of production costs and fertilizer subsidy allocation on the income of rice farmers in Pilang Village, Wonoayu District, Sidoarjo Regency. The findings demonstrate that rice farming remains economically profitable despite variations in fertilizer subsidy allocation. Farmers who experienced insufficient subsidized fertilizer allocation were able to maintain relatively high incomes by supplementing their fertilizer requirements with commercial fertilizers, indicating that maintaining crop productivity was prioritized over minimizing production costs.

The multiple linear regression analysis revealed that production input variables collectively had a significant effect on farmers' income. Among the variables examined, only urea fertilizer cost showed a positive and statistically significant relationship with income and emerged as the most influential factor affecting rice farming profitability. In contrast, pesticide cost had a

significant negative effect on income, suggesting that higher pesticide expenditures increased production costs without generating proportional improvements in productivity. Meanwhile, seed cost, NPK Phonska fertilizer cost, labor cost, and the fertilizer subsidy allocation dummy variable did not individually have significant effects on farmers' income.

The insignificant effect of fertilizer subsidy allocation indicates that receiving subsidized fertilizer according to the allocated quota alone does not guarantee higher farm income. Farmers who received inadequate subsidized fertilizer generally compensated by purchasing commercial fertilizers, enabling them to maintain production levels despite higher production costs. These findings suggest that the effectiveness of fertilizer subsidy policies should not be evaluated solely based on allocation accuracy but also on farmers' capacity to utilize production inputs efficiently to achieve optimal productivity.

Overall, this study highlights that improving rice farmers' income depends more on efficient input management, particularly the appropriate use of urea fertilizer, than on the adequacy of subsidized fertilizer allocation alone. Therefore, future agricultural policies should complement fertilizer subsidy programs with measures that improve fertilizer management practices, strengthen agricultural extension services, and enhance farmers' technical capacity to optimize input use and sustain rice productivity.

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