

# Risks of Shallot Farming in Kulonprogo Regency, Special Region of Yogyakarta

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**Abstract.** One commodity in the vegetable horticulture subsector that is susceptible to failure is shallots. Farmers who are logical in their core are risk averse. Farmers' risk-taking behavior is influenced by socioeconomic factors. The study intends to examine three key aspects of risk: (1) its level; (2) farmers' risk-taking behavior; and (3) social factors influencing farmers' risk-taking behavior in relation to shallot farming. The analysis used in the study was descriptive in nature. Observation and interviews were used to collect data, with questionnaire guidance. Compared to the Srikayang variety, the tajuk variety carries a higher risk of shallot farming. Most farmers exhibit aversion to the risks associated with growing shallots. A farmer's aversion to risk increases with the size of their land, their age, and how frequently their venture fails. Farmers' risk aversion decreases with education level, amount of shallot farming experience, number of family members, and farm income. Compared to the Srikayang variety, farmers are less willing to take on the risk of growing shallot of the tajuk variety. Farmers who plant shallots in a timely manner will reap the best benefits. Farmers are taught when to plant shallots through counseling.

## 1 Introduction

The most popular vegetable grown in the horticultural subsector is shallots. Plant classification for onions: Plantae, Order Liliales, Class Monocotyledoneae, Division Spermatophyta, Family Liliaceae, Genus *Allium*, Species *Allium ascalonicum* L. [1]. Since shallots are a horticultural product that the community, particularly housewives, always needs as a spice for cooking, intensive shallot farming is expected to boost farmers' incomes. Shallots are a flavoring ingredient that every household needs, even though they are not a staple food because they are one of the ten basic needs of the family.

Every region has a different yield of shallots, both in terms of quantity and quality. This is a result of the fact that shallot varieties vary depending on the climate, soil, and topography of the respective region [2]. The exceptional economic value of this shallot commodity makes it a superior commodity. Shallot farming has a high economic value, as evidenced by the amount of labor required, the expenses incurred, and the revenue produced. Additionally,

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shallot farming in Kulonprogo Regency requires daily morning and evening watering due to its coastal land and moor.

Shallot farming has been adopted by farmers all over Indonesia, from the highlands to the lowlands [3]. Shallots require specific climatic, soil, and topographic conditions to thrive, so the yield and quantity of shallots produced vary by region [4]. Shallots are considered a strategic commodity in Indonesia due to their potential to impact inflation in the event of price fluctuations. Shallots are also a high-value crop, which is why a lot of farmers grow them [5]. The amount of shallot produced nationally in 2015 was 10.06 tons per hectare [6]. Even so, if standard operating procedures are followed, Indonesia's shallot productivity can only reach 17–20 tons/ha, which is still less than that of other shallot-producing nations like China, which achieves 38.43 tons/ha [7].

Because of the volatility and unpredictability of prices, shallot farming is vulnerable to both production and price failure. Farmers who are rational in their core are risk averse. [4, 8, 9, 10]. Individual differences in risk aversion will influence the decisions that they make [11, 12]. Farmers' risk-taking behavior is influenced by socioeconomic factors [13]. Land area, farmer age, education, farming experience, frequency of farming failure, and farmer income are examples of Faktor-Socioeconomic factors.

The research aims are based on the problem formulation and background (1). Examine the Shallot Farming Risk Level, (2). Examine how farmers respond to the dangers associated with shallot farming, and (3). Examine the social determinants that affect farmers' attitudes toward the dangers of growing shallots.

## 2 Research Method

The study was conducted using a descriptive method of analysis [14, 15, 16, 17]. 50 respondents were selected from each of the two shallot production centers—Bugel Village, Panjatan District, and Srikayangan Village, Sentolo District—in the Kulonprogo Regency, Yogyakarta Special Region, which served as the research location. Data were gathered through interviews and observation under the direction of a questionnaire. Inductive techniques are employed in data processing techniques to generate conclusions based on empirical facts obtained from the research site, as well as concretely known facts and events.

### 2.1 Risk of Shallot Farming

The coefficient of variation's magnitude is used to analyze the degree of risk associated with shallot farming income. Chen et al. state that the standard deviation and variance magnitude can be used to quantify the risk of income [18]. The coefficient of variation can be mathematically written as follows:

$$KV = \frac{\sigma}{\bar{X}} \quad (1)$$

Information:

$KV$  = coefficient of income variation.

$\sigma$  = standard deviation of income

$\bar{X}$  = average revenue

The average risk (income risk) is shown to be small on average when the coefficient of variation is small, indicating that the average value in the distribution has low variability.

## 2.2 Farmers' Behavior Toward Risks

Using a quadratic utility function model approach, farmers' behavior toward the risk of shallot farming is ascertained:

$$U = b_0 + b_1M + b_2M^2 \tag{2}$$

Information:

- U = value utility
- M = the acceptance obtained at the equilibrium point of the alternative option is filed.
- b<sub>0</sub> = intercept
- b<sub>1</sub> = regression coefficient
- b<sub>2</sub> = risk preference coefficient

The equilibrium value is a condition of equilibrium between values under definite conditions and values under uncertain conditions, as established by Bernoulli's principle and the Neumann-Morgenstern technique enhanced with neutral probability (50:50). This equilibrium value is known as the certainty equivalent, or CE, which represents the profit made from growing onions. Utility functions can be obtained by connecting the utility's scale. Since each farmer has a unique CE value and a different revenue stream, each farmer will have a unique utility curve.

## 2.3 Socioeconomic Factors Influencing Farmer Behavior Towards Risk

A multiple linear regression model was employed to analyze the effects of land area, age, education, experience, number of family members, frequency of failure, and farmer income on the behaviour of farmers regarding shallot risk. The land area, age, education, experience, number of family members, frequency of failure over the previous five years, and farmers' annual income from agriculture serve as independent variables, with the risk coefficient serving as the dependent variable.

$$b_2 = \alpha_0 + \sum_{i=1}^7 \alpha_i X_i + \mu \tag{3}$$

Information:

- B<sub>2</sub>= risk preference coefficient
- X<sub>1</sub>= land size (hectare)
- X<sub>2</sub>= farmer age (year)
- X<sub>3</sub>= farmer education (year)
- X<sub>4</sub>= farmer experience (year)
- X<sub>5</sub>= number of members of the peasant family (person)
- X<sub>6</sub>= failure frequency
- X<sub>7</sub>= farmer income from farming (IDR/year)
- α<sub>0</sub>= intercept
- α<sub>1</sub>= land area regression coefficient
- α<sub>2</sub>= farmer age regression coefficient
- α<sub>3</sub>= regression coefficient of farmer education
- α<sub>4</sub>= regression coefficient of farmer experience
- α<sub>5</sub>= regression coefficient of the number of members of the peasant family
- α<sub>6</sub>= failure frequency regression coefficient
- α<sub>7</sub>= regression coefficient of farmer income from farming
- μ= disruptive variables

Two steps are involved in testing the analysis model using ordinary least square (OLS): (1) testing the classical assumptions and (2) testing the model's suitability [19, 20]. The multicollinearity and heteroscedasticity test is the traditional assumption testing used in this study. This is as a result of the data being cross-sectional or single-point time data [20]. Ordinary least square (OLS) analysis yields the model that was used to identify if the

analyzed model does not have interference from classical assumptions. If multicollinearity and heteroscedasticity disorders exist, the model has been enhanced to eliminate both disorders.

The heteroscedasticity test used a variety of tests, including the Harvey, Glesjer's, Koenker, and Breusch-Pagan tests, to ascertain whether heteroscedasticity disorders were present in the Shazam data analysis program. The model is corrected using the heteroscedasticity model and the Feasible Generalize Least Square (FGLS) method of analysis if at least one of the four tests demonstrates a heteroscedasticity disorder. [21]. Four different types of heteroscedasticity models were used to improve the model for heteroscedasticity disorders [22]. These models are as follows: (a) model depvar (dependent variable); (b) model mult (multiplicative); (c) model stdlin (standart deviation is a linear function of exogenous variable); and (d) model varlin (variance is a linear function of exogenous variables). One of the best (most appropriate) models from the four heteroscedasticity improvement models was selected to be the model used to determine the factors influencing the risk preference coefficient.

### 3 Results and Discussion

#### 3.1 Risk of Shallot Farming

A coefficient of variation analysis of shallot farming income is used to ascertain the risk associated with that income. The amount of the coefficient of variation is computed for farmers who receive revenue from growing onions in the analysis of the coefficient of variation. Table 1 presents an analysis of the coefficient of variation in onion farm income.

**Table 1.** Average, standard deviation and coefficient of variation in shallot farming income per hectare, 2024

<b>Farm Income</b>	<b>Srikayangan Village</b>	<b>Bugel Village</b>
Average (IDR)	103,656,208	104,179,393
Standard Deviation	55,251,733	57,524,115
Coefficient of Variation	0.533	0.552

The findings demonstrated that there was a significant variance in shallot farming income between the Tajuk and Srikayang varieties. The findings indicated that the Srikayang variety of shallot grown in Srikayangan Village had the greatest income variation, at IDR115,750,000 per hectare, and the lowest, at IDR63,300,000 per hectare. Tajuk Bugel Village, a shallot farming variety, has the greatest income variation at IDR 116,500,000 per hectare and the lowest at IDR 58,500,000 per hectare. The findings of this investigation aligned with multiple studies indicating that shallot farming carries a significant degree of risk. [23, 24,25,26,27].

Production and price are two factors that directly impact farmers' income from farming. The variability in shallot production yields a greater risk to farmers' income from shallot farming: for shallots of the Srikayang variety of Srikayangan Village, the lowest production variation is 7,750 kg per hectare, and the highest is 12,560 kg per hectare; similarly, for shallots of the Tajuk Village Bugel variety, the lowest production variation is 7,500 kg per hectare, and the highest is 12,750 kg per hectare; similarly, for shallots of the Tajuk Village Bugel variety, the lowest price variation is IDR 16,500 per kilogram and the highest is IDR 18,500 per kilogram for shallots of the Srikayangan Village; for shallots of the Tajuk Village Bugel variety, the lowest price variation is IDR 17,750 per kilogram and the highest is IDR 22,500 per kilogram. The reason for this variation in production is that farmers do not plant shallots at the same time.

Because shallot growth is strongly influenced by weather and climate, farmers who plant shallots in the middle of the rainy season, around December, where the rainfall is quite high, will naturally experience low production. Similarly, farmers who plant shallots in late fall or early winter will experience differences in growth and harvest times, which will ultimately result in differences in production produced. In contrast, farmers who plant shallots at the start of the rainy season will undoubtedly yield higher yields because the amount of rainfall during this time of year is not as high. Analyzing the variation in shallot production reveals that the variation in shallot income is caused by variations in the farmers' quality output, with varying qualities leading to variations in both the prices obtained and the income received. Additionally, the findings indicated that growing shallots of the Tajuk Bugel variety carries a greater risk than growing shallots of the Srikayang variety grown in Srikayang Village. This is because there is a greater chance of failure in the sand area of Bugel Beach compared to Srikayang Moor.

### 3.2 Farmers' Behavior Toward Risks

A quadratic utility function is used to ascertain the farmers' behavior regarding the risks associated with growing onions. Based on the Bernoulli-Morgenstern principle refined with neutral probability (50:50) and the procedures proposed in the research method, the utility function of each farmer is estimated.

The coefficient of determination for Srikayang Village's Srikayang variety was determined using Ttable 2 of each farmer's utility functions in shallot farming ( $R^2$ ) the low is 0.965 and the high is 0.997. This indicates that changes in shallot farming revenue account for 96.50% of the variation in the utility value of the practice, whereas variations in other factors not included in the model account for the remaining 3.50 percent for farmers whose coefficient of determination value is lower ( $R^2$ ). The farmers with the highest coefficient of determination ( $R^2$ ) values demonstrated that variations in shallot farming revenue accounted for 99.70 percent of the variation in the utility value of the practice, while variations in other factors not included in the model accounted for the remaining 0.30 percent.

Regarding shallot cultivation, the Bugel Village Tajuk variety yielded a coefficient of determination ( $R^2$ ) of 0.995 at the high and 0.952 at the low. This demonstrates that for farmers whose coefficient of determination value ( $R^2$ ) is lowest, variations in shallot farming revenue account for 95.20 percent of the variation in the utility value of shallot farming, while variations in other factors not included in the model account for 4.80 percent of the variation. Regarding farmers, the ones with the highest coefficient of determination ( $R^2$ ) demonstrated that variations in shallot farming revenue accounted for 99.50 percent of the variation in the utility value of the practice, with variations in other factors not included in the model accounting for the remaining 0.50 percent.

**Table 2.** Distribution of farmers' behavior towards the risks of shallot farming in Kulonprogo Regency, 2024

Behavior	Shallots Srikayang Variety, Srikayangan Village		Shallots Tajuk Varieties, Bugel Village	
	Sum	Presented %	Sum	Presented %
Averter	40	80	45	90
Neutral	8	16	5	10
Lover	2	4	0	0
( $R^2$ ) Lowest	0.965		0.952	
( $R^2$ ) Highest	0.997		0.995	
Lowest F-count	67.551		56.521	
Highest F-count	1,252.100		1,001.500	

Table 2 demonstrates that, of the 50 farmers who cultivate shallots in Srikayangan Village, 40 farmers, or 80% of the farmers, have a risk coefficient ( $b_2$ ) that is negative and significant, indicating that they behave aversion to the risks associated with growing onions; 5 farmers, or 10% of the farmers, have a risk coefficient ( $b_2$ ) that is negative; 3 farmers, or 6% of the farmers, have a risk coefficient ( $b_2$ ) that is positive but not significant, indicating that they behave neutrally towards the risks of shallot farming, and 2 farmers, or 4% of the farmers, exhibit aversion to the risks involved in shallot farming. The findings demonstrated that the majority of Srikayangan Village shallot farmers exhibit reluctance in response to the hazards associated with shallot farming. Of the 50 farmers cultivating Tajuk Bugel Village shallots, 45, or 90% of the farmers, have a risk coefficient ( $b_2$ ) that is negative and significant, indicating that they are averse to the risks associated with growing onions. The remaining 5 farmers, or 10% of the farmers, have a risk coefficient ( $b_2$ ) that is insignificant. Which means that farmers behave neutrally towards the risks of shallot farming and no farmer dares to risk shallot farming. The findings demonstrated that the majority of Tajuk Bugel Village shallot farmers exhibit reluctance when it comes to the risks associated with shallot farming. The findings of this investigation align with multiple studies demonstrating farmers' reluctance to take on the risks associated with shallot farming [8,18,28].

Being risk averse is a natural behavior for most farmers, as most farming households deal with some sort of major financial challenge. Farmers in rural areas always face weather uncertainty and live very close to the limit of subsistence, making it impossible for them to use the formula for calculating maximum profit in farming. Rather than take big risks in hopes of making huge profits, farmers will try to avoid failure. The majority of farmers exhibit what is known as "safety first" behavior.

Because shallots grow quickly and fetch a high price, farmers who cultivate them are motivated to increase their income. But most farmers, who have little or no capital, have not ventured to grow shallots on a large commercial scale because of the significant risks involved, which include pest attacks and volatile price swings. A tiny minority of farmers—two in Srikayangan—are willing to cultivate shallots on a large commercial scale, but this is only because they are speculative and wealthy farmers. When harvest time arrives, small or capital-constrained farmers must inevitably sell all of their produce, regardless of price, as they no longer have a budget supply to meet their needs. When harvest time comes around, large-cap farmers sell everything if the price is good or high. If the price is low, however, they typically hold off on selling until the price is high and still have enough money saved up to cover their living expenses. Most farmers use a monoculture system when growing shallots. In Srikayangan Village, shallots of the Srikayang variety are planted from August to October, while in Bugel Village, shallots of the Tajuk variety are planted from December to February.

### 3.3 Socioeconomic Factors Influencing Farmer Behavior Towards Risk

Table 3 presents the results of a multiple linear equation model that is used to analyze the factors that affect farmers' risk-taking behavior. Table 3 demonstrates that, out of the seven independent variables, three independent variables—farmer income, age, and education—have a significant impact on the non-free variable, which is the risk coefficient, which represents the risk-taking behavior of farmers.

The next step involves detecting heteroscedasticity and multicollinearity in order to determine whether there are any deviations from the traditional assumptions of multiple linear regression models. A perfect or clear linear relationship between some or all of the variables reported in the regression model is referred to as multicollinearity. An indicator of the correlation coefficient between independent variables is used to determine whether multicollinearity exists in the estimator model. It can be inferred from the analysis's findings

that there is no multicollinearity issue with the multiple linear regression model that was employed. This is because the correlation coefficient between the independent variables is fairly low.

**Table 3.** Regression coefficient and t-calculate the behavioral function of shallot farmers towards risk, 2024

Independent Variables	Regression Coefficient	T-Count
Intercept	0.825E-05***	13.150
Land ( $X_1$ )	-0.678E-10 <sup>NS</sup>	-0.895
Farmer Age ( $X_2$ )	-0.337E-07*	-2.441
Farmer Education ( $X_3$ )	0.875E-08**	2.564
Farmer Experience ( $X_4$ )	0.287E-07 <sup>NS</sup>	1.673
Number of Family Members ( $X_5$ )	0.754E-08 <sup>NS</sup>	1.071
Failure Frequency ( $X_6$ )	-0.232E-06 <sup>NS</sup>	-0.663
Farmer Income ( $X_7$ )	0.257E-05**	2.767
Dummy (D)	0.656E-06***	3.989
Coefficient of Determination ( $R^2$ )	0,871	
F-Count	7.823***	
DW	1.801	

Note: \*\*\*: significant on  $\alpha$ : 1 %; \*\*: significant on  $\alpha$ : 5 %; \*: significant on  $\alpha$ : 10 %; NS : insignificant on  $\alpha$ : 10 %  
 T-table (with  $df=\infty$ ) at  $\alpha$ : 1% = 2.576;  $\alpha$ : 5% = 1.960; and  $\alpha$ : 10% = 1.645  
 F-table, at  $\alpha$ : 1% = 2.510;  $\alpha$ : 5% = 1.940; and  $\alpha$ : 10% = 1.670

**Table 4.** Regression analysis between risk coefficients and seven independent variables that have eliminated the influence of heteroscedasticity, 2024

Independent Variables	Regression Coefficient	Heteroscedasticity Free Regression Coefficient			
	OLS	DEPVAR	MULT	STDLIN	VARLIN
Intersep	0,825E-05*** (13,150)	0.756E-05*** (16.31)	0.754E-05 <sup>NS</sup> (0.954)	0.821E-05 <sup>NS</sup> (0.644)	0.157E-06*** (3.669)
Land ( $X_1$ )	-0.678E-10 <sup>NS</sup> (-0.895)	-0,666E-10*** (-13.42)	-0.705E-10* (-1.857)	-0.547E-10 <sup>NS</sup> (-1.239)	-0.354E-11 <sup>NS</sup> (-0.221)
Farmer Age ( $X_2$ )	-0.337E-07* (-2.441)	-0.266E-07*** (-11.83)	-0.116E-7 <sup>NS</sup> (-1.072)	-0.813E-07 <sup>NS</sup> (-0.689)	-0.423E-08* (-1.881)
Farmer Education ( $X_3$ )	0.875E-08** (2.564)	0.455E-08*** (12.81)	0.122E-8*** (2.822)	0.344E-08 <sup>NS</sup> (1.446)	0.751E-08*** (2.667)
Farmer Experience ( $X_4$ )	0.287E-07 <sup>NS</sup> (1.673)	0.278E-07*** (8.45)	0.139E-07 <sup>NS</sup> (0.728)	0.286E-07 <sup>NS</sup> (1.415)	0.433E-08 <sup>NS</sup> (0.574)
Number of Family Members ( $X_5$ )	0.754E-08 <sup>NS</sup> (1.071)	0.674E-08*** (10.33)	0.555E-08 <sup>NS</sup> (0.756)	0.323E-08 <sup>NS</sup> (0.452)	0.945E-08 <sup>NS</sup> (1.336)
Failure Frequency ( $X_6$ )	-0.232E-06 <sup>NS</sup> (-0.663)	-0.233E-06*** (-10.71)	-0.815E-6 <sup>NS</sup> (-0.883)	-0.778E-06 <sup>NS</sup> (-0.554)	-0.234E-07* (-1.898)
Farmer Income ( $X_7$ )	0.257E-05** (2.767)	0.253E-05*** (11.22)	0.734E-5*** (3.150)	0,675E-06 <sup>NS</sup> (1,565)	0.766E-06* (1.868)
Dummy (D)	0.656E-06*** (3.989)	0.786E-06*** (7.559)	0.687E-6*** (3.229)	0.466E-06*** (2.944)	0.886E-06*** (2.779)
$R^2$	0.871	0.871	0.871	0.871	0.871
F-Count/LR	7.823***	22.446***	22.446***	22.446***	22.446***

Information:

- OLS : Ordinary least square
- Depvar : Improved heteroscedasticity with dependent variables
- Mult : Improvement of heteroscedasticity with multiplicative
- Stdlin : Improvement of heteroscedasticity with standard deviation is a linear function of exogenous variable
- Varlin : Correction of heteroscedasticity with variance is a linear function of exogenous variable
- \*\*\*: significant on  $\alpha$ : 1 %; \*\* : significant on  $\alpha$ : 5 %; \* : significant on  $\alpha$ : 10 %; NS : insignificant on  $\alpha$ : 10 %
- The number in parentheses is t-count
- T-table (with  $df=\infty$ ) at  $\alpha$ : 1% = 2.576;  $\alpha$ : 5% = 1.960; and  $\alpha$ : 10% = 1.645
- F-table, at  $\alpha$ : 1% = 2.510;  $\alpha$ : 5% = 1.940; and  $\alpha$ : 10% = 1.670
- Chi-Square, at  $\alpha$ : 1% = 20.090;  $\alpha$ : 5% = 15.510; and  $\alpha$ : 10% = 13.360

Based on the results of the analysis in Table 4, it is known that the heteroscedasticity model has a coefficient of determination value ( $R^2$ ) of 0.871. This indicates that variations in land area, age, education, experience, number of family members, frequency of failure over the past five years, and income from farming account for as much as 87.10 percent of the variation in the value of the risk coefficient or farmers' behavior towards risk, while other variables that determine but are not included in the model account for 12.90 percent.

The calculation results obtained a likelihood ratio (LR) value of 22.446 greater than the chi-square value ( $X^2$ -table of 20.090), so that the independent variables together have a real effect on the dependent variable. Stated differently, the socioeconomic characteristics of farmers collectively—land area, age, education, experience, number of family members, frequency of failure over the previous five years, and farming income—have an impact on how farmers behave when faced with risk.

Table 4 demonstrates that, out of the four models that were used to reduce the influence of heteroscedasticity, the Depvar model—an improvement on heteroscedasticity with dependent variables—is the most effective model due to the fact that, in comparison to the other three models, it has the greatest number of independent variables that have a real influence—that is, all independent variables have a real influence. For this reason, the depvar model—an improvement on heteroscedasticity with dependent variables—was selected to determine the variables affecting farmers' risk-taking behavior. It is known that each independent variable has a true partial effect on the dependent variable based on the depvar model (improvement of heteroscedasticity with dependent variables).

Based on the results of the analysis of socioeconomic factors that influence farmers' behavior towards the risk of shallot farming (Table 4) can be described as follows:

### 3.3.1 Land

Farmers typically own 0.1950 hectares of land, which is a relatively small area. Table 4 indicates that the regression coefficient for land area is negative and significant, indicating that a rise in land area will lead to a significant decrease in the risk coefficient of *ceteris paribus*. Stated differently, a farmer is less willing to take on the risk of failing the larger their land. Contrary to the study's findings [10], these findings are consistent with research demonstrating that farmers are less willing to take on the risk of failure the larger their land [12].

Because of this uncertainty, planting shallots is actually a risky decision for farmers. The risk of failure increases even further if only a small area is at risk, particularly when dealing with a large area. The condition of the no longer fertile soil and pests increase the risk of failure in addition to the uncertainty factor. A portion of the farmers' land in Srikayangan Village is saturated, a state marked by hard soil that makes it difficult for plants to grow. If the land is planted, shallots can grow at first, but eventually they wilt and die, and the bulbs decay. Many experts believe that this is because of the overuse of pesticides and inorganic fertilizers, which contaminate the soil with chemicals. As a result, farmers are becoming less inclined to grow shallots on vast tracts of land.

### 3.3.2 Farmer Age

Farmers are 45 years old on average; the oldest are 74 years old and the youngest are 31 years old. Given that age has a negative and significant regression coefficient, getting older will substantially lower the risk coefficient of *ceteris paribus*. Put differently, farmers who are older tend to be less averse to the risk of failing, and farmers who are younger tend to be more averse to it.

This makes sense because some older farmers are more skilled and experienced, but they also tend to be more conservative and get tired more easily. Younger farmers are physically stronger and behave more progressively toward new innovations despite their lack of experience and skills. Young farmers are more inclined to take risks due to their progressive nature, which tends to mold their behavior. This is demonstrated by a small number of young farmers who are beginning to take the risk of changing how production factors are used. For instance, they have started to reduce their use of chemical pesticides, only using them when absolutely necessary due to the presence of diseases and pests. Previously, farmers had a weekly spraying schedule for chemical pesticides, regardless of the presence or absence of diseases and pests. These results are in line with earlier studies that demonstrated older farmers are less willing to take on the risk of failing [12]. Age is inversely proportional to the risk coefficient, even though research [10] indicates that age is not significant. These findings run counter to studies that indicate younger farmers exhibit higher levels of risk aversion than older farmers [27].

### **3.3.3 Education**

The average length of formal education is eighteen years, with a range of fifteen to twenty-three years. The typical farmer has thus completed upper high school. The farmer education variable has a positive and significant regression coefficient, indicating that, under the assumption that other factors remain constant, raising education will significantly raise the risk coefficient. Put differently, farmers who possess higher levels of education tend to be more willing to take risks. This is possible because the typical farmer, who has completed high school, is risk-taking and generally well-educated. These findings are in line with studies that demonstrate more risk-averse behavior in farmers with higher levels of education [12]. While education does not significantly influence research [10], the trend remains the same.

### **3.3.4 Experience**

Farmers' levels of shallot farming experience vary widely. Farmers have an average of 32 years of shallot farming experience, ranging from 13 to 44 years. The risk coefficient of *ceteris paribus* will rise dramatically as the experience of shallot farming farmers increases, according to the positive and significant regression coefficient of their experience. Put another way, farmers' risk aversion decreases with increasing maturity in their shallot farming experience. These results are consistent with earlier studies that have demonstrated that farmers will be less risk averse the more seasoned they have been in farming [12], Farming experience is not significant in research [10], but the tendency is still there.

Farmers learn their craft through observation and experience, gaining knowledge from both the surrounding environment and experiences passed down from generation to generation. Farmers with a good deal of experience who are open to learning from it are highly skilled and aware of the potential consequences of their decisions, such as those regarding productivity and price. Some farmers who belong to farmer groups demonstrate this. This farmer group always takes past experiences or events into account before deciding to cultivate shallots. Additionally, they survey other regions that grow comparable crops because, if other regions grow the same crops, it is a given that the price will drop at harvest, necessitating the use of substitute plants. Farmers will learn a great deal from their past mistakes, and they will make an effort to plan ahead to avoid repeating those mistakes.

### **3.3.5 Number of Family Members**

The average farmer has a family of three members, with the number of family members ranging from 0 to 4. If other factors stay constant, the variable number of family members has a positive and significant elasticity, which means that adding family members will significantly raise the risk coefficient. This implies that farmers will be less risk averse as much as family members they have.

This is due to the strong correlation between the number of family members and labor availability. Please be advised that shallot farming is labor-intensive. The majority of farmers use family labor for all tasks, including prepping seeds, tillage, planting, weeding, fertilizing, watering, harvesting, and post-harvesting. The study's findings also demonstrate that a big family size necessitates the head of the household to work harder to achieve excellent results and be able to support the family. Farmers are encouraged by this to act more courageously and take calculated risks. These outcomes are consistent with research that indicates farmers will be less risk averse the more family members they have [12]. Despite research [10] finding that the number of family members is negligible, the tendency remains the same and runs counter to study findings [27].

### **3.3.6 Failure Frequency**

Seasonal uncertainty leads to the emergence of pests and diseases, which is the primary cause of failure in onion farming for the majority of farmers. Furthermore, in addition to the high cost of shallot farming, unstable price factors also contribute to the failure of shallot farming. Over the previous five years, the frequency of failures has varied between 0 and 2 times, with an average of 0.5 times. If other factors remain, increasing the frequency of failure will significantly lower the risk coefficient because the elasticity of the frequency of failure to farm shallots has a negative and significant value. Put another way, a farmer's aversion to risk increases with the frequency of failure. This finding is consistent with research demonstrating an inverse relationship between failure frequency and risk coefficient—that is, the higher the failure frequency, the lower the risk aversion of farmers. [10,12].

### **3.3.7 Income**

The average annual income for farmers from farming is IDR30.750.000, with a range of IDR20.000.000 to IDR145.000.000. In Srikayangan Village, farmers mostly make their living from growing shallots, chilies, and rice; in Bugel Village, farmers mostly make their living from growing shallots, chilies, watermelon, melons, rice, and eggplant. An increase in farmer income over the course of a year will substantially raise the risk coefficient of *ceteris paribus* because farmer income has a positive and significant elasticity. Put another way, farmers will become less risk averse as their income from farming rises. The findings of this study support earlier research that found that farmers who have higher incomes will be less risk averse [12]. Research [10] did not find this relationship to be statistically significant, but the general trend indicates that income is directly correlated with risk.

This makes sense because the primary incentive for farmers engaged in shallot farming is to generate a high income. In addition, since shallot farming entails high costs, a high income is necessary. Some wealthy or well-capitalized farmers even venture to cultivate shallot farming on a larger scale. They still have a budget supply for their needs, so they don't mind taking the chance of failing.

### 3.3.8 Dummy

Dummy variables are used to distinguish the crop commodities cultivated, namely shallots of the Srikayang variety grown in Srikayangan Sentolo and the Tajuk variety grown in Bugel Panjatan Kulonprogo.  $D = 1$  for shallots of Srikayang variety grown in Srikayangan Village and  $D = 0$  for shallots of Tajuk variety grown in Bugel Village. Dummy variables have a positive and significant regression coefficient, meaning that farmers' aversion to the risks of shallots planted in Srikayangan Village with farmers' aversion to the risks of shallots planted in Bugel Village have different levels of reluctance. This can be seen from the average coefficient value for Srikayang variety shallot farming planted in Srikayangan Village of  $-0.523E-08$  and for Tajuk variety shallot farming planted in Bugel Village of  $-0.134E-06$ , which means that farmers' aversion to the risks of farming shallots of the Header variety planted in Bugel Village is higher than farmers' reluctance to the risks of farming shallots of the Srikayang variety planted in Srikayangan Village, this is because the shallots of the Header variety planted in Bugel Village have a higher risk because coastal sand land is more susceptible to pests and diseases.

## 4 Conclusion and Policy Implication

### 4.1 Conclusion

The following conclusions can be made considering the study's findings and the conversation that followed:

- a. Farming shallots of the Tajuk variety in Bugel Village has a higher risk than the Srikayang variety in Srikayangan Village.
- b. The majority of farmers behave as an aversion to the risks of shallot farming
- c. A farmer's aversion to risk increases with the size of their land, their age, and how frequently their venture fails. The farmer's aversion to risk decreases with increasing education, experience in shallot farming, family size, and agricultural income.
- d. Compared to the Srikayang variety in Srikayangan Village, farmers in Bugel Village are less willing to take on the risks associated with growing shallots of the Tajuk variety.

### 4.2 Policy Implications

Farmers who plant shallots on schedule will yield optimal yields; those who arrive late will yield subpar yields. Government regulations regarding when shallots should be planted are necessary in this case. Farmers receive information on when to plant shallots through counseling.

## References

1. N. Suriana, *Bawang Bawa Untung Budidaya Bawang Merah dan Bawang Putih*, Cahaya Atma Pustaka, (2011)
2. A. Pranata, A. T. Umam, *Jejak*, 8, 36–44, (2015), <https://doi.org/10.15294/jejak.v8i1.3852>
3. A. S. Harahap, D. A. Luta, D. Sri, M. B. Sitepu, *Seminar Nasional UNIBA Surakarta*, 287–296, (2022)
4. Helmayuni, Mardianto, F. Agustin, *EJPP*, 2, 159–166, (2022), <https://ejournal-unespadang.ac.id/index.php/EJPP>

5. L. Rahmadona, A. Fariyanti, B., *Jurnal Hortikultura Indonesia*, 8, 128–135, (2017), <https://doi.org/10.29244/jhi.8.2.128-135>
6. A. Susanti, A. Supriyatna, *Outlook Bawang Merah komoditas pertanian subsektor hortikultura*, Pusat Data Dan Sistem Informasi Pertanian Kementerian Pertanian, 1–94, (2020), [https://satudata.pertanian.go.id/assets/docs/publikasi/Outlook\\_Komoditas\\_Hortikultura\\_Bawang\\_Merah\\_Tahun\\_2020.pdf](https://satudata.pertanian.go.id/assets/docs/publikasi/Outlook_Komoditas_Hortikultura_Bawang_Merah_Tahun_2020.pdf)
7. Kementerian PPN/Bappenas, *Lampiran Peraturan Presiden Republik Indonesia Nomor 2 Tahun 2015 Tentang Rencana Pembangunan Jangka Menengah (RPJMN) 2015-2019 Agenda Pembangunan Wilayah*, 1–516, (2015), <https://www.djkn.kemenkeu.go.id/pug/assets/files/informasi/Perpres-Nomor-2-Tahun-2015.pdf>
8. R. Mutisari, D. Meitasari, *Jurnal Ekonomi Pertanian Dan Agribisnis*, 3, 655–662, (2019), <https://doi.org/10.21776/ub.jepa.2019.003.03.21>
9. S. Saifan, R. Shibli, M. S. A. Yajid, J. Abd Hamid, S. M. F. Azam, *AgBioForum*, 23, 113–122, (2021)
10. Pujiharto, S. Wahyuni, *Universitas Nusantara PGRI Kediri*, 1, 65–73, (2017), file:///C:/Users/sriya/Downloads/2099-4428-1-SM%20(1).pdf
11. Erny, D. H. Darwanto, Masyhuri, L. R. Waluyati, *EurAsian Journal of BioSciences*, 13, 931–936, (2019), <https://www.proquest.com/openview/cb60064817f30384f6b5eabd88d02bcf/1?pq-origsite=gscholar&cbl=2042720>
12. Sriyadi, A. Yekti, *E3S Web of Conferences*, 316, 1–13, (2021), <https://doi.org/10.1051/e3sconf/202131602043>
13. C. Choiril, S. Soetriono, E. S. Hani, *SOROT*, 13, 15–27, (2018), <https://doi.org/10.31258/sorot.13.1.4810>
14. A. Martínez-Rodríguez, J. Sánchez-Sánchez, M. Martínez-Olcina, M. Vicente-Martínez, L. Miralles-Amorós, J. A. Sánchez-Sáez, *Nutrients*, 13, 1–11, (2021), <https://doi.org/10.3390/nu13061911>
15. O. K. Kroytor, M. D. Malykh, S. P. Karnilovich, *Discrete and Continuous Models and Applied Computational Science*, 28, 141–153, (2020), <https://doi.org/10.22363/2658-4670-2020-28-2-141-153>
16. C. Maibvise, T. R. Mavundla, *Health SA Gesondheid*, 24, 1–8, (2019), <https://doi.org/10.4102/hsag.v24i0.1070>
17. D. H. Darwanto, L. R. Waluyati, *EurAsian Journal of BioSciences Eurasia J Biosci*, 13, 931–936, (2019), <https://www.proquest.com/openview/cb60064817f30384f6b5eabd88d02bcf/1.pdf?pq-origsite=gscholar&cbl=2042720>
18. K. Z. Chen, K. D. Meilke, C. Turvey, *Agricultural Economics*, 20, 173–183, (1999), [https://doi.org/10.1016/S0169-5150\(98\)00079-6](https://doi.org/10.1016/S0169-5150(98)00079-6)
19. R. Winkelmann, *Econometric analysis of count data*, (2008), <https://doi.org/10.1007/978-3-540-78389-3>
20. D. Gujarati, *Econometrics by Example*, (2012), <https://zalamsyah.staff.unja.ac.id/wp-content/uploads/sites/286/2019/11/7-Econometrics-by-Example-Gujarati.pdf>
21. W.H. Greene, *Econometric Analysis*, Second Edition, Macmillan Publishing Company, New York, (1993)
22. K.J. White, S.D. Whistler, S.A. Haun, *Shazam Econometrics Computer Program: User's*

*Reference Manual Version 6.2*, Mc Graw-Hill Book Company, (1990)

23. M. Fauzan, *AGRARIS: Journal of Agribusiness and Rural Development Research*, 2, 107–117, (2016), <https://doi.org/10.18196/agr.2231>
24. I. G. L. P. Tanaya, R. Rosmilawati, A. Hidayati, *JURNAL AGRIMANSION*, 21, 69–81, (2020), <https://doi.org/10.29303/agrimansion.v21i2.383>
25. N. Laia, K. Laowo, W. Saragih, *Jurnal Agribizda*, 6, 81–93, (2022)
26. L. T. W. Astuti, A. Daryanto, Y. Syaikat, H. K. Daryanto, *Jurnal Ekonomi Pertanian Dan Agribisnis*, 3, 840–852, (2019), <https://doi.org/10.21776/ub.jepa.2019.003.04.19>
27. M. R. Ghozali, R. Wibowo, *Jurnal Ekonomi Pertanian Dan Agribisnis*, 3, 294–310, (2019), <https://doi.org/10.21776/ub.jepa.2019.003.02.7>
28. M. Lawalata, *JURNAL AGRICA*, 10, 56, (2017), <https://doi.org/10.31289/agrica.v10i2.924>