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Analysis of Factors Influencing Rice Imports in Indonesia

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Abstract

Indonesia is an agricultural country with great potential in producing food commodities. Rice is the most widely consumed food commodity by the Indonesian population, so one of the main tasks of the government is to ensure that the availability of rice can meet the needs of the community. This study aims to analyze the effect of rice production, price of imported rice, urban population growth, and foreign exchange reserves on rice imports in Indonesia in 1985-2021. This research is a type of quantitative research using secondary data obtained from UN Comtrade, FAO, and the World Bank. The research method used is the Error Correction Model (ECM). The results of the study stated that (1) rice production has a significant effect on rice imports in the short and long term, (2) the price of imported rice has a significant effect on rice imports in the short and long term, (3) urban population growth has no significant effect on imports rice in the short term, but has a significant effect on rice imports in the long term, and (4) foreign exchange reserves have a significant effect on rice imports in the short and long term.

Keywords: Rice, Imports, Urban Population, Foreign Exchange Reserves, Error Correction Model

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INTRODUCTION

International trade experienced very rapid development after the end of the second world war, its development even exceeded the economic growth of countries in the world. Exports of developing countries are dominated by natural resource products, while imports for developing countries are industrial goods (Nugraheni, 1997). In contrast, developed countries have modern technology but their natural resources are limited. This condition causes a tendency for developed countries to import raw materials from developing countries, then with technology processed into finished

goods to be sold domestically or exported. The difference in the gift of natural wealth owned by each country causes a country to carry out international trade.

Indonesia is an agricultural country with the majority of the population making a living as farmers. As an agricultural country, Indonesia has vast and fertile agricultural land spread throughout Indonesia. The condition of Indonesia which has a tropical climate and is supported by a soil structure suitable for farming makes Indonesia the potential producer of the largest food commodity in the world.

Indonesia has the potential to produce various agricultural commodities such as food crops, horticultural crops, and plantation crops. The agricultural sector has an important role in meeting the basic needs of society. One of the food commodities resulting from agriculture is rice. Rice is the most widely consumed agricultural product by Indonesian people.

Rice is a staple food for more than 90% of Indonesia's population (Kementrian Pertanian, 2019). Therefore, one of the main tasks of the government is to ensure that the availability of rice can meet the needs of the community. This main task is contained in Undang-Undang No. 18 Tahun 2012 concerning Food in Pasal 12 Ayat 2 which reads "The Government and Regional Government are responsible for the Availability of Food in the regions and the development of Local Food Production in the regions".

Rice is a staple food that is needed by Indonesian people to maintain their survival. Even though a small portion of the middle and upper class of society have started to reduce their consumption of rice and shift their consumption from rice to bread or vegetarianism, until now rice is still the number one commodity for life (BPS, 2019). Rice is one of the staple food ingredients that always appears in the daily menu of Indonesian people.

Tambunan (2015: 64) states that Indonesia is an agricultural country that has the potential to become an agricultural exporter, but in reality Indonesia is not a major player in the world market for agricultural products. Even for the commodity of rice, Indonesia has become very dependent on imports.

Imports by Indonesia are one of the government's policies in the field of international trade. The rice import policy in Indonesia is stated in Pasal 14 Ayat 2 Undang-Undang No. 18 Tahun 2012 concerning Food which reads "In the event that the sources of supply of Food as referred to in paragraph (1) are not sufficient, Food can be fulfilled with Food Imports according to needs".

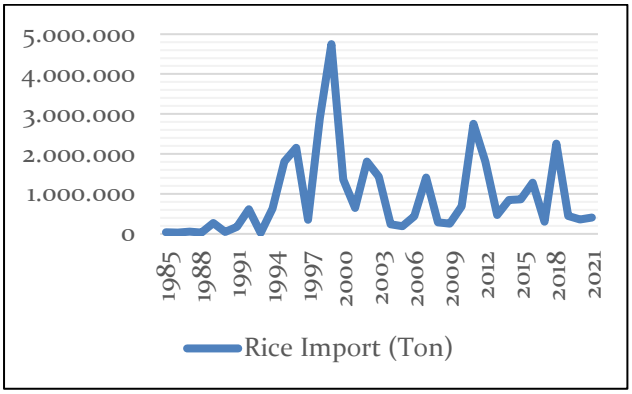

Figure 1. Development of Rice Imports in Indonesia in 1985-2021
Source: UN Comtrade, 2023

The contents of the article state that if food supply cannot be met with domestic production and national food reserves as referred to in paragraph 1, a food import policy is carried out according to need. Indonesia succeeded in achieving rice self-sufficiency in 1984 with rice production reaching 25.8 million tons (Hasanah, 2022).

Because of this success, Indonesia received an award from the Food and Agriculture Organization in 1985. Even so, Indonesia still imported rice in the period 1985-2021. The development of rice imports in Indonesia experienced very significant fluctuations, in fact Indonesia was recorded as the 4th largest rice importer in Southeast Asia in 2021. The development of Indonesian rice imports can be seen in Figure 1.

Figure 1. shows that rice imports in Indonesia for the 1985-2021 period experienced fluctuations. The level of rice imports in Indonesia is very uncertain. The lowest rice import occurred in 1993 with an import volume of 24,317 tons. Meanwhile, the highest rice import occurred in 1999 with an import volume of 4,751,398 tons.

Import is a cycle faced by every country in the world. Import dependence is principally caused by three reasons. First, domestic production is limited while demand in the domestic market is high. Second, the price of imported products is cheaper than the price of domestic products. Third, imports are more profitable because domestic production can be exported with the assumption that the export price abroad is higher than the import price that must be paid.

Imports that are higher than exports are not a good thing. This shows that the country is a net importer, meaning that the country imports more than it exports. Indonesia's increasing dependence on imports of agricultural products indicates that the green revolution in the 1970s which aimed to increase productivity, quality and diversification of agricultural production not only failed to make Indonesia a group of major agricultural exporting countries in the world but also failed to make Indonesia a developing country forever self-sufficient in agricultural products.

Tambunan (2015: 65) states that high dependence on rice imports will have political and social implications. If Indonesia experiences problems with countries where rice imports originate, such as Thailand and Vietnam, it will not only result in political crises and social unrest but also a very large risk of starvation.

Rice imports which are still being carried out every year without considering rice productivity will lead to dependence on the government in meeting domestic rice needs. The cheaper price of imported rice will cause the price of domestic rice to decrease, the decline in rice prices is the goal that the government wants to achieve. However, the low price of rice will have both positive and negative impacts.

The positive impact is that it can relieve consumers, but on the other hand it will harm domestic farmers. The decline in rice prices will cause agricultural production costs to be unmet, so that it will reduce agricultural productivity which causes production to decrease. Imports that are always carried out in maintaining food availability will be very high risk (Sringo & Daulay, 2014).

Mankiw (2014: 63) states that the amount of demand is the amount of goods and services that consumers want and can afford at a certain price level and period of time. While the number of offers is the number of goods or services that are willing to be sold and able to be sold by the seller.

The theory of demand and supply can explain the dynamic nature of market changes. This theory shows consumer choices in determining demand for goods and services, while costs or inputs used in the production process are the basis for determining the

amount of goods and services offered to consumers (Samuelson & Nordhaus, 2003: 52). So it can be concluded that the core of the theory of demand and supply is the achievement of price balance.

Rice production is the total rice produced by rice mills in Indonesia in a certain period of time which is used to meet domestic rice needs and for re-marketing (Kurniyawan, 2012). According to Sari (2014) rice production has a negative relationship with rice imports. If domestic rice production is able to meet people's needs, rice imports will not be carried out. Conversely, if domestic production is unable to meet the needs of the community, the government will import rice from abroad.

The theory of comparative advantage put forward by David Ricardo states that international trade between countries will arise if each country has the smallest comparative cost. This theory states that the occurrence of international trade is caused by differences in production factors, namely productivity and efficiency which have an impact on price differences for similar goods between two countries.

A country will import goods which, if produced by themselves, would require more expensive costs. Therefore, international trade is carried out to meet the need for an item in order to stabilize its price. Febriaty (2016) states that food imports in Indonesia are caused by a very large population and consumption of rice by Indonesia's population is the largest in the world. According to Badan Riset dan Inovasi Nasional (BRIN), rice consumption in Indonesia in 2021 is 114.6 kg per person per year.

Rochaeni (2014: 104) states that the concentration of the national population has changed where in the 1970s 70% lived in villages and 30% lived in cities, now 50% live in villages and 50% live in cities. This proportion will continue to shift if the government cannot create jobs in the village. Then, what happened next was the shifting pattern of farming business.

The burden on farmers and farm workers will be even heavier because the land area that has been reduced will have to meet the food needs of urban residents whose population is increasing. Indirectly, this condition will burden the farmers in producing agricultural products. Ouédraogo (2018) states that the urban population is a large consumer of rice and demands high quality rice.

Urbanization has often been accompanied by increased consumption outside the home, a phenomenon that has resulted in increased consumption of rice due to its ease of storage, preparation and cooking. Apart from being a large consumer of rice, urban residents also demand the quality of the rice they consume. The growth of urbanization will increase the demand for imported rice which they perceive to have better quality than domestic rice.

The balance between food supply and food use was predicted by Robert Malthus in 1798. According to Robert Malthus, the rate of population growth as food consumers moves in geometric progression, while the rate of food growth moves arithmetically. In other words, the balance between population growth and food increase is not equivalent.

Rice is the most widely consumed food commodity in Indonesia. If domestic rice production is unable to meet the food needs of the people, then the step taken by the government is to import rice from abroad. According to Undang-Undang No. 23 Tahun 1999 foreign exchange reserves are assets owned

by the central bank and monetary authorities in the form of foreign currency, gold and securities. Foreign exchange reserves are used to keep the demand for dollars smaller than the supply of rupiah which can cause an increase in the price of the exchange rate so that the rupiah spent to buy foreign currency is greater (exchange rate depreciation).

Sultan (2011) states that foreign exchange reserves have an important role in influencing import demand, including rice imports. Foreign exchange reserves are a transaction tool used in international markets for developing countries to import goods or services from abroad. The relationship between foreign exchange reserves and imports has a positive direction, if there is an increase in foreign exchange reserves, the tendency of a country to import will also increase (Juniantara, 2011).

Based on the explanation and data above, it can be concluded that Indonesia does not need to import rice considering that domestic rice production is still high and is even listed as the 4th largest rice producing country in the world. The rice import policy will have an impact on the welfare of farmers and national food security.

Rice imports will be detrimental to farmers, but on the other hand rice imports are a solution in maintaining food availability which cannot be fulfilled by domestic production. Therefore, the researchers took the title "Analysis of Factors Influencing Rice Imports in Indonesia".

RESEARCH METHODS

This research is a type of quantitative research with research locations in Indonesia for the 1985-2021 time period. The dependent variable in this study is rice imports. While the independent variables used in this study are rice production, price of imported rice, urban population growth, and foreign exchange reserves.

Sources of data in this study were obtained from UN Comtrade, Food and Agriculture (FAO), and Worldbank which were collected using documentation techniques. The data analysis technique used is the Error Correction Model (ECM) method.

Error Correction Model (ECM) is a descriptive analysis method that aims to identify long-term and short-term relationships that occur due to cointegration between research variables (Basuki, 2014). Systematically the long-term regression model in this study is formulated as follows:

$$LMt = \alpha_0 + \alpha_1 LPRODt + \alpha_2 LPIMt + \alpha_3 URBANt + \alpha_4 DEVt + \mu$$

While the general form of the short-term ECM equation is formulated as follows:

$$D(LM)t = \beta_0 + \beta_1 D(LPROD)t + \beta_2 D(LPIM)t + \beta_3 D(URBAN)t + \beta_4 D(DEV)t + ECTt\text{-}1 + et$$

Where M is Rice Imports (tonnes), PROD is Rice Production (tonnes), PIM is Price of Imported Rice (USD/kg), URBAN is Urban Population Growth (%), and DEV is Foreign Exchange Reserves (million USD). Rice imports are the amount of rice imported from abroad through international trade transactions. Rice production is the total rice produced by a country in a certain period of time.

The price of imported rice is the cost sacrificed to obtain rice through international trade transactions. Urban population growth is the percentage increase in urban population at a

certain time compared to the urban population at the previous time, and (5) Foreign exchange reserves are all foreign assets that can be used at any time which are useful in maintaining stability exchange rates and financing imbalances in the balance of payment deficit.

The Error Correction Model method is a dynamic model that can provide an overview of how the independent variable influences the dependent variable in the long and short term. Dynamic models are useful for avoiding spurious regression problems. Regression skewed is a condition where the regression results show a high coefficient of determination, but the relationship described by the correlation coefficient is not related to each other.

RESULTS AND DISCUSSION

The advantage of the Error Correction Model Method is that it is able to explain short-term and long-term relationships between the independent variables and the dependent variable. The first condition that must be met when using this method is that the data cannot be stationary at the level and must be stationary at the same order. The unit root test in this study was carried out using Augmented Dickey Fuller (ADF). The results of the unit root test can be seen in Table 1.

Table 1. Unit Root Test Results

ADF	Probability	
	Level	**First Difference**
LM	0,0721	0,0170
LPROD	0,1501	0,0000
LPIM	0,6702	0,0000
URBAN	0,8928	0,0001
DEV	0,9943	0,0000

Source: Data Processed, 2023

Table 1. shows that there is no data that is stationary at the level and has been stationary at the same level, namely the first difference, so that the next stage is continued, namely the cointegration test. The cointegration test is used to determine whether or not there is a long-term balance between variables in the research model. Cointegration testing in this study was carried out by carrying out a unit root test using Augmented Dickey-Fuller on the residual value of the OLS equation which is named Error Correction Term (ECT). If the residual value is stationary at the levels, then the model has cointegration, meaning that there is an equilibrium in the long term. Cointegration test results can be seen in Table 2.

Table 2. Cointegration Test Results

Variabel	ADF	Probability
ECT	-6,0258	0,0000

Source: Data Processed, 2023

The cointegration test results are in Table 2. It shows that the ECT residual value is stationary at the level level because it has a probability value of 0.0000 or less than the significance level α = 5%. Next, estimation of regression is performed using the Error Correction Model method. The short-term regression estimation results can be seen in table 3.

Table 3. it shows that the ECT (Error Correction Term) coefficient is negative, which is -1.0048 and is statistically significant because the probability is 0.0000 < 5%. So it can be concluded that the ECM model in this study is the right model and a valid model specification. The short-term ECM equation model is formulated as follows:

D(LM)t = -0,12 + 17,00D(LPROD)t – 3,32D(LPIM)t + 1,24D(URBAN)t + 5,37D(DEV)t - 1,00ECT(-1)

Based on the equation 3 model, it is known that the rice production variable has a positive effect on rice imports with a coefficient value of 17.00. The price of imported rice has a negative effect on rice imports with a coefficient of -3.32. Urban population growth has a positive effect on rice imports with a coefficient of 1.24. Foreign exchange reserves have a positive effect on rice imports with a coefficient value of 5.37.

Table 3. Short Term Regression Results

Variable	Coefficient	Prob.
D(LPROD)	17,0093	0,0022
D(LPIM)	-3,3257	0,0218
D(URBAN)	1,2411	0,1954
D(DEV)	5,37E-05	0,0294
ECT(-1)	-1,0048	0,0000
C	-0,1166	0,6108
R-Squared	0,5543	
Adjusted R-Squared	0,4801	
S.E. of regression	0,9938	
Durbin-Watson stat	2,0542	
F-statistic	7,4635	
Prob(F-statistic)	0,0001	

Source: Data Processed, 2023

Based on the short-term regression results in Table 3 it is known that the Adjusted R-Square value is 0.48. This means that the independent variables used in the model, namely rice production, imported rice prices, urban population growth, and foreign exchange reserves together can explain the variation in the dependent variable namely rice imports by 48%, while the remaining 52% is explained by the variable others outside the research model.

The long term is a period that allows full adjustment to changes that occur, so that it can show the extent to which changes in the independent variable fully adjust the dependent variable. The long-term estimation results using the Error Correction Model (ECM) method can be seen in Table 4.

Table 4. Long Term Regression Results

Variable	Coefficient	Prob
LPROD	17,5651	0,0000
LPIM	-4,1739	0,0024
URBAN	1,7191	0,0030
DEV	3,83E-05	0,0093
C	-330,9886	0,0000
R-Squared	0,5691	
Adjusted R-Squared	0,5153	
S.E. of regression	0,9828	
Durbin-Watson stat	2,0653	
F-statistic	10,5676	
Prob(F-statistic)	0,0000	

Source: Data Processed, 2023

Based on Table 4 it is known that all independent variables in the study have a significant effect on the dependent variable. This is shown from the probability value of each variable whose value is less than the significance level α = 5%. The long-term equation model of the Error Correction Model method is formulated as follows:

LMt = -303,99 + 17,57LPRODt – 4,17LPIMt + 1,72URBANt + 3,83DEVt

The equation model 4 shows that rice production has a positive effect on rice imports with a coefficient value of 17.57. The variable price of imported rice has a negative effect on rice imports with a coefficient value of -4.17.

Urban population growth has a positive effect on rice imports with a coefficient of 1.72. Foreign exchange reserves have a positive effect on rice imports with a coefficient of 3.83.

Based on the long-term regression results in Table 4 it is known that the Adjusted R-Squared value is 0.51. This means that the independent variables used in the research model, namely rice production, the price of imported rice, urban population growth, and foreign exchange reserves together can explain the variation in the dependent variable namely rice imports by 51%, while the remaining 49% is explained by the variable others outside the research model.

Based on the results of regression estimation using the Error Correction Model approach, the results show that rice production has a positive and significant effect on rice imports in the short and long term. The findings in this study are not in accordance with initial expectations. In addition, the results of this study are inversely proportional to the results of research conducted by Sari (2014) which states that rice production has a negative and significant effect on rice imports in Indonesia both in the short and long term.

The positive relationship between rice production and rice imports is due to an increase in rice production coupled with an increase in the population in Indonesia. The development of rice production and population in Indonesia from 1985-2021 can be seen in Figure 2.

Figure 2. shows that the population in Indonesia has increased linearly from year to year, while rice production has tended to increase but at a relatively low growth rate. These findings are in accordance with the theory put forward by Robert Malthus which states that population growth will follow a geometric progression while the increase in food ingredients follows an arithmetic progression. That is, the increase in population is faster than the increase in food.

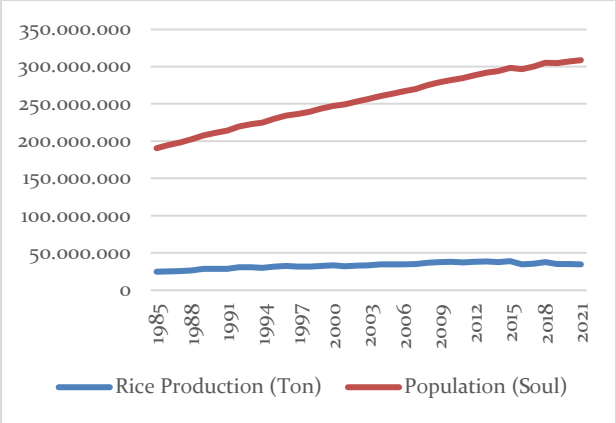

Figure 2. Development of rice production and population in Indonesia in 1985-2021
Sources: FAO and Worldbank

When food growth cannot keep up with population growth, it will cause a shortage of food. Therefore, the government is still importing rice from abroad to meet domestic rice needs even though rice production in Indonesia is increasing.

The relatively low growth rate of rice production is due to inadequate agricultural supporting infrastructure such as reservoirs and irrigation which play an important role in increasing agricultural productivity, especially rice crops. The low reliability of irrigation water is a problem faced in the management of irrigation systems in Indonesia.

The area of surface irrigation whose water comes from reservoirs is only 76,542 ha (10.7%), while the remaining 6,383,626 ha (89.3%) relies on river water discharge (Ditjen Sumber Daya Air, 2018). The next problem is that the conditions and functions of national surface

irrigation are not yet optimal. Direktorat Jenderal Sumber Daya Air noted that an area of 3.3 million ha or 46% of the total irrigation in Indonesia is in a damaged condition.

The findings in this study are in line with the results of Salsyabilla's (2010) which states that the positive effect of rice production on rice imports is caused by several factors, including the lack of transparency in the distribution of rice, and many irregularities and fraud. Furthermore, the results of research by Paipan & Abrar (2020) stated that the positive effect of rice production on rice imports was caused by several types of rice that were not produced domestically and the Logistics Affairs Agency (Bulog) did not absorb the government's rice optimally.

In the short term, the price of imported rice partially affects rice imports with a coefficient of -3.3258. That is, if the price of imported rice increases by 1 percent, it will reduce rice imports by 3.3258 percent. The long-term regression results show that the price of imported rice has a significant effect on rice imports with a coefficient of -4.1739. That is, if the price of imported rice increases by 1 percent, it will reduce rice imports by 4.1739 percent.

The results of this study are in accordance with the theory of comparative advantage put forward by David Ricardo. According to David Ricardo, a country will import goods which, if produced domestically, are inefficient and require more expensive costs.

The results of this study are also in line with the results of research conducted by Prinadi et al., (2016) which stated that the price of international rice had a negative and significant effect on rice imports. That is, if the international price of rice increases, the volume of rice imports will decrease. Conversely, if the international price of rice decreases, the volume of rice imports will increase.

Urban population growth has no significant effect on rice imports in the short term. According to Dwipayana & Kesumajaya (2014) population size does not affect rice imports due to changes in the consumption patterns of Indonesian people who used to consume rice and now switch to consuming other types of food such as bread and wheat.

According to Purwaningsih et al., (2015) the proportion of rice expenditure for households in urban areas is smaller than households in rural areas. Households in urban areas are starting to shift their consumption patterns from rice to tubers, fish, meat, eggs and milk, and fruits (Miranti et al., 2016). Changes in consumption patterns of urban communities from rice to other types of food are caused by high levels of income which result in people's preference for more rice substitute goods.

In the long term, urban population growth has a positive and significant effect on rice imports. This is shown from the probability value of 0.0217 and the coefficient value of 1.7191. That is, if urban population growth increases by 1 percent, it will increase rice imports by 1.7191 percent, assuming cateris paribus.

These findings are in line with the results of research conducted by Ouédraogo (2018) which states that the urban population has a positive and significant effect on rice imports. The urban population is a large consumer of rice and also demands the quality of the rice consumed. The growth of urbanization will increase the demand for imported rice whose quality is considered better than domestic rice.

In the short term, foreign exchange reserves have a significant effect on rice imports with a coefficient of 5.37. That is, if foreign

exchange reserves increase by 1 million USD, rice imports will increase by 5.37 percent assuming cateris paribus. Meanwhile, in the long term, foreign exchange reserves also have a positive and significant effect on rice imports with a coefficient of 3.83. This means that if foreign exchange reserves increase by 1 million USD, it will increase rice imports by 3.83 percent, assuming cateris paribus.

The results of this study are in line with the results of research conducted by Arize & Malindretos (2012) which states that an increase in foreign exchange reserves will increase the wealth of a country which has an impact on increasing the volume of imports. In addition, research by Zaeroni & Rustariyuni (2016) also states that foreign exchange reserves are a source of financing for imports, so that an increase in foreign exchange reserves in a country will have an impact on increasing the volume of imports including rice imports.

Furthermore, research conducted by Dwipayana & Kesumajaya (2014) states that foreign exchange reserves have a positive and significant effect on rice imports in Indonesia. An increase in foreign exchange reserves will cause the exchange rate to appreciate. Appreciation of the exchange rate will cause the price of imported products to become cheaper. The law of demand states that if the price of a good decreases, the quantity demanded will increase.

From January to October 2014, food imports consumed foreign exchange reserves of US$6.6 billion or equivalent to Rp. 80 trillion based on the rupiah exchange rate against the US dollar that was in effect at that time (Tambunan, 2015: 65). Imports of food commodities including rice if carried out excessively will use up foreign exchange which can result in a deficit in foreign exchange reserves.

Aside from being a source of financing for imports, foreign exchange reserves are also useful for paying off foreign debt, maintaining exchange rate stability, and financing balance of payments imbalances. Therefore, rice imports should be carried out according to the need to minimize risks that could threaten a country's economy.

CONCLUSION

Based on the results of the analysis and discussion of the data, it can be concluded that rice production has a positive and significant effect on rice imports in the short and long term, the price of imported rice has a negative and significant effect on rice imports in the short and long term, urban population growth has no effect on rice imports in the short term but has a positive and significant effect on rice imports in the long term, and foreign exchange reserves have a positive and significant effect on rice imports in the short and long term.

Rice is the most widely consumed food commodity by the Indonesian population. If the availability of domestic rice is unable to meet people's needs, the government will suffice it by importing rice from abroad. Therefore, the government must optimize efforts to absorb rice surpluses that are not fully owned by the government by establishing direct cooperation between the government and farmers so that rice stocks at the Central Logistics Agency (Bulog) can be fulfilled.

Furthermore, the government must establish policies that seek to encourage local farmers to increase rice productivity through improving agricultural supporting infrastructure, applying appropriate technology,

and supporting facilities and capital for farmers. In addition, the community must also support government policies in efforts to diversify food so that national consumption does not only focus on one type of food, even though rice is a staple food for the people of Indonesia.

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