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Production risk and income risk analysis of rice farming

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Abstract. The purpose of this study was to analyze production risk and income risk of rice farming in the Gowa District. This research was conducted in Julubori Village, Pallangga Subdistrict (lowland area), and Parigi Village, Tinggimoncong Subdistrict (highland area). The method of data analysis of this study was the variation coefficient analysis (CV). The result of this study indicates the risk of rice farming in Julubori Village obtained CV production value of 0.029 and CV income of 0.039, while the risk of rice farming in Parigi Village obtained CV production value of 0.039 and CV income of 0.088 and risk included in the low category because of CV <0.5.

1. Introduction

Rice is a nation's strategic food commodity and has a high sensitivity in terms of political, economic, and social [1]. The strategic role of rice in the national economy is: (1) is a staple food for more than 95% of Indonesia's population with a share of energy consumption derived from rice more than 55%; (2) around 30% of the total expenditure of poor households is allocated to rice; and (3) rice farming provides employment opportunities and a source of income for more than 25.6 million farm households [2].

Gowa Regency is a regency in South Sulawesi Province, which is quite potential for the development of agricultural crops, especially rice, which is the largest source of food in the district. The area of paddy fields in the Gowa Regency is 34,125 Ha. This is one of the main factors that can make this area a potential food surplus (rice). One area in the lowlands is Julubori Village, Pallangga District, and the plain area high is Parigi Village, Tinggimoncong District [3].

Based on data from the Food Crops and Horticultural Services Office of Gowa Regency [4], rice production in 2015 in Pallangga District has decreased compared to 2014. However, in 2016 production has increased again by 34,293 tons. Meanwhile, rice production in Tinggimoncong Sub-district in 2014 was 14,916 tons, and in 2015 rice production was 10,014 tons or experienced a significant decrease of 33%. This is due to the risks that occur in rice farming activities.

Rice farming in Gowa Regency cannot be separated from risks that have an impact on the level of production and income. Zakirin, et al. [5] states that various business activities in agriculture often occur in extreme situations, namely events that contain risks (risk events) and uncertain events



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(uncertainty events). The risk of agricultural production is greater than the risk of non-agriculture because agriculture is greatly influenced by nature, such as weather, pest, disease, drought, and flood. Besides nature, risks can also be caused by marketing activities. Price risk is caused because the market price cannot be controlled by farmers. Price fluctuations are more common in agricultural products. Based on these problems, this study aims to analyze the risk of production and income of rice farming in the Gowa Regency.

2. Methods

This research was conducted in Julubori Village, Pallangga Subdistrict, and Parigi Village, Tinggimoncong Subdistrict, in Gowa Regency in February-March 2019. The site selection was conducted purposively with the consideration that this area is one of the areas with potential food surplus (rice) in South Sulawesi. In addition, one of the areas in Gowa Regency located in the lowlands is Julubori Village, and the highlands area is Parigi Village. The population in this study were paddy rice farmers who were members of farmer groups in Julubori Village, Pallangga District, and Parigi Village, Tinggimoncong District. The population in the village of Julubori is as much as 625 people, and in the village of Parigi, that is as much as 834 people. Determination of the sample of respondents using the random sampling method. The number of samples taken was 60 respondent farmers consisting of 30 lowland farmers in Julubori Village and 30 upland farmers in Parigi Village. Data analysis techniques used the analysis of the coefficient of variation (CV) to determine the risk of production and income of rice farming in the Gowa Regency.

2.1. Coefficient of variation (CV)

The coefficient of variation (CV) wherein the calculation first calculates the value of variation and standard deviation. As according to Hernanto [6] the coefficient of variation (CV), which is a relative risk measure is systematically formulated as follows:

$$\begin{array}{ll} \text{Production Risk} & \text{Income Risk} \\ CV = \frac{\sigma}{X_q} & CV = \frac{\sigma}{X_y} \end{array} \quad (1)$$

Note :

CV = Coefficient of variation
 σ = Standard deviation
 X_q = Average production
 X_y = Average income

To calculate the standard deviation, use the following formula:

$$\sigma = \sqrt{\frac{\sum_{i=1}^n (X_i - \bar{X})^2}{n-1}} \quad (2)$$

Note :

σ = Standard deviation
 X_i = Production/ income
 \bar{X} = Average production/ Average income
 n = Number of samples

If the coefficient of variation (CV) > 0.5, then the analyzed farming has a big risk, or there is a chance of loss that will be suffered by farmers. Conversely, if the coefficient of variation (CV) < 0.5, then the farm being analyzed has a small risk, or the farmer will always profit or break even.

3. Results and Discussion

3.1. Farm risk analysis

1. Risk of Rice Production in Lowland and Highland Areas

Production risk analysis is carried out to determine the magnitude of the likelihood of the risk occurring in rice farming. This risk is analyzed by using the coefficient of variation. The data used to analyze production risk is done using data on the level of production of respondents in the Julubori and Parigi Villages. The analysis of farming production risk in the lowlands in Julubori Village and in the highlands in Parigi Village can be seen in table 1.

Table 1. Production risk analysis

No.	Description	Julubori Village	Parigi Village
1.	Average production (Kg)	4,356	4,066
2.	Standard deviation (Kg)	127.93	160.28
3.	Coefficient of variation (CV)	0.029	0.039

Table 1 shows the average rice production produced by farmers in Julubori Village is greater than in Parigi Village, in a row which is 4,356, - kg / Ha per season and 4,066, - kg / per season. Meanwhile, the coefficient of variation (CV) value for Julubori Village is 0.029, and the coefficient of variation (CV) value for Parigi Village is 0.039. Based on the coefficient of variation of the two research locations, the risk of production of upland rice farming in Parigi Village is greater than the risk of lowland farming production Julubori Village with a CV value (0.039 > 0.029) and is classified as having a low risk because of the CV value < 0.5

2. Risk of rice farming income in lowland and highland areas

Income risk is analyzed using the coefficient of variation. The magnitude of the coefficient of variation shows the relative risk of farming. Meanwhile, the small coefficient of variation value indicates that the average value of the variability is low. The analysis of farm income risk for lowland areas in Julubori Village and upland areas in Parigi Village can be seen in table 2.

Table 2. Income risk analysis

No.	Description	Julubori Village	Parigi Village
1.	Average income (Rp)	13,285,241,00	7,906,924,00
2.	Standard of deviation (Rp)	518,547,76	694,249,43
3.	Coefficient of variation (CV)	0.039	0.088

Table 2 shows the average income of the respondent farmers' rice farming in Julubori Village is Rp 13,285,241.00 per hectare per season, while the average income of respondent farmers in Parigi village is Rp 7,906,924.00 per hectare per ha season. And the coefficient of variation (CV) values in the Village of Julubori and Village of Parigi are 0.039 and 0.088. Based on the coefficient of variation (CV), it can be seen that the income risk of upland rice farming in Parigi Village is greater than lowland rice farming in Julubori Village (0.082 > 0.037). However, in terms of the risk of rice farming income, the two research locations are classified as having low-income risk because of the CV value < 0.5.

4. Conclusion

From the results of research related to the analysis of production risk and income of lowland rice farming in Gowa Regency, it can be concluded that the production risk and risk of lowland rice income in the

Julubori Village obtained the coefficient of variation (CV) values of 0.029 and 0.039. Meanwhile, the plateau area in the village of Parigi obtained the coefficient of variation (CV) values of 0.039 and 0.088. The coefficient of variation shows that the production risk and the income risk of lowland rice farming are smaller than the production risk and the risk of highland rice farming income and the risk is categorized as low because of $CV < 0.5$.

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