CHAPTER III

RESEARCH METHODOLOGY

A. Research Object

The type of data of research used in the study is a quantitative study. Quantitative methods-research techniques used to analyze quantitative data-enable professionals to organize and understand numbers and, in turn, to make good decisions. (Brandimarte, 2011)**.**

This study used a literature study on the effect of Rubber price, Export of rubber, Exchange rate Thai baht to US dollar, and Rubber production in Thailand from January 2011 to December 2016.

Variables used the study consisted of four variables there are:

1. Rubber price (the price of Thailand)
2. Export of Rubber
3. Exchange rate Thai Bath to US dollar.
4. Rubber Production

B. Data Type

This study uses secondary data time series in the form of annual data with an observation period from January 2011 to December 2016. The data used in this study are as follow:

1. The data Rubber price (the price of Thailand). Based on data from Rubber Authority of Thailand data files.
2. The data on Export of rubber in Thailand. Based on data from Rubber Research Institute Department of Agricultural.
3. The data on Exchange Rate Thai bath to US dollar. Based on data from Bank of Thailand.
4. The data on Production rubber in Thailand. Based on data from Rubber Research Institute Department of Agricultural.

C. Data collection

Data collection is the systematic approach to gathering and measuring information from a variety of sources to get a complete and accurate picture of an area of interest. Data collection enables a person or organization to answer relevant questions, evaluate outcomes and make predictions about future probabilities and trends (Rouse, 2016). The data collected and used in this study is that the data is secondary to the method of documentation. Sources of Rubbers price (the price of Thailand), Export rubber, Exchange rate, and Rubber production.

D. Definition of Operational Data Variable

1. Dependent variable

The dependent variable is dependents on the independents variable. The dependent variable in this research is Rubber price (the price of

Thailand). Rubber prices are important to Thai farmers, because if high rubber prices will improve their quality of life.

2. Independent variable

The independent variable is a variable that affects or causes change or the emergence of the following variables. In this research used the independent are:

a. Production

According to Bates and Parkinson, Production is the organized activity of transforming resources into finished products in the form of goods and services; the objective of production is to satisfy the demand for such transformed resources.

According to J. R. Hicks, Production is any activity directed to the satisfaction of other peoples' wants through the exchange". This definition makes it clear that, in economics, we do not treat the mere making of things as production. What is made must be designed to satisfy wants. (Suman, n.d.)

b. Export

The Export of goods and services represent the value of all goods and other market services provided to the rest of the world. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other

services, such as communication of employees and investment income and transfer payments.

c. Exchange Rate

An Exchange Rate is the price of the domestic currency stated in terms of another currency. In other words, a foreign exchange rate compares one currency with another to show their relative values. Since standardized currencies around the world float in value with demand, supply, and consumer confidence, their values change relative to each over time (Shaun, n.d.).

E. Analysis method and Data Processing

The analysis method used is multiple linear regression analysis. Multiple linear regression analysis methods used to explain the relationship and how big influence between independent variables with the dependent variable. Multiple linear regression analysis in this research is used to know the influence are Rubber production, Export of rubber, and foreign exchange Thai bath to US dollar to rubber's price against the rubber price (the price of Thailand) from January 2011 to December 2016.

1. Multiple Linear Regression Analysis

Multiple linear regression analysis is a linear relationship between two or more independent variables (X1, X2, ...Xn) with the

dependent variable (Y). This analysis is to know the direction of the relation between the independent variable and dependent variable whether each independent variable is positive or negative and to predict the value of the dependent variable if the value of the independent variable increases or decreases. (Consultant, 2015).

According to Agus Tri Basuki and Nano Prawoto (2016), Linear Regression analysis is statistical techniques for modeling and investigating the effect of one or more independent variables on a dependent variable. There are two kinds of linear regression analysis:

- Simple linear regression: Regression analysis with one independent variable, with general formulation:

$$\mathbf{Y = a + b_1 X_1 + e}$$

- Multiple linear regression: Regression analysis with two or more independent variables, with general formulation:

$$\mathbf{Y = a + b_1 X_1 + b_2 X_2 + \ldots + b_n X_n + e}$$

Explanation:

Y = Dependent variable

a = Constanta

b_1 = regression coefficientX_1, b_2 = regression coefficientX_2, and so on.

e = Error

Regression equation function in addition to predicting the dependent variable value (Y), can also be used to determine the direction and magnitude of influence Independent variable (X) to Dependent variable (Y) (Prawoto, 2016).

In this research used multiple regression analysis, because of these research three independent variables. The regression equation in this research is as follows:

$$\mathbf{Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e}$$

Explanation: Y = *Rubber price*

a = *constants*

e = *error*

β = *regression coefficient*

X_1 = *Export of rubber*

X_2 = *Exchange Rate Thai Bath to US dollar*

X_3 = *Rubber Production*

2. Classical Assumption Test

Testing the classical assumptions used are normality test, multicollinearity, autocorrelation, and heteroscedasticity in detail can be explained as follows:

a. Normality Test

This normality test aims to test whether, in the regression model of the dependent variable, the independent variable or

both are normally distributed or not. A good model is that which has a normal data distribution. The residual value is said to be normally distributed when most of the residual value approaches the average.

According to Agus Tri Bakasi and Imamudin Yuliadi (2014), to detect whether the residual is normally distributed or not by comparing the value of Jarque Bera (JB) with X^2 table, namely:

- If the probability of Jarque Bera (JB) > 0,05, then the residual is normally distributed.
- If the probability of Jarque Bera (JB) < 0,05, then the residual is not normally distributed.

b. Multicolinearity Test

Multicollinearity is to see whether or not there is a high correlation between the independent variables in a multiple linear regression models. If there is a high correlation between the independent variables, then the relationship between independent variables to the dependent variable to be disturbed.

Multicolinearity is a linear relationship between independent variables in the regression model. If the linear relationship between free X variable in multiple regression is perfect correlation then the variables said Perfect

multicollinearity. Multicolinearity detection can see the value of Variance Inflation Factors (VIF). The testing criterion is that if the value of VIF <10 then there is no multicolinearity among independent variables, and Otherwise, if the value of VIF >10 then there is multicolinearity among independent variables. (Prawoto, 2016, pp. 61-62)

With regard the problem of Multicolinearity, Sumodiningrat (1994: 281-182) suggests that there are 3 things that need to be discussed first:

1) Multicolinearity is essentially a sample phenomenon. In the Population Regression Function (PRF) it is assumed that all independent variables included in the model have an individual effect on the dependent variable Y, but it may happen that in a particular sample.
2) Multicolinearity is a matter of degree and not a matter of kind. This mean that the problem of Multicolinearity is not matter of whether the correlation is between the negative or positive, but it is a matter of the correlation between the independent variables.
3) The problem of Multicolinearity relates to the existence of linear relationships among the independent variables. This mean that the problem of Multicolinearity will not occur in the regression model whose form of function is

non-linear, but the problem of Multicolinearity will appear in a regression model whose linear form functions among the independent variables.

Multicolinearity is the existence of a linear exact contact between the explanatory variables. Multicolinerity is thought to occur when the value of R^2 high, the value of t all of explanatory variable are not significant, and the value of F high (Yuliadi A. T., Elektronic Data Processing (Spss 15 dan EViews 7), 2014).

c. Autocorelation Test

Autocorrelation Test is used to find out whether or not the deviation of classical assumptions, autocorrelation is the correlation between residuals in an observation with other observations on the regression model (Prawoto, 2016, p. 60). Autocorrelation is a condition where there has been a correlation between this year's residual with the error rate of the previous year, to know the presence or absence of an autocorrelation disease in a model, can be seen from the Durbin-Watson statistic score or with the Breusch-Godfrey Test.

The most commonly used test method is the Durbin-Watson test (DW test) with the following conditions:

- If d < dL or d > 4-dL then hypothesis 0 is not rejected, which means there is autocorrelation.
- If d located between dU and (4-dU) then hypothesis 0 is rejected, which means there is no autocorrelation.
- If d located between dL and dU or between (4-dU) and (4-dL), then hypothesis 0 is rejected, which means there is no autocorrelation. Then do not result in a definite conclusion.

The value of dU and dL can be obtained from the Durbin Watson statistics table which depends on the number of observations and the number of variables that explain. (Prawoto, 2016, p. 60).

d) Heteroscedasticity Test

Heteroscedasticity is a hard word to pronounce, but it doesn't need to be a difficult concept to understand. Put simply, Heteroscedasticity (also spelled Heteroskedasticity) refers to the circumstance in which the variability of the variable is unequal across range of the values of a second variable that predict it (J.Taylor, n.d.).

According to Agus Tri Bakasi and Imamudin Yuliadi (2014), Heteroscedastisitas is the residual inequality of

residuals for all observations in the regression model. the heteroskedasitas test is to know the existence of deviations from the terms of the classical assumption on the regression model, in which the regression model must be met in the absence of Heteroscedasticity test.

The consequence of Heteroscedasticity in fact, assuming that the variant of the term disturbance is constant may be difficult to fulfill. In this case can be understood if taken into account or see the factors that cause the emergence of problems of Heteroskedastisitas in a regression model (Agus Tri Basuki and Imamudin Yuliadi, 2014)

3. Regression Analysis

Linear regression analysis is statistical techniques for modeling and investigating the effect of one or more independent variables on a single response variable (Yuliadi A. T., 2015)

a. T-Test

T-Test is used to determine the influence of each independent variable partially. T-Test basically shows how far the influence of the independent variables in explaining the dependent variable (Ghozali, 2009).

The significance of independent variables to dependent variables can be seen from Sig value. At the 0.05 (5%)

significance level, assuming the independent variable has a constant value.

Hypothesis:

- If the probability βi > 0.05 Not significant
- If the probability βi < 0.05 Significant

b. F-test

F-test in multiple linear regression analysis aims to determine the effect of independent variables simultaneously at a significant level of 0.05 (5%) (Prawoto, 2016). Testing all coefficients of regression are jointly done with the -f test with the test as follows:

Hypothesis:

- If the probability $\beta i > 0.05$, it's mean not significant.
- If the probability $\beta i < 0.05$, it's mean significant.

c. Coefficient of Determination (R-Squared)

R^2 test is a value that show how much the independent variable will explain the variable dependent variable, R^2 in the regression equation is susceptible to the addition of independent variables, where more independent variables are involved then the value of R^2 will be greater because that is the use of R^2 adjusted on multiple linear regression analysis (Prawoto, 2016).

If the value of coefficient of determination = 0 (Adjusted R^2 = 0), meaning that variation of variable Y cannot be explained by variable X, while if R^2 = 1, it means variation of variable Y as a whole can be explained by variable X. In other words If Adjusted R2 approaches 1, then the independent variable will be able to explain the change variant of the dependent variable, and if Adjusted R^2 approaches 0, then the independent variable is unable to explain the dependent variable.