Production risk, price and income analysis on shallot hatchery business (*Allium cepa* var. *ascalonicum*) (case: Medan Marelan District, Medan City)

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Abstract. This research aims to analyse the risk of production, price and income in the business of shallot hatchery in Medan Marelan district, Medan City. The study was carried out on 30 farmers who carried out hatchery cultivation in Medan Marelan district. The research method used to measure the risk of production, price and income uses variety, the standard deviation of the coefficient of variation (K V), and the lower limit of the highest yield. The results showed that the production risk was 0.23, price risk was 0.06 and income risk was 0.33. Production risk is caused by pests, diseases, and erratic weather. Price risk is caused by fluctuating prices. Income risk is caused by the amount of production, fluctuating prices, large farming costs and lack of market demand. The highest risk is income risk, followed by production risk and price risk.

1. Introduction
The agricultural sector includes the food crop and horticulture sub-sectors, plantations, livestock and fisheries has helped support the economy, both national and regional scale. One of the horticulture commodities that is of concern is shallot. In Indonesia, shallots are growing and cultivated by farmers starting in the lowlands to the highlands. At present the production of shallots is not optimal and is still reflected in the diversity of cultivation methods that are characterized by specific agroecosystems where shallot is cultivated [1]. For a long time, shallot was one of the leading vegetable commodities that has been cultivated by farmers intensively [2].

In the daily life of the Indonesian people, shallots never miss as a complementary ingredient in cooking. Shallot is also needed as an industrial raw material [3]. Although fluctuations in prices of shallots go up and down, shallot farming is prospective to be cultivated in the form of farming and industry [4].

In carrying out shallot farming activities cannot be separated from the use of inputs from production facilities. Such as the use of seeds, fertilizers, pesticides, and labour. The lack of knowledge on the use of production factors can result in not maximizing the profits [5]. One of the most influencing shallots production is seeds. The low production of shallot hatchery is caused by not
many producers who want to move in the field of shallot seeding. This is due to the existence of various risks and constraints including high capital, human resources, and production factors [6].

Farmer decision-making attitudes related to the magnitude of risk are also influenced by environmental and cultural factors of the community itself, as well as how farmers use capital in their business both in the use of fertilizers, pesticides, seeds and the intensity of land use, so that the results they get are also different [7].

Basically, Indonesia is able to produce shallot seeds themselves. However, the varieties produced by local shallot hatchery are not as good as imported seeds. Local seeds whose quality is not the same as the quality of imported seeds is due to various risk factors (problems) that exist in the field such as the risk of processing. Risks can cause uncertainty, causing farmer's income to be erratic [8]. Though the cultivation of shallots has good prospects for farmers. However, to do this hatchery requires more intensive attention so that not many farmers want to do this hatchery business. Based on the description, the risk analysis is needed for the onion hatchery business so that it can find out the risks involved in the cultivation of shallots and to minimize risks in the future.

2. Research methodology

2.1. Methods for determining research areas
The location of the study was determined purposively or deliberately taken with certain considerations in accordance with the objectives of the study. This research was conducted in Medan Marelan District, North Sumatra, which is one of the sub-districts of vegetable production centres in the city of Medan.

2.2. Sample determination method
The population in this study were farmers who sought seeding of shallots in the Medan District of Marelan. The number of populations that seeks shallot seeding is 30 people. Sampling for this study was carried out in census, meaning that all population of farmers who made an effort to seed shallots in the Medan District of Marelan were sampled. Thus, the sample size used in this study was 30 people.

2.3. Method of collecting data
Data collection methods carried out in this study are primary data and secondary data. The primary data was obtained through direct interviews with respondents, namely farmers who made an effort to seed shallots in Medan Marelan District by using a list of questionnaires prepared in advance. Secondary data is obtained through relevant agencies and agencies such as the Central Statistics Agency (BSP) and the sub-district office.

2.4. Data analysis method
The data analysis method used in this study is the coefficient variation (CV).

2.4.1. Variety and standard deviation. For measure the spread of risk using a quantitative approach can be calculated using the value of the expected results as an indicator of the probability of investment and the size of the variance and standard deviation as an indicator of risk [9]. Variety can be calculated by the formula:

\[
Vα^2 = \frac{\sum(Qi - Q)^2}{n-1}
\]  

Information:
\( Vα^2 \) : Variance
Q : Production Results, Prices and Revenues
Qi : Average Production Results, Average Prices and Average Revenue
n : Farmer Sample Number

Standard deviation can be calculated by the formula:

\[ V_{\alpha} = \sqrt{V_{\alpha}^2} \]  \hspace{1cm} (2)

Information:
V_{\alpha} : standard deviation
V_{\alpha}^2 : Variance

2.4.2. Variation coefficient (CV). The lowest variation or the lowest risk level is a comparison between the risks that must be borne by the farmer and the amount of income to be obtained as a result of the amount of capital invested in the production process [9]. The variation coefficient can be calculated by the formula:

\[ CV = \frac{V_{\alpha}}{Qi} \]  \hspace{1cm} (3)

Information:
CV : Coefficient Variation
V_{\alpha} : Standard Deviation
Qi : Average Production Results, Average Prices and Average Revenue

2.4.3. Highest lower limit (L). The lower limit of the highest yield is to show the lowest income nominal value that may be received by farmers. If the value is less than zero, then it will most likely suffer a loss. The lower limit of the highest yield can be calculated by the formula:

\[ L = Qi - 2V_{\alpha} \]  \hspace{1cm} (4)

Information:
L : Highest Result Lower Limit
Qi : Average Production Results, Average Prices and Average Revenue
V_{\alpha} : Standard Deviation

3. Results and discussion

3.1. Overview of research sites

The research area was conducted in Medan Marelan district. Medan Marelan district is one of the sub-districts in the Medan City which has an area of about 44.47 km² with an altitude of 5 meters above sea level. The population of Medan Marelan district in 2017 was 169,342 people consisting of 83,552 men and 85,790 women with a population density of 3,808 people per km. The number of people who work as farmers in Medan Marelan district is 4,120.

3.2. Risk level

3.2.1. Production risk. Calculation of production risk in shallot hatchery business is done by analysis of coefficient of variation using the shallot hatchery production data obtained through interviews with respondents can be seen in the Table 1.
Table 1. Production risk of shallot hatchery business

| Description                  | Production Risk |
|------------------------------|-----------------|
| Average Production (Qi)      | 7,753.33        |
| Variety (Vα²)               | 3,073,442.53    |
| Standard Deviation (Vα)      | 1,753.12        |
| Coefficient Variation (CV)   | 0.23            |
| Lower Limit (L)              | 4,247.09        |

Based on the results of Table 1 above the risk of production in shallot hatchery business is 0.23. This means that for each one unit produced, will faced a risk of 0.23. Or for one-kilogram shallot seeds produced, will experience a production risk of 0.23 kg at the time of production risk. The lower limit on the risk of production is 4,247 kg. This means that the lowest production that will be produced by farmers at the time of production risk is 4,247 kg.

Based on interviews conducted with respondents, information was obtained that the risk of production in a shallot hatchery business originated from pest attacks, diseases and volatile weather. Pests that usually attack onion seeds at the time of planting are leaf caterpillars in addition to other pests such as fleas. At the time of planting, shallot hatchery is very susceptible to fungus, the disease that most often attacks at planting is moler, the disease is caused by fungi. To overcome this source of risk, farmers use insecticides to attack pests. To cope with the disease, farmers use fungicides because the diseases that come from fungi.

3.2.2. Price risk. Price is something that is very important for farmers in a farm. The price for a product is always changing according to circumstances, but it is this that can cause a risk to the price. The following calculation of production risk in shallot hatchery business is carried out by analysis of coefficient of variation using data on shallot hatchery production, the results of which can be seen in the Table below.

Table 2. Risk of business prices of shallot hatcheries

| Description                  | Price Risk |
|------------------------------|------------|
| Average Price (Qi)           | 42,500     |
| Variety (Vα²)                | 6,465,517.24|
| Standard Deviation (Vα)      | 2,542.74   |
| Coefficient Variation (CV)   | 0.06       |
| Lower Limit (L)              | 37,414.52  |

Based on the Table above, it is known that the risk of price on a shallot hatchery business is 0.06. This means that price changes for each unit of production sold will faced the risk of 0.06. Or for every one IDR the price of yielded shallot seeds, there will be a price risk of 0.06 rupiah when there is a price risk. Lower limit on the risk of a price of 37,414 IDR/kg or 37,000 IDR/kg. This means that the lowest price that farmers will receive at the time of the risk of a price of 37,000 IDR/kg.

For price risk in shallots hatchery business comes from fluctuations in seed prices that occur. One of the sources that can cause fluctuations in the price of is the prices of shallots. The price of shallot seeds will follow the price of consumption of shallots. If the price of consumption shallots rises, then the price of seeds also goes up, and vice versa if the price of shallots drops then the price of seeds will also decrease. At present, farmers in the research area have not found the best solution to overcome these price fluctuations. However, they always pay attention to the development of consumption shallot prices that occur. If when prices rise, farmers will immediately offer shallot seeds to potential buyers.
3.2.3. Income risk. Revenue is the result obtained by farmers on shallot hatchery from the receipt of sales results which have been deducted by costs incurred during the farming process. Income risk is analysed using a coefficient whose results can be seen in Table 3.

Table 3. Business income risk of shallot hatchery

| Description             | Income Risk       |
|-------------------------|-------------------|
| Average Income (Qi)     | 180,454,196.75    |
| Variety (Va^2)          | 3,615,207,895,833,940 |
| Standard Deviation (Va) | 60,126,598.9     |
| Coefficient Variation (CV)| 0.33             |
| Lower Limit (L)         | 60,200,998.94    |

Based on Table 3, it is known that the risk of income in the onion hatchery business is 0.33. This means that the results of income in the cultivation of shallots in 1 year will face a risk of 0.33. Or for every 1 IDR of shallot seeds income generated, will experience an income risk of 0.33 IDR when income risk occurs. Lower limit on risk of income of 60,200,998.94 IDR. This means that the lowest income that will be received by farmers at the time of the risk is 60,200,998.94 IDR.

There are several sources of risk in income risks such as the amount of production, fluctuating prices, large farming costs and lack of market demand. If production decreases, income will also decrease. Likewise, if the selling price of shallot seeds decreases, the income will also decrease. Therefore, production risk and price risk can affect income risk. Production costs also affect income risk. In addition to production, prices and labour costs, the demand for shallot seeds on the market also affects income. The market demand for shallot seeds in the study area is not too high so respondents have to offer seeds to other regions. According to information obtained from interviews with farmers, farmers in the study area who did not grow shallots due to their fear of failure during the production process.

4. Conclusion

Based on the results of the analysis and discussion, it can be concluded that the biggest risk from the business of shallots hatchery is income risk, followed by production risk and price risk. Income risk is caused by production, price, and market demand. For production risks caused by pests disease and erratic weather and for the price risks caused by fluctuating prices.

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