Effects of International Crude Oil Prices, Fuel Consumption and Production on Fuel Imports (Case Study of PT Pertamina)

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ABSTRACT
The purposes of this study were to analyze the influence of International Crude Oil Price Fuel Consumption and Production on Fuel Import and to find out how many contributions of all independent variables to dependent variable. Multiple Linear Regression Analysis method was used in this study. Data used in this study were secondary data collected from PT Pertamina (Persero) and summarized by Ministry of Energy and Mineral Resource (period 2005 -2016). The result of F-test showed that simultaneously and significantly all of independent variables influenced dependent variable. Meanwhile, t-test result showed that only Fuel Consumption had a significant influence on Fuel Import. However, the other independent variables did not have partial influence on Fuel Import. While, based on coefficient of determination test, it was found that International Crude Oil Price, Fuel Consumption and Production had a high contribution in explaining fuel import. In addition, the interpretation model showed positive equation of Fuel Consumption, so it means that if there is an increase in Fuel Consumption then Fuel Import will also increase.

Key words: International Crude Oil Price, Fuel Consumption, Fuel Production and Fuel Import

Pengaruh Harga Minyak Mentah Internasional, Konsumsi Bahan Bakar dan Produksi terhadap Impor BBM (Studi Kasus PT Pertamina)

Abstrak
Tujuan dari penelitian ini adalah untuk menganalisis pengaruh Konsumsi dan Produksi Bahan Bakar Minyak (BBM), Harga Minyak Mentah Internasional terhadap Impor BBM dan untuk mengetahui seberapa besar kontribusi semua variabel independen terhadap variabel dependen. Metode analisis yang digunakan dalam penelitian ini adalah Metode Analisis Regresi Linier Berganda. Data yang digunakan dalam penelitian ini adalah data sekunder yang diperoleh dari PT Pertamina (Persero) dan dirangkum oleh Kementerian Energi dan Sumber Daya Mineral (periode 2005 -2016). Hasil analisis uji F menunjukkan bahwa secara simultan dan signifikan semua variabel independen mempengaruhi variabel dependen. Sementara itu, hasil uji-t menunjukkan bahwa hanya Konsumsi Bahan Bakar yang berpengaruh signifikan terhadap Impor Bahan Bakar. Namun, variabel independen lainnya tidak memiliki pengaruh parsial terhadap Impor BBM. Kemudian, berdasarkan uji koefisien determinasi, ditemukan bahwa Harga Minyak Mentah Internasional, Konsumsi Bahan Bakar dan Produksi memiliki kontribusi tinggi dalam menjelaskan impor bahan bakar. Sebagai tambahan, model interpretasi menunjukkan persamaan positif dari Konsumsi Bahan Bakar, sehingga dapat diartikan bahwa jika ada peningkatan Konsumsi BBM maka Impor BBM juga akan meningkat.

Kata kunci: Harga minyak mentah internasional, Konsumsi bahan bakar dan produksi, impor BBM

INTRODUCTION

Energy is very important thing that is needed in various aspect of human life. The needs of the energy will increase day by day. In fact, the most used energy in the world is oil. About 80% of the energy needs are supplied from fossil fuels, especially fuel oil. Consumption of fuel oil energy for transportation sector is dominated by road transportation, which is 88% of total fuel oil consumption in transportation sector, particularly diesel and gasoline (Akhmad and Amir, 2018).). In this case, the one of the biggest
industries in Indonesia that provide oil and gas is Pertamina. The total sales of fuel Pertamina in 2018 was about 4,44 billion liters which dominate Indonesian sales of fuel more than 80%. The high amount of consumption because of the high number of vehicles in Indonesia. The average fuel consumption per day in 2016 was 1.3 million bopd (barrel oil perday). Pertamina meets the fuel needs from domestic crude oil production, crude oil imports, and fuel imports. Pertamina still need to import fuel because not all of crude oil can be produced to fuel, which is only 75% of it. The price reference in this import activity is international crude oil price. Fuel oil availability issue for Indonesia is very important to fulfill the need of the society and to improve economic growth. Therefore, the government needs to maintain a balance between economic growth and the availability of fuel oil as one of the requirements to achieve developed and sustainable economic development.

Literature Review

According to Martinez (2019), A fuel is a substance that can be burned in air or other oxidant containing substance that so quickly reacts with oxygen that heat and light is emitted in the form of a sustained flame. Based on Kotler and Armstrong (2017:50), Price is the amount of money that customers must pay to get the product. Meanwhile Keller (2013:191) stated that price is the one revenue generating element of the traditional marketing mix, and price premiums are among the most important benefits of building a strong brand. Based on Mankiw (2016), consumption is spending on goods and services by households. Referring to Samuelson and Nordhaus (2001;408), Consumption is the expenditure made to fulfill the purchase of goods and services in order to get satisfaction or meet their needs. According to Bates and Parkinson (Cited in Mulchandani, 2018:106), 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 Krugman et al (2018), The most important single insight in all of international economics is that there are gains from trade—that is, when countries sell goods and services to each other, this exchange is almost always to their mutual benefit. The range of circumstances under which international trade is beneficial is much wider than most people imagine". According to Tandjung (2011:379), Import is a trading activity by entering goods from abroad into Indonesian customs areas in accordance with the provisions of applicable laws and regulations.

RESEARCH MEHODS

Data used in this research were time series data collected from PT Pertamina (Persero) and summarized by Ministry of Energy and Mineral Resource in the period of 2005-2016. International Crude Oil Price, Fuel Consumption, and Fuel Production as independent variables and Fuel Import as dependent variable. The measurement used in this research was USD$ for International crude oil price and barrels (BBL) for fuel consumption, production and import. Moreover, Multiple Linear Regression Analysis was used for this research methods equipped with the Classic Assumption Test and Coefficient of Determination.

RESULTS AND DISCUSSION

Classic Assumption Test

The classic assumption test aims to determine whether the variables are required as BLUE (Best Linear Unbiased Estimator) in using multiple regression analysis. They are:

Multicollinearity Test

Multicollinearity test is used to detect the correlation among independent variable. The ways to detect multicollinearity are using Variance Inflation Factor (VIF) and Tolerance.

The result showed that the value of VIF was less than 10 for each variable, so it was found that there was no correlation among independent variables. In addition, every variable had a tolerance value greater than 0.10. So, it can be concluded that there was no presence of multicollinearity among independent variables.

Autocorrelation Test

The data used to estimate linear regression models were time series data. Hence, an autocorrelation test was needed in this research to detect that problem. Durbin-Watson and Run-test were used in this research.

Based on Run-test result, it was proved that there was no autocorrelation detected in this research because the sig. value was 0.130 that was greater than 0.05.

Heteroscedasticity Test

Heteroscedasticity means the relationship of residual and the entire range of the dependent variable is different and the best model if the relationship is the same or called homoscedasticity. The test of heteroscedasticity was determined by looking at the scatter plot.

The result in this study explained that the point of distribution did not form a particular pattern. So, it can be concluded that heteroscedasticity did not occur in this analysis. In other words, this model was homoscedasticity. A classic assumption about heteroscedasticity was fulfilled.

Normality Test

A normality test is used to detect whether the data has a normal distribution or not. Shapiro-Wilk was used in this research because the number of the data are less than 50.

As a result, the data were normally distributed because the sig. value of each variable was higher than 0.05. Table 5.6 shows the sig. value of International Crude Oil Price was 0.191. Fuel Consumption was 0.086, Fuel Production was 0.093 and Fuel Import was 0.137 which were greater than 0.05. Therefore, the assumption of normality was fulfilled.

Linearity Test

A linearity test is used to detect the correlation between independent variables and the dependent variable is linear or not. Given classical assumption, the linearity test is required in this linear regression model. In this case, Curve Estimation was used to detect the linearity. The terms of Curve Estimation are (Solimun, 2013):
a. If the linear equation is significant (Sig < 0.05) and the other equations are ignored.
b. If all of the equation models are not significant (Sig > 0.05).

If one of the requirements is fulfilled, then there is a linear correlation between independent variables and the dependent variable.

International Crude Oil Price

The result showed that the linear equation was significant because sig. value 0.040 was less than 0.05, so the other equations were ignored. Then, it means that the International Crude Oil Price had a linear correlation with Fuel import.

Fuel Consumption

The result showed that the linear equation was significant because the sig. value 0.000 was fewer than 0.05, so the other equations were ignored. It means that Fuel Consumption had a linear correlation with Fuel import.

Fuel Production

The result showed that all of the equations were not significant because the value of each item was higher than 0.05. It means that Fuel Production had a linear correlation with Fuel import.

Based on the several tests completing the classical assumption, it was found that all variables were fulfilled the requirements of classic assumption test, which were multicollinearity test, autocorrelation test, heteroscedasticity test, normality test, and linearity test.

Goodness of Fit Model

Goodness of fit model contains the several tests to verify the properness of its model that is explained below:

F-Test (simultaneous)

F test is used to identify the influence of independent variables simultaneously on the dependent variable.

Based on result, it can be concluded that simultaneously and significantly International Crude Oil Price, Fuel Consumption, and Production influenced Fuel Import. The sig. value showed in 0.001 that was less than 0.05, and the F-Count 22.01 was greater than F-table 4.07.

T-test (Partial)

The t-test is used to test whether each independent variable influences the dependent variable or not.

International Crude Oil Price and Fuel Import

According to the result, it can be concluded that partially there was no significant influence of International Crude Oil Price on Fuel Import because a sig. value of price variable was 0.144 which was higher than 0.05 and t-count was 1.618 that was less than 2.30600. As a result, H01 was accepted and Ha1 was rejected. In other words, if the International crude oil price has changed then it will not affect on fuel import.

Fuel Consumption and Fuel Import

Based on the result, it was found that Fuel Consumption partially and significantly influenced Fuel Import. The value of significance for consumption variable was 0.001 which was less than 0.05 and t-count was 5.466 that was higher than 2.30600, then H02 was rejected and Ha2 was accepted. Hence, it means that if the fuel consumption increases then fuel import will increase complying with the demand for fuel.

Fuel Production and Import

The result showed that there was no partial and significant influence of Fuel Production on Fuel Import. The significance of the production variable was $0.767 > 0.05$ and t-count was $-0.377 < 2.30600$, then H03 was accepted and Ha was rejected. It means that if fuel production is increasing or decreasing then it will not affect on fuel import.

Coefficient of Determination

The result revealed the value of Adjusted R^2 was 0.813 showed the contribution of independent variables explaining the dependent variable (Fuel Import) was 81.8%. It means that the variable of International Crude Price Oil, Fuel Consumption and Production had a proportion variance about 81.8%, and the rest 19.2% (100% - 81.8%) was explained by other variables that were not in this research.

Multiple Linear Regression

The last step was interpretation of model. Below is the regression model of this research:

$$Y = 292 X_1 + 757 X_2 - 55 X_3$$

With:
Y = Fuel Import
X_1 = Fuel Consumption
X_2 = Fuel Production
X_3 = Fuel Import

Because only one independent variable influenced the dependent variable, so that only Fuel Consumption was written in this interpretation model. It means that every addition to 1 of fuel consumption, it can cause an increase in fuel import about 757 (thousand barrels) at PT Pertamina (Persero), with an assumption if the other variables are constant. It means that there was a positive effect occurred between Fuel Consumption with Fuel Import.

CONCLUSION AND RECCOMENDATION
Conclusion

Based on the analysis result, there were several conclusions obtained that can be described below:

1. According to F-test, it was found that simultaneously International crude oil price, fuel consumption and production had a significant influence on fuel import at PT Pertamina (Persero).
2. Meanwhile, based on t-test result, it showed that partially not all of the independent variables influenced fuel import. Only fuel consumption positively and significantly influenced fuel import. Nevertheless, International crude oil price and fuel production did not influence fuel import.
3. In addition, Adjusted R2 value showed International crude oil price, fuel consumption and production had a contribution proportion considerably in explaining fuel import.
4. In accordance with these results, the interpretation of multiple regression linear explains that if fuel consumption is increasing, then fuel import will also increase.

Recommendation

There are several recommendations obtained from this research:

1. it is recommended for the company to expand the exploration of fuel production refineries in order to reduce fuel import.
2. It is advisable to re-build old refineries that are not used or less productive, such as Brendan refinery, Balikpapan refinery, Kasim Refinery and add sophisticated technology in it.
3. It is recommended to develop the program of renewable technology, such as B20. B20 is a government program that requires mixing 20% of biodiesel with 80% of diesel fuel which is environmentally friendly because it uses organic material.
4. In addition, it is advisable to join the partnership with domestic companies running in oil and gas explorations. This may also push the import of crude oil besides fuel.

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