

Analysis of Factors Affecting the Smallholder Rubber Farming Production

(Case Study: Desa Terusan Tengah, Tinggi Raja District, Asahan Regency)

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Abstract : The aim of this study is to analyze the factors that affect the production of smallholder rubber in the Desa Terusan Tengah, Tinggi Raja District, Asahan Regency. The research sample was taken using the Nonprobability Sampling method with the snowball sampling technique. Total samples 38 respondents are the rubber farmer who are domiciled willingly to be interviewed. Data were analyzed using multiple linear regression test. The independent variables in this study were land area, plant age, capital and farming experience. The dependent variable is smallholder rubber production. The results showed that the variable production factors (land area, plant age, capital, farming experience) simultaneously has a significant effect on smallholder rubber production. While partially the variables (land area, plant age, capital, farming experience) has a significant influence on smallholder rubber farming production in Desa Terusan Tengah.

Keywords: Smallholder Rubber farming, Factors Of Production, Production

1 Introduction

Rubber (*Hevea brassiliensis*) is one of main commodities that has a significant contribution to national income. Rubber commodity occupies a fairly important position as a source of non-oil and gas foreign exchange for Indonesia and as a source of income for more than 10 million farmers and absorbs around 1.7 million workers, supplies the rubber raw materials and also play an important role in encouraging the growth of new economic centers in the rubber development area as well as in preserving the environment and biological resources [1].

According to FAOSTAT data (2018), Indonesia is the largest natural rubber producer in the world with a total production of 3,630,268 tons in 2018 and occupies the second position after Thailand. In 2018, Thailand produced 4,744,250 tons of natural rubber. While the third place in 2014 Vietnam is a country that produces natural rubber with a total production of 1,137,725 tons. Additionally, according to Barani (2008), rubber farming has problems at low production levels, rubber productivity is currently relatively low because it is only around 900 - 1000 Kg/Ha/Year [12].

Besides, the smallholder rubber plantation are

not well-managed. Smallholder farmers prefer to cultivate rather than o farming. Cultivation is lack of good growing conditions consideration. Most of plant rubbers grow without intensive rejuvenation such as fertilization and cleaning of pests and diseases. For farmers, rejuvenating the rubber plants means losing their main source of income. During the TBM period, the rubber plantation area still provide income for the farmers. Modification of plant spacing needs to be done for ease of intercropping [6].

Based on these problems, it is necessary to identify what are influential factors on rubber production in the Terusan Tengah Village, Tinggi Raja District, Asahan Regency.

2 Problem Formulation

How is the influence of land area, plant age, capital and experience in farming on smallholder rubber production in Tengah Tengah Village, District Tinggi Raja, Asahan Regency?

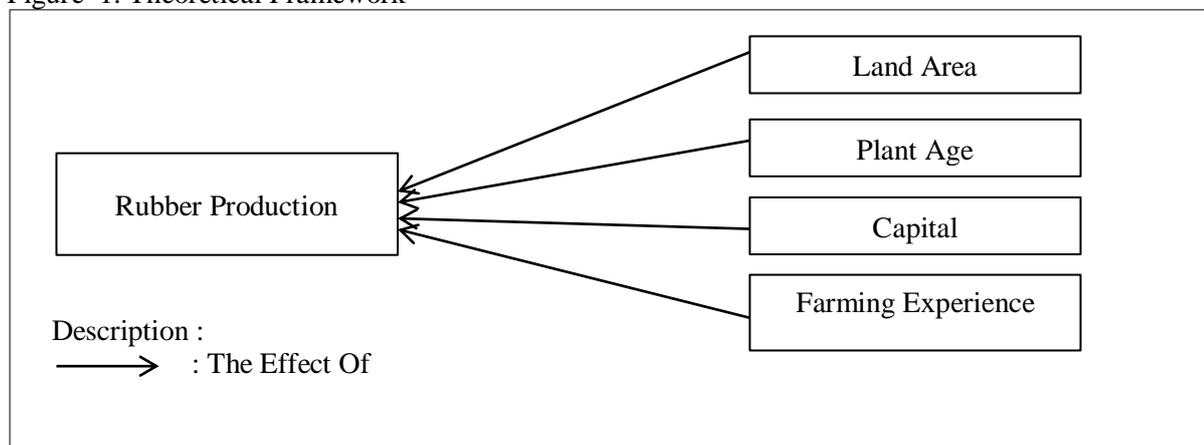
2.1 Theoretical Framework

The land area is one factors affecting the production. The wider the area, the more the production of latex. Others factors is plant age that affects production. The

older the tree, the lower the productivity of the rubber plant. Moreover, capital also affects the rubber plants production, the more capital, the more resources for farmers to grow and cultivate the rubber plants.

Farmers' experience is considered to be one of the factors that affects the production. The higher the farmers' experience, the more skilled it will be.

Figure 1. Theoretical Framework



2.2 Implementation Method

This research was conducted in Desa Terusan Tengah, Tinggi Raja District, Asahan Regency. The determination was made intentionally with the consideration that Desa Terusan Tengah is one of the villages whose residents work as rubber farmers. The research was took place in 2021.

The population of this study were rubber farmers in the Desa Terusan Tengah, Tinggi Raja District. The research sample was taken using the nonprobability sampling method with the snowball sampling technique. Total samples 38 respondents are the rubber farmer who are domiciled in Desa Terusan Tengah and willingly to be interviewed. The primary data was obtained from direct interviews based on a list of questionnaires. While secondary data is obtained from various agencies such as the Department of Agriculture of the Asahan Regency, the Central Bureau of Statistics, the Office of the Head of Desa Terusan Tengah, and relevant literature.

The identification of factors was done by multiple linear regression analysis. The Microsoft Excel and SPSS programs are used for testing. The suggested mathematical model is as follows:

$$Y = f (X_1, X_2, X_3, X_4, e) \text{ or}$$

$$Y = \alpha + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + e$$

Estimator model :

$$Y = b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + e$$

Where

Y = Rubber production (kg)

b₀ = intercept (constant)

b₁...b₂ = Regression coefficient

X₁ = Land area (Ha)

X₂ = Plant age (Year)

X₃ = Capital (Rp)

X₄ = Farming experience (Year)

e = Disruption coefficient

3 Problem Solution

3.1 Factors Affecting The Rubber Production

An analysis was used to determine the effect of independent variables such as land area (X₁), plant age (X₂), capital (X₃) and farming experience (X₄), on smallholder rubber production in Desa Terusan Tengah, Tinggi Raja District, Asahan Regency. For this purpose, the classical assumption test (normality test, multicollinearity and heteroscedasticity test) was carried out.

Based on the results of the normality test carried out with the one sample Kolmogorov-Smirnov Test, the Asymp value was obtained. Sig of 0.200 > 0.05. It is concluded that the data is normally distributed.

The results of the multicollinearity test showed that the data is free from symptoms of multicollinearity. It is proved by the tolerance value was > 0.1 and the VIF value was < 10. The tolerance values X₁ to X₅ are 0.547, 0.837, 0.444, 0.641, 0.608 and the VIF values X₁ to X₅ are 1.829, 1.194, 2.254, 1.559 and 1.644, respectively.

Heteroscedasticity test is carried out to look for the pattern of the distribution of points on the scatterplot diagram (Priyatno, 2009). According to Ghozali (2011), the heteroscedasticity test aims to test whether in the regression model there is an inequality of variance from the residuals of one observation to another observation.

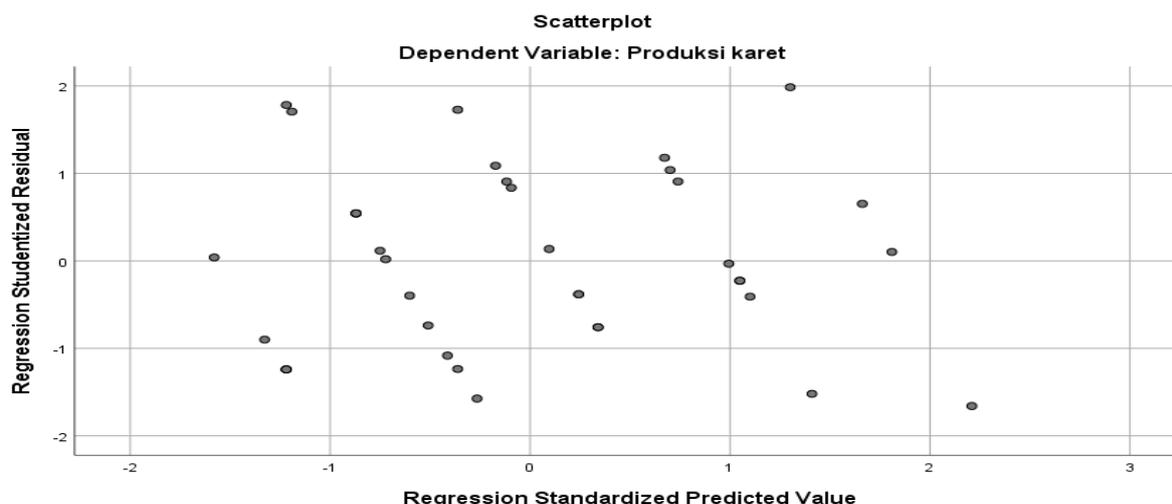


Figure 2. Scatterplot Diagram
 Source : Primary data, 2019

Figure 2 shows that the scattered dots do not form a certain pattern like the wavy pattern. So it can be concluded that there is no heteroscedasticity.

Furthermore, the regression equation model can be seen:

$$Y = 0,686 + 0,296X_1 - 0,141X_2 + 0,537X_3 + 0,174X_4 + e$$

Table 1. Regression Analysis of the Effect of Several Factors on Smallholder Rubber Production in Desa Terusan Tengah

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	VIF
	B	Std. Error	Beta			
1 (Constant)	.686	.204		3.368	.002	
Land area	.296	.120	.222	2.469	.019	3,640
Plant age	-.141	.039	-.172	-3.581	.001	1,047
Capital	.537	.077	.630	6.985	.000	3,679
Farming experience	.174	.078	.158	2.238	.032	2,257
R ²	0,927					
F _{count}	104,664				0,000	

Source: Primary data analysis, 2021

Table 1. shows the value of R square in the multiple linear regression analysis test of 0.927. It implies that the variables of land area (X1), plant age (X2), capital (X3), farming experience (X4) have an effect of 92.7% on production. people's rubber. The remaining 7.3% is explained by other variables not included in the estimation model.

The value of sig.F is 0.000. As sig. F 0.05. Thus, it can be concluded that H1 is accepted and H0 is rejected. The variables of land area, plant age, capital, education level, farming experience simultaneously affect the rubber production of smallholder of Desa Terusan Tengah.

The results of the t-test analysis was shown in Table 2. There is a significant effect between the

independent variable (X) on the dependent variable (Y), thus H1 is accepted, as the value of sig 0.05 and H0 is rejected.

3.1.1 Land Area (X1)

The coefficient value of the land area variable in the analysis equation of this regression model is 0.296 and is positive. It implies that an increase in the area of rubber land by 1 ha by assuming other factors remain, it will increase the production of rubber in the Desa Terusan Tengah by 0.296 kg. The significance value of the land area variable is $0.019 < 0.05$ ($\alpha=5\%$). This means that the area of land partially has a significant effect on

smallholder rubber production in Desa Terusan Tengah. Thus H1 is accepted H0 is rejected.

According to Rahim (2012) in (Rosmiyati, 2019), the larger the land area, the more the production. This is because the land area is where the planting process is carried out.

3.1.2 Plant Age (X2)

The coefficient value of the plant age variable in the analysis equation of this regression model is -0.141 and is negative. There is an increase in the age of rubber plants by 1 year by assuming other factors remain, it will reduce rubber production in Desa Terusan Tengah by 0.141 kg. The significance value obtained for the plant age variable was $0.001 < 0.05$ ($\alpha=5\%$). Thus, the plant age partially has a significant effect on the production of smallholder rubber in the Desa Terusan Tengah. H1 is accepted H0 is rejected.

According to Budiman (2012), the age of the plant is said to be not potential (damaged) aged >27 years. Thus, low productivity plantations (400-500 kg/ha/year) need to be replaced or replanted. As the age of the plant increases, the rubber production will continue to increase, but when it reaches its peak, production will continue to decrease [3].

3.1.3 Capital (X3)

The coefficient value of the capital variable in the analysis equation of this regression model is 0.537 and is positive. This shows a tendency if there is an increase in capital of Rp100.000 by assuming other factors remain, it will increase rubber production in Desa Terusan Tengah by 0.537 kg. The significance value obtained for the capital variable is $0.000 < 0.05$ ($\alpha=5\%$). It can be concluded that capital partially has a significant effect on smallholder rubber production in Desa Terusan Tengah. Thus H1 is accepted H0 is rejected.

According to Suratiah (2008), capital in farming can be in the form of land, agricultural tools/materials and receivables/cash. The availability of this capital will affect the success of farmers in managing their farms. By the increase in farmer's capital, the productivity farming will be increase [7].

3.1.4 Farming Experience (X4)

The coefficient value of the farming experience variable in the analysis equation of this regression model is 0.174 and is positive. This shows that if there is an increase in farming experience by 1 year by assuming other factors remain, it will increase rubber production in the Desa Terusan Tengah by 0.174 kg. The significance obtained for the farming

experience variable is $0.032 < 0.05$ ($\alpha=5\%$). It can be concluded that the experience of farming partially has a significant effect on smallholder rubber production in Desa Terusan Tengah. Thus H1 is accepted H0 is rejected.

In line with Suhendrik *et al.* (2013), argued that farmers do not consider age, but the skills or tenacity. Both young and old farmers able to carry out farming activities.

4 Conclusion

1. Based on the results of analysis, it can be concluded that the variables of land area, plant age, capital and farming experience simultaneously affect the rubber production of Desa Terusan Tengah.
2. Variables of land area, plant age, capital and experience in farming have a significant effect on smallholder rubber production in Desa Terusan Tengah, Tinggi Raja District, Asahan Regency

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