

# Factors Influence Tea Exports in North Sumatera Province

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**Abstract** - The province of North Sumatra has a leading commodity tea that shows the role in international trade activities through exports to several countries in the world. This study aims to analyze the effect of production, GDP of destination country, population of destination country, and exchange rate against dollar against tea export of North Sumatera. The type of this research is quantitative analysis using time series data from 2006 to 2015 from 10 export destination countries, namely Malaysia, United States, United Kingdom, Taiwan, Germany, Singapore, Pakistan, Emirates Arab, Canada and Russia. Data obtained from Central Bureau of Statistics (BPS) of North Sumatra Province and World Bank. Data analysis technique used is panel data regression with Fixed Effect Model (FEM) model. The results showed that production and GDP had positive and significant effect, the number of population had negative and significant effect, while the exchange rate did not significantly influence the tea export of North Sumatera.

**Keywords** - Panel Data; GDP; Exchange Rate; Population; Production.

## I. INTRODUCTION

Tea plantation is one of agriculture commodity sub-sector of plantation which cultivated commercially in Indonesia since 1800s. Tea commodities have a great role in generating foreign exchange for Indonesia through exports abroad. In 2015, total tea export reached US \$ 128.4 million with export volume of 62.77 tons. The 10 largest tea export destination countries are, Russia, Malaysia, Pakistan, Australia, Germany, China, United States, Poland, Taiwan, and England.

Based on Table 1 and Table 2 both the development of production and the development of tea export in North Sumatra both tend to show a decline. This, of course, becomes ironic, where the demand for world tea increases with the increase of the world population but production and exports are not increasing. To respond to this, of course, efforts need to improve the improvement of all factors that affect it.

Table 1. Growth of Tea Area in Indonesia by Status of Exploitation Year 2011-2015

| Year | Large Area (Ha)   |                         |                           |
|------|-------------------|-------------------------|---------------------------|
|      | Perkebunan Rakyat | Large State Plantations | Large Private Plantations |
| 2011 | 55.983            | 38.609                  | 29.346                    |
| 2013 | 56.092            | 37.922                  | 28.021                    |
| 2014 | 53.358            | 37.398                  | 28.143                    |
| 2015 | 52.806            | 32.279                  | 28.356                    |

Source : Outlook Teh, 2016

Table 2. Regency of Central Tea Production in North Sumatera Province 2015

| No | Regency          | Production (Ton) |
|----|------------------|------------------|
| 1  | Simalungun       | 12.502           |
| 2  | Toba Samosir     | 145              |
| 3  | Tapanuli Selatan | 115              |
| 4  | Dairi            | 48               |

Source : Outlook Teh, 2016

North Sumatra tea production is largely to meet export destinations. The development of tea export volume of North Sumatra tends to decrease from year to year. This is due to several factors such as unpredictable weather, volatile export prices and volumes of production, the continued decline of tea plantation area, the unstable domestic economy, and the quality of the tea produced.

North Sumatra exports to 25 countries with the main destination countries of Pakistan, the United States and the UK. Seen from the share of Indonesian tea export market in 2015 Indonesia is ranked eleventh world exporter country (Ministry of Agriculture, 2016). The development of Indonesian expo rteh fluctuates every year and tends to weaken.

Increasing and decreasing exports may be affected by a supply and demand. In the theory of international trade mentioned that the factors that affect the export can be seen from the demand side and supply side. According to Sukirno (2003), there are several factors that affect the number of demand, namely: production, GDP, population, and exchange rate. Production affects the export value in North Sumatra, if production increases, it is expected that the export value will increase. GDP and population of destination countries also affect the value of exports. If GDP and population of destination country increase, it is expected that the export value will increase. Exports are affected by exchange rates, if the foreign currency exchange rate against the dollar rises (appreciation) means the value of the dollar down so it will lower the value of exports. If the exchange rate increases, it is predicted that the export value of tea in North Sumatra will decrease.

In this study, the countries to be seen as influencing the tea exports of North Sumatra are the ten Consumer Countries which are generally the largest tea importer countries, namely Malaysia, United States, United Kingdom, Taiwan, Germany, Singapore, Pakistan, Emirates Arab, Canada and Russia. These countries are selected on the basis of export continuity to that State.

Research Rangkuti (2014) entitled analysis of coffee exports in North Sumatra Province. Data analysis technique used is panel data regression analysis with Fixed Effect Model (FEM) weighting cross section weights with time frame from 2000 - 2012 (time series) and cross-section of 3 export destination countries namely Singapore, UK and Italy. International coffee prices positively and significantly affect changes in coffee exports in North Sumatra province, international prices and the amount of coffee production positively and insignificantly affect changes in coffee exports.

Simatupang Research (2010) entitled analysis of the determinants of Indonesian natural rubber exports. Data were analyzed using Fixed Effect model with Generalized Least Square (GLS). The results showed that GDP and exchange rate variables have a positive and significant influence on the demand of Indonesian natural rubber exports, while the price of natural rubber and the price of synthesis rubber have a negative and significant effect on the demand of Indonesian natural rubber exports.

## II. RESEARCH METHODS

### A. Data Used

The data used in this study is panel data which is a combination of time series and time series data. The data studied from 2006-2015 (10 years) and cross section data (N) in the ten destination countries of North Sumatera tea exports, namely Malaysia, United States, United Kingdom, Taiwan, Germany, Singapore, Pakistan, Emirates Arab, Canada and Russia. Observational data (T X N) obtained by 100 observations. Analyzed with Eviews program aid tool and in the form of secondary data.

### B. Data Analysis Method

The method used to analyze the factors affecting the export of tea in North Sumatra is the method of econometric analysis using the panel data regression analysis model which is a combination of cross section data and time series data to find out how big the influence of production,

destination country GDP, population destination countries and US \$ exchange rates against tea exports to Malaysia, United States, United Kingdom, Taiwan, Germany, Singapore, Pakistan, Emirates Arab, Canada and Russia. Analyzed by using equation function:

$$\text{LnNEit} = \alpha_i + \beta_1 \text{LnPRODit} + \beta_2 \text{LnGDPit} + \beta_3 \text{LnJPit} + \beta_4 \text{LnNTit} + \epsilon_{it}$$

Where :

NE = The value of tea export in North Sumatra (US \$)

PROD = Tea production in North Sumatra (kg)

GDP = GDP of export destination country (US\$)

JP = Population of export destination country (soul)

NT = The nominal exchange rate of the currency of the export destination country against the US Dollar (US \$)

i = Cross-section unit of N

t = Time-series unit of T

$\alpha$  = intercept

$\beta_n$  = regression coefficient (i = 1, 2, 3, ...)

$\epsilon_{it}$  = Error term

In econometrics, a model that states between time series and cross section data produces data called panel data. So in panel data has a time series of  $T > 1$  and latitude  $N > 1$ . According to Umar (2008) panel data is data combination between time series data which have observations in a unit of analysis at a certain point in time. The special characteristic of time series data is a numerical sequence where the interval between observations over a number of variables is constant and constant. While cross data is still a unit of analysis at a certain point by observation of a number of variables.

In this study using panel data is by using data between time and data between commodities called panel data. Using panel data has several advantages. According to Baltagi (2001) the advantage of using panel data is panel data relating to individuals, companies, countries, regions, etc. at any given time, then the data is heterogeneous. Heterogeneous panel data estimation techniques can explicitly be considered in the calculations.

One of the estimation methods that can be used in the panel data regression model is the fixed effect model (FEM). The general form of panel data regression in FEM is as follows:

$$Y_{it} = \alpha_i + \beta X_{it} + \epsilon_{it}$$

Where :

$Y_{it}$ : The variable is bound to the individual at the time of day

$X_{it}$ : The independent variable for the individual at the time of day

i: Cross-section units of N

t: Unit time-seriessebanyak T

$\alpha$ : intercept

$\beta$ : slope

$\epsilon$ : error term / interruption

Index i on the intercept indicates that the intercept of each cross-section unit varies. This difference is due to the use of dummy variables to explain the different intercepts that arise between individuals. The term FEM derives from the fact that although the intercept of  $\alpha_i$  differs between individuals but the intercept is time-bound (Gujarati, 2004).

It also gives the assumption that the  $\beta$  slope remains the same between individuals and between time. Therefore the above equation can be written to be:

$$Y_{it} = \alpha_i + D\alpha_i + \beta X_{it} + \epsilon_{it}$$

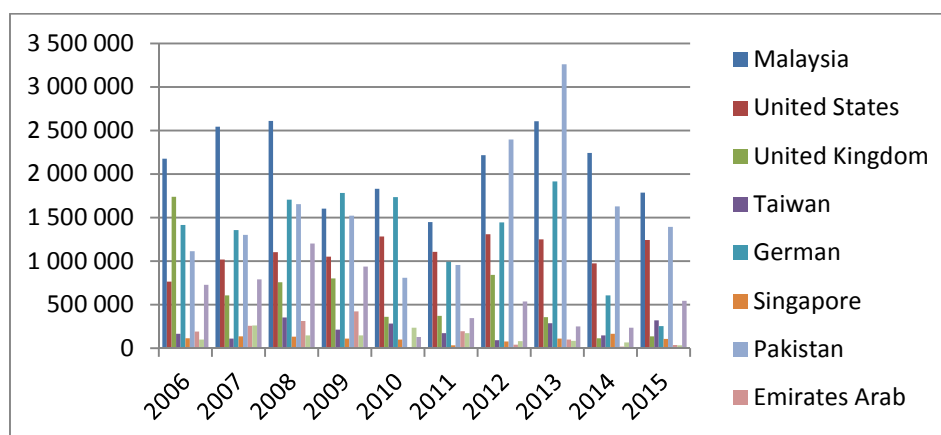
Where :

$D = [d_1, d_2 \dots d_n]$  is the dummy variable for i-unit (Greene, 2012). It is the use of this dummy variable that makes the estimation of FEM is called Least Square Dummy Variable (LSDV) model.

### III. RESULTS AND DISCUSSION

#### A. Value of North Sumatera Tea Exports

The value of North Sumatera tea export to destination country differs in each country stated in US \$ starting from 2006 to 2015. Furthermore, the development of tea export value of North Sumatera in ten export destination countries in 2006-2015 can be seen in Figure 1.



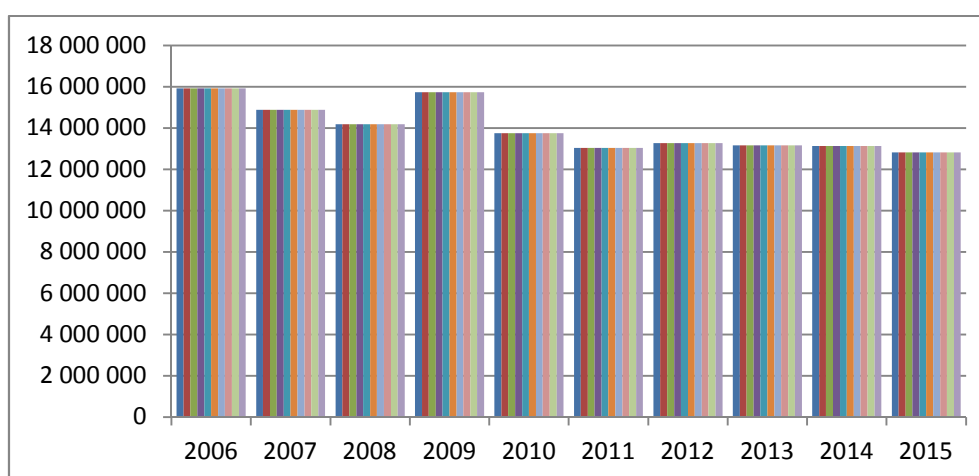
Picture 1. The Development of North Sumatra Tea Export Value in Several Export Destination Countries in 2006-2015

In Picture.1 shows the highest export value of tea is to Pakistan in the amount of US \$ 2,397,858 in 2012 while the lowest is to the country of Singapore which is only US \$ 32,748 in 2015. Fluctuations in tea export value occurred from 2006 to Year 2015 tends to decline.

to change the amount of volume to be exported. A country will export an item if production is greater than consumption in the country. Furthermore, the development of North Sumatera tea production for the period of 2006-2015 can be seen in Picture 2

## B. Tea Production of North Sumatra

Production is one of the factors affecting the export of a country's commodities. Changes in production will be able



Picture 2. Development of North Sumatra Tea Production Year 2006-2015

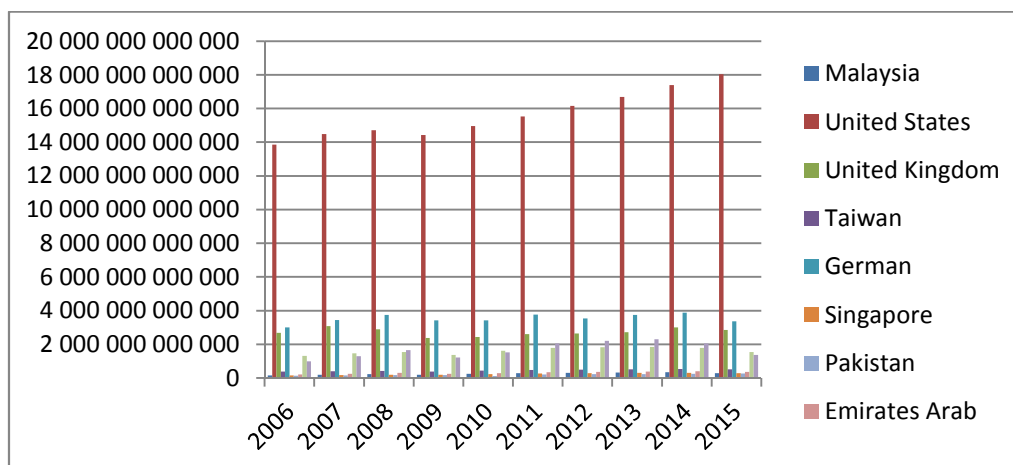
In Picture 2 shows the fluctuation of tea production of North Sumatra in 2006-2015 tends to decrease. The highest production occurred in 2006 amounted to 15,911,000 while the lowest production occurred in 2015 of 12.81 million. This is because the area of tea plantations decreases every year.

## C. GDP of Export Destination Countries

Gross Domestic Product (GDP) is the real Gross National Income (GDP) which represents the income of the country of destination of tea export within one year in units of US billion Dollars. GDP from exporter and importer countries has a positive relationship with bilateral trade. GDP from exporting countries measures the country's

production capacity. Furthermore, the development of GDP value of tea export destination countries of North Sumatera in

2006-2015 can be seen in Picture 3.



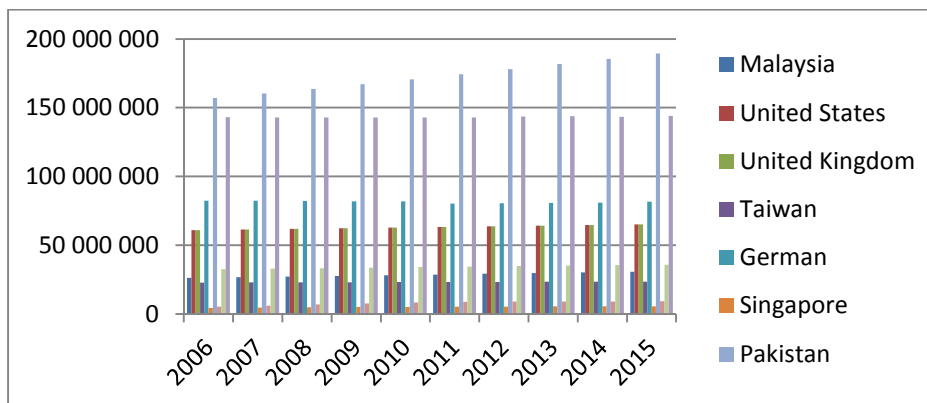
**Picture 3.** GDP Value of Country Destination of North Sumatera Tea Exports Year 2006-2015

In Picture 3 shows that among the ten countries, United States is the country with the highest GDP of US \$ 18,038.65 trillion in 2015 while Singapore is the country with the lowest GDP of US \$ 147.79 billion in 2006.

increase demand for export commodities from importing countries that can make the value and quantity of commodities to be traded between the two countries getting bigger. Furthermore, the development of population of tea export destination countries of North Sumatera in 2006-2015 can be seen in Picture 4.

#### D. Number of Export Destination Countries

The population of the destination country represents the amount of demand for the export of North Sumatera tea to the destination country. The increase in population will



**Picture 4.** Growth of Population Country Destination Export of Tea North Sumatera Year 2006-2015

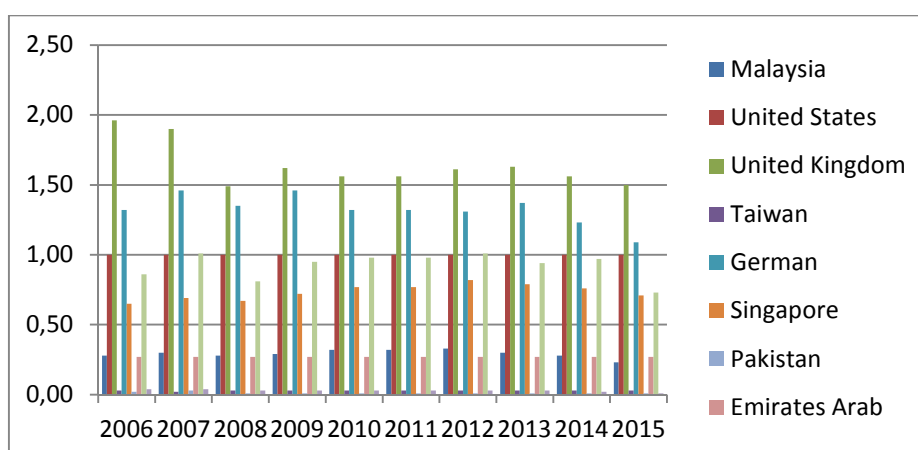
Picture 4 shows the population growth data of several tea export destination countries of North Sumatera for 10 years. The development of the data shows an increasing number from year to year. The highest population is Pakistan by 189,380,513 by 2015, while Singapore is the lowest of 4,401,365 in 2006.

#### E. Nominal Exchange Rate of Export Destination Country against Dollars

The nominal exchange rate of the country's currency against the dollar is the ratio of the foreign exchange rate to the US dollar exchange rate. The use of exchange rate is only set at US Dollar value because the export payment system uses United States Dollar.

Furthermore, the development of rupiah exchange rate

against the dollar in 2010-2015 can be seen in Picture 5.



**Picture 5.** Development of Nominal Currency Exchange Rate of Export Destination Country against Dollar Year 2006-2015

In Picture 5 it can be explained that the foreign currency exchange rate against the dollar in 2006 to 2015 fluctuated. United Kingdom is the country with the highest exchange rate of 1.96 occurred in 2006 while the country with the lowest exchange rate is the Pakistan state of 0.01 occurred in 2015.

estimate based on Fixed Effect Model, from the estimation result Chow test and Hausman test is to determine the best model between the selected estimation result. The best test results will be used as a reference to draw conclusions in this study. The next step, after obtaining the best model is to test the econometric problems using Generalized Least Square (GLS) approach.

#### F. Selecting Data Panel

Processing using Eviews 8.0 software with Pooled Least Square (PLS) estimation model. The next step is to make an

Table 3. Test Results Chow

| Effect Test              | Statistic | d.f.  | Prob.  |
|--------------------------|-----------|-------|--------|
| Cross section F          | 12,338833 | -9,86 | 0,0000 |
| Cross section Chi-square | 82,910764 | 9     | 0,0000 |

Table 4. Test Results Hausman

| Summary Test         | Chi Sq. Statistic | d.f. | Prob.  |
|----------------------|-------------------|------|--------|
| Cross section random | 14,898265         | 4    | 0,0049 |

Based on the estimation of Hausman test shows the value of p-value 0.00 where the value is smaller than the 0.05 level. Thus, it can be concluded that accept H1 then this research using fixed effect model (FEM) method.

#### G. Factors Affecting Tea Exports in North Sumatra Province

In regression equation for North Sumatran tea export value variables to Malaysia, United States, United Kingdom, Taiwan, Germany, Singapore, Pakistan, Emirates Arab, Canada and Russia obtained R-squared value of 81.49 percent. This value indicates that 81.49 percent change in dependent variable can be explained by independent

variables, while the remaining 18.51 percent is explained by other factors outside the model.

The probability value of F statistic is smaller than at the 0.05 significance level ( $0.00 < 0.05$ ). Thus, it can be concluded that simultaneously production variables, destination country GDP, destination country population, and exchange rate significantly influence the value of North Sumatera tea export.

In the regression equation of factors affecting the export value of North Sumatera tea to Malaysia, United States,

United Kingdom, Taiwan, Germany, Singapore, Pakistan, Emirates Arab, Canada and Russia indicated that independent variables ie production, GDP of export destination countries, and the total population of the export destination country has a probability value smaller than the real level of 0.05 except in the independent variable of the exchange rate. The result of partial variable analysis can be seen in Table 5.

Table 5. Result of Estimation of Factors Affecting Tea Exports in North Sumatera Province with Panel Data Method

| Variable              | Koefisien | Prob.  |
|-----------------------|-----------|--------|
| ConstantS             | -26,86364 | 0,4688 |
| Production (Prod)     | 3,451618  | 0,0075 |
| GDP (GDP)             | 1,081060  | 0,0422 |
| Total population (JP) | -2,653649 | 0,0182 |
| Exchange rate (NT)    | 0,014243  | 0,9667 |
| Fixed Effects (Cross) |           |        |
| _MLY--C               | 1,789178  |        |
| _US--C                | 3,032305  |        |
| _UK--C                | -0,190127 |        |
| _TWN--C               | -1,702637 |        |
| _GER--C               | 1,144179  |        |
| _SIN--C               | -5,725936 |        |
| _PAK--C               | 6,619811  |        |
| _EA--C                | -4,991416 |        |
| _CAN--C               | -2,618663 |        |
| _RUS--C               | 2,643306  |        |

The destination country of North Sumatera tea exports has a constant of positive and negative values. A positive sign indicates that the country has a high tea export value, whereas a negative sign indicates that the country has a low tea export value. There are 5 countries that have high tea export value that is, Malaysia, United States, German, Pakistan, and Russia while 5 other countries have low export value.

From the 10 destination countries of tea export, the country used as a reference is Pakistan because it has the highest constant value. It can be seen in the table that the consecutive values of the most closely approximated to those having a considerable value with Pakistan are United States, Russia, Malaysia, Germany, United Kingdom, Taiwan, Canada, Emirates Arab and Singapore. This shows the level of the export value of tea to each country.

Table 6. The Influence of Individuals on Destination Countries of Tea Exports

| Country  | Coefficient |
|----------|-------------|
| Malaysia | -25,07      |
| US       | -23,83      |
| UK       | -27,05      |

|               |        |
|---------------|--------|
| Taiwan        | -28,56 |
| German        | -25,71 |
| Singapore     | -32,58 |
| Pakistan      | -20,24 |
| Emirates Arab | -31,85 |
| Canada        | -29,48 |
| Rusia         | -24,22 |

#### IV. CONCLUSION AND SUGGESTION

##### A. Conclusion

Tea production and GDP of tea export destination countries shows a positive and significant effect on the tea export of North Sumatra. The total population of tea export destination countries shows a negative and significant effect on the tea export of North Sumatra. The nominal exchange rate of the tea-exporting country to the dollar indicates a positive and insignificant effect on the North Sumatra tea export.

##### B. Suggestion

For the object of research to increase tea export of North Sumatra to country having high GDP. This is because in this study, GDP variables of export destination countries have a significant effect and have a positive coefficient. While exports will decrease in countries with high population.

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