



Risk Analysis of Shallot Farming Production in Malang City

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Abstract

This research aims to determine the risk level of shallot farming and the factors that influence it in Malang City. The sample determination method used was Simple Random Sampling with a sample size of 102 respondents. The research results show that shallot farming in the research area has a high risk with factors that influence the level of production risk being the number of workers, the amount of pesticides, and the amount of NPK fertilizer. Shallot productivity in Malang City is quite high compared to the average shallot productivity in East Java.

Keywords: Farming, shallots, production risk.

1. Introduction

Agriculture is a sector that has an important role in the Indonesian economy, especially in the formation of Gross Domestic Product (GDP) (Irham, 2016). Vegetable plants are a type of commodity that has high economic value and plays an important role in meeting the various needs of farming families (Giller, 2021). This can be demonstrated by several phenomena, including the fact that vegetable plants have a relatively short lifespan so they can produce quickly, can be cultivated easily, and the results of vegetable production are quickly absorbed by the market (Ji, 2018). One vegetable commodity that has long been cultivated is shallots (Prasetyowati, 2021). Shallots, as an unsubstituted spice, function as a food spice and traditional medicine, providing bright prospects for the development of agricultural businesses (Suswadi, 2022).

Data released by the East Java Province Agriculture and Food Security Service in 2017 showed that shallot production had increased from 2012 to 2014, from 222,862 tonnes to 293,179 tonnes. Then production decreased quite significantly to 277,123 tons in 2015, and increased again in 2016. Even though there was an increase in production, it turned out that in terms of productivity it actually tended to decrease from 2012 to 2016. Unstable production conditions and productivity which continues to fall indicates that shallot farming has quite serious production risks.

This research aims to assess the risks of shallot farming and farmer behavior in overcoming them, as well as identifying factors that influence these risks. It is hoped that the results of this research can be used as consideration for reducing risks in shallot farming.

2. Research Methods

2.1 Research Location and Time

Research location in Malang City. The city of Malang was chosen based on the consideration that this location is one of the shallot producing cities in East Java and also that the productivity of shallots in Malang City is quite high compared to the average shallot productivity in East Java. The time the research was conducted was around June-July 2018.

2.1 Analysis Method

The aim of this research is to determine the risk level of shallot farming and determine the factors that influence the risk level of shallot farming. The risk level of shallots is identified by looking at the coefficient of variation (CV), which is the relative risk level obtained by dividing the standard deviation of production by the expected value. Mathematically the formula is as follows:

$$CV = \frac{\sigma}{\bar{Y}}$$

Where CV is the coefficient of variation, σ is the standard deviation (standard deviation) and \bar{Y} is the average shallot production in kg units. The criteria that can be concluded from the results of calculating the coefficient of variation are as follows:

- If the CV value is <0.5 , it can be concluded that shallot farming in the research area has a low risk
- If the CV value is >0.5 , it can be concluded that shallot farming in the research area has a high risk.

Apart from that, this research also looked at the behavior of shallot farmers in facing risks using the risk aversion parameter $K(S)$ (Olarinde et al., 2007) with behavioral criteria according to Moscardi and de Janvry (1977). Where the formula for this calculation is as follows:

$$K(S) = \frac{1}{\theta} \left(1 - \frac{P_{xi}X_i}{P_y f_i \mu_y} \right)$$

Information:

θ = coefficient of variation of productivity ($\theta = \delta y / \mu y$) when δy = standard deviation of productivity and μy = average productivity

P_{xi} = $i - th$ input price (for each respondent)

X_i = number of inputs i (the number of inputs that are the most significant and have the largest contribution to each respondent)

P_y = price of shallot products

f_i = production elasticity of the $i - th$ input (elasticity of the input that is most significant and has the largest contribution)

μy = shallot productivity

$K(S)$ = measuring risk aversion parameters, S is a variable that represents farmer characteristics

The risk aversion parameter $K(S)$ is used to classify farmers into 3 categories, namely:

- Taking risks (risk lover) or low risk ($0 < K(s) < 0.4$)
- Take a neutral position; (risk neutral) or medium risk ($0.4 \leq K(s) < 1.2$)
- Reject risk (risk averter) or high risk ($1.2 \leq K(s) < 2.0$)

A model developed by Just and Pope (1979) to obtain factors that influence the risk level of shallot farming. This model uses a two-step procedure, namely the first is to create a Cobb-Douglas production function to find the estimated production value.

The following is the Cobb-Douglas production function of shallots:

$$\ln Y = \ln a + a_1 \ln X_1 + a_2 \ln X_2 + a_3 \ln X_3 + a_4 \ln b_4 + a_5 \ln X_5 + a_6 \ln b_6 + a_7 \ln X_7$$

Information:

a = intercept while b_1 - b_5 are parameter coefficients.

Y = amount of shallot production (tons/ha)

X_1 = number of shallot seeds (kg/ha)

X_2 = amount of urea fertilizer (kg/ha)

X_3 = amount of KCL fertilizer (kg/ha)

X_4 = amount of NPK fertilizer (kg/ha)

X_5 = amount of ZA fertilizer (kg/ha)

X_6 = amount of pesticide (liter/ha)

X_7 = number of workers (HOK/ha)

Production risk can be formulated:

$$\sigma^2 Y = (Y_i - \hat{Y}_i)^2$$

$\sigma^2 Y$ = regression model residuals (production variance)

Y_i = actual production

\hat{Y}_i = estimated production results

The production risk function is described as:

$$\ln \sigma^2 Y = \ln a + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln b_4 + b_5 \ln X_5 + b_6 \ln b_6 + b_7 \ln X_7$$

Where the hypothesis of the model is:

$H_o : a_i; \beta_i \neq 0$ (There is no significant influence between the i dependent variable on the j dependent variable)

$H_a : a_i; \beta_i = 0$ (There is no significant influence between the i dependent variable on the j dependent variable)

The method for estimating parameters of the Multiple Regression function (3 and 5) uses the Ordinary Least Square (OLS) method. Where this method is carried out in two stages, namely (1) testing for violations of classical assumptions, and (2) testing for model suitability. Classical assumption testing includes normality, multicollinearity and heteroscedasticity tests, which are carried out for cross-section data (Gujarati, 1997). Because if the classical assumptions are not met then the OLS method cannot be used.

3. Results and Discussion

Before identifying the risk level of shallot farming in Malang City, it is necessary to calculate the costs, receipts and income of shallot farming in Batu City. The average costs, revenues and income of shallot farming in Batu City can be seen in Table 1. Based on the data in Table 1, it can be seen that the average production of shallots reaches 12,456.16 kg/ha. This level of productivity can be categorized as quite high, because shallot productivity in East Java is currently only around 10,000 kg/ha. With an average selling price of IDR 12,500.00/kg at the farmer level, income of IDR 145,456,712.00/ha can be obtained and subtracting existing costs, the average income obtained during one planting season is IDR 73,875,524.28/ha.

Table 1: The average costs, revenues and income of shallot farming in Batu City

No	Description	IDR
1	Production (kg/ha)	12,456.16
2	Selling price (IDR/kg)	12,500.00
	Total Revenue (IDR/ha)	145,456,712.00
3	Total Fixed Costs (IDR/ha)	2,678,632.00
	Total Variable Costs (IDR/ha)	73,875,524.28
	Seedling Costs	31,875,453.00
	Urea Cost	873,992.58
	KCL fees	3,765,812.00
	NPK fees	8,765,087.00
	ZA fees	734,654.65
	Pesticide Costs	6,983,978.00
	Labor costs	22,876,269.00
6	Total income	66,431,875.65

The variable cost component most often incurred by farmers is for seeds, IDR 31,875,453.00/ha. Then NPK fertilizer is IDR 8,765,087.00/ha, and pesticide costs are IDR 6,983,978.00/ha. The use of NPK fertilizer is the highest compared to the use of other fertilizers because NPK fertilizer itself is a type of compound fertilizer which has 5 nutrients that shallot plants need. Meanwhile, the reason for the high cost of pesticides is because pest and disease attacks are quite high, so that almost every week farmers will apply pesticides to reduce pest and disease attacks.

Farmers are always faced with various risks in their farming activities. Starting from production risk, market risk, financial risk to policy risk. This level of risk will influence farmers' decisions in determining which commodities to cultivate. The results of the analysis of the risk level of shallot farming in Batu City can be seen in Table 2.

Table 2: Analysis of the risk level of shallot farming in Batu City

Information	Value
Average production	4672.516 kg
Average land area	0.435 ha
Standard deviation	2314.876321
Variety	4971865.13
Coefficient of Variation (CV)	0.7456
Risk coefficient (KS)	2.3

Based on Table 2, it can be seen that the risk level of shallot farming production in the research area is 0.7, which is included in the high category. Meanwhile, if you look at the KS coefficient of 2.3, it indicates that on average shallot farmers in the research area are Risk Averters (risk averse). This is in accordance with the results of interviews with shallot farmer respondents that have been carried out, the existing production risks are caused by high levels of pest and disease attacks. This can also be seen from the relatively large cost of using pesticides in the research area,

namely IDR 6,983,978.00/ha. In line with the results of research conducted by Budiningsih and Pujiharto (2006) that the largest expenditure on shallot production costs after seed costs is the cost of pesticides because in general shallot plants are prone to attacks by pests and diseases, so control measures with pesticides are one way for farmers to reduce the risk. crop failure. Likewise, according to Horowitz and Lichtenberg (1994) farmers tend to use excessive pesticides in order to reduce the risk of yield loss due to pests and diseases.

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