Demand and supply of shallot in North Sumatera Province

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Abstract. Shallots have a fluctuating demand therefore this is not balanced by a continuous supply. The purpose of this study was to see what factors influence the demand and supply of shallots in north Sumatera province. The method of analysis used is a simultaneous equation approach using data from 1989-2018 and processed with the help of software programs. 10. The results show that the price shallots, population together had a significant effect on the demand of shallots in north Sumatera province. The price of shallots, harvested area and fertilizer prices together had effect on the supply of shallots north Sumatera. Per capita income and fertilizer prices together have effect on the price of shallots in north Sumatera province.

1. Introduction

Shallot (Allium ascalonicum L.) has potential market, so it is included in the national superior commodity. Shallot is one of the strategic commodities because most of the Indonesian people need shallot for daily cooking spices so as it affects macroeconomic and inflation rates [1]. Shallot supply is not always made by the producers throughout the year because it depends on the growing and harvest season [2,3]. In addition, the demand by consumers will continue throughout the year because the consumption of shallot is carried out throughout the year considering that shallot is a strategic need of the people of North Sumatera Province with the increasing of population throughout the year [4].

An increase in shallot has actually become a common thing, one of which causes the rising of prices due to the increased cost of production such as the price of fertilizer used for successful harvest. However, extreme price rises in a relatively short time will be a big question mark. Not only natural factors, post-harvest factors also have the potential to influence this problem. In this case, the consumption of shallot will depend on the community's ability to buy shallot at a price that is relatively rising every year based on how much income the community receives [5].

The results of on harvest area variable reveals that harvest area has a significant / significant effect on the shallot planting area, price and prices TSP fertilizers. The elasticity of shallot supply to the price of shallots in North Sumatera both short and long inelastic term [6,7,8]. Because shallot is a strategic need, then this research is needed in order to find out the factors influencing the demand and supply of shallot North Sumatera with the aim of the study was to analyse the factors influencing the demand, supply and price of shallot in North Sumatera Province.
2. Research methods

2.1. Method of data collection
The data used in this study were secondary data from 1989 to 2018 (yearly). The sources of data were obtained from the Central Bureau of Statistics of North Sumatera Province, the Department of Food Security of North Sumatera Province, the Department of Agriculture, other relevant agencies, and also taken from books and scientific journals related to the Demand and Supply of Shallot in the Province of North Sumatera.

2.2. T test (statistic test)
   a. If prob. < α, H₀ is rejected and H₁ is accepted, that is, there is significant influence between the independent variable on the dependent variable with = 0.05.
   b. If prob. > α, H₀ and H₁ are rejected, that is, there is no significant effect between the independent variable on the dependent variable with = 0.05

2.3. F test (simultaneous test)
   a. If prob. (F-statistic) < α, then H₀ is rejected and Hₐ is accepted, that is, there is a significant influence between the independent variables together on the dependent variable with = 0.05
   b. If prob. (F-statistic) > α, then H₀ is accepted and Hₐ is rejected, that is, there is not significant effect between the independent variables together on the dependent variable with =0.05

2.4. Coefficient of determination (R²)
   a. 1. If R² = 0 or close to 0, then there is no significant effect between the independent variable on the dependent variable.
   b. 2. If R² = 1 or close to 1, then there is a significant influence between the independent variable on the dependent variable.

3. Results and discussion

Table 1. Factors affecting the demand for shallots in North Sumatera Province

| Variable                        | Coefficient | Stnd. Error | t-Statistic | Prob.    |
|---------------------------------|-------------|-------------|-------------|----------|
| C                               | -17829.12   | 10976.17    | -1.624348   | 0.1164   |
| Prices of Shallots (HBM)        | -0.215994   | 0.098464    | -2.193634   | 0.0374   |
| Total Population (JPD)          | 0.004083    | 0.000997    | 4.093920    | 0.0004   |
| Income / Capita (PKK)           | 6.43E-05    | 6.82E-05    | 0.942960    | 0.3544   |

R-squared                        | 0.752550    |
Adjusted R-squared               | 0.723998    |
F-statistic                      | 26.35729    |
Prob(F-statistic)                | 0.000000    |

The shallot demand equation model in this study was as follows:

\[
Q_d = -17829.12 + -0.215994(HBM) + 0.004083(JPD) + 6.405(PKK) \quad (1)
\]

The value of R² shows that 75.52% of the exogenous variables used are able to explain endogenous variables. The results of the coefficient estimation variable population amounted to 0.004083 and the significant level was of 0.0004 < α = 0.05, then H₀ was rejected and Hₐ was accepted. Partially, there was a positive and significant effect of the population number at the demand of shallots in North Sumatera Province. If there is an increase in the population of North Sumatera Province by 1 person,
then the demand for shallots in North Sumatera Province would be increasing by 0.004083 ton in one year. While the result of coefficient estimation on income per capita variable was 6.43E-05 and the level was significant at the probability of 0.3544 > α = 0.05, then H₀ was accepted and H₁ was rejected. This means that there was a partially positive and insignificant effect of income per capita to shallot demand in North Sumatera Province.

Table 2. Factors affecting the shallots supply in North Sumatera Province

| Variable               | Coefficient | Std. Error | t-Statistic | Prob   |
|------------------------|-------------|------------|-------------|--------|
| C                      | 17419.17    | 3195.124   | 5.451800    | 0.0000 |
| Price of Shallots (HBM)| -0.096081   | 0.126062   | -0.762173   | 0.4528 |
| Fertilizer Prices (HPU)| 2.173578    | 0.790812   | 2.748540    | 0.0107 |
| Harvested Area (LP)    | 3.088338    | 2.655021   | 1.163207    | 0.2553 |
| R-squared              | 0.612361    |            |             |        |
| Adjusted R-squared     | 0.567633    |            |             |        |
| S.E. of regression     | 3101.860    |            |             |        |
| Sum squared resid      | 2.50E+08    |            |             |        |
| F-statistic            | 13.69088    |            |             |        |
| Prob(F-statistic)      | 0.000015    |            |             |        |

From the estimation, the shallot supply equation model obtained in this study was as follows:

\[ Q_s = 17419.17 + -0.096081(HBM) + 2.173578(HPU) - 3.088338(LP) \] (2)

The result of R² from the simultaneous equation of shallot supply in North Sumatera Province amounted to 0.6123 (61.23 percent). The result of coefficient estimation on the price of shallot, land area, and fertilizer price on the supply of shallot in North Sumatera Province. The result of the estimated coefficient of harvest area variables was significant at the probability of 0.2553 > α = 0.05, then H₀ was accepted and H₁ was rejected. Partially, there was no significant effect of harvested area on the supply of shallot in North Sumatera Province. Because the harvest area in North Sumatera was very small compared to the very high supply, then shallot was taken from Java Island to meet the supply in North Sumatera.

The result of the estimated coefficient of fertilizer price variable was 2.173578 and the level was significant at probability of 0.0107 < α = 0.05, then H₀ was accepted and H₁ was rejected. This means that partially there was a positive and significant influence between the price of fertilizer on the supply of shallot in North Sumatera Province. If there is an increase in fertilizer price in North Sumatera Province by 1 rupiah per kilogram, then the supply of shallot in North Sumatera Province would increase by 0.0107 ton in one year. The result of R² from the simultaneous equation of shallot prices in North Sumatera Province equal to 0.821542 (82.15 percent), meaning that shallot and fertilizer price variable simultaneously had effect of 82.15 percent of the shallot price in North Sumatera Province, while the remaining 4.59 percent was influenced by other variables outside the estimation model. There was a significant positive relationship between the variable’s shallot price and fertilizer price in North Sumatera Province.

From the estimation, the shallot price equation model obtained in this study was as follows:

\[ HBM = -13082.81 + 0.000170(PPK) + 4.085302(HPU) \] (3)
The estimation result of income per capita coefficient was of 0.000170 and a significant level on probability was 0.1405 > α = 0.05, then H₀ was accepted and H₁ was rejected. Partially, there was a positive and insignificant influence between income per capita income and shallot price in North Sumatera Province. While the result of the estimated fertilizer price coefficient variable amounted to 4.0853 and a significant level was on probability of 0.0003 <α = 0.05, then H₀ was rejected and H₁ was accepted. Partially, there was a positive and significant effect of fertilizer price on the price of shallot in North Sumatera Province. If there is an increase in fertilizer prices in North Sumatera Province by 1 rupiah per kilogram, then the price of shallots in North Sumatera Province would increase by 4.0853 rupiahs in one year.

Table 3. Factors affecting the price of shallots in North Sumatera Province

| Variable               | Coefficient | Stnd. Error | t-Statistic | Prob. |
|-----------------------|-------------|-------------|-------------|-------|
| C                     | -13082.81   | 3577.498    | -3.656971   | 0.0011|
| Income/Capita (PPK)   | 0.000170    | 0.000112    | 1.518448    | 0.1405|
| Fertilizer Prices (HPU)| 4.085302   | 0.990325    | 4.125214    | 0.0003|
| R-squared             | 0.821542    |             |             |       |
| Adjusted R-squared    | 0.808323    |             |             |       |
| F-statistic           | 62.14813    |             |             |       |
| Prob(F-statistic)     | 0.000000    |             |             |       |

4. Conclusions
The price of shallot and the number of residents jointly had a significant effect the demand for shallots in North Sumatera Province. Variable income per capita was partially positive and had not significant effect on shallot demand in North Sumatera Province, while the variables population number and the price of shallot partially has a positive and significant effect on the demand for shallots in North Sumatera Province.

The price of shallot, harvested area, and price of fertilizer simultaneously had a significant effect on supply of shallot North Sumatera Province. The variables price of shallot and harvest area partially had a positive and not significant effect on the supply of shallot in North Sumatera Province while the variable price of fertilizer partially significantly affected the supply of shallot in the Province of North Sumatera.

Per capita income and fertilizer prices have a significant effect the price of shallots North Sumatera. Per capita income variable is not partially significant to the price of shallots in North Sumatera. While the fertilizer price variable partially has a positive and significant effect on the price of shallots in North Sumatera Province.

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