The Stability of Supply and Rice Price in Sukoharjo Regency

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ABSTRACT

The economic conditions of rice, whether aspect of supply, demand, or rice price is continue to fluctuate due to changes of the phenomena. Therefore, this commodity needs to be examined in regarding its supply, demand and price aspects. This study aims to analyze the supply and price stability of rice. The study used a secondary data method. The study was conducted in Tawangsari and Mojolaban Districts of Sukoharjo Regency. Data were analyzed by Co variance analysis. The study results showed that supply and rice consumption were surplus and stable. The stability of prices and supply for paddy and rice is occurred in Tawangsari and Mojolaban Districts and Sukoharjo regency as well.

Key words: paddy, price, rice, stability, supply

INTRODUCTION

Background

Food has become a serious concern of the government and the public in early 2013. This is highly related to Indonesia's population of more than 250 million people who need a huge production and consumption of food commodities. Merely food availability is not enough to bring food security into realization but food access and food absorption are also important factors. If these three indicators i.e. food security, food access, and food absorption cannot be fulfilled, food insecurity as a condition where it is unable to obtain sufficient food will occur. If there is food insecurity, then economic, political, and social stabilities of a country will be threatened. Food insecurity is one of the causes of inefficient land use due to the limited land tenure of farmers. This in turn will result in low productivity.

Development of agricultural commodities requires an understanding of market prospects, resource capabilities and technological potential. The imbalance between supply and demand will affect the price and profitability, so that it requires an intervention policy and planning to deal with the situation. Projection of supply or demand is very important for production planning which will have an impact on what level of supply to maintain price stability. Food supply and price stabilization is a problem faced by almost every region in Indonesia. Some factors that affect the stability of supply and food prices are the amount of production, population increase, demand, climate change, trade barriers.

Rice is a strategic commodity that can affect economic, social and even political stability. Rice commodity is still one of the key commodities in influencing the stability of

general prices. The increase in rice prices can trigger an increase in the prices of other goods (Sari 2010). This can be seen from the significant role of rice in people's lives, among others: (i) a staple food of most of Indonesia's population; (ii) from perspective of household expenses, 63% is spent for food and 17% is allocated for rice consumption; (iii) contributors to calorie and protein requirements and; (iv) the rice industry involves total of 18 million farmers, most of whom are small farmers, as well as workers involved in the supply of production inputs and factors, processing, and marketing (Saifullah, 2005, Widadi and Sutanto, 2012). Thus, it is not surprising if the rice situation has a strong correlation with the development of economic and non-economic situations. History has proven that the instability of food supplies, especially rice, has triggered riots and criminal acts at the beginning of reformation era. This indicates the important role of the government in maintaining rice availability throughout the year, as well as its even distribution and stable prices.

The economic conditions of rice, whether related to the aspect of supply, demand, and price are continue to fluctuate. Thus there are many quantitative economic relations found between the economic models of rice, whether concerned to the supply, demand, and the price stability of both paddy and rice.

One of agricultural characteristics is scattered production in several areas. The price per unit volume or per unit for the similar commodity is different from one area to other areas. According to Chen and Shagaian (2016), variations in the price of one particular commodity between two regions are caused by: 1) different ability in commodity production and transfer costs between regions, 2) differences in farming operational costs, 3) differences in demand condition and local supply, 4) market imperfections.

Agricultural commodities will move from surplus areas with relatively cheap prices to deficit areas with relatively high prices, thus there is movement from surplus to deficit areas. In fact, transfer costs are required for trading purposes between two areas, which include terminal area and transportation costs. The flow of agricultural commodities from surplus area Y to deficit area X will be stopped if the transfer costs are equal to the difference in prices between the deficit area and the surplus area, supply stability and price stability will occur.

Based on the background, the formulation of the problem is how the conditions of paddy and rice supply in the study area. While this study aims to analyze the paddy and rice stability of supply and price in the study area.

METHODS

The analysis of stability of paddy and rice supply and price in Sukoharjo Regency, especially in Tawangsari and Mojolaban Districts, was conducted by using the analytical descriptive method to get a systematic, factual, and accurate description of the situation of study area concerning the facts, nature and relationship between the phenomena studied (Nasir, 1988).

Sukoharjo Regency is determined as the location of the study because it has the highest rice productivity in Central Java, which is 7,466 tons/ha while the average rice productivity in Central Java is 5.74 tons/ha. Whereas the determination of Tawangsari and Mojolaban

Districts is based on activities related to efforts to increase production and land productivity, namely the existence of a land consolidation program.

Secondary data method was used in this research with the kind of data are paddy production, rice supply, population, rice consumption, paddy prices and rice prices in the year of 2016, 2017 and 2018. Meanwhile the variety of paddy was IR64 and C4. The analytical method used is descriptive analysis by observing the rice supply and demand so that its supply stability is known, while the other method is coefficient of variance analysis. Fluctuations of paddy and rice price / supply are measured by the coefficient of variation (CV) (Setiawan, 2012 and Proborini, 2018) where the supply is said to be stable if the price variation (coefficient of variation) of rice on the market is less than 9 (The Indonesian Ministry of Trade, 2019).

The coefficient of variation (CV) is the ratio between the standard deviation and the average value, expressed as a percentage, which is useful for looking at the distribution of data from the calculated average (Walpole, 2000).
Where:

$$CV = \frac{\sigma}{X}$$

Cv = coefficient of variation

σ = standard deviation

X = mean variable

RESULT AND DISCUSSIONS

General Description of Study Location

The area of Sukoharjo Regency is 46,666ha wide or 1.43% of the total area of Central Java. The land in Sukoharjo Regency is allocated for rice fields of 20,617ha (44.18%) and non-rice fields of 26,049ha (55.82%). Rice fields are classified into technical irrigated of 14,655ha (71.08%), semi-technical irrigated of 2,161ha (10.47%), simple irrigated of 1,967ha (9.54%), and rain fed area of 1,834ha (8.89%). The population of Sukoharjo Regency in 2017 was 871,397 people consisting of 431,686 male (49.54%) and 439,711 female (50.46%). An overview of the regional potential is presented in Table 1.

Table 1. The Area Wide by Utilizing in Grobogan Regency, 2018

Component	Rice Fields (ha)	Non Rice Fields (ha)
Wide area	20,617	26,049
Technical irrigated	14,655	
Semi-technical irrigated	2,161	
Simple irrigated	1,967	
Rain fed area	1,834	

Central Java Province is one of the main food producers for national stock lead to promote paddy productivity. In 2018, the level of wetland paddy productivity is about 6.099 tons/ha, with the harvested area 1.80 million ha and production of wetland paddy 11.00

million tons. Meanwhile, Sukoharjo Regency is one of regencies that support food in Central Java, so the productivity food crops, especially paddy, is continually increased. In 2018 productivity of paddy reached 7.208 tons/ha, while production of paddy reached 391,675 tons and 54,339 ha of harvested area. Productivity of paddy in Sukoharjo is higher among the paddy productivity in other regency/municipality, while the lowest productivity was recorded in the Pekalongan Regency in the amount of 4.312 tons/ha. The high productivity of paddy in Sokoharjo showed that the ability of farmers in paddy farming has been going well.

The research approach taken is paddy and rice stability. So there is a conversion from paddy to rice. The Central Statistics Agency said that the conversion rate of milled unhusked rice (GKG) to rice that is now used is 64.02%. This figure is up from the previous calculation at 62% which is often used as a reference for farmers and rice mills before. The change in number was caused by an improvement in the paddy production sector, "The processing technique has improved.

Supply Stability

Stability of price/supply represents fluctuations (increase or decrease) in price / supply over a certain period of time. The smaller the price/supply fluctuations during certain period, the price/supply conditions are said to be stable, and vice versa. Fluctuations of food price/supply re measured by variation coefficient values (CV).

Demand is very important for production planning to be have an impact on how big the rate is supply to keep price stability. Total commodity demand is useful for food as one input in determining food commodity production targets, how much is needed as well overview of future price developments. Meanwhile the number of supply is useful for food commodities as description of the level of commodity production concerned agriculture that can achieved based on assumptions that are used. By comparing the results of demand and can be known the condition of the demand balance and supply of the relevant commodity whether in a state of surplus or deficit. In the short term and medium condition will be related to current distribution of food commodities which impact on supply and price stability.

The main actors in development agriculture is a farmer that cultivate the certain agricultural commodities. Farmers have an important position as one of the subject actor's economy in the local, regional order even nationally. Important thing farmers are expected to be sustainable farm is price certainty. So that agricultural business that it runs able to provide an income feasible and sustainable, then commodities which should be cultivated properly is a prospective commodity on the market.

a. Stability of Rice Supply

Distribution of rice availability and demand for consumption needs to be known, so that regions with potential rice production can be better developed and areas with no potential of rice production can develop their approriate food potential. The aim is to increase the rice availability. The balance between supply and demand of rice consumption is strongly influenced by the population. If the rice availability is greater than the consumption, then the area is said to be a rice surplus area, otherwise the area is said to be a rice deficit if the rice

availability is smaller than its consumption. This is consistent with Nuryanti (2005), that the fluctuating dynamics of bidding are highly vulnerable because the population increases so consumption also increases.

The amount of food available must meet the interests of all people, whether sourced from domestic or imported production. Second, accessibility both physically and economically. Physical affordability requires that food is easily accessible to individuals or households. Whereas economic affordability means the ability to obtain or buy food or is related to the people's purchasing power for food. Third, the aspect of stability (stability), refers to the ability to minimize the possibility of food consumption below the level of standard needs in difficult seasons (famine or natural disasters) (Fuad, 2009).

One aspect of food, namely food availability, has a correlation with rice field area (Tambunan, 2008), harvested area, planting area (Suwarno, 2010), rice productivity (Mulyo and Sugiarto, 2014), and rice production. The increase of rice field area, harvested area, planting area, rice productivity, and rice production can increase the rice availability. The net production of rice is assumed to be the condition of rice availability. In this case, the operational limit used is rice availability from the perspective of domestic production generated to meet the demand of community consumption without considering the rice produced from the study area. The rice demand for consumption can be calculated through the following formula:

Rice Consumption Demanded = Population x 113.48 kg/capita/year.

The figure of 113.48 kg/capita/year is the standard value of rice consumption demand per-capita determined by Central Bureau of Statistic. This figure means that each population needs 113.48 kg of rice per year. This study assumes that each population has the same amount of rice consumption needs. In this case, the assumption used is that all the rice available in an area is entirely used to meet rice consumption needs in the area. If the stock of rice available is greater than the needs of rice consumption, then the area is said to2be a rice surplus area, whereas if the stock of rice available is smaller than the needs of rice consumption, then the area is said to be a rice deficit.

It was found that the results of rice production in Tawangsari, Mojolaban and Sukoharjo Regency each is 32,115 tons, 46,795 tons and 391,675 tons respectively, with total population of 48,021 people for Tawangsari, 93,841 people for Mojolaban, and 871,397 people for Sukoharjo Regency. The amount of rice supply can be seen from the conversion of paddy to rice by 62.74%. The values of production, consumption, and supply stability are summarized in Table 2.

The results of rice production in the Districts of Tawangsari, Mojolaban and Sukoharjo Regency were converted to rice using a reference rate of 65.4%. The conversion results illustrate the availability of rice which is a source of public consumption. The need or consumption of rice is the result of the population with a reference to rice consumption, which is 113.48 kg / per capita / year. Of the availability and need of rice in the Districts of Tawangsari and Mojolaban and Sukoharjo Regency are in a surplus condition. The existence

of a rice surplus shows that the consumption needs of the population have been met. However, the surplus condition needs to be studied further to find out the stability of supply. Meanwhile the projected supply useful for food commodities as description of the level of commodity production concerned agriculture that can achieved.

TABLE 2. ANALYSIS OF COEFFICIENT OF VARIANCE OF AVAILABILITY AND CONSUMPTION OF RICE IN TAWANGSARI, MOJOLABAN DISTRICT AND SUKOHARJO REGENCY

District Year	Paddy Production (ton)	Rice Supply (ton)	Population (person)	Rice Consumption (ton)	Surplus (ton)	CV
Tawangsari						
- 2016	32,12	21,003.21	47,94	5,439.78	15,563.43	
- 2017	35,17	22,999.87	47,99	5,446.13	17,553.74	6.35
- 2018	32,39	21,181.10	47,95	5,441.14	15,739.96	
Mojolaban						
2016	46,79	30,603.93	93,845	10,641.57	19,962.36	
2017	45,64	29,846.60	95,06	10,779.69	19,066.91	7.88
2018	40,53	26,503.35	96,27	10,916.79	15,586.56	
Sukoharjo						
2016	391,68	256,155.45	871,39	98,886.13	157,269.32	
2017	387,98	253,738.92	878,37	99,677.88	154,061.04	7.78
2018	341,59	223,403.13	880,35	99,902.23	123,500.90	

Source: Jawa Tengah Dalam Angka 2018, Tawangsari Dalam Angka 2019, Mojolaban Dalam Angka 2019

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The amount of rice supply and consumption in the Tawangsari District and Mojolaban District showed that both regions have been able to meet the consumption even in the third year the supply of rice is decerase. It is mean that the amount of rice supply is higher than rice consumption resulting in a surplus of rice supply. The occurrence of a rice surplus is one of the factors of stability. The amount of rice supply is stable if the co variance value is smaller than 9.
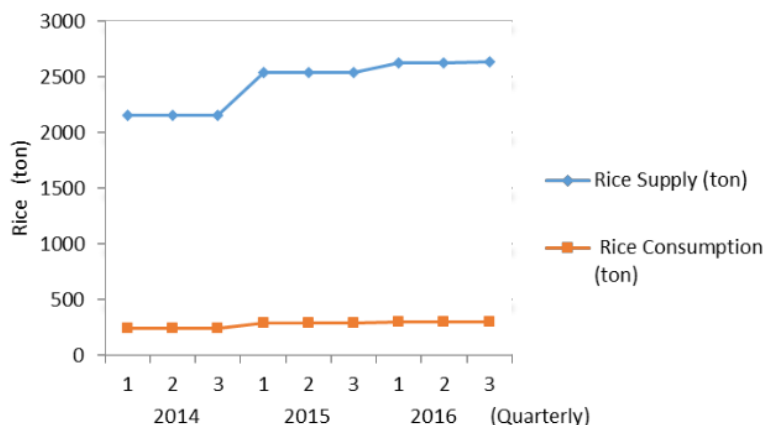
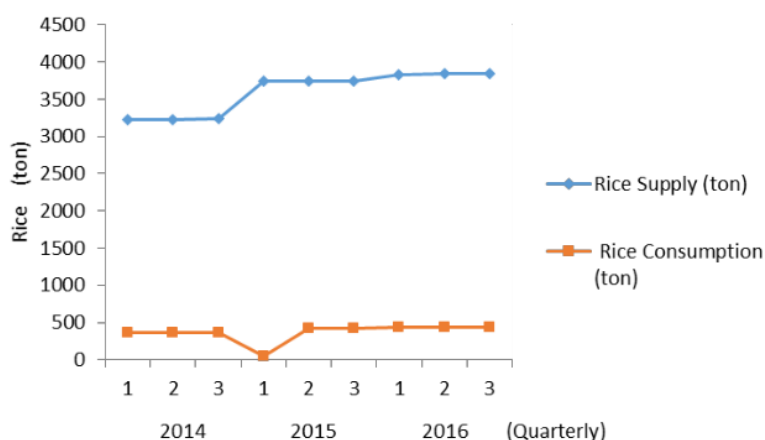**FIGURE 1: RICE SUPPLY AND RICE CONSUMPTION IN TAWANGSARI DISTRICT**

FIGURE 2: RICE SUPPLY AND RICE CONSUMPTION IN MOJOLABAN DISTRICT

The results of the CV analysis in the study area showed a value smaller than 9, namely 6.35; 7.88 and 7.87 respectively. This shows that the availability of rice in the study area is stable. The surplus and stability of a region's rice supply illustrates that rice is a potential commodity in the area. Furthermore, with the existence of a surplus and stability the distribution of these commodities is possible to other regions.

The amount of rice produced at the study area showed its ability to meet the demand or consumption of the population. This can be seen from the amount of production or supply and consumption where the amount of supply is greater than the value demand, so it can be said that in the three areas of the rice supply is stable. Therefore, Sukoharjo Regency and the two study locations are areas with supply stability that can meet their regional consumption and it is also possible to have distribution outside the region as presented in the supply chain.

Based on the results of one sample t test analysis, it is known that rice in the study area is in a stable condition. This is indicated by the significance value of each CV namely

0.036; 0.041 and 0.046 respectively that less than 0.05. This showed that paddy and rice commodities are potential commodities for Tawangsari and Mojolaban Districts and Sukoharjo Regency.

The stability of rice supply is a potential for the region to distribute to other regions. Because the amount of availability is greater than population consumption and is an area that has food security, especially rice.

b.   Price Stability

Annual production pattern of paddy and rice in the production center shows that paddy and rice production during the main harvest is always abundant while monthly demand for paddy and rice is relatively stable. This matter causing the price of paddy and rice to fall. Conversely when it does not occur harvest, less paddy and rice production so it is lower than paddy and rice needs. As a result, prices will increase and not affordable, which occurs when farmers actually do not have inventory. This shows that the price of paddy and rice fluctuates according to season.

Fluctuations in commodity prices basically occur due to an imbalance between the quantity of supply and the quantity of demand needed by consumers. If there is an oversupply, the commodity prices will go down, on the other hand the commodity prices will rise if there is a lack of supply. For agricultural commodities that depend on the season, price fluctuations during the harvest season and non harvest season will occur.

Prices play an important role in the market economy. Price is one of the factors that determine every decision of producers and consumers in allocating limited resources in order to go to the optimal Pareto condition or balance condition (Brummer et al., 2009). According to Nicholson (2004), market prices have two main functions, namely: (i) as information about the quantity of commodities that producers should offer to obtain maximum profits; and (ii) as a determinant of the level of demand for consumers who want maximum satisfaction.

There are at least two reasons why an analysis of rice prices is important to do, in this case related to the purpose of conducting a price analysis namely (1) to estimate certain economic coefficients (parameters) such as the elasticity of demand for rice prices, and (2) to forecast (price) in the future and the factors that influence the price level of rice.

Price fluctuations are actually a normal thing and are needed to keep the market functioning, ie creating a competitive market. Changes in prices will become a problem if prices soar very high and unpredictable, which in turn will create uncertainty that can increase risks for producers, traders, consumers, and of course also the government.

Supply stability is illustrated by the price, so it can be examined to the stability of paddy and rice prices. The paddy data were approached with prices at each harvest season, while the rice price can be approached every month.

TABLE 3 AVERAGE PADDY PRICES AND COEFFICIENT VARIANCE IN STUDY LOCATIONS

Description Districts	Average Paddy Price (IDR/kg)				Coefficient Variance			
	C4		IR64		C4		IR64	
	2017	2018	2017	2018	2017	2018	2017	2018
Tawangsari	4,607.1	4,642.8	4,478.5	4,528.5	5.3	5.4	5.1	4.6
Mojolaban	4,528.5	4,485.7	4,432.1	4,485.7	4.8	4.3	4.8	4.4
Sukoharjo	4,261,4	4,608.6	4,265.0	4,558.6	5.7	5,6	5.0	5.1

Based on the analysis results, it is known that there is price variation in paddy prices in Tawangsari and Mojolaban Districts and Sukoharjo Regency with the C4 and IR64 varieties. It can be said that there is no difference in the paddy in price of C4 variety in research location for 2017-2018 period, however there has been a flat price reduction of IDR 42.8/kg in Mojolaban District. This is because the supply or harvest during the planting season 1 of 2018 in Mojolaban is greater than Tawangsari so that the price declines. This is in accordance with the opinion of Brummer et al. (2013) concluded that price fluctuations are basically strongly influenced by supply and demand in the market. For agricultural commodities, input markets and fossil fuels greatly affect price fluctuations. Stock can also affect prices, low stock will cause prices to increase in the market. Price fluctuations in the study area did not cause price volatility. This is indicated by the CV value lower than 9, which means that the price of paddy is in a stable condition. Price variations also occur in rice prices. Variations in rice prices in the study area were approached with C4 and IR64 varieties in 2017 and 2018. It is presented at Table 4.

TABLE 4. AVERAGE RICE PRICE AND COEFFICIENT VARIANCE IN STUDY LOCATIONS

Description Location	Average Rice Price (IDR/kg)				Coefficient Variance (%)			
	C4		IR64		C4		IR64	
	2017	2018	2017	2018	2017	2018	2017	2018
Tawangsari	10,438.4	10,692.3	9,507.7	9,580.7	2.12	2.3	0.29	1.69
Mojolaban	9,984.6	10,615.4	8,769.2	9,076.9	5.6	5.8	4.4	7.1
Sukoharjo	10,615.4	12,150.0	9,534.6	11,600.0	5.8	6.1	4.9	7.5

In 2017, the average price of C4 variety in Tawangsari District was IDR 10,500/kg with Coefficient Variance of 0. This is happened because throughout 2017 period the price of C4 variety is stagnant so that it could be said to be very stable. Likewise, the price of IR64 variety in 2018 is also stagnant. Unlike the price variations of C4 and IR64 varieties in Mojolaban District, the average price of rice in Mojolaban is lower than Tawangsari, but there are variations in price progression for the two rice varieties above. The value of Coefficient Variance for the two rice varieties in Mojolaban is greater than Tawangsari with the largest CV from IR64 of 7.0. If it is carefully examined, the CV values of both C4 and IR64 varieties for the two Districts and Sukoharjo Regency can be categorized into minor because the values are less than 9. This is consistent with Proborini (2018) that the minimum standard of CV value for price stability set is less than 9%. Based on inferent and descriptive analysis, it can be stated that the stability of rice prices in the study area is maintained.

Prices and CV in Sukoharjo Regency are greater than Tawangsari and Mojolaban Districts. This happens because Sukoharjo is an area that encompasses several districts where each district varies greatly in the price of rice. Moreover, not all districts are paddy granaries and rice. The smaller the coefficient of variation can be interpreted that the price is relatively stable or has a low level of fluctuation. Price stability is one indicator that can be used to give a signal to producers of price risk factors that may be faced by a producer and the government in order to protect producers and consumers.

Actually, food price stability can be achieved if it can built sufficient government food reserves for respond to food insecurity due to natural disasters and social and reduce the sharp rise in food prices (Suryana et al., 2014).

CONCLUSIONS

Based on the research result, it can be concluded that: The amount of rice produced at the study area showed its ability to meet the demand or consumption of the population. The rice consumption is smaller than rice supply, so Sukoharjo Regency is a rice supply area.

Paddy and rice supply and price fluctuations in the study area did not cause volatility. This is indicated by the CV value lower than 9, which means that the supply and price of paddy and rice is in a stable condition.

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