Rice Demand Analysis in Indonesia's Central Java

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Abstract:- Rice is the main commodity of Indonesian society. The Indonesian government designed an agricultural policy to be able to produce rice according to its demand.Economically, many people depend on rice for their livelihoods, producing rice, either through farming, marketing, or processing activities. Politically, this commodity holds a central position in the national food policy because of its very large role as a staple food ingredient for the Indonesian population.Central Java is the third rice producer in Indonesia, after West Java and East Java. The consumption of the people of Central Java is very dependent on rice. so that the scarcity of rice becomes a vital problem for Indonesia. This study tries to analyze the factors that influence demand for rice in Central Java. The estimation technique in this study uses the Panel Data model. This model uses 35 cross section data units and 4 time series data sets. The Panel Data model is the most appropriate model to use because this study uses a time series of trade flows of each cities and regencies which is then cross-sectioned with time series data of other cities demand. The results showed that the variable of price of rice, income per kapita, and population had a positive and significant effect on rice demand, while rice of corn did not affect public sector investment in the seven ASEAN countries

Keywords:- Rice Demand, Price Of Rice, Price Of Corn, Income Per Capita, And Population.

I. INTRODUCTION

Procuring food and maintaining good health has been one of humankind's main pursuits, However, despite significant technological advancements in food production and transportation methods and scientific progression in nutrition research, the ability of people to maintain health and well-being through food and nutrition has paradoxically become increasingly difficult (Colatruglio and Slater, 2014). Food is defined as everything that comes from biological sources of agricultural, plantation, forestry, fishery, livestock, aquatic and water products, both processed and unprocessed, which are intended as food or drinks for human consumption, including food additives, food raw materials, and other materials used in the process of storing, processing, and or manufacturing food and beverages.

One of the important food commodities for Indonesian people is rice. Together with Indonesia, Bangladesh, Vietnam, Myanmar, Thailand, the Philippines, Japan, Pakistan, Cambodia, the Republic of Korea, Nepal, and Sri Lanka, Asian countries account for 90% of the world's total rice production (Muthayya et al, 2014). Rice is still considered a strategic commodity and the shortage of rice production will easily become a socio-political, economic and security problem. Consequently, the government must be responsive to parameters related to rice supply, demand and stock.

Rice is a commodity with inelastic demand, meaning that changes in price do not cause changes in the amount of consumer demand and if availability decreases it will cause prices to soar so that they are not affordable by consumers (Isvilananda and Kongrith, 2008). Rice is a strategic food commodity in Indonesia. This is because rice is the staple food of most Indonesians. Economically, many people depend on rice for their livelihoods, producing rice, either through farming, marketing, or processing activities. Politically, this commodity holds a central position in the national food policy because of its very large role as a staple food ingredient.

Why do Indonesian people consume so much rice and why is the demand for rice increasing from year to year? Teken and Kuntjoro (1978) argued that rice consumption is difficult to reduce for the following reasons: (1) Rice consumption has few substitutes in some areas. In an area where people consume maize, cassava, or other tuber foods as secondary foods, they will change their diet to consuming more rice as their incomes increase, (2) Family planning has been intensified to reduce the birth rate. In addition, improved health service by the government has lowered the death rate. The results of these programs remain to be seen. (3) One alternative is to let the price of rice increase as determined by market forces, but the government thinks that this alternative is difficult. First, demand for rice is very inelastic. Second, rice is used as a wage good for some groups, such as civil servants, military personnel, and estate and industrial laborers.

Seeing how important rice commodity is for the community, the government needs to maintain the stability of rice prices so as to maintain the level of public consumption. Rice is the staple food for most of the Indonesia people, and more than 95 percent of Indonesia still relies on rice as a staple food. These conditions resulted in the price of rice is the benchmark of various economic indicators. Purchasing power of food shows the level of welfare of society. Fluctuations of the price of rice in Indonesia is the caused by many things, for example: (1) structural factors and cycles, (2) factors of supply and demand, (3) international and domestic markets, (4) climate, (5) distribution, (6) the exchange rate, and more. The period of the rice harvest are

factors that play a great role in price changes. Much of supply of rice were great at providing a decrease in the price of rice, so that rice prices could fall due to an oversupply (Hermawan et al, 2017).

According to a special report on the condition of rice in Central Java issued by the Central Java Food Security Agency, it is stated that in order to achieve food security in Central Java, it is necessary to have an understanding from all parties to maintain the stability of rice prices and rice availability. Several aspects that are needed are the aspect of willingness that can be met from production within the region (country) or bringing in from outside the region (imports); determining policy options to meet the availability of rice will have a wide impact (especially for farmers). Then the aspect of distribution (between regions/regions or countries) and aspects of food security and community consumption patterns.

The majority of the 35 regencies/cities in Central Java Province in 2018 experienced a surplus of rice production. This situation also occurred in 2017 and 2016, according to the Central Statistics Agency, during 2018, there were around 60 percent of districts/cities that experienced a rice surplus while the rest experienced a deficit. Regions experiencing the highest surplus of rice production include the regencies of Grobogan, Demak, Cilacap, Blora and Sragen which amount to more than 200 thousand tons of rice. On the other hand, Surakarta City, Pekalongan Regency and Semarang City are the three regions experiencing the largest rice production deficit, reaching over 50 thousand tons of rice.

The contribution of the agricultural sector in Central Java Province is still dominant to the Gross Regional Domestic Product, so that Central Java Province which is the main contributor to national food needs to ensure the provision of sustainable food agricultural land because the existence of agricultural land is an important means for the agricultural sector to provide food, especially rice, However, currently economic development which has begun to focus on the non-agricultural sector such as investment in the industrial sector, infrastructure, hotels, restaurants and other buildings has made agricultural land narrower, with this development of course requiring wider land resources, resulting in an increase in the need for land for development.

II. LITERATUR REVIEW

Market demand is the sum of individual demand and represents the alternative number of commodities demanded per time period at various alternative prices by all individuals in the market. Thus, the market demand for a commodity depends on all the factors that determine the individual demand and subsequently on the number of buyers of the commodity in the market. The market demand function for a commodity shows the relationship between the quantity demanded of the commodity and all the factors that affect the demand, which is generally written as follows:

Q_x^d = f (commodity X prices, substitute commodity prices, consumer income, tastes, preferences and others)

According to Mankiw (2015), the factors or variables that affect the demand or consumption of an item include:

- Price Consumer demand can be influenced by price, the price of the goods to be purchased (P), the price of substitute goods (Ps) and the price of complementary products (Pc). Consumers will limit the purchase of the desired amount of goods if the price of the goods is too high, there is even a possibility that consumers will shift their consumption and purchases to substitute goods (substitution goods) which are cheaper, for example, coffee drinks can be replaced with tea drinks. The price of complementary goods will also affect a consumer's decision to buy or not the main goods, if the demand for the main goods increases, the demand for substitute goods will decrease and vice versa for example sugar as a complement to tea and coffee drinks.

- Consumer demand can be influenced by consumer income. Consumers will not be able to make purchases of necessities if there is no or insufficient income. Thus, changes in income will encourage consumers to change the demand for goods they need. Based on the nature of changes in demand that will occur if income changes, various types of goods can be divided into four groups : (1) Inferior Goods, (2) Essential Goods, (3) Normal Goods, and (4) Luxury Goods.

- Consumer demand can be influenced by the number of consumers. The increase in the number of consumers, for example the population, does not automatically cause an increase in the number of requests for an item. However, population growth is followed by the development of job opportunities. Thus, more people will receive income and this will also increase people's purchasing power. The increase in people's purchasing power will increase demand.

- Consumer demand can be influenced by consumer tastes. Changes in tastes can be manifested in market behavior. Changes in consumer tastes can be indicated by changes in the shape or position of the indifference map, without any changes in the price of goods or income, the demand for an item for an item can change due to changes in taste.

- Consumer demand can be influenced by forecasts about future conditions. Forecasted changes in future conditions can affect demand. Consumers' predictions that prices will rise in the future will encourage consumers to buy more to save spending in the future.

Rice demand in Indonesia is influenced by consumption, income and population. according to research by Sanim (2017) Sudaryanto (2002) and Simatupang (2008) the price of rice affects rice consumption. Rice Consumption continues to rise primarily because of population growth. The Indonesian population growth rate is still very high. Rice is an essential item, namely basic necessities that are very important in daily life and in general, an increase in income will have a large effect on increasing the number of requests.

The level of consumption of rice is influenced by the consumption of other goods, both long-term and short-term necessities. However, consumers are considered capable of separating the two types of needs (the principle of separability, separability). Thus, in determining rice

consumption, households only pay attention to short-term necessities or daily needs. In the case of rice, there are several researchers who use various substitute goods such as corn, chicken eggs, and flour.

> *Research Variables and Operational Definition Variables*

• *Demand For Rice*

The demand for rice is the amount of rice consumed by the population. The demand for rice consists of household consumption, and consumption outside the household which includes for the needs of restaurants, hotels, processing industries, and the need for rice for household reserves. In addition, rice products are also used for seeds and feed mixes.

• *Price of Rice*

The price of rice is the price set in the market equilibrium. the price of rice collected by the government each year. Rice prices are sourced from the Commodity Price and Production Information System (SiHaTI) portal created by the Central Java Provincial inflation control team.

• *Substitute Goods (Corn)*

Substitute goods are substitutes or goods that can be exchanged for other goods. The presence of these goods is quite beneficial for consumers, because that way, they do not depend on one item to fulfill certain wants or needs. In this study, a substitute product that can replace rice consumption is corn. an indicator that can be used is the price of corn.

• *Income Per Capita*

Per capita income is an indicator or benchmark in measuring the level of community welfare in a country. Per capita income is the total income of the state divided by the total population so that the average income of the population is known.

• *Population*

Variable population is a person who legally lives or lives in an area. In this study population growth is expressed in percent.

Data collected using secondary data are public sector investment data used for public sector investment variables are secondary data from World Bank, Indonesian Statistical Center (BPS), and Central Java provincial government production information system (SiHaTI) from 2015-2018

The data used for the demand for rice, variable is a type of secondary data obtained from the World Bank in 2015-2018. The data used in the variable price of rice and corn are a type of secondary data obtained from Central Java provincial government production information system (SiHaTI). The data used in the variable income per capita and population are using secondary data and was obtained from the Indonesian Statistical Center (BPS) in 2015-2018

> *Analysis Method*

This research uses quantitative descriptive analysis method. According to Sudjana (2001) quantitative descriptive analysis is used for the purpose of describing or explaining phenomena, events or events occurring at the present time in the form of meaningful numbers. The estimation technique is then continued using the Panel Data model. This model uses a cross section data unit and time series data sets. The Data Panel Model used is the Random Effect Model. Panel data analysis method with Random effect Model must meet the requirements, namely the number of cross sections must be greater than the number of research variables. According to Gujarati and Porter (2012), this method is better used on panel data if the number of individuals is greater than the number of available time periods.

The analysis tool used is Eviews 7 software to estimate the significance of determinants of demand of rice using the Data Panel. The relationship between the independent variable and the dependent variable in this study can be stated with the basic equation as follows:

$$\ln D_{it} = \beta 0 + \beta 1 \ln Px_{it} + \beta 2 \ln PY_{it} + \beta 3 \ln Y_{it} + \beta 4 \ln JP_{it} + eit.$$

Information:

α	: Regression coefficient
D	: Demand for rice
Px	: Price of rice (Rupiah)
Py	: Price of corn (Rupiah)
Y	: Income Per Capita (Rupiah)
JP	: Population in Central Java
i	: Shows the notation for cross section, in this study the cross section is regencies and cities
t	: Shows the time series notation, in this study the time series are 35 Regencies and Cities in Central Java
e	: Error term

III. RESULTS AND DISCUSSION

This research uses data processing tools with Eviews7. To find out the magnitude of the influence of an independent variable on the dependent variable, this study uses a Random Effect Model that uses cross-section data in 35 Regencies and Cities In Central Java Indonesia and within 4 Years. Multiple linear regression is used to determine the effect of changes from an independent variable (Price of rice, Price of corn, Income Per Capita, and Population) to the dependent variable (Demand For Rice).

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LnPx	0,138324	0.043570	2,588612	0.0107
LnPy	0,036993	0.030992	1,493294	0.1377
LnY	0,103138	0.008860	2,399160	0.0178
LnJP	0,714544	0.020038	7,954620	0.0000
C	2,303097	1.284347	1.940727	0.0321

Table 1:- Results of Regression of Demand For Rice Models in 35 Regencies and Cities

➢ *Effects of Price of Rice on Demand For Rice*

The results showed that the Price of rice variable had a positive and significant influence on demand for rice in 35 Regencies and Cities In Central Java Indonesia. This empirically proves that price of rice has an influence on demand of rice with a coefficient value of 0.1383, which means that if there is an increase in price if rice by 1 percent, demand of rice in 35 regencies and cities in Central Java will increase by 0.1383 percent with the assumption of cateris paribus.

These results are consistent with research by Tarigan and Lubis (2011). In the short term and in the long term the demand for rice is inelastic. In the long run, it can be seen that the income elasticity of demand for rice is inelastic, where an increase in income only causes a small increase in demand, while in the short term the demand for rice is inelastic because rice is a staple food that must be consumed every day, even though the price increases in quantity. The same amount must still be consumed, on the other hand, when the price falls, rice consumption will not increase much because consumption needs are relatively constant.

➢ *The Price of Corn on Demand For Rice*

The results showed that the price of corn variable with a coefficient of 0.0369 had a positive but not significant effect ($\alpha = 5\%$). Therefore, the variable of price of corn has no effect on demand for rice in Central Java Indonesia. This shows that the price of corn will not affect people's consumption of rice, because in general the people of Central Java are not accustomed to consuming corn as a staple food to replace rice or rice.

This condition needs to be considered by the government. According to Mardianto and Mewa (2004), in some areas which traditionally have the main food of corn or sago, some people have switched to consuming rice.

➢ *Effect of Income Per Kapita on Demand For Rice*

The results showed that the variable income per kapita has a positive and significant effect on demand for rice in Central Java Indonesia. This empirically proves that income per kapita has an influence on demand for rice with a coefficient value of 0.1031, which means that if there is an increase in income per kapita by 1 percent, demand for rice Central Java Indonesia will rise by 0.1031 percent with the assumption cateris paribus. This makes it clear that rice is an essential item, namely basic necessities or goods that are very important in daily life and in general, an increase in income will have a large effect on increasing the number of requests.

➢ *The Population on Demand For Rice*

The results showed that the variable population with a coefficient value of 0.7145 had a positive significant effect on demand for rice in Central Java Indonesia. which means that if there is an increase in Central Java Population by 1 percent, demand for rice Central Java Indonesia will rise by 0.7145 percent with the assumption cateris paribus. the increase in population on the demand for rice is higher than the effect of increasing per-capita income. This could be due to the increase in the population itself and at the same time it will

increase the consumption of rice per capita, so that in aggregate it has a major effect on the increase in rice demand.

IV. CONCLUSION

Based on the results of research conducted in seven ASEAN countries, it was found that price of rice, income per kapita, and population have a positive effect, and are statistically significant for demand for rice. This means that any price of rice, income per kapita, and population will contribute to an increase in demand for rice. While price of corn have a positive but not statistically significant effect on demand for rice.

The limitation in this study is that the variables used have not been able to explain the whole phenomenon that occurs in demand for rice. The government is expected to protect the public as consumers by properly controlling the price of rice so that the price of rice is affordable for all people, especially the people of Central Java. The people of Central Java need to change the pattern of consumption of staple foods from rice to other staple foods such as corn, wheat cereal, or cassava. So that when there is a fluctuation in rice prices, people can replace their staple food which is affordable with a cheaper price.

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