



## EFFECT OF LAND AREA, PRODUCTION AND RUBBER PRICES ON THE INCOME OF RUBBER FARMERS IN NORTH SUMATERA

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### Abstract

The research aims to determine the effect of land area, production and price of rubber on the income of smallholder rubber farmers in North Sumatra Province. This research was conducted in North Sumatra Province. The basis for choosing the location for this study was 10 of 33 districts in North Sumatra. This research was conducted in November-December in 2022. The data used in this study is secondary time series data with a range of 2017-2021 with data sources from the Central Statistics Agency, the Central Statistics Agency for Medan City, North Sumatra. The data used are data on rubber planting area, rubber production, rubber prices and rubber farmer income from 10 districts namely Mandailing Natal, Langkat, North Padang Lawas, South Labuhan Batu, Central Tapanuli, Labuhan Batu, Padang Lawas, Serdang Bedagai, Labuhan Batu North and South Nias. Data analysis was performed using multiple linear regression analysis with the independent variables consisting of rubber planting area (X1), rubber production (X2), rubber prices (X3), while the dependent variable consisted of rubber farmer income (Y). The results showed that partially rubber production and rubber prices had a significant effect on the income of rubber farmers in North Sumatra province, while the area of rubber plantations had no significant effect on the income of rubber farmers in North Sumatra province. Simultaneously the area of rubber plantations, rubber production and rubber prices has a significant effect on the income of rubber farmers in the province of North Sumatra. Keywords: Sweet Potato, Variety, Source of Potassium.

Keyword: land area, production, price, income, cup lump.

### 1. Introduction

Agriculture is a subsector with an important and strategic role in development. Rubber is considered an agricultural commodity with high economic value, provides profitable opportunities and has many benefits in life, both for balancing nature or supporting the industrial sector as a source of income, employment and foreign exchange, as well as supporting new industrial centres in the world—surrounding area. Rubber is also one of the plantation crops that is widely used as a source of income. The agricultural sector is a sector that can contribute directly to economic growth and the welfare of farmers. This depends on the farmers' income and the surplus the sector achieves. Thus, farmer income is a major determinant of farmer welfare and contributes to economic growth.

Mandailing Natal Regency is one of the areas with the highest rubber cultivation area in 2019. in 2020, the rubber plant area reached 369,031 hectares; in 2021, it increased to 369,032 hectares. Rubber plant production in 2019 reached 309,017 tons; in 2020, it reached 309,973 tons; and in 2021, it reached 310,016 tons. Several areas in North Sumatra need to be planted with rubber plantations, including Samosir District, Sebolga, Tanjung Balai, Pematang Siantar, Tepeng Tinggi, Medan, and Bingai District.

The price of Rubber in 2018 was IDR 8,118 per kilogram, then in 2019, it rose to IDR 9,631 / kg, decreased in 2020 to IDR 7,934 / kg and rose again in 2021 to IDR 12,267 / kg. Where the income of rubber farmers in 2018 of IDR 9,286,894.58 is a lower income for rubber farmers than in 2019, while in 2019, the income of rubber farmers has increased, from 9,286,894.58 IDR 11,025,164.3. In 2020, the income of rubber farmers decreased from IDR 11,025,164.3 to IDR 9,083,771.48, so it can be concluded that the annual income of rubber farmers, especially in 2018/2021, has increased.

According to Antonio (2001), income is the total increase in assets, decrease in liabilities, or a combination of both during the period determined by the income statement



resulting from investments and legitimate gains, such as managing a limited investment account. The income also called the income of a citizen, is the result of the sale of the factors of production that he owns in the production sector. This productive sector buys these production factors to be used as inputs in the production process at prices prevailing in the production factor market (Gumilar, 2022).

Rubber farmers' income is influenced by land area, production costs, number of plants, and labour (Sari, 2018; Pujianti, 2016). Meanwhile, rubber commodities in South Sumatra are low in competitiveness (Hertina, 2015). Based on the description above, this study was conducted to determine how the influence of land area, production, and rubber price on rubber farmers' income in North Sumatra Province.

## 2. Methods

This research is a study with time series data ranging from 2017-2021 with data sources from the Central Statistics Agency, Medan City Statistics Agency, North Sumatra. The data used is cross-section data consisting of data on rubber land area which has price data and rubber income data in 10 districts that produce rubber plants in North Sumatra, including Mandailing Natal, Langkat, North Padang Lawas, South Labuhan Batu, Central Tapanuli, Labuhan Batu, Padang Lawas, Serdang Bedagai, North Labuhan Batu and South Nia's districts so that the number of samples in this study was  $10 \times 5 \text{ years} = 50$  samples. The variables measured in this study are land area, production and rubber prices. The data obtained will be measured using multiple linear regression analysis using SPSS.

## 3. Results and Discussion

The regression test results of the effect of land area of rubber plants, rubber production, and rubber prices on the income of rubber farmers in North Sumatra can be seen in Table 1.

**Table 1.** Multiple Linear Regression Test Results

Independent Variable	Regression Coefficient	t-count	Sig.	Description
(Constant)	-0,000000018	-14,061	0,000	
Land Area	352,823	0,622	0,537	Not Significant
Production	7172,115	10,401	0,000	Significant
Price	23740,446	16,620	0,000	Significant
R <sup>2</sup>	= 0,971			
F-count	= 506,749			
Sig.	= 0,000			

Table 1 shows the results of multiple linear regression tests to analyze the effect of land area of rubber plants, rubber production and rubber prices on the income of rubber farmers in North Sumatra. The multiple linear regression equation is as follows:

$$Y = -0.000000018 + 352.823 X_1 + 7172.115 X_2 + 23740.446 X_3$$

The constant value of the regression model is -0.000000018, stating that when all variables in the research model are equal to zero (have no value), then the income of rubber farmers is -0.000000018, which is an influence from outside this regression model.

### 1. Coefficient of Determination (R<sup>2</sup>)

The results of the analysis show that the coefficient of determination or R<sup>2</sup> is 0.971, meaning that 97.10% of the variation in the variable income of rubber farmers in North Sumatra can be explained by variations in the variable area of rubber plantations (X<sub>1</sub>), rubber

production (X2) and rubber prices (X3) and the remaining 2.90% is explained by other variables not included in the model.

## 2. Simultaneous Test (F-test)

Table 1 shows that the F-count of 506.749 is greater than the F-table of 2.81 with a significance of 0.000 at the  $\alpha = 0.05$  level. This shows that the significance value of F is smaller than the probability value ( $0.000 < 0.05$ ), so the influence of the variable land area of rubber plants, rubber production, and rubber prices simultaneously significantly affects rubber farmers' income in North Sumatra.

## 3. Partial Test (t-test)

### **Effect of Land Area of Rubber Plantation on Income of Rubber Farmers**

The regression coefficient value of the rubber plant land area variable has a positive sign with a regression coefficient value of 352.823. This shows that the land area partially has a positive effect on the income of rubber farmers in North Sumatra province. The regression coefficient is positive, indicating that if the land area of the rubber plant increases by 1 hectare with ceteris paribus conditions, it will increase the income of rubber farmers in North Sumatra province by 352.823%, meaning that an increase in the land area of the rubber plant can cause an increase in the income of rubber farmers. Daniel (2002) states that the agricultural land area plays an important role in agricultural production because a narrow land area is less efficient than a wider land. The smaller the land area, the less efficient the cultivation. In this study, the effect of land area has a positive effect on the income of rubber farmers in North Sumatra, but it is not significant. The small impact is due to changes in the area of rubber plantations in North Sumatra, which only occurs sometimes because the increase or decrease in land area is only small. This study is different from research conducted by Juliansyah and Reunoa (2018), which states that land area significantly affects rubber farmers' income. Rubber land area does not significantly affect rubber farmers' income, meaning that the small size of the land area planted with rubber does not determine farmers' income, nor does the land area guarantee high rubber production. Production can be increased by maximizing maintenance and plant care through fertilization according to the recommended dose. In addition, the influence of seed use also greatly affects rubber production. Farmers who use superior clones will have higher production than farmers who use clones of origin. The age of the rubber plant also influences it.

### **Effect of Rubber Production on Income of Rubber Farmers**

The regression coefficient value of the rubber production variable has a positive sign with a regression coefficient value of 7172.115. This shows that partial rubber production positively affects rubber farmers' income in North Sumatra province. The positive regression coefficient shows that if rubber production increases by 1 ton with ceteris paribus conditions, it will increase the income of rubber farmers in North Sumatra province by 7172.115%, meaning that an increase in rubber production can cause an increase in the income of rubber farmers. This is in line with the research of Juliansyah and Reunoa (2018), which shows that production significantly influences rubber farmers' income. Effendi et al.'s research (2018) shows that production quantity has a positive and significant effect on the income of rubber farmers. Increased income of rubber farmers is also caused by the production of high-quality rubber, which is free of chemicals and impurities that can reduce latex elasticity. According to Suartawan (2017), that production has a positive effect on rubber farmers' income which is very significant on production. Increased rubber production must be consistent with the

specified quality standards so that farmers can improve their performance to achieve the specified standards to meet the price of rubber desired by farmers and industry. Training is required to improve the performance of farmers. In this case, rubber farmers will be taught several stages in the process of maximizing rubber production so that the income of rubber farmers will also increase in the future.

### **Effect of Rubber Price on Income of Rubber Farmers**

The regression coefficient value of the rubber price variable has a positive sign with a regression coefficient value of 23740.446. This shows that the price of rubber partially has a positive effect on the income of rubber farmers in North Sumatra province. The regression coefficient is positive, indicating that if the price of rubber increases by 1000 rupiah with *ceteris paribus* conditions, it will increase the income of rubber farmers in North Sumatra province by 23740.446%, meaning that an increase in the price of rubber can cause an increase in the income of rubber farmers. These results align with research by Aulina et al. (2021), which states that an increase in rubber prices has a positive and significant effect on increasing farmers' income. The highest rubber prices are in Labuhan Batu Regency, Padang Lawas Regency and Langkat, while the lowest are in Mandaling Natal Regency and Central Tapanuli Regency. The difference in rubber prices in each region is influenced by the quality of rubber the community produces. Farmers in the provinces of Central Tapanuli and Mandaling-Natal used to use TSP fertilizer as a raw material for latex. This makes the quality of the rubber produced low. Lower rubber quality will lead to a decrease in the price of rubber produced in the region.

Meanwhile, rubber farmers in Labuhan Batu, Padang Lawas, and Langkat districts generally use vinegar to thicken the latex. The use of vinegar improves the quality of rubber, thus increasing the price of rubber in the area. In addition to agglomeration factors, rubber prices are influenced by other rubber quality parameters such as rubber dry content, moisture content, dirt content and elasticity.

## **4. Conclusion**

Rubber Production and Rubber Prices partially affect the income of rubber farmers in North Sumatra Province. In contrast, the area of rubber cultivation land has no significant effect on the income of rubber farmers in North Sumatra Province. The area of rubber plantations, rubber production and rubber prices have a considerable influence on the income of rubber farmers in North Sumatra Province.

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