PROSPECT OF INDONESIA BLACK AND WHITE PEPPERS EXPORT

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Abstract

This study analyzes the behavior of pepper exports, consisting of black pepper and white pepper,to various destination countries. The results of this study showed that black pepper exports affected by the destination country's gross domestic product (GDP), the price of white pepper, the population of the country of destination and the exchange rate against the dollar. Meanwhile, white pepper exports affected by the destination country's GDP, the population of the country of destination, the price of black pepper, white pepper prices and the exchange rate against the dollar. The results also showed that black pepper and white pepper are not mutually substituted.

Abstrak

Penelitian ini menganalisis perilaku ekspor lada, terdiri dari lada hitam dan lada putih, ke berbagai negara tujuan. Hasil penelitian ini menunjukkan bahwa ekspor lada hitam dipengaruhi oleh Pendapatan domestik bruto (PDB) negara tujuan, harga lada putih, populasi negara tujuan dan nilai tukar rupiah terhadap dolar. Sementara itu, ekspor lada putih dipengaruhi oleh PDB negara tujuan, populasi negara tujuan, harga lada hitam, harga lada putih dan nilai tukar rupiah terhadap dolar. Hasil penelitian juga menunjukkan bahwa lada hitam dan lada putih tidak saling bersubstitusi.

INTRODUCTION

Pepper is one of the herbal plants thatb ecome one of the most important merchandise goods as well as the most important spice traded internationally. Pepper is one of the earliest types of spices traded in Europe. Pepper is used primarily in pharmaceuticals and food industries (Rismunandar, 2003). Pepper has been a worldwide commodity and has been receiving worldwide concerns regarding the crop (John, 2012), the consumption (Nwaopara et al., 2007, Singletray, 2011), or the trade (see Kiong et al., 2010).

Indonesia is one of the world's largest producer of pepper. Pepper from Indonesia is exported in the form of black pepper and white pepper. In addition, Indonesian pepper also sold in powder, green pepper and oil pepper. Besides Indonesia, major pepper exporting countries are Brazil,

Vietnam, India and Malaysia. The black pepper exports from major pepper producing countries are shown in Table 1 (For more on production and export performance of black pepper, please see Yogesh and Mokshapathy, 2013).
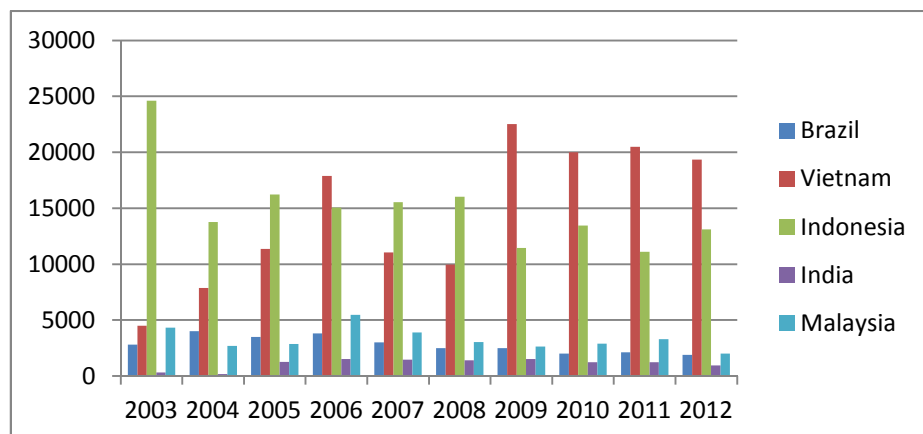
Figure 1 shows that the Indonesian black pepper exports have increased during the periods. The value of exports from 2003 to 2012 increased by 12.58% per year. The decline in the value of exports only occurred in 2004, 2005 and 2011. In 2011, the value of these exports plummeted by 48.38% from the previous year. Figure 1 also shows that the Indonesian black pepper exports value is lower than that of Vietnam.

Figure 2 shows that from 2003 to 2008, Indonesia is the largest exporter of white pepper in the world. During 2003-2012, the average growth of export volume decreased by 4.07% per year but the value grew by 19.78% per year. In 2009, the number of Indonesian exports of white pepper has been exceeded by the number of pepper export from Vietnam. This is an alarming condition considering Vietnam is a new country in spices export basiness.
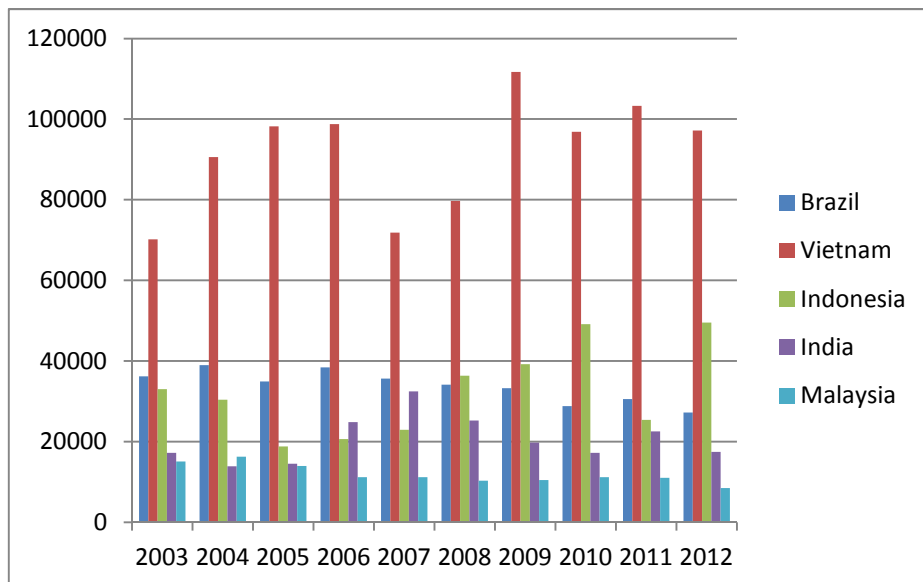
Source: IPC Statistical Yearbook 2012
Figure 1. Progress of Black Pepper Export

Source: IPC Statistical Yearbook 2012
Figure 2. Progress of White Pepper Export
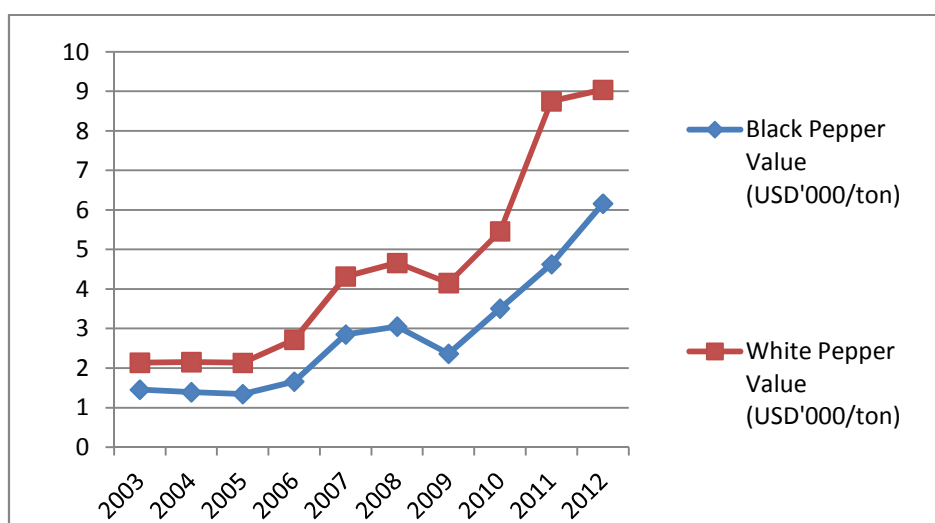
Source: IPC Statistical Yearbook 2012
Figure 3. Progress of Black and White Peppers Exports

Figure 3 shows that the value of Indonesian white pepper export exceeds the value those of black pepper. This is because both the number and the price of white pepper is bigger than those of black pepper. Throughout 2003-2012, black pepper export volume grew by an average of 12.58% per year, while its value grew by 20.66% per year. Meanwhile, the average growth of white pepper export volume during 2003-2012 decreased by 4.07% per year, eventhough the value grew by 9.78% per year.

Black pepper and white pepper are actually commodities that come from the same tree. The difference between both commodities is based on the difference in harvesting time and in processing. Black pepper is harvested when it is ripe-picking and dried with the skin without prior soaking process. White pepper are harvested when it is fully ripe and dried after soaking and stripping processes (Suwarto, 2002). In terms of utilization, both products have differences and similarities. Black pepper ingredient is widely used for traditional medicines such as Java herbal and liniment. The outer skin of black pepper can also be refined to produce etheric oils and typical scented resine. That is why black pepper are still produced by the farmers (Sarpian, 2003)

Indonesia exports black and white peppers to various countries. Indonesian pepper export destination countries have various characteristics depends on their income, population, and the value of their different currencies. These characteristics will affect trade between Indonesia and export destination countries. The income of export destination countries (Gross Domestic Product), the population of export destination countries, the price of pepper, and the exchange rate are expected to affect the export of Indonesian pepper.

According to Marwoto (2008), the phenomenon of substitution between black and white peppers also have an impact on developments in the pepper trade. The fact that black pepper prices are always cheaper than white peppers causes consumers choose black pepper. To analyze such phehonema, this paper conducts a research on factors influence black and white pepper exports from Indonesia to various destination countries.

Soebtrianasari (2008) analyzing the factors that affect the supply of white pepper from Indonesia and the factors that influence the demand for white pepper in the international market. She found that the Indonesia export of white pepper to the United States is strongly influenced by the

production of Indonesian white pepper, white pepper export amount of the previous year, and the real price of white pepper exports Meanwhile, white pepper exports to the Netherlands are only influenced by the real price of white pepper exports. United States white pepper import demand is affected by the US real income per capita and the number of the previous year imports of white pepper. Dutch white pepper import demand is influenced by the amount of the previous year imports of white pepper.

Marlinda (2008) analyzes the value of Revealed Comparative Advantage (RCA) to see the competitiveness of pepper. The results of the research showed that in 2006 the value of Indonesian pepper RCA is 14.32 but its competitiveness is still lower than that of Vietnam. To improve its competitiveness, Indonesia needs improve the quality and quantity of sales pepper to develop and increase exports of pepper.

Triana (2000), using time series data from the period 1969 to 1998 with the simultaneous equations, tests the influence of internal and external factors to the demand and supply of white pepper in the domestic and world markets. She found that the white pepper production is only responsive to changes in long-term productivity, but is not responsive to changes in the price of pepper, fertilizer prices, wages, interest rates, and harvest area. White pepper exports to Germany, the Netherlands, and Singapore are more responsive to changes in production levels compared with the change in the export price of white and black peppers, exchange rates, interest rates and the volume of re-exports of pepper of Singapore. Demand for white pepper imports of United States and the Netherlands are more responsive to changes in income compared to change in import prices of white and black peppers, the number of inhabitants, and the exchange rate. Japanese white pepper import demand is responsive to changes in the world price of black pepper. Meanwhile, the Germany

and Singapore demand for imports of white pepper are responsive to changes in population.

Different from previous studies, this research builds a model for black pepper export and another model for white pepper export. With these two models, the paper will be able to identify the influence of the characteristics of export destination countries for the exports. This study focuses on the influence of external variables of export destinations and testing the substitution level of black and white peppers. In addition, this study uses a variety of observation to answer the latest phenomenon, namely a drastic decline in pepper exports during 2011-2012. This study also uses a different model from the previous ones, namely it uses a panel data model This model is expected to be able to show the best export destinations for black and white peppers.

METHODS

This study uses time series and cross section data. The time series data include annual data from the period of 2001 to 2012. The cross section data include eight of export destinations. To choose the country, this paper uses two criteria. First, it chooses countries that continuously trade pepper with Indonesia for 12 years. Second, it choosescountries that simultaneously import black and white peppers. This selection resulted in 8 countries, namely the United States, the Netherlands, Hong Kong, India, Germany, Japan, Singapore, and Taiwan. The variables expected to affect exports of pepper are real GDP of export destination countries, the price of real exports of black pepper and white pepper in the destination country, the population of export destination countries, and the exchange rate.

This paper estimates a panel data model, i.e. a model that accommodates a combination of time series and cross section data. The estimation results of the panel data model is more efficient than that

of regular models because it uses more observations. In addition, the use of panel data models can also reduce the effects of bias due to the increasing degrees of freedom. According to Veerbek (2008), the availability of repeated observations on the same unit allows economists to determine and estimate the model in a more complex and a more realistic ways than the model with cross section data only or models with time series data alone.

The approaches used in the analysis of panel data covering the pooled ordinary least squares, fixed effect model, and random effect model. Pooled least squares (PLS) models can be estimated using OLS. PLS assumes that both the intercept and the slope are constant. Such a model does not accommodate variations in individuals and time. However, constant intercept and slope are less realistic. To overcome these problems, we can use two types of panel data, namely the fixed effect model and random effect model. To accommodate variability in intercepts, we can use a dummy variable, so the model is also known as a Least square dummy variable (LSDV) model. The equation can be written as follows:

$$Y_{it} = a + \beta X_{it} + \lambda_2 W_{2i} + \lambda_3 W_{3i} + ... \\ + \lambda_N W_{Ni} + \mu_2 Z_{2t} + \mu_3 Z_{3t} + \mu_T Z_{Tt} + \varepsilon_{it} \quad (1)$$

where
Y_{it} is dependent variable for i^{th} individual at t^{th} time.
X_{it} is independent variable for i^{th} individual at t^{th} time.
W_{it}, Z_{it} is dummy variable
W_{it} is 1 for indivual i, and $W_{it} = 0$ therwise; $i = 1,2,....,N$
Z_{it} is 1; for period t; and $Z_{it} = 0$ otherwise; t is $1,2,......T$

For the REM method, considering there are two components that have contributed to the formation of error, i.e. the individual and time, then the random error in REM also needs to be decomposed into an error

for an individual component, a time component error and a combined error. The REM equation can formulated as follows

$$Y_{it} = a + \beta X_{it} + \varepsilon_{it}; \quad \varepsilon_{it} = u_1 + v_t + W_{it} \quad (2)$$

where
u_1 is error cross section component
v_t is error time-series component
W_{it} is combined error component

To choose the appropriate model, this paper uses three tests, namely the Chow, Hausman, and LM tests. Chow test was used to choose between the two models, namely pooled least squares and fixed effect models. After doing the Chow test, this paper conducts Hausman test to choose between the two models, namely the fixed effect model and random effect model. In the last step of model selection, this paper conducts a Lagrange Multiplier Test (LM test) to determine whether to use REM model or PLS model.

To analyze the behavior of exports of black and white peppers to the destination countries, this paper estimates the following regression model:

$$XLH_{ijt} = a_0 + a_1 Y_j + a_2 PLH_{xj} + a_3 PLP_{xj} + \\ a_4 POP_j + a_6 ER_j + e_1 \quad (3)$$

where
XLH_{ijt} is Volume of black pepper export to country j (tons)
Y_j is GDPof export destination country (USD billion)
PLH_{xj} is Price of black pepper in export destination country (USD/ton)
PLP_{xj} is Price of white pepper in export destination country (USD/ton)
POP_j is Population of export destination country (juta orang
ER_j is Exchange rates (Rp/USD)
t is Periods (year)
a_0 is constant
a_i is koefisien regresi (i: 1,2,3,....)
e_1 is *error term*

The determinant of white pepper export to the destination countries are

$$XLP_{ijt} = b_0 + b_1 Y_j + b_2 PLH_{xj} + b_3 PLP_{xj} + b_4 POP_j + b_5 ER_j + e_2 \qquad (4)$$

where:

XLH_{ijt} is Volume of white pepper export to country j (tons)

Y_j is GDP of export destination country (USD billion)

PLH_{xj} is Price of black pepper in export destination country (USD/ton)

PLP_{xj} is Price of white pepper in export destination country (USD/ton)

POP_j is Population of export destination country (juta orang

ER_j is Exchange rates (Rp/USD)

t is Periods (year)

a_0 is constant

a_i is koefisien regresi (i: 1,2,3,....)

e_2 is *error term*

Panel data includes more information, have a little collinearity between variables, have more degree of freedom, as well as more efficient, so that a panel data model does not require classical assumptions. For more discussion on panel data, please refer to Hsiao (2005), among others.

## RESULTS AND DISCUSSIONS

Progress of Indonesia Pepper Export

Indonesia has been exporting pepper to various countries. These countries have a variety of characters that could affect exports. The pepper importing countries have different tastes of the black pepper and white pepper. This can be inferred from the export volumeof to these countries.

Black and White Peppers Exports to the USA

The USA imports peppers from Indonesia, Brazil, India, Vietnam and Malaysia. Indonesia is a major exporter of pepper to the United States. The progress of Indonesia black and white peppers exports to the United States in 2001 to 2012 are presented in Figure 4.

Figure 4 shows that the number of black pepper exports exceeds the number of white pepper exports. Black pepper exports increased by 10:31% per year, while exports increased by 7.7% of white pepper per year.
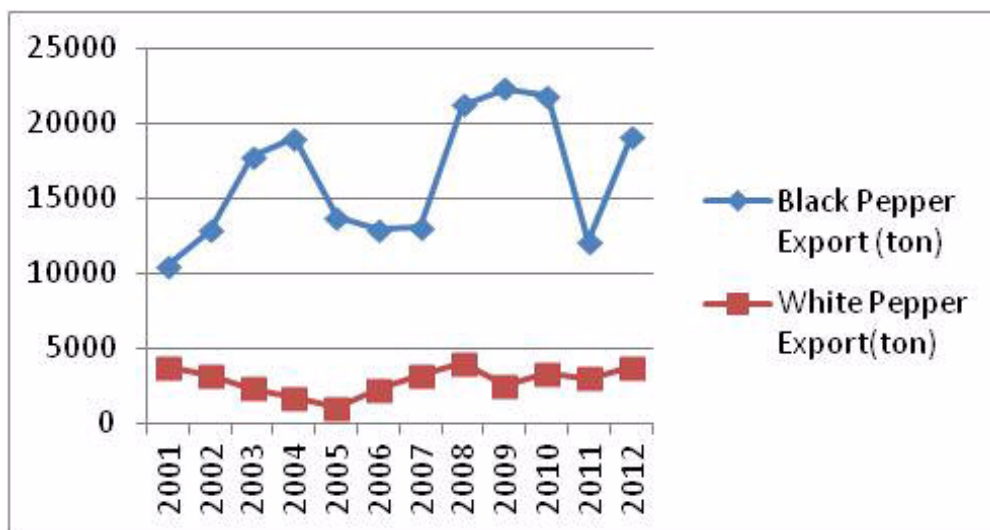
Source: IPC Statistical Yearbook 2012
Figure 4. Pepper Export to the USA

Black and White Peppers Exports to the Netherlands

Netherlands imports peppers from mostly Vietnam, Brazil, Indonesia, India, Malaysia. The progress of Indonesia black and white peppers exports to Netherlands are presented in Figure 5. The number of Indonesian exports of white pepper to the Netherlands tend to fall throughout 2007-2012, approximately 13.94% per year. Meanwhile, the number of black pepper exports increased by 31.6% per year.

Black and White Peppers Exports to Hongkong

Hongkong imports peppers mostly from Indonesia, Malaysia, India, China, Vietnam.

The progress of Indonesia black and white peppers exports to Hongkong are presented in Figure 6. The number of black and white pepper exports to Hong Kong experienced a substantial decline in 2002. After 2002, the export of pepper tends to increase. The exports of black pepper increases by 33.04% per year, while white pepper export increase only 8.83% per year.

**Black and White Peppers Exports to India**

Eventhough India produces pepper, but India also imports pepper, mostly, from Sri Lanka, Indonesia, Vietnam, China, Brazil. The development of Indonesia exports of black pepper and white pepper to India are presented in Figure 7.
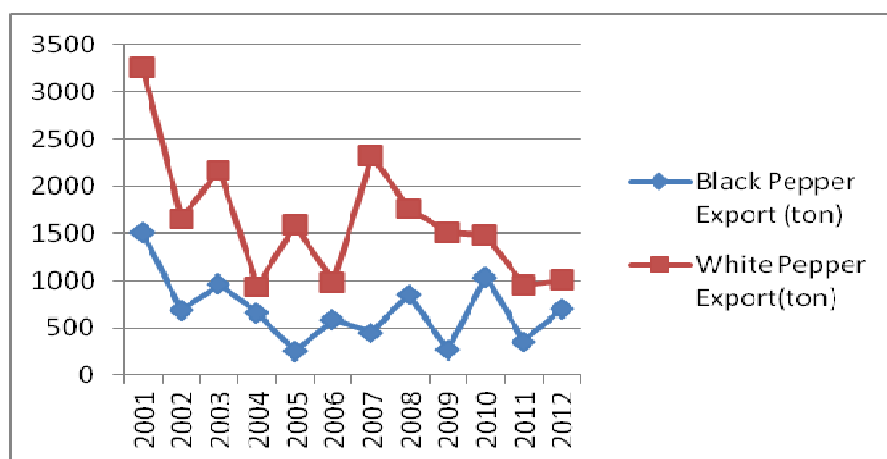
Source: IPC Statistical Yearbook 2012
Figure 5. Pepper Export to Netherlands
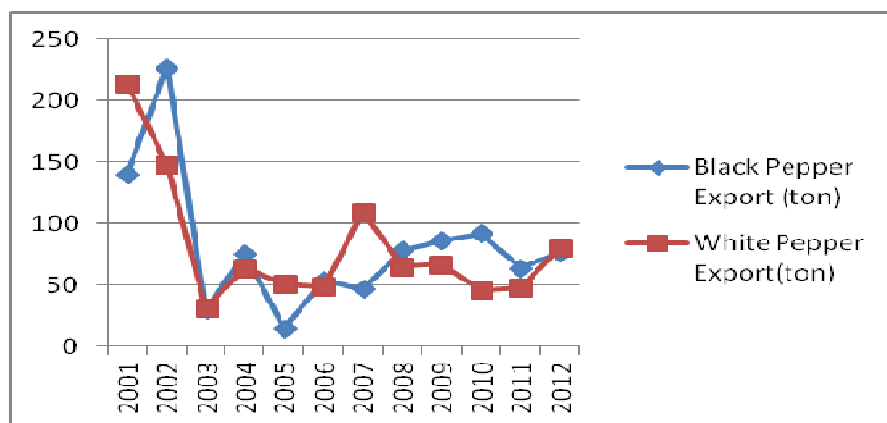
Source: IPC Statistical Yearbook 2012
Figure 6. Pepper Export to Hongkong
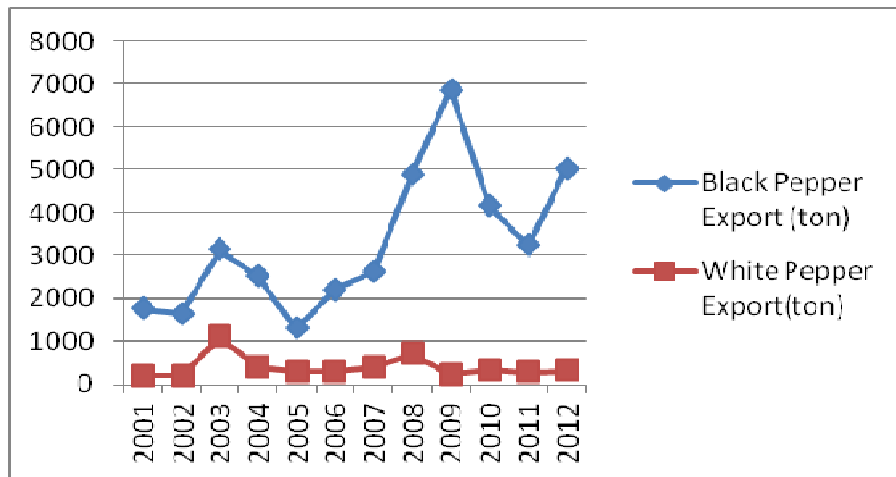
Source: IPC Statistical Yearbook 2012
Figure 7. Pepper Export to India

The number of Indonesian black pepper exports to India increased by 20.49% per year throughout 2001-2012. Meanwhile, in the same period, the number of Indonesian exports of white pepper to India increased by 8.01% per year
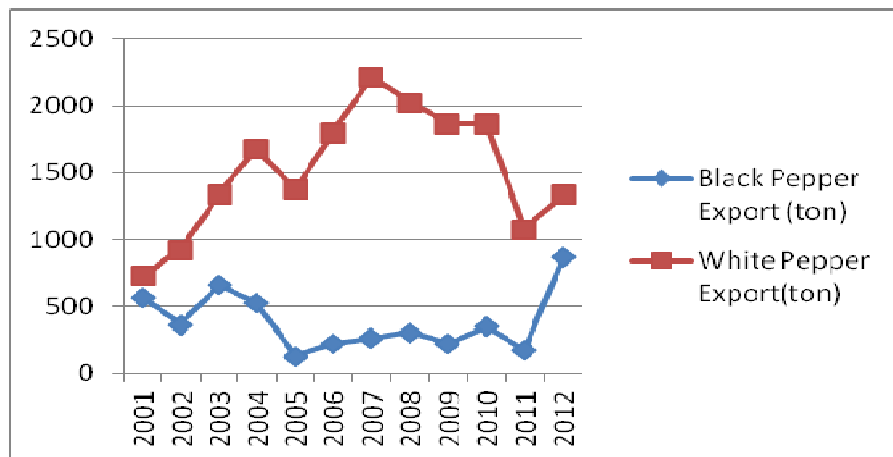
Black and White Peppers Exports to Germany

Based on the report of trade attaché Embassy in Berlin in 2013, Germany imports of pepper grows 11% per year throughout 2008-2012. Germany imported pepper mainly from Vietnam, Brazil, the Netherlands, Indonesia, India. The development of Indonesia exports of black pepper and white pepper to Germany are presented in Figure 8.

Indonesia white pepper exports to Germany increased by 6.38% per year during 2001-2010, and then drastically decreased by 42% in 2011. The number of black pepper exports to Germany plummeted 35.27% in 2002 and 74% in 2005. Indonesia black pepper export starts to increase in 2006 by 13.71% per year.
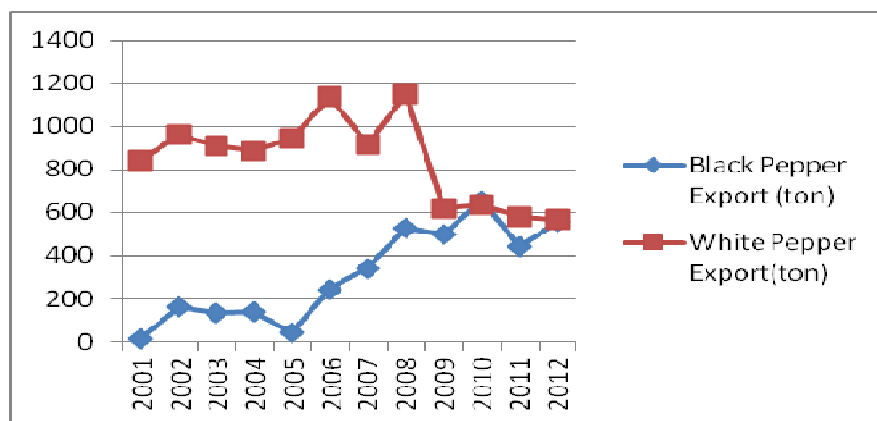
Black and White Peppers Exports to Japan
Japan imported pepper mainly from Malaysia, Indonesia, India, Vietnam, Brazil. The development of Indonesia pepper exports to Japan are presented in Figure 9.

Source: IPC Statistical Yearbook 2012
Figure 8. Pepper Export to Germany

Source: IPC Statistical Yearbook 2012
Figure 9. Pepper Export to Japan

In 2005, the number of Indonesia white pepper exports to Japan began to decline, while the amount of black pepper exports began to rise sharply. The number of white pepper exports fell by 13.51% per year throughout the last four years. Meanwhile, the number of black pepper exports increased by 48.64% per year.

Black and White Peppers Exports to Singapore

Singapore imports pepper mainly from Vietnam, Indonesia, Malaysia, India, Madagascar. Up to 2009, the export of pepper to Singapore is dominated by white pepper, but after 2009 the export of black pepper and white pepper are likely the same amount. The development of exports of black pepper and white pepper Indonesia to Singapore is presented in Figure 10.

Figure 10 shows that the number of white pepper exports fell by 19.83% per year throughout 2005-2009. Meanwhile, the number of black pepper exports increased by 22.73% per year. For the record, Singapore is processed pepper exporting countries. International Pepper Community states that the development of black pepper exports to Singapore in 2001 to 2012 fluctuated. A very interesting phenomenon is the tendency of white pepper exports that declines sharply.
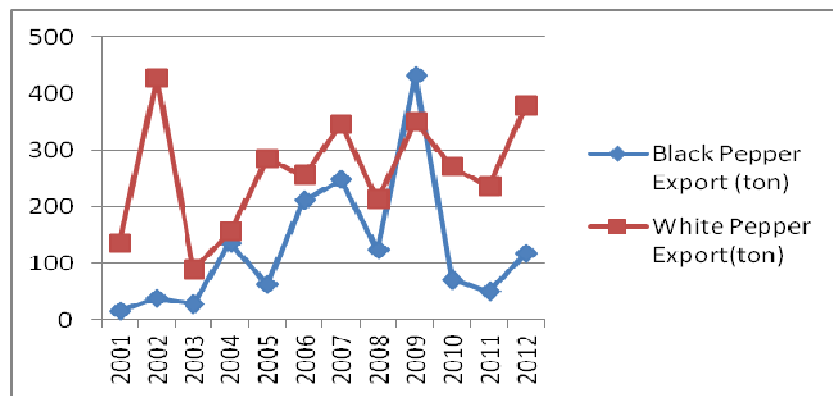
Black and White Peppers Exports to Taiwan

Taiwan imported pepper mainly from Vietnam, Brazil, Indonesia, India, Malaysia. The development of Indonesia exports of black pepper and white pepper to Taiwan is presented in Figure 11.
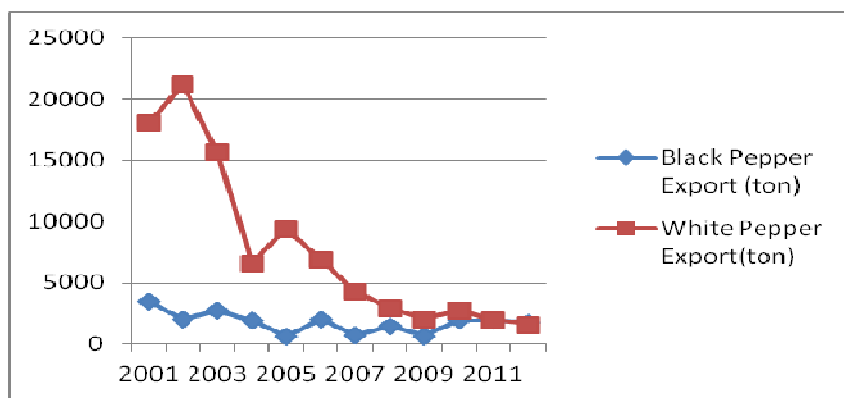
Source: IPC Statistical Yearbook 2012
Figure 10. Pepper Export to Singapore

Source: IPC Statistical Yearbook 2012
Figure 11. Pepper Export to Taiwan

Figure 11 shows that the highest number of white pepper exports occurred in 2002 amounted to 426 tons with a value of USD561 thousand. The exports of black pepper was the highest in 2009 amounted to 430 tons with a value of USD157 thousand. Export of black pepper and white pepper increases and decreases simultaneously.

Choosing the Panel Data Model

This paper uses Chow test to determine the best model from two competing models, namely the Fixed Effects Model (FEM) and Random Effects Model (REM). Chow test results and the estimation are presented in Table 1.

The p-value of both F-test and chi-square for the equation of black pepper export is 0.0000 which allows us to reject H0. This means that FEM is better than PLS.

The estimation result of the FEM also has a higher R^2 (93.11%) than the PLS does (79.89). This means that the result of the FEM model is better than that of PLS. The same results were shown by the estimates of white pepper equation. The F-test and chi-square values of the model has a p-value 0.0000, and it has higher R^2 as well.

The next step is to choose the best model between two options, namely FEM with REM, by using the Hausman test. The estimates of REM and the Hausman test are presented in Table 2.

The p-value for black pepper export equation is 0.0077 so that H_0 is rejected at 1% significance level. The R^2 for FEM and REM are 93.1% and 46.8%, respectively, indicating that the FEM is better the best one for the black pepper export equation.

Table 1: Chow Test

Equations	PLS	FEM	Chow Test	
	R^2	R^2	*F-test*	*Chi-Square*
Blac Pepper	0,798	0,931	0,0000	0,0000
White Pepper	0,076	0,590	0,0000	0,0000

Table 2: Hausman Test on Black and White Peppers Equations

Persamaan	FEM	REM	Uji Hausman
	R^2	R^2	*p-value*
Lada Hitam	0.931	0.468	0.0077
Lada Putih	0.590	0.121	0.3176

Hausman test for white pepper export equation shows the p-value of 0.3176 (> 5%) so that H_1 is rejected. Thus, the REM model is better than the FEM model for white pepper export equation. However, this result is not consistent with the results of the estimation. The estimation results indicate that the R2 for FEM and PLS models are 59% and 12.1%, respectively. This indicates that the FEM model is better than the REM model. For such cases, when the number of time series observations is greater than the number of cross section observations, the recommended approach is the FEM one.

Factors Affecting Export of Black Pepper

The estimation results for black pepper exports are presented in Table 3. Variables significantly affecting black pepper export to the USA, the Netherlands, Hong Kong, India, Germany, Japan, Singapore, and Taiwan during 2001-2012 are GDP, the price of white pepper, population and exchange rates. Meanwhile, the price of black pepper does not affect the export of Indonesian black pepper. The R^2 value of 85.4% and the prob(F stat) of 0,00000 indicating the the model is a good one.

Individual Effect of Destination Export of Black Pepper

Individual effects (cross section effect) showed the different from each cross section. Individual effects for each export destination is obtained by adding the value of the constant equation of black pepper exportsto each individual coefficient:

$$\text{Individual Effect} = \text{Constant} + \text{Individual Coefficient} \qquad (5)$$

Individual effect of black pepper export destination country can be seen in table 4.

The USA and Singapore are countries with positive individual effects. This means that both countries are the most potential black pepper export country destinations. If we assume that all the independent variables change, or constant, jointly, across countries and over time, the export destination country will give individual impact on Indonesia black pepper export as indicated by the value of the individual effect. The USA and Singapore are the export destination countries for Indonesia black pepper that will provide a positive individual influence, namely 3989.104 and 1368.23, respectively.

Table 3: Estimation Result of Factors Affecting Black Pepper Export*

Variable	Coefficient	Probability
C	-1880.053	0.0272
GDP	0.694987	0.0003
Price of Black Pepper Export (PLH)	0.006969	0.8055
Price of White Pepper Export (PLP)	-0.053904	0.0035
Population (POP)	12.58262	0.0001
Exchange Rates (ER)	0.043683	0.0050
Fixed Effect (Cross)		
The USA	5869.667	
The Netherlands	1682.426	
Hongkong	1490.113	
India	-9668.895	
Germany	-902.0474	
Japan	-2916.880	
Singapore	3248.801	
Taiwan	1196.814	
$R^2 = 0.854028$, Adjusted $R^2 = 0.832924$, Prob (F-Stat) = 0.000		

*Notes: FEM Methods with the Weight of Cross Section SUR

Table 4: Individual Effect of Export Destination Countries

Country	Individual Effect
The USA	3989.104
The Netherlands	-198.137
Hongkong	-390.45
India	-11549.5
Germany	-2782.61
Japan	-4797.44
Singapore	1368.238
Taiwan	-683.749

Factors Influencing White Pepper Export

The estimation results of Indonesia white pepper export is in Table 5. Variables that affect the Indonesia export of black pepper and white pepper are GDP, prices of black and white peppers, population, and the exchange rate against the dollar.

The Individual Effect of White Pepper Export Destination Countries

The individual effect of each Indonesia export destination country is in Table 6.

Table 5. Estimation Result of Factors Affecting White Pepper Export*

Variable	Coefficient	Probability
C	709,4278	0,1288
GDP	1,391079	0,0000
Harga Ekspor Lada Putih (PLP)	-0,320052	0,0001
Harga Ekspor Lada Hitam (PLH)	0,360322	0,0000
Populasi (POP)	9,621072	0,0000
Nilai tukar (ER)	-0,411170	0,0000
Fixed Effect (Cross)		
The USA	-12934.26	
The Netherlands	4457.718	
Hongkong	3612.029	
India	-7613.155	
Germany	751.3863	
Japan	-3288.265	
Singapore	11504.31	
Taiwan	3510.240	
$R^2 = 0,885101$, Adjusted $R^2 = 0,868489$, Prob (F-Stat) = 0.000		

*Notes: FEM Methods with the Weight of Cross Section SUR

Table 6. Individual Effect of Exporting Destination Countries

Country	Individual Effect
The USA	-12224.8
The Netherlands	5167.146
Hongkong	4321.457
India	-6903.73
Germany	1460.814
Japan	-2578.84
Singapore	12213.74
Taiwan	4219.668

The country with the biggest individual effect is Singapore, while the country with the smallest individual effect is the USA. The Netherlands, Hongkong, Germany, Singapore and Taiwan have positive individual effects which means that they are the best white pepper export destination countries.

CONCLUSION

This study found that the Gross Domestic Product (GDP) of export destination countries, the population of export destination countries, and the exchange rate against the dollar positively affect the export of Indonesian black pepper. Indonesian white pepper prices in the country of destination negatively affect Indonesian exports of black pepper in the destination country. Meanhile, the Indonesian black pepper prices in the destination country does not significantly influence the Indonesian black pepper exports in the destination country.

GDP of the destination country, Indonesian black pepper prices in the destination country, and the population of the destination country have a positive effect on Indonesia white pepper export. Indonesian white pepper prices in the destination country and exchange rates negatively affect Indonesian white pepper export.

The best export destination countries for Indonesian black pepper are the USA and Singapore, while the best export destination countries for Indonesian white pepper are The Netherlands, Hong Kong, Germany, Singapore and Taiwan. This paper also found that black and white peppers are not subtitute each other.

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