RISK MANAGEMENT OF SALAK PONDOH BUSINESS PRODUCTION IN TURI DISTRICT, SLEMAN REGENCY

Manajemen Risiko Produksi Usahatani Salak Pondoh di Kecamatan Turi Kabupaten Sleman

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ABSTRACT

Production risk management is important for production optimization. The objectives of this study are to 1) Examine the factors that affect the production of salak pondoh farming in Sleman Regency 2) analyse the magnitude of the production risk and what are the factors that influence the production risk of salak pondoh farming in Sleman Regency, and 3) develop appropriate risk management to be applied in salak pondoh farming in Sleman Regency. The respondents of this study were 30 salak pondoh farmers in Bangunkerto Village, Turi District, Sleman Regency. Interviews with respondents were carried out in October 2021. This study were analyzed using multiple regression analysis with the Ordinary Least Square (OLS) model, while the risk level was analyzed using the coefficient of variation method. The results showed that the variables of organic fertilizer, number of workers, farming experience, plant age, and number of clumps significantly affected production. In contrast organic fertilizers and plant age have the potential to reduce the risk.

Keyword: coefficient of variation, multiple regression analysis risk production, risk management, salak pondoh

ABSTRAK

Manajemen Risiko produksi merupakan hal yang penting untuk pengoptimalan produksi. Tujuan penelitian ini adalah 1) Meneliti faktor yang mempengaruhi produksi usahatani salak di Kabupaten Sleman 2) Menganalisis besarnya risiko produksi dan apa saja faktor yang mempengaruhi risiko produksi usahatani salak di Kabupaten Sleman

3) Menyusun manajemen risiko yang tepat untuk diterapkan dalam usahatani salak di Kabupaten Sleman. Responden penelitian ini berjumlah 30 petani salak di Desa Bangunkerto Kecamatan Turi Kabupaten Sleman, Wawancara kepada responden dilaksanakan pada Bulan Oktober 2021. Faktor yang mempengaruhi produksi dan risiko usahatani salak pondoh dianalisis menggunakan analisis regresi berganda dengan model Ordinary Least Square (OLS), sedangkan tingkat risiko dianalisis menggunakan analisis koefisien variasi. Hasil Penelitian menunjukkan variable pupuk organic, jumlah tenaga kerja, pengalaman berusahatani, umur tanaman, dan jumlah rumpun mempengaruhi produksi secara signifikan. Sementara pupuk organik dan umur tanaman memiliki potensi untuk menurunkan risiko

Kata Kunci: koefisien variasi, analisis regresi berganda, risiko produksi, manajemen risiko, salak pondoh

INTRODUCTION

Sleman Regency is one of the regencies located on the slopes of Mount Merapi so that it has fertile soil conditions and can support the development of the agricultural sector. Most of the land in Sleman Regency is used as agricultural land, Sleman Regency holds the title as the largest producer of salak pondoh in Indonesia. Salak pondoh is a native plant of Indonesia with the original habitat of tropical rain (Annisaurrohmah et al., 2014).The production of salak pondoh in 2020 reached 531,821 quintals, higher than the previous year of 391,929 quintals, and was dominated by Turi District (BPS Kabupaten Sleman, 2021). Salak plants experience three harvest periods in a year, from November to January - large harvest, February to April - small harvest, and May to July - medium harvest (Bimantio & Putra, 2021).

Salak pondoh Sleman has a characteristic sweet taste even though it is not ripe, thick flesh, white flesh, and a crunchy texture (Hidayati, 2013). The water content of Salak Pondoh Sleman is quite high, which is 78% so the fruit is fresher (Risqiyah & Santoso, 2017). Besides being marketed domestically, Salak pondoh Sleman has been exported to Cambodia. The export of salak pondoh has been carried out since 2017 through the CV. Mitra Turindo as much as 150 tons. Then in 2018, it increased by 350 tons and in 2019 was able to export 650 tons. However, in 2020, when the COVID-19 pandemic began to enter Indonesia, exports of salak pondoh fruit decreased to 160 tons due to limited transportation for exports (Pemerintah Kabupaten Sleman, 2021).

To produce quality Salak, a production process planning is needed that ensures that the fruit is obtained by the established quality standards (Suharso et al., 2017). Beside that, in running a farm production inputs are required to support an optimal production. Factors affecting production need to be considered as an effort to manage and optimize production. By knowing which factors have the most influence on production and which factors have the highest probability of error, it will be easier for farmers to manage and

determine priorities for each action. In the process of running organic farming, farmers are often faced with risks that can hinder ongoing farming and can cause losses for farmers. Agriculture is an industry with high pressure, the management of an agricultural business will be filled with risks and uncertainties. For example; farmers will face risks when it doesn't rain or when it rains but at the wrong time, So it is very important to do risk mitigation (Ambarawati et al., 2018).

In almost every production process, especially for agricultural production, production risk plays a very important role in the decision on the allocation of input use which will ultimately affect the level of production achieved (Basyarahil et al., 2016). Some of the risks that affect the production of cultivation include land risks; seed risk; fertilizer risk; pesticide risk as well as labor risk. according to Nurbudiati & Wulandari (2020), identification of risk sources is important for determining risk mitigation strategies. Risk is a major problem because production is a dynamic phenomenon and price uncertainty affects expected productivity and income. The risks that arise from farming generally come from the production inputs used (Sholihah et al., 2018). Each input used must be managed properly to achieve optimal production. Management of production inputs is one way that can be done to reduce the possibility of adverse effects from the emergence of risks (Ghozali & Wibowo, 2019).

Pratiwi et al. (2019) has conducted research related to the analysis of production risk, price, and income of salak farming in Turi District, Sleman Regency. In this study, the researcher only analyzes the magnitude of production risk without analyzing the factors that influence the production risk. Based on this description, the objectives of this study are 1) Examine the factors that affect the production of salak pondoh farming in Sleman Regency 2) analyse the magnitude of the production risk and what are the factors that influence the production risk of salak pondoh farming in Sleman Regency, and 3) To develop appropriate risk management to be applied in salak pondoh farming in Sleman Regency.

RESEARCH METHOD

This research uses the descriptive analysis method, which is a problem-solving procedure by describing or describing the condition of the research object in the past and present, according to the facts obtained in the field. (Sarwono, 2006). The location selection was carried out purposively based on certain considerations, namely Turi District, Sleman Regency is a center for salak pondoh cultivation in the Special Region of Yogyakarta. The respondents of this study were 30 salak pondoh farmers in Bangunkerto Village, Turi District, Sleman Regency. Interviews with respondents were carried out in October 2021.

Internal factors that influence salak production are land, labor, capital, technology level, farmer's ability to allocate family income, and number of families (Hadijanto et al., 2020). According to (Prajoko et al., 2019), the production factors that significantly influence the production of Salak Pondoh include land area, plant population, organic fertilizer, and labor time. While in this study several other production factors were added to complement the previous research. The data analysis method uses multiple regression analysis with the help of EViews software. Before performing the multiple regression test, it is necessary to test the classical assumptions first. The basic assumptions include tests of normality, multicollinearity, and heteroscedasticity. After confirming that all assumptions are met, multiple regression analysis can then be carried out. Based on research Febriawan et al. (2018) multiple linear regression analysis was used to determine the effect of the independent variable (X) on the dependent variable (Y) with the following equation:

$Ya = lna + b1lnXa1 + b2lnXa2 + b3lnXa3 + b4lnXa4 + b5lnXa5 + b6lnXa6 + b7lnXa7 + b8lnXa8 + \in$ …………………………………...………………...(1)

Notes: Ya is Salak pondoh production (kg), a is Constanta, b is Multiple Regression Coefficient, Xa1 is Land area (m²), Xa2 is Organic Fertilizer (Kg), Xa3 is Labor (HOK), Xa4 is Age of farmer (years), Xa5 is Education (years), Xa6 is Experince (years), Xa7 is Plant age (years), Xa8 is Number of Clumps (clumps), and $\in$ is *standard error*

In the next step, the data were analyzed again using OLS. The difference is that the independent variable used is the variance value obtained from the first test. The equation used is as follows:

$\in a = lna + b1lnXa1 + b2lnXa2 + b3lnXa3 + b4lnXa4 + b5lnXa5 + b6lnXa6 + b7lnXa7 + b8lnXa8$ …………………………………………………………….(2)

Notes: a is Constanta, b is Multiple Regression Coefficient, Xa1 is Land area (m²), Xa2 is Organic Fertilizer (Kg), Xa3 is Labor (HOK), Xa4 is Age of farmer (years), Xa5 is Education (years), Xa6 is Experince (years), Xa7 is Plant age (years), and
Xa8 is Number of Clumps (clumps)

In addition to being analyzed using OLS, to determine the magnitude of the risk, a coefficient of variation (CV) analysis was performed. At this stage, the size of the risk of farming production in Salak pondoh will be assessed in Sleman Regency. Salak pondoh farming risk can be known based on (Bakdiyah et al., 2020) formula, production risk:

$$CV = \frac{V}{E}$$

Where CV is the coefficient of variation of the production risk of salak pondoh farming, V is the standard deviation of salak pondoh farming

production (kg), and E is the average production of salak pondoh farming (kg). Before measuring the coefficient of variation, one must find the average production of salak pondoh farmers and their standard deviation. Diversity is mathematically formulated as follows:

$$V^2 = \frac{\sum_{t=1}^{n}(Ei - E)^2}{n - 1}$$

Where V^2 is the diversity of production, is the symbol of the addition operation, Ei is the production received by the farmer (kg), E is the average production of the farmer (kg), and n is the number of respondents in the study. The standard deviation formula is:

$$V = \sqrt{V^2}$$

RESULT AND DISCUSSION

Factors Affecting Salak Pondoh Production

This analysis used to determine the factors that influence the production of salak pondoh. Data on the average production of salak pondoh in one year (kg) was used as the dependent variable. While the independent variables include land area, plant age, number of clumps, organic fertilizer, and labor. The following is the result of the analysis of the production function of salak pondoh based on multiple regression analysis.

Table 1.   Factors Affecting Salak Pondoh Production in Turi District

Independent variable	Expected	Coefficient Regression
Constanta		1.675
Ln Land area (m²)	+	0.124 ns
Ln Organic fertilizer (kg)	+	-0.069**
Ln Labor (HOK)	+	-0.047**
Ln Age of farmer (years)	-	0.349 ns
Ln Education (years)	+	0.016 ns
Ln Experience (years)	+	0.219**
Ln Plants age (years)	-	-0.385**
Ln number of clumps	+	0.812***
Adjusted R²		0.958
F		83.495***
Sig F		0.000

Source: 2021 primary data analysis
Notes: *** is significance at 99% confidence level (α= 0.01), ** is significance at 95% confidence level (α= 0.05), * is significance at 90% confidence level (α= 0.10), and ns is not significant

Based on the results of the regression analysis in Table 1. the adjusted R2 value of 0.958 or in other words 95.8% of the variation in the dependent variable (salak pondoh production) can be explained by variations in the independent variables in the model (land area, plant age, number of clumps, organic fertilizers (compost), labor, age, education, and experience) and the remaining 4.2% is explained by variations in other variables outside the model. Meanwhile, based on the significance value of F, the independent variables in the regression model together have a significant effect on the production of salak pondoh at a 99% confidence level. The effect of each independent variable on the dependent variable can be seen from the t-test or partial test. The following is an explanation of the influence and interpretation of each independent variable on the dependent variable:

Land area

In this study, the area of land used for cultivation did not have a significant effect on the production of salak pondoh in DIY. This condition shows that there is no significant difference between the different land areas. The difference in yield is more influenced by the number of clumps owned by farmers in the unit area of land used for the cultivation of salak pondoh. This is supported by the research of Darmansyah et al. (2017) which states that land area has no significant effect on Siamese citrus production in Sambas Regency. But different according to Hakim et al. (2018) and (Donsley Tamalonggehe et al., 2015) which states that land area has a significant effect on increasing salak production. Although the land area is increased, if it is not accompanied by optimizing the number of clumps and rejuvenating trees, the land area will not have a significant effect on the production of salak pondoh (Prajoko et al., 2019).

Plant Age

Based on the results of the analysis, the age of the salak pondoh plant has a significant effect on the production of salak pondoh in DIY at the 95% confidence level. The coefficient value of the age of the plant is 0.385, meaning that every 1-year increase in the age of the salak pondoh plant will reduce the production of the salak pondoh by 0.385%. Salak pondoh that is planted generatively begins to bear fruit when the plants are 8-10 years old, and yields can continue to increase if the salak pondoh plants are cared for properly but if the care is inadequate, the production will decrease as the plant's age. This is by the research of Darmansyah et al. (2017) which states that plant age has a significant effect on citrus production in Sambas Regency.

Number of Clumps

The number of clumps of salak pondoh has a significant effect on the production of salak pondoh in DIY at the 99% confidence level. The coefficient value of the number of clumps of 0.812 means that every 1% increase in the number of clumps of salak pondoh will increase the production of salak pondoh by 0.812%. according to (Prajoko et al., 2019) that the number of salak clumps has a significant effect on increasing salak production because more clumps in one area of land can increase production. Widaningsih et al. (2013) show that a clump of salak can bear an average of 5.8/year.

Organic Fertilizer (compost)

The application of organic fertilizer (compost) has a significant negative effect on the production of salak pondoh in DIY at the 95% confidence level, where if the amount of organic fertilizer applied is increased by 1%, the production will decrease by 0.069. This is by research by Novianto & Setyowati (2009) which states that organic fertilizers have a significant negative effect on production, this is because the land at the research site is already sufficiently nourished with the remaining chopped bark of the fronds of salak pondoh resulting from routine pruning which can be used as a nutrient enhancer inland.

Labor (HOK)

In this study, the allocation of energy devoted by farmers to caring for cultivated plants from seeding to harvesting has a significant negative effect on the production of salak pondoh in DIY at a 95% confidence level, where if the amount of energy devoted increases by 1%, production will decrease by 0.047. The cultivation of Salak pondoh does not require too intensive care so the more workers, the production will decrease by 0.047. This is different from the results of Purba et al. (2021) research which states that labor does not have a significant influence on salak production.

Age

Based on Table 1. the age of the farmer does not have a significant effect on the production of salak pondoh in DIY. This condition shows that there is no significant difference between young and old farmers in producing salak pondoh. This is supported by the research of Rama et al, (2016) which explains that age has no effect on production.

Education

The level of education of farmers does not have a significant effect on the production of salak pondoh in DIY. This is supported by the research of Rama et al, (2016) which explains that the level of education does not affect rice production in both wet and dry land. Farmers tend to cultivate by the habits that have been attached to each farmer.

Farming experience

Farming experience has a significant influence on the production of salak pondoh in DIY at the 0.05 level of confidence. This condition shows that farmers who have more experience related to the cultivation of salak pondoh tend to increase production.

Factors Affecting the Risk of Salak Pondoh Production

This analysis was conducted to determine the factors that influence the risk of salak pondoh production. The variance data from the regression results of factors that affect production are used as the dependent variable. While the independent variables include land area, plant age, number of clumps, organic fertilizer, labor, age, education, and experience. Table 2 presents the analysis of factors that affect the risk of salak pondoh production.

Table 2.   Factors Affecting the Risk of Salak Pondoh Production in Turi District

Independent variable	Expected	Coefficient Regression
Constanta		0.103
Ln Land area (m^2)	-	0.008 ^{ns}
Ln Organic fertilizer (kg)	-	-0.007**
Ln Labor (HOK)	-	-0.003 ^{ns}
Ln Age of farmer (years)	+	0.005 ^{ns}
Ln Education (years)	-	0.005 ^{ns}
Ln Experience (years)	-	0.007 ^{ns}
Ln Plants age (years)	+	-0.029**
Ln number of clumps	-	-0.010 ^{ns}
Adjusted R^2		0.433
F		3.768***
Sig F		0.007

Source: 2021 primary data analysis
Notes: *** is significance at 99% confidence level (α= 0.01), ** is significance at 95% confidence level (α= 0.05), * is significance at 90% confidence level (α= 0.10), and ns is not significant

Based on the value of the parameter coefficient on the productivity variance, it is known that the factors of plant age (-0.029), organic fertilizer (-

0.007), and labor (-0.003) are factors that reduce production risk (risk-reducing factors). Meanwhile, factors in the form of land area (0.008), number of clumps (0.010), age (0.005), education (0.005), and experience (0.007) are factors that increase production risk (risk inducing factors) with a confidence level of 90%. However, based on the t-test conducted on all independent factors, it was shown that only plant age and organic fertilizer had a significant effect on production risk (p-value > 5%). This study refutes the research results of Darmawan et al. which stated that plant age and organic fertilizer had no significant effect on Siamese citrus production in Sambas Regency.

Causes of reduced risk

Based on the analysis results, four variables in the model have the potential to reduce risk, namely plant age, number of clumps, organic fertilizer, and labor. Variables of plant age and organic fertilizer have a significant effect on reducing the risk of salak pondoh production. Salak pondoh trees that are planted generatively only bear fruit when they are 8-10 years old, so that at an average age of 20 years, the tree remains productive, of course with proper care. According to Guntoro (2004), there has been no research that states with certainty the productive age of salak pondoh plants, but some experts state that salak pondoh plants are generally able to produce well until the age of 50 years, so salak pondoh can have an economic life of up to 50 years

In addition to plant age, organic fertilizer also has a significant negative effect on the risk of salak pondoh production. The addition of organic fertilizers will increase soil fertility, with fertile soil conditions, production will increase because soil productivity increases. Besides that, with the application of organic fertilizer, the plants will be more fertile and have strong roots so that they are more resistant to pests and diseases, wind, etc. which reduce the risk of production. The organic fertilizer applied must be of good quality. Good quality is meant that the fertilizer has been fermented so that it is easier to decompose in the soil and does not interfere with plants and cause excessive weeds.

Although the labor variable does not have a significant effect on reducing risk because in the cultivation of salak pondoh does not require intensive care. In salak pondoh farming the most needed labor is for pollination pruning and fruit thinning (Mahayani et al., 2017). If more intensive care of salak pondoh especially for pruning, pollination, and thinning, the risk of production can be reduced. To get optimal results, pruning is done at least every 3-4 months so that the tree is not dense and facilitates the process of pollination, thinning, and harvesting. The salak pondoh tree requires human assistance for the pollination process to obtain optimal results, after that it is necessary to thin the ovary so that in one bunch there are not too many fruits so that the size of the salak pondoh fruit is optimal.

Causes of increased risk

In addition to the factors causing the decrease in potential risk, some factors cause an increase in production risk, namely the variable land area, farmers' age, education, and experience. Although it does not have a significant effect, some of these factors have the potential to increase the risk. For example, the variable of land area, the larger land area that is managed for cultivation will certainly increase the difficulty for farmers. So sometimes farmers need additional labor from outside the family. The increased risk due to the addition of land area can be overcome by adding labor so that the land can still be managed properly.

Coefficient of Variation

The magnitude of the risk of farming needs to be measured so that the severity of the risk can be known. The level of farming risk can be seen from the variance, standard deviation (V), and coefficient of variation (CV). The variance can be measured by adding up the difference in the square of the return and the expected return multiplied by the probability of each event. While the standard deviation can be measured from the square root of the variance value, and CV can be measured from the ratio of V to the expected return of an asset. The level of risk of salak pondoh production can be seen in Table 3.

Expected Results (E)

The expected yield is calculated from the total productivity obtained by farmers of salak pondoh for one year and divided by the number of periods in one year consisting of two harvest seasons. This value describes the amount of net production that farmers expect in each production process in the future. The average value of the number of production observations is 10324.643 Kg which indicates that this value is the expected result by farmers in the future period.

Variance (V2)

The greater the value of the resulting variance, the greater the deviation that occurs, so the risk faced by farmers is even greater. Vice versa, the smaller the value of the variance, the smaller the risk faced by farmers. In this study, the value of the variance is 134216.256.

Table 3.   Production Risk of Pondoh Salak Farming in Turi District

No	Period	Productivity (Kg/Ha)
1	Planting time 1 (Kg/Ha)	11719.683
2	Planting time 2 (Kg/Ha)	8929.603
	Average (E)	10324.643
	Varians (V²)	134216.256
	Standard Deviation (V)	366.355
	Coefficient of Variation (CV)	0.035
	Lower Limit (L)	9591.932

Source: 2021 primary data analysis

Standard Deviation (V)

The standard deviation is the square root of the variance value. So, the standard deviation value is directly proportional to the variance value. The greater the value of the variance, the greater the value of the standard deviation. The greater the value of the standard deviation, the greater the risk that must be borne by the farmer, and vice versa. In this study, the value of the standard deviation is 366.355.

Coefficient of Variation (CV) and Lower Limit Value (L)

The coefficient of variation is a comparison between the standard deviation value and the expected result value. The greater the value of the coefficient of variation, the greater the risk faced. The value of the coefficient of variation obtained from the calculation results is 0.035, which means that for every 1 kg obtained by the farmer, the production risk is 0.035 kg. This value indicates a very low parameter because the CV value is 0.5. This is in accordance with (Mahayani et al., 2017) research which states that the coefficient of variation in salak production is 0.5, which means that every 100 harvests, there is a chance that the harvest will fail 50 times from the expected production. Another study from (Pratiwi et al., 2019) stated that the risk of salak pondoh production was 0.04.

The lower limit value is obtained from the difference between the expected results and twice the standard deviation. Based on the calculation results, the L value obtained is 9591.932 kg/ha. This figure shows the minimum production limit that must be produced by Salak Pondoh farming in the next growing season. If viewed from the relationship between CV and L values, if the CV value > 0.5 then the L value < 0, as well as if the CV value is 0.5 then the L value 0. This indicates that if CV > 0.5 then the production risk of Salak Podoh borne by farmers is getting bigger by bearing a loss of L, while the CV value 0.5 then farmers will avoid production risk.

CONCLUSION AND SUGGESTION

Conclusion

The factors affecting the production salak pondoh are organic fertilizer, labor, experience, plant's age, and number of clumps. The risk production of salak pondoh is low because the coefficient value of the variation is small, the value of the smaller variation coefficient indicates the variability of the average value on the distribution is low. This illustrates the risks faced in obtaining such low production.

Suggestion

It is better for farmers to rejuvenate salak trees so that production continues to increase, and for further researchers it is hoped that they can develop research related to the risks faced by farmers so that farmers' welfare can be achieved.

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