ANALYSIS OF RICE FOOD SECURITY IN GROBOGAN DISTRICT PERIOD 2017-2021

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ARTICLEINFO	ABSTRACT
Keywords: *Harvested Area* *Rainfall* *Land Productivity* *Rice Prices*	This study aims to analyze rice food security in Grobogan Regency. The research data includes 5 independent variables which are secondary data in the panel regression data analysis method, with cross sections of 19 districts and time series for the 2017-2021 period. This study aims to measure the direction and magnitude of the influence of harvested area, rainfall, land productivity, rice prices and population on rice food security in Grobogan District. The results of this study prove that written factors have a significant effect on rice food security. The variable harvested area has a negative and significant effect on rice food security, rainfall has a positive and insignificant effect on rice food security, land productivity has a negative and significant effect on rice food security, rice prices have a positive and significant effect on rice food security, and population has an effect positive and significant impact on rice food security.
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1. INTRODUCTION

Food itself is a human need to have food reserves. As a basic requirement, it is very important that the basic needs of food as a reference for development become a focal point for all authorities to advance the development of food availability [1]. Indonesia's aim to increase food production through self-sufficiency which strengthens itself is largely the result of various external factors that affect food security [2]. Indonesia claims that in addition to strengthening the nation's life support system, the need for food security coupled with the availability of agricultural land will have a fairly strong economic impact on its national food reserves.

According to the National Food Agency (Bapanas), Indonesia now has access to sufficient food even in the midst of a potential world food crisis. This need is based on estimates of the country's nutritional balance and the existence of a high potential for a variety of locally produced foods, which have a good chance of emerging as an alternative to imported foods. Estimates of the national food balance show that a surplus condition of up to 7.5 million tons of rice by the end of December 2022. Thus only through collaboration between academia, business, community, government and media will food security be achieved [3].

Food growth, like an arithmetic series and population growth, like a geometric series, seems to have hit a major milestone at this precise time. The need for food continues to increase along with the increase in population causing access to food to decrease. According to the World Food Organization 854 million people worldwide do not have enough food. According to the Global Food Security Index, there has been a gradual increase in Indonesia's food security over the past five years. The security of food supply is one of the most important issues in Indonesia, not only in terms of economic and social values but also because it has significant political consequences. We can imagine what will happen to the continuity of the government cabinet or the country's political stability if Indonesia faces the threat of food shortages or hunger [2].

In the future, if food production does not increase, Indonesia, which has a growing population, will also have the opportunity to experience problems meeting the food needs of its citizens. The need for food continues to increase along with the increase in population. In fact, some food needs cannot be met. Due to the very limited ability of the state to produce and distribute food, this creates an inconsistency between food needs and their fulfillment nationally [4]. Therefore, the best and most effective effort to maintain national sovereignty, namely without importing food or rice, is to meet food needs. By continuing to subsidize people's food, Indonesia will be able to manage national consumption and reserves adequately so that it can maintain food security stability.

The Committee for Food Security clarified that food security may be a multidimensional issue requiring investigation of various parameters; disproportion between production and supply of food.

Although there is no specific way to do this, the complexity of food security itself is rearranged centering on three specific but interrelated measures: accessibility of food, availability of food for the family unit, and people's appetite for food. The markers used are based on the FSVA Food Security Committee (Food Security and Vulnerability Atlas), which refers to the three basic food security frameworks in terms of the concept of food safety and a healthy food system. Determination of measurements on the selection of food security indicators is then included in data dependencies at each district or sub-district local level.

Food security according to FAO in [5], is a situation where individuals or families can gain access to food or achieve financial stability for all household members and without having to bear the risk of losing both. At least food is a basic need for every individual to eat every day. Food security is the community's need for food supply as long as the availability of food is sufficient in quantity and quality, safe, diverse, nutritious, evenly distributed and abundant, and does not conflict with religion, in accordance with the provisions of the Food Security Act No. 18 of 2012 namely maintaining the values and community culture while living a healthy, active and productive life is another shared obligation that must be maintained.

Indonesia's achievement as a self-sufficient food country has motivated the government to further increase rice production. The extent of the agricultural area has made Grobogan Regency the object of government attention to change cropping patterns. Before the Ombo Technical Reservoir irrigation was built, the farming community had a Palawija cropping pattern. Rice has unique properties that make it an important food ingredient. The BND and Insus programs continued until Indonesia finally achieved self-sufficiency in food in November 1984. This was an extraordinary achievement for Indonesia, which for the first time was able to meet its food needs without importing rice from abroad. With this achievement, the government pays more attention to rice production.

Grobogan Regency is one of the second largest districts in Central Java Province, and the soil conditions in Grobogan Regency are ideal for agriculture, especially rice and secondary crops. Until now the ability of the agricultural sector is still influential in supporting the economic sector of Grobogan Regency. The Grobogan Regency land area is 197,586.00 ha, divided into paddy fields with an area of 82,726.63 ha, non-paddy agricultural land covering an area of 83,101.37 ha, and non-agricultural land covering an area of 31,728.00 ha [6].

The most important need which is the main staple food of the Indonesian people is rice. Rice contains ingredients that are important for the body, such as vitamins and minerals, and apart from that rice also contains carbohydrates that are easily digested. In processing technology, processing and storage are simple. Paddy (rice) can be grown from the tropics to the subtropics, from the lowlands to the highlands and can also be grown in traditional and non-traditional ways. Other nutrients in rice can be used for feed, organic fertilizers and industrial raw materials [7]. So that rice consumption is the highest choice compared to other food sources. Grobogan Regency is one of the largest supplying areas for rice production in Central Java, so that Grobogan Regency is in the category of a crucial position; towards food security in Indonesia, especially in Central Java, always trying to optimize rice food.

Table 1. Rice Harvested Area and Productivity in Grobogan Regency in 2017-2021

Year	Rice Harvested (ha)	Productivity (kw/ha)
2017	139,481	62.00
2018	132,155	59.16
2019	136,091	58.09
2020	131,929	61.10
2021	132,664	60.37

Source: Grobogan Agriculture Service Various years of publication

In the table above, we can see that the highest harvested area was in 2017, namely 139,481 ha, which has decreased gradually over the past 5 years. It can be seen that in 2018 there has been a drastic decrease of 7,326 ha. Grobogan Regency has the potential to be developed to support the local economy of Grobogan Regency, one of which is agriculture. Although the conversion of agricultural land to non-agricultural land has recently increased, the potential of the agricultural sector to support the economic sector of Grobogan Regency has so far dominated [8].

This data is believed to be based on the assumption regarding the effect of changing the area of agricultural land to non-agricultural land and selling prices that are not proportional to the rice production that has been produced. Posterior with the occurrence of the Covid-19 pandemic over the last two years, this has triggered the price of fertilizer to increase when the need for agricultural production requires an economical cost, but at the same time the economic financial conditions of the farming community during

the pandemic are not supported in efforts to produce their agricultural products, so that the harvest area and Land productivity has increased and decreased significantly gradually.

The unique land characteristics combined with the vast area are supported by human resources to support making Grobogan Regency an area with a variety of commodities in the agricultural sector. Grobogan Regency's agricultural products are quite standard, including corn, cassava, peanuts, soybeans, green beans, pepper, eggplant, tomatoes, kale, spinach and fruit. With the exception of rice, whose production has continued to increase since 1985, agricultural production has increased and decreased from year to year. Based on the factors above, national development, namely economic development with an emphasis on the agricultural sector and industrial improvement which will continue to be developed in subsequent instruments (Grobogan Regency Government, 2019).

However, in fulfilling this, Grobogan rice food security resulted in superior results between the amount of production and consumption which was very sufficient for the people's own consumption and was also still in the surplus category for each production and availability of rice.
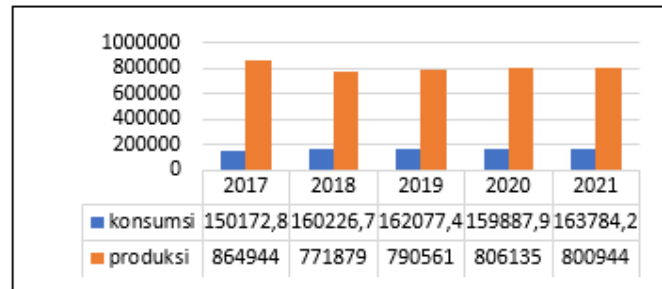

Figure 1. Total Production of Rice and Total Consumption of Rice in Grobogan Regency in 2017-2021

Figure 1 explains that rice production in Grobogan Regency is sufficient for the rice consumption of the Grobogan people themselves. However, Grobogan Regency still has the responsibility to strengthen regional food security in order to support national food security. Which currently requires attention to conditions for the stability of rice production and rice consumption supported by 19 sub-districts in Grobogan Regency which guarantee conditions at each household level in each sub-district with different conditions, for example regarding harvested land area, rainfall, land productivity, rice prices and population. So in this way these conditions will be used to measure rice food security in each sub-district in Grobogan Regency.

Based on Gayatri (2017), Rusdjijati et al., (2020) and Arijuddin (2018), found that the factors that affect food security are the area of harvested land, rainfall, land productivity, rice prices and population. Therefore, this study aims to determine the influence of written factors on rice food security using panel data regression to estimate the direction and magnitude of the influence of rice food security in Grobogan Regency in 2017-2021 [9][10][11].

2. METHOD

The data research method for this research uses quantitative data collection with secondary data sourced from the Food Crops Agriculture and Horticulture Office, the Grobogan Regency Food Security Service and the Central Bureau of Statistics (BPS). The analytical method used in this study is the panel data regression method, which is a combination of time series data from 2017-2021 with cross-sections in all sub-districts in Grobogan Regency.

The dependent variable in this study is the ratio of rice availability, while the independent variables used are harvested area, rainfall, land productivity, rice price and population. Where in this study used the dependent variable ratio of rice availability as a proxy for food security variables. The independent variables used in this study include the following:

a. Harvest Area

Harvested area is the total area of paddy fields used to produce rice in each district during the 2017-2021 period in Grobogan Regency. The data unit for paddy harvested area is the hectare.

b. Rainfall

Rainfall in agriculture includes the amount of rainwater that fell in each sub-district during the 2017-2021 period in Grobogan Regency. The unit of rainfall data is mm/year.

c. Land Productivity

Land productivity includes the average amount of rice that has been produced in 1 hectare of land per year in each sub-district during the 2017-2021 period in Grobogan Regency. the data unit for land productivity is quintals/hectare.

d. Rice Prices

The price of rice is the price of the commodity rice which has been totaled with distribution costs (market prices) and then measured per unit kilogram with the total price using rupiah units during the 2017-2021 period which was generated in each sub-district in Grobogan Regency. rice price data unit is rupiah/kilogram.

e. Total population

The population in this study is the number of people or people in each district per year in Grobogan Regency. with the data unit of the population is thousands of people.

So that the variables in this study were applied in a natural logarithmic form with a log-log model. To analyze the effect of harvested area, rainfall, land productivity, rice price and population on the ratio of rice availability as a proxy for food security, panel data regression analysis tools are used with the following econometric models:

$$\log AOC_{it} = \beta_0 + \beta_1 \log HA_{it} + \beta_2 \log RF_{it} + \beta_3 \log LP_{it} + \beta_4 \log RPR_{it} + \beta_5 \log P_{it} + e_{it}$$

Information:
AOC = availability of rice
HA = harvested area
RF = rainfall
LP = land productivity
RPR = price of rice
P = total population
Log = logarithm
I = unit cross-section (19 districts)
T = unit time series (5 years)
Et = error term
β_0 = intercepts
β_1 〖-β〗_5 = regression coefficient

According to Ghozali & ratmono (2013) in determining the panel data analysis method, there are three stages for estimating panel data regression, namely Common Effect, Fixed Effect and Random Effect [12]. Furthermore, from the three analytical methods above, the panel data regression estimation method will be chosen through the Chow-test, Hausmant test and LM test. Then the estimation results show that the selected model, namely the Common Effect model, is better to use.

The hypothesis test in this study is by conducting statistical tests which will be used to determine the results of a variable or the model as a whole. The statistical test used is the t-test explaining whether the independent variables have a significant effect or not and the F test is conducted to test how much significance the determination of the R2 value of the independent variable can describe its effect on the dependent variable.

3. RESULT AND DISCUSSION

Analysis of the regression results after estimation in this study obtained the following results:

Table 2. Hypothesis Test Results

| Variable | R² | F Stat | | koef | t test | | ket |
		F Stat	sig		t stat	sig	
C				-41,33475	-2,795859	0,0063	-
Ha				-0,791929	-15,78854	0,0000	Sig
Rf	0,823085	82,81340	0,000000	0,000640	0,104938	0,9167	Not Sig
Lp				-1,677642	-3,657034	0,0004	Sig
Rpr				5,303472	3,173260	0,0021	Sig
P				0,469989	6,936034	0,0000	Sig

Hypothesis Testing Results 1

Hypothesis 1, namely the harvested area has a negative effect on the ratio of rice availability to the food security fraction and the t-stat value is -15.78854, which is negative, the prob value is 0.0000 <0.05, it

can be concluded that the harvested area variable has a negative and significant effect on the ratio availability of rice.

Hypothesis Testing Results 2

Hypothesis 2, namely rainfall has a positive effect on the ratio of rice availability to the food security fraction and the t-stat value is 0.104938 which is positive, the prob value is 0.9167> 0.05, it can be concluded that the rainfall variable has a positive and not significant effect on the ratio availability of rice.

Hypothesis Testing Results 3

Hypothesis 3 is that land productivity has a negative effect on the ratio of rice availability to the food security fraction and the t-stat value is -3.657034 which is negative, the prob value is 0.0004 <0.05, it can be concluded that the variable land productivity has a negative and significant effect on the ratio availability of rice.

Hypothesis Testing Results 4

Hypothesis 4 is the price of rice has a positive effect on the ratio of rice availability to the food security fraction and the t-stat value of 3.173260 is positive, the prob value is 0.0021 <0.05, it can be concluded that the price variable of rice has a positive and significant effect on the availability ratio rice.

Hypothesis Testing Results 5

Hypothesis 5 is that the population has a positive effect on the ratio of rice availability to the food security fraction and the t-stat value of 6.936034 is positive, the prob value is 0.0000 <0.05, it can be concluded that the variable population has a positive and significant effect on the availability ratio rice.

Simultan Test

Obtaining the F statistic test proves that the independent variables simultaneously affect the dependent variable, the results of the F-stat test can be seen in table 3.1. It can be seen that the F-stat value is 82.81340 with a significance value of 0.000000 <α (0.05) which H0 is rejected, then the model used exists, so it is concluded that the variables of harvested area, land productivity have a negative effect, rainfall, rice prices and population simultaneously have a positive and significant effect on the ratio of rice availability. The test results together can be seen by looking at the R-squared value of 0.823085, which concludes that all variables of harvested area, rainfall, land productivity, rice prices and population have succeeded in explaining the dependent variable by 82.30%. On the other hand, the difference of 17.70% is explained by other variables outside the model.

4. CONCLUSION

Based on the results of the explanation obtained, the following conclusions can be drawn: First, based on the estimation results of panel data, this study selected the best model, namely the Common Effect Model (CEM). Second, the results of the simultaneous significance test (F test) show that the model used exists. Third, the overall independent variables are able to explain the dependent variable of 82.30%, where these 80% beliefs together have a significant effect on the ratio of rice availability. Fourth, the variable harvested area has a negative and significant effect, indicating that an increase in harvested area affects a decrease in the ratio of rice availability (Rice Food Security) in Grobogan Regency in 2017-2021. Fifth, the rainfall variable has a positive but not significant effect, explaining that rainfall does not affect the increase in the ratio of rice availability (Rice Food Security) in Grobogan Regency in 2017-2021. Sixth, the variable land productivity has a negative and significant effect, in which the increase in land productivity greatly affects the decrease in the ratio of rice availability (Rice Food Security) in Grobogan Regency in 2017-2021. Seventh, the rice price variable has a positive and significant effect, this shows that the increase in rice prices affects the increase in the level of rice availability ratio (Rice Food Security) in Grobogan Regency in 2017-2021. Eighth, the population variable has a positive and significant effect, proving that an increase in population will affect an increase in the ratio of rice availability (Rice Food Security) in Grobogan Regency in 2017-2021.

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