Is the Subsidy Policy Still Effective for Rice Production

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ABSTRACT
One of the pillars of agricultural policy is the provision of fertilizer subsidies. An important component of agricultural policy once more, agricultural input subsidy schemes are intended to boost production and reduce farmer poverty. Recently, though the government has reduced fertilizer subsidies and even planned to do away with them altogether. This is due to stagnation and low production brought on by the expansion into increasingly marginal regions, along with old and deteriorated soils, irregular humidity, and climatic variability. However, because of these circumstances, supporting businesses like fertilizer production are susceptible to outside changes. As a result, this research tries to examine how the policy of the fertilizer subsidies has affected the production of rice. In this research, we use secondary data from the agricultural census which conducted 719 households rice farming in three provinces in 2013. Through the multiple linear regression analytical technique, we can know that for the first the price of urea and TSP are negatively related to the use of urea and TSP, and the second is subsidies that have an insignificant effect on rice production.

Keywords: *Rice, Subsidy, Agricultural Policy*

1. INTRODUCTION

Agriculture and food needs are two things that go hand in hand. The role of agriculture in supporting food needs is important and needs to be addressed. Furthermore, in addition to population growth, it is a determining factor for the government to ensure food availability. Increasing food production is the government's primary concern, and one of them is increasing the productivity of food products.

Consequently, a number of government measures boost the agricultural sector's production. The fertilizer subsidy policy is one of these policies. This is consistent with what the Minister of Defense of the Republic of Indonesia said, according to which food sovereignty cannot be achieved without a guarantee of the availability of suitable agricultural land, adequate irrigation and water supply systems, a supply of fertilizer tailored to the region's needs, and a guarantee of seed availability. Quality and in accordance with the specifications of the development area, without guarantees of investment permits, without guarantees of environmental carrying capacity, without guarantees and support of science and technology, without regional support and so on [1].

Meanwhile, one common problem for Indonesian farmers in food production is limited capital in access to fertilizers. With the growing popularity of modern agriculture, the consumption of fertilizers in developing countries is constantly increasing. Changes to the fertilizer subsidy policy in Indonesia have been observed frequently, with the aim of responding to farmers' demand for quality fertilizers. Changes in fertilizer subsidy policy with respect to fertilizer trade and distribution initially had a positive overall effect on fertilizer supply. However, most policies to deregulate fertilizer subsidies cannot ensure the quality of fertilizer in the right quantity and at the right time [2].

Aside from the availability of subsidized fertilizers, farmers hope that fertilizer prices are affordable and inexpensive. Even though farmers are aware that there are subsidized fertilizers available, many still have to purchase fertilizer at the retail level, which means they must pay more for non-subsidized fertilizers. In addition, occasionally some traders still try to raise the price of subsidized fertilizers above the correct price. The objective of this study is to determine the effect of the availability and price of subsidized fertilizers on rice production in Indonesia.

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2. MATH AND EQUATIONS

This study uses secondary data. The data is sourced from the results of the Agricultural census conducted in three provinces in 2013. The unit of analyses included in this research were 719 households in rice farming.

Multiple linear regression analytical techniques in this study to ascertain the direct link between the independent and the dependent variable. Our empirical model is a modification of the model used by [3], which is described as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 D_s + \varepsilon \quad (1)$$

Whereas:
Y : Harvested dry grain (Kg)
X_1 : Urea (Kg)
X_2 : TSP (Kg)
X_3 : Land Area (Ha)
D_s : Dummy subsidies, with value 1 if receiving subsidies and 0 if vice versa

B_0 shows the constant/ intercept, β_1 to β_4 shows the regression coefficient/slope for each explanatory variable. The dependent variables in this study are production. Production is the total output of rice cultivation in the form of Harvested Dry Grain which is calculated during one growing season. Other explanatory variables are urea fertilizer, TSP fertilizer, land area and subsidy, as the main explanatory variable is a dummy which will be worth 1 if the household receives a fertilizer subsidy and 0 if it does not.

3. RESULTS AND DISCUSSION

1.1 Overview of Research Area

The descriptive statistical analysis as shown in table below. The table shows the minimum, maximum, mean, and standard deviation values for each variable. The maximum value is the highest value for each variable, while the minimum value is the lowest value for each variable. Then, the mean value is the average value of each variable studied and the standard deviation is the distribution of the data used in the study that reflects the heterogeneous or homogeneous data that is fluctuating.

Table 1. Distribution of Respondents by Age Category

Age (Year)	Subsidies	Non Subsidies
Average	29,86	52,26
Standar Deviation	3,25	10,05
Minimum	16,00	25,00
Maximum	34,00	75,00

Source: Primary Data, 2023 (processed)

From Table 1, it is known that the value of the standard deviation for subsidies and unsubsidized fertilizers in distribution of respondents by age category is smaller than the average value. This explains that the data used has been spread evenly and homogeneous. The lowest age of members is 16 years old and the highest is 34 years old.

From Table 2, we can know that the characteristics of respondents in the last education category used are non graduated elementary school, elementary school graduated, junior high school, senior high school, one year diploma, two year diploma, three year diploma, bachelor, graduate and postgraduate. The highest number of respondents in the last education aspect is elementary school in both subsidies and non subsidies, which is 191 people and 122 people. While the lowest aspect is one year diploma/two year diploma. Both subsidies and non subsidies of the used fertilizer have a low education level. Characteristics of knowledge have a negative impact on fertilizer application [4].

Table 2. Distribution of Respondents by Land Area Category

Land Area (ha)	Subsidies	Non Subsidies
Average	0,43	0,48
Standar Deviation	0,51	0,66
Minimun	0,03	0,03
Maximum	6	8

Source: Primary Data, 2023 (processed)

Based on Table 3, it is known that the value of the standard deviation for subsidies and unsubsidized fertilizers of land area uses is bigger than the average value. This explains that the data used has been not spread evenly and heterogeneous. The lowest land area of members is 0,03 ha and the highest is 8 hectares on the side of non-subsidized fertilizers members.

Table 3. Distribution of Respondents by Productivity Category

Productivity (kg/ha)	Subsides	Non Subsidies
Average	4.449	5.161
Standar Deviation	1.769	2.267
Maximum	10.000	10.000
Minimum	400	350

Source: Primary Data, 2023 (processed)

Table 4. Distribution of Respondents by Education Level

Source: Primary Data, 2023 (processed)

Productivity (kg/ha)	Subsides	Non Subsidies
Average	4.449	5.16
Standar Deviation	1.769	2.26
Maximum	10.000	10.00
Minimum	400	35

From Table 4, it is known that the value of the standard deviation for subsidies and unsubsidized fertilizers in distribution of respondents by land area category is smaller than the average value. This explains that the data used has been spread evenly and homogeneous. The lowest productivity of members is 10 kg/ha on all sides, while for the lowest productivity is 350 kg/ha on the non-subsidized fertilizers members.

1.2 Regression Analysis

The study's findings, which are negative for both urea and TSP fertilizer, with respective negative values of -0.0391082 (Table 5) and -0.011689 (Table 6), are in line with expectations. Given the probability t value of 0.000, it is clear that both of these fertilizers are significant. This indicates a negative relationship between fertilizer price and fertilizer use, meaning that for urea fertilizer, a 1% increase in fertilizer price will result in a 3.91% decrease in fertilizer use, and vice versa. TSP fertilizer will cut fertilizer use by 1.16% in the meanwhile.

Table 5. Regression Result Between the Use of Urea and the Price of Urea

Variable	Coefficient	p>|t|
Urea Price	-0,0391082	0,000
Constanta	182,4422	0,000

Source: Primary Data, 2023 (processed)

Table 6. Regression Result Between the Use of TSP and the Price of TSP

Variable	Coefficient	p>|t|
TSP Price	-0,0011689	0,000
Constanta	90,14696	0,000

Source: Primary Data, 2023 (processed)

Despite the fact that they are substitutes, TSP and urea fertilizers are still used. The demand for one type of fertilizer will decline and the demand for the other type will rise, and vice versa, if the price of one type of fertilizer increases. In keeping with a study by [5] that claimed a variety of variables, with cost being the primary one, affect fertilizer use.

Additionally, research examines the connection between subsidized fertilizers and the output produced and the use of each fertilizer in order to ascertain the effectiveness of subsidized fertilizers. Table 3 displays the results of the regression.

The use of TSP and land area have positive coefficients of determination, as would be predicted. This demonstrates that an increase in the use of TSP fertilizers as well as land expansion go hand in hand with an increase in rice yield. The findings of this study align with earlier research, which indicates a positive correlation between rice farming production (output) and the application of inputs [6]. These studies further noted land size, level of mechanization, amount of fertilizer application, and high yielding varieties as important factors that are highly responsive to the production and productivity of rice farming. While the World Bank stressed that excessive fertilizer use will over time diminish the soil fertility of rice fields, the results of this study go against that generalization.

Table 7. Regression Result among the Production, Quantity of Urea, Land Area and Subsidies

Variable	Coefficient	p>|t|
Quantity of Urea (Kg)	-0,0914342	0,915
Quantity of TSP (Kg)	6,617786	0,000
Land Area (Ha)	3869,378	0,000
Seeds (Kg)	0,498629	0,886
Fertlizer Subsidies	-117,8264	0,236
Constanta	91,91615	0,324
R-squared		0,7966
F		558,49
Number of obs		719

Source: Primary Data, 2023 (processed)

The F-test conducted verified the validity of the entire model, and R^2 of 0.78 indicates that the independent variables included in the model, such as fertilizer subsidies, land area, and quantity of urea and TSP fertilizers, account for 78% of the variability of the dependent variable of rice production.

Related to subsidized fertilizer, it shows a value of 117.8264 which is not significant. These results indicate that fertilizer subsidies do not significantly affect rice production. The results of the research are in line with earlier study, which showed that increased productivity and production due to fertilizer subsidies will only occur in the short term [7]. Meanwhile, in the long run, fertilizer subsidies are no longer effective in increasing productivity and production. This relates to the type of subsidized fertilizer that is addressed to inorganic fertilizers. Meanwhile, inorganic fertilizers in the long term have a negative impact that damages the land and results in land degradation so that it will have implications for a decrease in production. A similar opinion was expressed by [8].

Meanwhile in Indonesia, common problems related to subsidized fertilizers include the quality of fertilizers, the limited amount of subsidies, the distribution of fertilizers that is not on time and not on target. Several of these factors allow the fertilizer subsidy policy to have no impact on production because low quality fertilizer will be ineffective in growing rice, accompanied by a limited number of subsidies for each farming household, which adds to the ineffectiveness of fertilizer application. In addition, the distribution of fertilizers that were not on time and on target distorted the production order. This is supported by the results of research from [9] which states that the ineffectiveness of fertilizer subsidy policies in Indonesia is shown by the failure to achieve the six correct principles, namely the right amount, the right type, the right quality, the right price, the right place and the right time.

4. CONCLUSION

The findings of this research are (1) the price of fertilizers has a negative significant relation to the quantity of fertilizer which indicates that farmers will reduce the quantity of fertilizers when their prices are increasing. (2) Fertilizer subsidies do not have a significant effect on increasing rice production. This may be due to the average farmer receiving the subsidy having a small area (0.43 ha) and a relatively low level of education (not completing basic education) so that the management of their farming is more influential on the achievement of production compared to fertilizer subsidies. Further research on the effectiveness of fertilizer subsidies is expected to look at the area size and level of education as control variables.

AUTHORS' CONTRIBUTIONS

Nuhfil Hanani developed the theory and performed the computations, verified the analytical methods, and supervised the findings of this work. All authors discussed the results and contributed to the final manuscript.

REFERENCES

[1] Wahyu and Setiawan, I. (2017). Food BUMN: Evolution to Food Sovereignty. Jakarta: Penebar Swadaya.

[2] Azwardi, Abdul Bashir, Mohamad Adam and Taufiq Marwa (2016). The Effect of Subsidy Policy on Food Security of Rice in Indonesia. International Journal of Applied Business and Economic Research, 14(13), 9009-9022.

[3] Wossen, T., Abdoulaye, T., Alene, A., Feleka, S., Gilbert, J. R., Manyong, V., and Awotide, B. (2017). Productivity and Welfare Effects og Nigeria`s E-Voucher- Based Input Subsidy Program. World Dev, 97, 251 – 265.

[4] Ginige, S.R., and Cooray, N. S. (2020). Modelling the Dynamic Impact of Fertilizer Subsidy on Paady Production: Empirical from Srilanka. Journal of Reviews on Global Economics (9), 293 – 307.

[5] Jaynea, T. S., Masona, N. M., Nurkeb, W. J., and Ariga, J. (2018). Review: Taking Stock of Africa`s Second Generation Agricultural Input Subsidy Programs. Food Policy (75), 1 – 14.

[6] Ranathilaka, M. B., and Arrachchi, I. A. (2019). The Effect of Fertilizer Subsidy on Small-Scale Paddy Production in Srilanka: A case in Hinguranggoda Divisional Secretariat Division in Polonnaruwa District. Srilanka Journal of Economic Research, 6(2), 69 – 82.

[7] Komarel, A. M., Drogue, S., Chenoune, R., Hawkins, J., Msangi, S., Belhouchette, H., and Flichman, G. (2017). Agricultural Household Effects of Fertilizer Price Changes for Smallholder Farmers in Central Malawi. Agricultural System 154, 168 – 178.

[8] Theriault, V., Smale, M. (2021). The Unintended Consequences of the Fertilizer Subsidy Program on Crop Species Diversity n Mali. Food Policy, 102(102121), 1 – 11.

[9] Wijetunga, C. S., and Saito, K. (2017). Evaluating the Fertilizer Subsidy Reforms in the Rice Production Sector in Srilanka: A Simulation Analysis. Advances in Management and Applied Economics, 7(1), 31.