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Factors that influence the interests of farmer in shallots farming at Cinta Dame village of Simanindo sub district of Samosir district

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Abstract. Shallots contains a lot of usefull ingredients for human life, especially as flavor to dishes by Indonesian.The need for shallots was increasing as increasing population. The increased demand of shallots caused the price to increase due to production in North Sumatera was low. The objective of this study is to analyze interest and factors that affect the interest of farmers in shallots farming and analyze the responses from each factors to the interest of farmers in shallots farming. The samples were 85 farmers in shallots farming. Binomial logit was used as data analysis method. The result of the study showed that the factors that influence the interest of farmers in shallots farming consist of land area, experience, income, supporting and trauma.. The opportunity of farmers in shallots farming increased 22% if the area of land increased by one acre. The probability variable with the supporting is higher 0,3 % compared without the supporting. While the probability variable without the trauma is higher 0,014 % compared with the trauma.

1. Introduction

Shallot has an important meaning for society. Both from its high economic value and its nutritional content. Shallot is not a basic necessity, but its needs can hardly be avoided by household consumers as a complement to dishes and useful for health.

One of the provinces producing shallots in Indonesia is North Sumatra Province. Shallots harvest area in North Sumatera in 2015 is 1,238 acre with production of 9,971 tons. As for the consumption of shallot in North Sumatra of 25,503 tons. There is a shortage of shallot production of 15,532 tons [1]

One of the shallot producing districts in North Sumatra is Samosir. It was famous for its local shallot since it used to be a national shallot producer. Samosir and surrounding areas include Samosir regency, Humbang Hasundutan regency, Simalungun regency, North Tapanuli regency is the main producer of shallots in North Sumatera with the name of local varieties Samosir.The characteristic of local shallots of Samosir has a more red color, low water content, has a more spicy taste. In addition, the price of local shallots has a high selling price in the market. At the time of harvest season, shallot farmers can also enjoy the proceeds from the sale of shallots which has become an economic source for farmers in Samosir.

Interest is closely related to attitude. Interest and attitude are also important in making decisions. Interest can cause a person to actively do something that has interest him. Interest can be a motivation that can provide benefits and satisfaction. Interest arises because of the feeling of being happy with something, having a positive nature and the desire and need to achieve goals.The use of interest as a

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key aspect of conformity between a person and a job makes it a reason to know what factors influence the interest of the farmers to plant shallots.

Simanido sub-district is one of the largest shallots producing areas in Samosir regency compared to other districts with productivity of 6.50 tons /acre. Therefore Cinta Dame village became the research destination area because the village is the biggest production center of shallot in Simanindo District with shallots harvest area in 2015 is 41.9 acre and production 270.9 ton.

In reality, the production produced by farmers in Cinta Dame has not been satisfy these days. The problems that occurred in recent years have caused farmers' constraints to increase shallots production. The main problems are pest attacks, expensive seed prices and unavailability of superior seeds. However, because the selling price of shallot and the high demand of shallot is expected by farmers can give hope again to plant shallots. Therefore, it can be a motivation for farmers to further increase the production of shallots. This study seek to empirically analysed interest and factors that affected interest and analysed responses from each factors in shallots farming.

2. Methodology

The location of the research is purposive in Cinta Dame Village, Simanindo Subdistrict, Samosir District. The reason of determining the location is because Samosir is one of production center of shallots in North Sumatera. While the determining of research location in the village of Cinta Dame with the reason that the village is the largest shallots production center area in Samosir district Simanindo with shallots crop area in 2016 is 41.9 acre and production 270.9 tons.

Population in this study were 109 sample of shallots farmer. The method of determining the sample size is determined by the Slovin method, sample size for each group based on the following formula:

$$n = \frac{N}{1+(N(\propto^2))} \quad (1)$$

Where :
N : Sample population
n : Sample size
$\propto$: level of accuracy (level of precision 0.05) [2].

So the number of samples of shallot farmers is determined as many as 85 of the shallot farmer population. Samples were drawn randomly using simple random sampling.

In analyzing interest and factors that influence the interest of farmers in shallots farming and analyze the responses from each factors to the interest of farmers in shallots farming, we use logistic regression model. Our regression model will be predicting the logit, that is, the natural log of the odds of having made one or the other decision. Logistic regression analysis studies the association between a categorical dependent variable and a set of independent (explanatory) variables. The name logistic regression used when the dependent variable has only two values, such as 0 and 1.

2.1 Model Specification

In analyzing the factors that influence the interest of farmers in shallots farming and analyze the responses from each factors to the interest of farmers in shallots farming, we specify a mathematical logistic regression model. The model is thus;

$$ln\left\{\left[\frac{P}{1-pi}\right]\right\} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 \quad (2)$$

Where : $ln\left\{\left[\frac{P}{1-pi}\right]\right\}$ is odd ratio where (p) explain the predicted probability of the event which is coded with 1 (interest), (1-p) is the predicted probability of the other decision which is coded with 0 (not interest).

β_0 = Intercept

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ = Coefficient of land area, experience, income, supporting from government and trauma

X_1 = Land area (acre)
X_2 = Experience (years)
X_3 = Income
(X=1 for income over the regional minimum wage)
(X=0 for income below the regional minimum wage)
X_4 = Supporting from government
(X=1 with supporting)
(X=0 without supporting)
X_5 = Trauma
(X=1 without trauma)
(X=0 for trauma)

2.2 Parameter Testing

2.2.1 *Concurrent Testing*. It is performed to know the significance of β parameters as a whole or simultaneously. This recitation hypothesis is:

$$H_0 ; \beta_0 = \beta_1 = \cdots = \beta_8 = \beta_p = 0. \quad (3)$$

With rejection: reject H_0 if value G > X_(α,1)^2 Where p is the number of statistical variables in the model or p- value < α..

2.2.2 Individual Test (Wald Test). It is intended to examine the significance of individual β parameters. This recitation hypothesis is:

$$H_0 ; \beta_j \qquad H_1 : \beta_j \neq 0, \ j = 1, 2 \ldots, p \quad (4)$$

With statistical tests:

$$W \text{ (Wald)} = \frac{\beta_j}{S.E\ (\beta_{j)}} \quad (5)$$

Denial area : reject H_0 if $W_j^2 > \mathcal{X}_{\alpha,1}^2$ or p- value < α

2.2.3 Hosmer and Lemeshow Test. This test aims to compare the distribution of observation with the distribution of theory (model test).
Criteria Test :
If sign < 0,1 then accept H_1 reject H_0
If sign > then accept H_0 reject H1 [3]

2.2.4 Odd Ratio and calculation of marjinal effect. Odds ratio is a measure of risk or inclination to experience a certain incident between one category with another category is defined as the ratio of odds to = 1 to = 0. The value of odds ratio is used to interpret the relationship between independent variables with dependent variables that have differences with multiple linear regression with independent variables in the form of continuous (quantitative) [4].
Marginal Effect can be calculated by using the below equation:

$$p_{i=} \frac{1}{1 + e^{-\beta_i X_i}} = (1 + e^{-\beta_i X_i})^{-1}$$
$$\frac{dp_i}{dx_i} = \frac{d\,(1 + e^{-\beta_i X_i})^{-1}}{dx_i}$$
$$= -1(1 + e^{-\beta_i X_i})^{-2} \ \frac{d(1+ e^{-\beta_i X_i})^{-1}}{dx_i}; \left(e^{u\,(X)}\right) = e^{u\,(X)}\, U'(X) \quad (6)$$
$$= -\frac{1}{(1+ e^{-\beta_i X_i})^2} \left(0 + e^{-\beta_i X_i}\right)(-\beta_1)$$

$\beta \frac{1}{1+e^{-\beta iXi}} \frac{e^{-\beta iXi}}{1+e^{-\beta iXi}}$;1 – pi = $\frac{e^{-\beta iXi}}{1+e^{-\beta iXi}}$

= $\beta_i \ P_i \ (1 - \ P_i \ )$ [5].

3. Result and Discussion

Table 1. Result of Factors that Influenced the Interest in Shallots Farming

Variable	B	S.E.	Wald	Sig.	Exp(B)
Land area	1.38	0.55	3.47	0.042	3.991
Experience	0.01	0.14	0.005	0.941	1.013
Income	0.73	1.16	0.15	0.699	2.092
Supporting	5.79	1.45	11.98	0.001	0.003
Trauma	4.21	1.20	7.831	0.005	0.015
Constant	0.18	1.84	0.005	0.944	1.204

The estimated model is thus:

$$Ln \frac{p}{1-p} = 1.204 + 3.991 X_1 + 1.013 X_2 + 2.092 X_3 + 0.003 X_4 + 0.015 X_5 \quad (7)$$

Interpretation of result in logistic regression model :

3.1 Wald Test

Table 1 show that land area, supporting and trauma contributed significantly influenced farmer interest in shallots farming but income and experience did not. The p-value for land area, supporting and trauma are 0.042, 0.001 and 0.005 (<0.05) while p-value for income and experience 0.699 and 0.941 (>0.005).

3.2 Omnibus and Hosmer –Lemeshow Test

Table 2. Omnibus and Hosmer&Lemeshow Factors that Influence the Farmer Interest in Shallots Farming

Test	Omnibus	Hosmer & Lemeshow
Chi Square	93.959	1.760
Sig	0.00	0.972

Table 2 gave the result which indicated whether the inclusion of variables contributed significantly to model fit. A p-value (sig) of less than 0.05. The null hypothesis was rejected. Therefore, the model is statistically significant.

The Hosmer – Lemeshow tested the null hypothesis that predictions made by the model fit perfectly with observed group memberships. The Hosmer – Lemeshow statistic assumed sampling adequacy. Hosmer and Lemeshow statistic has a significance of 0.972 which means that was not statistically significant and therefore the model was quite a good fit.

3.3 Interpretation of Quantitative and Category Variables Exp (B)

Quantitative variables consist of land area and experience. Marginal effect is used to explain the quantitative variables indicated by the value of C_i where:

$$C_i = \beta_i \ P_i \ (1 - \ P_i \ ) \quad (8)$$

To calculate the value of C_i , then first calculate the value of P_i by antilog value of $ln\ \frac{P_i}{1-P_i} = \beta_i$ ($ln\ \frac{P_i}{1-P_i} = 1.38$). By entering value of β_i then, $\frac{P_i}{1-P_i} = e^{1,38}$ the value is obtained $\frac{P_i}{1-P_i} = 3.991$. By solving the previous equation, the value will be obtained $P_i = 0,8$. After obtaining the value of P_i then can be searched value of C_i by entering value $\beta_i = 0,8$ into the equation of C_i , $C_i = \beta_i\ P_i\ (1 - P_i)$. Then the value will be obtained $C_i = 0,22$.. Similarly, to calculate the marginal effect of experience variables by entering value of β_i. ($\frac{P_i}{1-P_i} = e^{0.013}$). The value is obtained $\frac{P_i}{1-P_i} = 1.013$ and then we can find the value will be obtained $P_i = 0.5$. By entering value of P_i into the equation of $C_i = \beta_i\ P_i\ (1 - P_i)$. We can obtain the value of C_i = 0.003 for experience variable.

Marginal effects showed the change in probability when the predictor or independent variable increases by one unit. Interpretation marginal effect of land area has the value of marginal effect 0.22. It means that when land area is raised by one unit (one acre) so that opportunity the farmer to plant shallots increasing 22 %.

This is in accordance with previous research, the results of the study stated that the Odss Ratio of farmers' land area is 2.484, if the area of farmers increasing one acre then the possibility to participate increasing by 2.484. The land area affected farmers in participating in the certification of oil palm, the greater the farmers' land the more likely to participate in the sustainability of their businesses in the future [6].

Interest is essentially a result of experience. Interest develops as a result of an activity and will cause it to be used again in the same activity [7]. Interpretation marginal effect of experience has the value of marginal effect 0.003. It means that every increase of one unit (one year) will increase the opportunity of farmer to plant shallot 0,3 %.

Category variables consist of income, supporting and trauma. To interpret the category variable by specifying when $X_i = 1$ into this equation $ln\ (\frac{P_i}{1-P_i}) = \beta_0 + \beta_i X_i$ then $ln\ \left(\frac{P_i}{1-P_i}\right)$ increasing as β_i or $\frac{P_i}{1-P_i}$ increasing as exp (β_i). The Exp (B) in the Table 1 presented the extent to which raising the corresponding measure by one unit influences the odds ratio.

Income variable consist of 2 variable X_1 = 1 and X_2 = 0 where X_1 = 1 show that income over the regional minimum wage and X_2 = 0 show that income below the regional minimum wage. The income variable is known $ln\ (\frac{P_i}{1-P_i}) = \beta_i X_i$ when income has X_1 = 1 then $ln\ (\frac{P_i}{1-P_i}) = \beta_i$ while X_2 = 0 then $ln\ \left(\frac{P_i}{1-P_i}\right) = 0$. It means that value $ln\ \left(\frac{P_i}{1-P_i}\right)$ at income over the regional minimum wage is higher as β compared by income below the regional minimum wage. The next step, we calculate P_i for income variable by antilog $ln\ \frac{P_i}{1-P_i} = 0.738$ then, $\frac{P_i}{1-P_i} = e^{0.738}$. the value is obtained $\frac{P_i}{1-P_i} = 2.092$. By solving the previous equation, the value will be obtained $P_i = 0.67$. The results obtained that the probability variable of income over the regional minimum wage is higher 67% compared by income below the regional minimum wage.

This is accordance with the previous study, the regression analysis can be seen that the income gives a positive influence on the farmer's interest in Sendangan village and has a significant influence on the real level of α 0.1 percent, the increase of income has a positive effect on the interest of farmers as much as 0.001 rupiah by assuming that other factors are constant. [8].

Supporting variable consist of 2 variable X_1 = 1 and X_2 = 0 where X_1 = 1 show that with the supporting and X_2 = 0 show that without supporting. The supporting variable is known $ln\ (\frac{P_i}{1-P_i}) = \beta_i X_i$ when supporting has X_1 = 1 then $ln\ (\frac{P_i}{1-P_i}) = \beta_i$ while X_2 = 0 then $ln\ \left(\frac{P_i}{1-P_i}\right) = 0$. It means that value $ln\ \left(\frac{P_i}{1-P_i}\right)$ with the supporting is higher as β compared without the supporting. The next step, we calculate P_i for supporting variable by antilog $ln\ \frac{P_i}{1-P_i} = 5.79$ then, $\frac{P_i}{1-P_i} = e^{5.79}$. the

value is obtained $\frac{P_i}{1-P_i} = 0.003$. By solving the previous equation, the value will be obtained $P_i = 0{,}003$. The results obtained that the probability variable with the supporting from government is higher 0.3 % compared without the supporting from government.

Stimuli coming from the environment or scope that matches one's desires or needs will be easy to generate interest [9]. The supporting gained by each farmer, such as production and technology factors that can generate or increase production, will increase the interest of farmers higher and encourage farmers to keep working on paddy farming [10].

And the last variable is trauma. Trauma variable consist of 2 variable X_1 = 1 and X_2 = 0 where X_1 = 1 show that without the trauma and X_2 = 0 show that with the trauma. The trauma variable is known $ln\ (\frac{P_i}{1-P_i}) = \beta_i X_i$ when trauma has X_1 = 1 then $ln\ (\frac{P_i}{1-P_i}) = \beta_i$ while X_2 = 0 then $ln\ \left(\frac{P_i}{1-P_i}\right) = 0$. It means that value $ln\ \left(\frac{P_i}{1-P_i}\right)$ without the trauma is higher as β compared with the trauma. The next step, we calculate P_i for trauma variable by antilog $ln\ \frac{P_i}{1-P_i} = 4.21$ then, $\frac{P_i}{1-P_i} = e^{4.21}$. the value is obtained $\frac{P_i}{1-P_i} = 0.0015$. By solving the previous equation, the value will be obtained $P_i = 0.0014$. The results obtained that the probability variable without the trauma is higher 0.014 % compared with the trauma.

Changes in farmers' interest towards shallot are caused by pests attacking nearly 90% of the farmer in Cinta Dame Village. The infected shallots caused shallots were die and the crop to be failure. The virus attacks caused some trauma farmers to plant shallots again.

The results of this study in accordance with previous research, it explained that one of the factors that affect the low interest of farmers to apply environmentally friendly chili cultivation is pest and disease attack [11].

4. Conclusion and Recommendation

Based on the findings of this study, we conclude that land area, experience, income, supporting and trauma influenced the interest of farmer in shallots farming simultaneously. While land area, supporting and trauma influenced the interest of farmer in shallots farming partially.

Therefore, the government should increase facilities and infrastructure as a government's support to farmers in running of shallots farming. The government also should keep the stability of shallots's price in selling the products of shallots.

References

[1] Central Agency on Statistics. 2014. Samosir in numbers, 2015
[2] Supriana, T. 2016. Socio-Economic Research Methods. USU press, Medan
[3] Hosmer, D.W., dan Lemeshow, S. 2000. Applied Logistic Regression. John Wiley dan Son. New York
[4] Gujarati, D. 2006. Fundamentals of Econometrics. Erlangga, Jakarta
[5] Chalil, D. 2014. Qualitative Data Analysis. USU press, Medan
[6] Emilia, R. 2014. Factors that Affect the Farmer Interest of People's Palm Oil in Product Certification in Kampar District. Agribusiness Department. Agriculture Faculty. Riau University
[7] Khairani , H. 2013. Psychologist Learning. National Library of Indonesia. Yogyakarta: Aswaja Persindo
[8] Muawiyah, S. 2014. Factors that Affect Rice Farmers' Interest in Sendongan Village, Kakas Subdistrict. Journal of Socio-Economic Research. Agriculture Faculty Sam Ratulangi University Manado. Manado
[9] Crow and crow. 1973. An outline of Pscicology (Translation Z. Kazijan) Surabaya : PT Bina Ilmu
[10] Widowati, S. 2007. Healthy with Low Glycemic Food Index. News Research and Development of Agriculture Vol. 29. No. 3
[11] Astuti, P. 2013. Factors - Causes of Low Interest in Farmers to Implement Green Chili Cultivation in South Lampung District. Agriculture Department of South Lampung Regency