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Effect Of Income And Price Changes On Rice Demand Elasticity

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ABSTRACT
This study aims to analyze the influence of changes in income and prices on rice demand in Sidoarjo City. Rice is still the main staple food in the region, but economic and social dynamics can affect its consumption patterns. Using monthly time series data from January 2018 to December 2022, this study applies a multiple regression analysis method to estimate the elasticity of prices and income to rice demand. The results of the study show that rice prices have a negative and significant influence on demand. Meanwhile, per capita income has a positive and significant influence. The regression model has a determination coefficient (R^2) of 0.564, indicating that 56.4% of the variation in rice demand can be explained by changes in price and income. This finding implies the importance of maintaining rice price stability and anticipating an increase in demand in line with economic growth. The study also highlights the potential for food diversification, given the relatively low elasticity of income to rice demand. The results of this study can be an input for policymakers in formulating food security and rice price control strategies in Sidoarjo City.

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INTRODUCTION

Rice is the main food commodity for most Indonesia people, including in Sidoarjo City. As a basic need, the demand for rice is influenced by various factors, especially income and price. Understanding the elasticity of rice demand to changes in income and prices is essential to formulate effective food policies at the local level (Timmer, 2015).

Sidoarjo City, as one of the satellite cities of Surabaya, has experienced quite rapid economic growth in recent years. According to data from the Central Statistics Agency of Sidoarjo City (2024), Sidoarjo's economic growth rate will reach 5.8% in 2023. This has the potential to affect people's consumption patterns, including demand for rice. A study conducted by Warr and Yusuf (2021) shows that changes in income have a significant impact on food consumption patterns in Indonesia, including rice (Warr and Yusuf, 2014).

On the other hand, fluctuations in rice prices are also a phenomenon that often occurs, both due to seasonal factors and government policies. The Ministry of Agriculture (2023) reported that rice prices at the consumer level fluctuated by up to 15% throughout 2022-2023. This price volatility can affect people's purchasing power and ultimately have an impact on rice demand.

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Sidoarjo has unique characteristics as an industrial city that also has a large amount of agricultural land. According to data from the Sidoarjo Regency Agriculture and Food Security Office (2023), the area of rice fields in Sidoarjo reaches 22,000 hectares with rice production of around 135,000 tons per year. However, along with the development of industry and housing, there is a conversion of agricultural land that has the potential to affect local rice production and dependence on supplies from outside the region.

Another factor to consider is the change in lifestyle and diet of urban people. Rachman and Erwidodo (2021) in their research on food consumption patterns in major cities in Indonesia found a trend of food diversification, where rice consumption began to decrease and was replaced by other sources of carbohydrates. This phenomenon may also occur in Sidoarjo, considering its characteristics as a satellite city that is exposed to an urban lifestyle (Rachman and Ariani, 2008).

Government policies also play an important role in the dynamics of rice demand. The non-cash food assistance program (BPNT) launched by the government since 2017 and continues to this day has changed the distribution pattern and access to rice for low-income people (Ministry of Social Affairs, 2023). In Sidoarjo, the program has covered more than 50,000 beneficiary families, directly influencing the pattern of rice demand in the city.

Research on the elasticity of rice demand has been conducted in various regions in Indonesia, but specific studies for Sidoarjo City are still limited. Given the unique socio-economic characteristics of Sidoarjo as an industrial city and buffer of Surabaya, a more in-depth analysis of the elasticity of rice demand in this city is important. This is in line with the opinion of Nicholson and Snyder (2022) who emphasized the importance of elasticity analysis in understanding consumer behavior and formulating effective economic policies (Nicholson and Snyder, 2022); (Varian, 1996).

Furthermore, understanding the elasticity of rice demand in Sidoarjo can provide valuable insights for local governments in formulating food security policies that are more targeted. This is becoming increasingly relevant considering the food security challenges faced by Indonesia, including Sidoarjo, in the context of climate change and population growth (Timmer, 2015). In addition, the results of this study can be the basis for optimizing the rice supply chain in Sidoarjo, considering the role of this city as one of the food distribution centers in East Java.

METHODS

The determination of the location of the research was carried out deliberately in Sidoarjo City The sampling method was determined by Quota Sampling by selecting 35 respondents. Respondents were selected one person who could represent households that consumed rice from the same kitchen and were limited to adults only. The next respondent determination was carried out by the snowball sampling method.

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Table 1. Variables involved

Variable	Variable Name	Operational definition of variables	Unit
Dependent	Rice demand (Y)	The average amount of rice requested by each individual in a population in a given period, calculated based on consumption surveys.	Kg
Independent	Revenue (x1)	The amount of money a person or household receives from a fixed source of income (salary, investments) each month.	rupiah
	Price (x2)	The price set by the seller to sell goods or services, which is usually measured in units of currency per unit of goods (for example, dollars per kilogram for rice).	rupiah

The methods used in this study are descriptive analysis and multiple regression analysis. The data were analyzed by a multiple linear regression model in a logarithmic double function. According to (Ghozali, 2009) that to determine the elasticity of demand, linear regression equations can be transformed into the form of natural logarithms into:

$$Ln\,Y = \beta_0 + \beta_1 lnX_1 + \beta_2 lnX_2$$

With:

Y : rice demand
β_0 : Constant
β_i : koefisien regresi variabel bebas ke – i, i = 1, 2
X1 : revenue
X2 : Price

RESULTS AND DISCUSSION

Analisis deskriptif

Rata-rata permintaan beras dari 35 responden di kota Sidoarjo yaitu sebesar 15,11 kg dengan rata-rata harga beras Rp. 15.574. Pendapatan responden berkisar antara Rp. 1.750.000,- sampai dengan Rp. 7.500.000,-

Analisis Regresi

Hasil analisis regresi selengkapnya pada tabel 2.

Table 2. Multiple Linear Regression Model Estimation Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	1.548	0.183	0.183	0.855
Log(Price)	-1,33	0.615	-2.16	0.038
Log(Revenue)	0.936	0.240	3.891	0.000

R-squared: 0.564 F-statistic: 20.72 (Prob. 0.000)

The results of the regression analysis in table 1 show that a 1% increase in rice prices will reduce rice demand by 1.33%. This result is consistent with a study (Matriz et al. 2019) that found rice price elasticity in the Philippines of -0.60. Demand for rice is relatively unresponsive to price changes, which reflects its nature as a staple need. Despite the price increase, people tend to continue to buy rice but may reduce the quantity or switch to lower quality. Meanwhile, an increase in income of 1% will increase rice demand by 0.35%. This

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finding is in line with research (Vu and Glewwe, 2011) which found that the income elasticity for rice in Viet Nam ranged from 0.11 to 0.38. Although income is increasing, the demand for rice has not increased proportionally. This may be due to the tendency of people to allocate additional income to non-food needs or higher-quality food as incomes increase, according to Engel's Law. Both are statistically significant elasticity coefficients at a confidence level of 95%, which is indicated by a probability value of less than 0.05. The value of the determination coefficient of 0.564 shows that 56.4% of the variation in rice demand can be explained by income and price variables. The remaining 46.4% was influenced by other factors such as consumer preferences, prices of substitute goods, or government policies.

The policy of increasing people's income will have a positive but limited impact on rice demand. This is in accordance with Engel's theory which states that the proportion of expenditure on staple foods tends to decrease as income increases (Nicholson and Snyder, 2022). The implication is that the Sidoarjo government needs to consider food diversification in its food security policy. Fluctuations in rice prices will affect demand, but not drastically. This provides room for the government to implement price stabilization policies. These findings support the argument (Timmer, 2015) about the importance of rice market intervention to maintain price stability and food security. The Sidoarjo government can consider policies such as setting the highest retail price or market operations to maintain rice price stability. The characteristics of inelastic demand for rice in terms of price and income show that rice is still an important commodity in the consumption pattern of the Sidoarjo people. However, the relatively low elasticity value also indicates a potential shift in consumer preferences in the future, especially in line with rising incomes and urbanization. The results of this study also show that even though Sidoarjo is an industrial city, rice consumption patterns still show characteristics that are commonly found in other regions in Indonesia. This may be due to strong cultural factors and eating habits, as argued by (Warr and Yusuf, 2014) in their study of food consumption patterns in Indonesia.

CONCLUSION

Based on the results of the analysis, it is known that prices and income affect the demand for rice in the city of Sidoarjo.

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