Topic: Determination of Natural Rubber Production in Malaysia

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# Abstract

This study aims to demonstrate the determination of the natural rubber population in Malaysia using the data downloaded from the Department of Statistics Malaysia website. This data had been constraining information on Malaysia's annual natural rubber statistics from 2018 to 2022. These variables involved natural rubber population, gross output, consumption, and population. This study examines the relationship between the natural rubber population and other factors like gross output, consumption, and population. This study also delivers descriptive statistics and graphical visualisation of the data and the interpretation of the outcome. Moreover, this study also concludes with some recommendations for the research findings for the policymakers and stakeholders.

**Keywords:** Department of Statistics Malaysia, Natural Rubber, Gross Output, Consumption, Population, Descriptive Statistics and Graphical Visualisation

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# Introduction

Natural rubber is one of the essential commodities in the Malaysian economy. According to DOMS, Malaysia was considered the 5th largest population in produce and the exporter of natural rubber in the world in 2019, calculated as 6.4% to 6.3% of the global population and their exports, respectively (Vijayakumar, 2019). Natural rubber has been widely used in numerous industries like automotive, construction and engineering organisations. Moreover, understanding the factors affecting natural rubber production is essential to form the trading of policymakers, producers, exporters, and consumers.

Several studies determined natural rubber production in Malaysia and other countries. According to the study of ‌Fong, Khin, & Lim (2020), the Natural economy indeed played a vital role due to the socio-economic perspective in the most NR production countries at the time were developing countries like Indonesia, Thailand, and Vietnam. Most of the plantation region of Hevea trees was managed by the private stakeholders and the farmers, indicating NR will ultimately affect the livelihood in the rural regions. According to the study by Khin et al. (2019), the Natural economy hit price instability and the imbalances of the supply-demand situation in the world market where the NR world of consumption far exceeds production. Moreover, non-fundamental factors like gross domestic product, production, and consumption were affected.

When the NR economy pricing was favourable to the stakeholders and cultivations, it encouraged the NR production to either of the existing regions of rubber yield. Similarly, Daulika, Peng, & Hanani (2020) study analysed the relationship between natural rubber production and the prices in Thailand using the cointegration and the causality test. They founded the long-run equilibrium relationship between natural rubber production and the prices, significantly influencing the production.

The existing study is focused on the single or the few factors that affected natural rubber manufacture, and it used data from a prolonged period that needed to reflect the current situation. For instance, the study aims to fill the gaps by the usage from 2018 to 2022, and it applied to the distribution of the descriptive analysis methods. The analysis of the relationship between natural rubber manufacture and numerous factors like gross output, population and consumption. This study delves into a comprehensive and updated determination of natural rubber production in Malaysia and offers valuable insights for policymakers and stakeholders.

# Problem Statement

Natural rubber production is a vital economic activity in Malaysia, but it is influenced by numerous factors that must be understood. This study aims to analyse the determinants of natural rubber production in Malaysia using multiple regression analyses and the annual data from 2018 to 2022.

# Research objective and Research question

This study aims to investigate the relationship between natural rubber production and consumption, population and the GDP of Malaysia. However, the research question addresses the following:

Q1) What are the main determinants of natural rubber production in Malaysia?

# Hypothesis

H1: Natural rubber production in Malaysia is significantly influenced by gross output, consumption, and population.

# Rationale of the study

This study aims to determine the sizeable gross output of natural rubber oriented with the considerable value-added or the profitability of the product manufacture that encourages the producers to raise their output. The higher domestic Customers of natural rubber indicated a greater demand for the manufacturers to raise their output. The larger population in Malaysia implies a higher potential market size or the labour force for natural rubber production.

# Methodology

## Data design

This study emphasised the quantitative study to demonstrate the data. This study is also considered the econometric modelling in business analytics, and econometrics are now driving data-centric to success (Dalla, 2021).

## Data collection

This study was collected from the Department of Statistics Malaysia (DOMS) website. The data has constrained information on Malaysia's annual natural rubber statistics from 2018 to 2022. The variables involved natural rubber production, gross output, population, and consumption. The data is downloaded in Excel format and imported from the E-vies software for the data gathered analysis.

## Data preparation

The data is checked by three missing values, outliers and errors. All values have been found in the data. Moreover, the outlier was detected by the natural rubber production variables in 2021. That wee being lower than the other estimated outcome.

Population and Sample

The population is constructed from the natural rubber producers in Malaysia from 2018 to 2022. The sample data has been constructed from the annual time series data obtained by DOSM.

## Data Analysis

The data analysis method has been used to demonstrate this study. However, this study constructed a

quantitative study to gather the data collection and better outcomes. This study also demonstrated multiple regression analysis to estimate the relationship between natural rubber, gross output, population, and consumption. In this study, intellectual Natural output was the dependent variable, and the other variable, intellectual, was the independent variable.

## Model Specification

The model specification of the multiple regression model to specify the outcome as:

|  |  |
| --- | --- |
| NATURAL\_RUBBER = C(1)\*GROSS\_OUTPUT + C(2)\*CONSUMPTION + C(3)\*POPULATION + C(4) |  |

## Model Evaluation

The multiple regression model is evaluated based on the coefficients' significance, the model's goodness of fit, and the assumption for the regression analysis. The study significance of the coefficient is tested using the t-test and the p-value. The R-squared value measures the goodness of fit with the model by examining the residual for independence and multicollinearity.

## Data Analysis

This data analysis method is used to study the multiple regression analysis. The multiple regression analysis is the statistical technique that estimates the relationship between natural rubber and the other intellectual variables to be demonstrated in a quantitative study. This data is collected from DOMS and gathered from E-views Software to consider better result evaluation.

# Results

This study demonstrated the relationship between natural rubber production and numerous econometric factors using the data from 2018 to 2022. The natural rubber is the dependent variable, whereas the other factor is the independent variable. Table 1 id demonstrates the raw value of all the data.

**Table 1: Raw Data**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Years | Natural Rubber | Gross Output | Consumption | Population |
| 2018 | 3,649,767 | 149948940 | 972,783 | 31,186.10 |
| 2019 | 2,454,933 | 38164899 | 735,667 | 31,633.50 |
| 2020 | 1,194,834 | 20051290 | 237,116 | 32,022.60 |
| 2021 | 15,570 | 163785200 | 1,659 | 32,382.30 |
| 2022 | 269,873 | 10522114 | 37,291 | 32,581.40 |

## Multiple regression Analysis

The table below is a constructed regression model that demonstrates the regression from dependent and independent variables. However, the coefficient velar of Gross output increased to -0.011, indicating that the rise of gross output is linked to a decline in agricultural rubber production. Moreover, the consumption coefficient is demonstrated in ad 2.132, indicating a 1% rise in consumption and linked to a 2,12% increase in natural rubber production. The coefficient for the population is calculated as -1111.98 influence, which is negative, but it has a minor impact on rubber production. The R-square value is calculated as 0.9915, indicating the value of R reaching 1, which means there is perfect collinearity between the regression constituents of variables.

**Table 2: Multiple Regression Analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Dependent Variable: NATURAL\_RUBBER | | | | |
| Sample: 2018 2022 |  | | | |
| Included observations: 5 |
|  | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|  |  |  |  |  |
| GROSS\_OUTPUT | -0.001191 | 0.002197 | -0.54217 | 0.6837 |
| CONSUMPTION | 2.123359 | 1.567935 | 1.354239 | 0.4049 |
| POPULATION | -1111.984 | 1242.591 | -0.89489 | 0.5353 |
| C | 36305643 | 40401217 | 0.898627 | 0.534 |
|  |  |  |  |  |
| R-squared | 0.991467 | Mean dependent var |  | 1516995 |
| Adjusted R-squared | 0.965869 | SD dependent var |  | 1528220 |
| SE of regression | 282330.7 | Akaike info criterion |  | 27.93011 |
| Sum squared resid | 7.97E+10 | Schwarz criterion |  | 27.61766 |
| Log-likelihood | -65.82527 | Hannan-Quinn criter. |  | 27.09152 |
| F-statistic | 38.73223 | Durbin-Watson stat |  | 2.632726 |
| Prob(F-statistic) | 0.117445 |  |  |  |

## Estimated Equation

The below equation has been estimated as the better intellectual of equation modelling.

|  |  |
| --- | --- |
| NATURAL\_RUBBER = -0.00119092269197\*GROSS\_OUTPUT + 2.12335934339\*CONSUMPTION - 1111.98385885\*POPULATION + 36305642.574 |  |

## Descriptive statistics

The descriptive statistics have been considered to the nature of the data evaluation; however, the mean of natural output production is approximately 1516 units. The larger mean of the gross output value is 76494489, whereas the consumption value is 396903.2, and the population mean value is 31961.18. moreover, the skewness and kurtosis values are the symmetric distribution for all the variables.

**Table 3: Descriptive Statistics**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Descriptive Statistics | NATURAL\_RUBBER | GROSS\_OUTPUT | CONSUMPTION | POPULATION |
| Mean | 1516995 | 76494489 | 396903.2 | 31961.18 |
| Median | 1194834 | 38164899 | 237116 | 32022.6 |
| Maximum | 3649767 | 1.64E+08 | 972783 | 32581.4 |
| Minimum | 15570 | 10522114 | 1659 | 31186.1 |
| Std. Dev. | 1528220 | 74200019 | 435163.6 | 564.3382 |
| Skewness | 0.404785 | 0.368228 | 0.398648 | -0.291309 |
| Kurtosis | 1.660158 | 1.220865 | 1.437303 | 1.700302 |
|  |  |  |  |  |
| Jarque-Bera | 0.510538 | 0.772435 | 0.641188 | 0.422637 |
| Probability | 0.774708 | 0.679623 | 0.725718 | 0.809516 |
|  |  |  |  |  |
| Sum | 7584977 | 3.82E+08 | 1984516 | 159805.9 |
| Sum Sq. Dev. | 9.34E+12 | 2.20E+16 | 7.57E+11 | 1273911 |
|  |  |  |  |  |
| Observations | 5 | 5 | 5 | 5 |

## Graphical representation

This study also considered all the values in the visualisation aspects to understand the better insights of the data.

**Figure 1: Graphical Representation**

# Conclusion

This study analysed the determination of the natural rubber production in Malaysia using multiple regression analyses of the annual data collected from DOMS from 2018 to 2022. This study focuses on natural rubber production, which is significantly influenced by the forces of output and the population and negatively affects consumption. This study also delivers descriptive statistics and a graphical visualisation of the data and result outcome. This study has limitations like a small sample size and the outlier in the data. Moreover, future studies use more data to demonstrate a better outcome to address these issues.

Based on the above findings, this study has some recommendations for policymakers and stakeholders.

* To raise the natural rubber production, policymakers have promoted value-added activities. To innovate in the natural rubber industry, similar to Kurnia, & Haris, (2020).
* To raise natural rubber production, policymakers also support the growth and establishment in the rural regions where natural rubber is cultivated (Malézieux et al., 2019).
* To balance natural rubber and consumption, policymakers must enhance the domestic demand for natural rubber production by eliminating the import tariff and rising subsidiaries.

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