

SARAWAK'S EXPORT OF PLYWOOD: AN ECONOMETRIC ANALYSIS

Kiew Leh Yieng¹

ABSTRAK

Sarawak merupakan pengeluar terbesar papan lapis di Malaysia. Industri kayu-kayan adalah penyumbang keempat terbesar, selepas gas asli, petroleum dan minyak kelapa sawit kepada ekonomi Negeri Sarawak. Pada tahun-tahun kebelakangan ini, nilai eksport papan lapis adalah tertinggi di antara produk kayu-kayan di Sarawak. Kajian ini bertujuan untuk menggambarkan trend pengeluaran dan eksport papan lapis di samping membangunkan model ekonometri bagi menganggarkan eksport papan lapis di Sarawak. Data siri masa dari tahun 1990-2013 digunakan dalam kajian ini. Regresi linear dengan kaedah Ordinary Least Squares (OLS) digunakan dalam penganggaran pembolehubah. Hasil kajian menunjukkan harga eksport, kadar pertukaran mata wang dan polisi kuota eksport kayu balak memberi kesan signifikan kepada eksport papan lapis di Sarawak. Model berkenaan sesuai digunakan untuk menganggar atau meramal eksport papan lapis Sarawak dan seterusnya sebagai rujukan berguna kepada agensi kerajaan atau swasta.

Kata kunci: Ekonometri, Eksport, Papan lapis

ABSTRACT

Sarawak was the largest producer of plywood in Malaysia. Timber and timber related products was the fourth largest contributor, after natural gas, petroleum and palm oil, to the state's economy. Among the timber products in Sarawak, plywood topped the export values in recent years. This study was aimed to illustrate Sarawak's plywood production and export trend and to develop an econometric model to estimate the export of plywood in Sarawak. Time series data from 1990-2013 were used in the study. The linear regression with Ordinary Least Squares (OLS) method was used to estimate the corresponding coefficients in this study. The export price, exchange rate and implementation of log export quota policy had been showed statistically significant to estimate the Sarawak's plywood exports. The model is suitable for projections or forecasting of Sarawak's plywood exports and thus can serve as a useful reference for government and private agencies.

Keywords: Econometric, Export, Plywood

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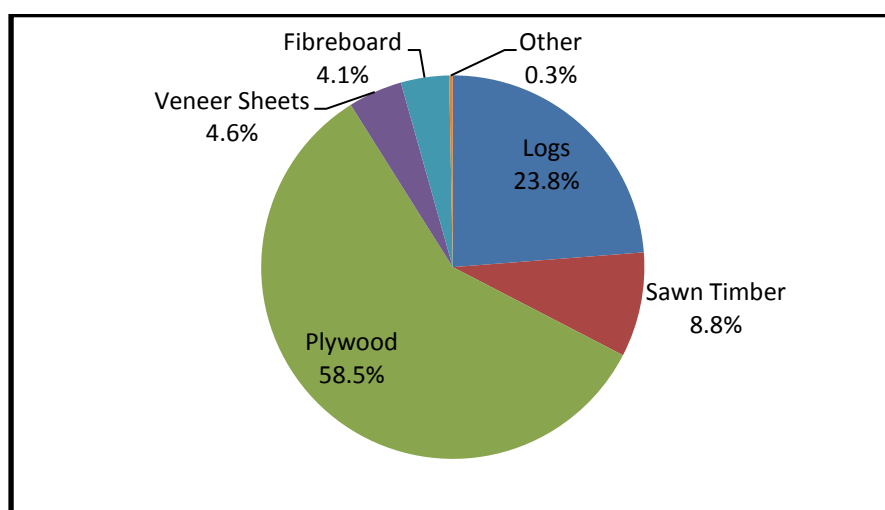
1. INTRODUCTION

Malaysia was the world's third largest supplier of plywood in the world for the year 2013. Sarawak contributed more than 70 per cent, which was the largest producer of plywood in Malaysia.

In 2013, timber exports was the fourth largest source of export earnings for Sarawak after natural gas, petroleum and palm oil. The timber exports contributed 6.6 per cent of total Sarawak's exports (Yearbook of Sarawak External Trade Statistics, 2014). Timber industry had been and will continue to be an important socio-economic sector for Sarawak. The industry provided economic opportunities in investment, employment, supporting services and others.

In recent years, plywood topped the export of log and timber products. It contributed 58.5 per cent to Sarawak's total export of log and timber products in year 2013 as shown in Figure 1 (Yearbook of Sarawak External Trade Statistics, 2014).

Figure 1: Sarawak Exports of Log and Timber Products, 2013

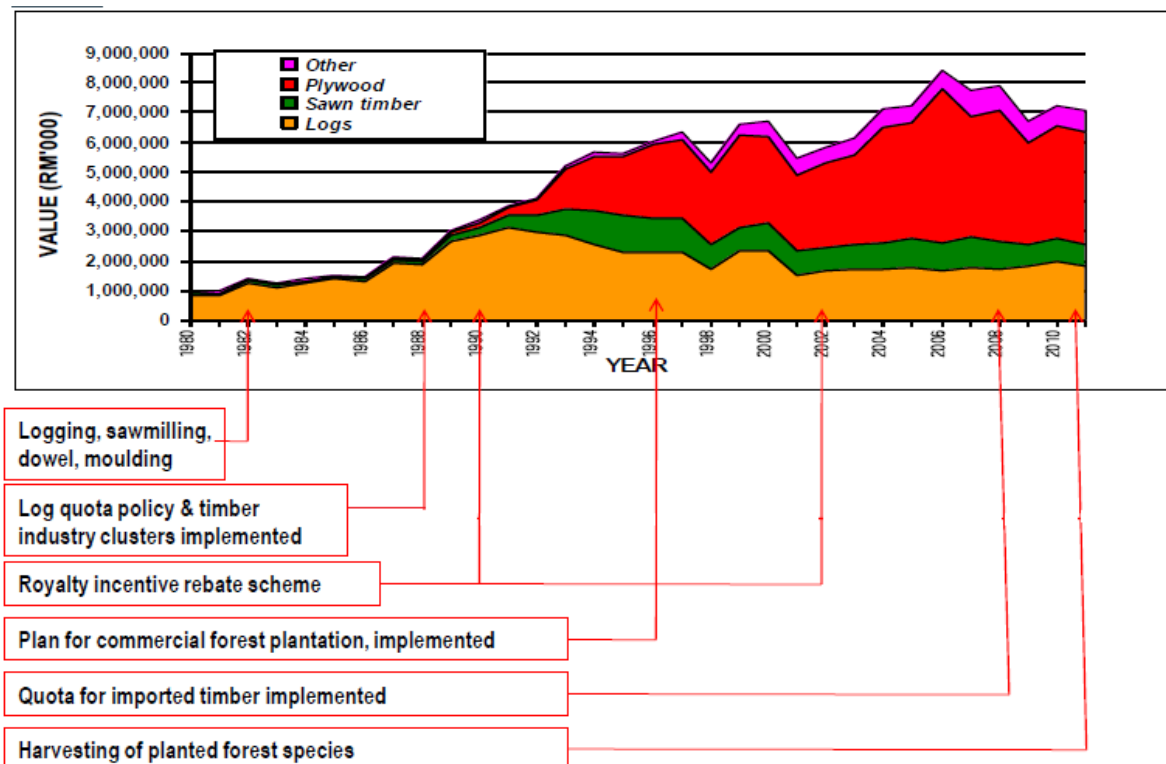


Source: Department of Statistics Malaysia (DOSM), Sarawak, 2014

Figure 2 showed the overall development progress of timber industry in Sarawak. The industry shifted from primary raw material to timber-based products processing over the period. The state government had implemented log export quota and royalty incentive rebate scheme as well as forest replantation in order to promote downstream wood processing and ensure sustainable management of forest in Sarawak.

For many years, the state government allowed up to 40 per cent of the state logs production to be exported, with the other 60 per cent reserved for processing into plywood and other valued-added secondary and tertiary products. The upward revision in the quota to 50 per cent took effect in the second half of 2013.

Figure 2: Timber industry in Sarawak



Source: Sarawak Timber Industry Development Corporation (STIDC)

Although some researches had been carried out on export trend and structure of timber industry in the world, such as Tachibana (2000), Minli et al. (2010) and Makkarennu and Akira (2013), there had been few empirical investigations into the factors that influenced plywood exports in the region specifically in Sarawak.

This study aims to examine the plywood's production and export trend in Sarawak. Furthermore, the study attempts to develop an econometric model to determine the economic factors that affecting the export of plywood in Sarawak.

2. LITERATURE REVIEW

Several studies investigating export of agriculture or timber products had been carried out by using different methods (Yusuf and Edom, 2007; Angles et al., 2011; Ajang et al., 2012 and Qazi, 2012). Cabuk et al. (2013) established an econometric model and developed projections for production, import and export of Turkish particle board industry.

Pakhriazad and Mohd.Hasmadi (2010) conducted a study to determine the trend of logs production and export in the state of Sarawak for the period of 1997 to 2006. The overall declining trend was further examined by species of logs and export destination.

To determine the effect of economic factors on plywood exports in China, Minli et al. (2010) applied the Engle-Granger error-modeling approach. Their econometric

estimations in long-run and short-run effects demonstrated that the growth in China's plywood exports was mainly due to consumer income growth in the target market.

Makkarennu and Akira (2013) investigated current situation of Indonesian plywood and trend of plywood exported in order to determine the potential future market for Indonesian plywood. The data was analysed by using single exponential smoothing method.

A study by Tachibana (2000) assessed the impacts of the log export restriction in the Southeast Asian countries on the Japanese plywood market by using econometric analysis. The results revealed that the log export restrictions led large profits to plywood industries.

Mark (2004) reviewed that exchange rate had a sizeable effect on export volumes. His findings showed that the impact of exchange rate to export volumes was unevenly spread across sectors. Non-primary sector export volumes tended to react more significantly to the real exchange rate than primary exports. Wong & Tang (2009) found that exchange rate had an adverse effect on Malaysia's electrical exports while the foreign income and prices were important determinants.

Similarly, Amina & Gao (2013) analysed the relationship between RMB to US dollar exchange rate and prices of US textile exports by using data for the period of 2001 to 2010. They concluded that there was no existence of significance relationship between them. Together these studies provided important insights into developing an econometric model in this study on determinants of plywood exports in the region Sarawak.

3. RESEARCH METHOD

3.1 Data

The data for this study was drawn from three main sources: publications of Department of Statistics, Malaysia, Website of Sarawak Timber Industry Development Corporation and website of Central Bank of Malaysia.

For the purpose of analysis, a time series of 14-years data from year 1990 to year 2013 was used. The data extracted were production volume, export volume and export price of plywood in Sarawak state as well as average annual currency exchange rate of Malaysia ringgit to US dollar.

3.2 Methodology

For the trend of plywood production and exports volume, the data was graphically illustrated by plotting on a line chart. Both the variables were plotted on the same chart for better comparison of trend.

To develop the econometric model for export volume of plywood, multiple regression function was used. The multiple regression function (Annete, J B, 1982) was shown in Equation 1.

$$Y_t = b_0 + b_1X_{1t} + b_2X_{2t} + e_t \quad (1)$$

where e was the residual term and the b 's were the estimators.

For this study, the hypothesized function of Sarawak's plywood export was given in Equation (2).

$$Q = f(P, ER, DM) \quad (2)$$

The dependent variable was the volume of plywood exported, denoted by Q . Q was measured in thousand of cubic metre.

The plywood export price (P) was one of independent variables in this model. The producers decided whether to export plywood or not considering plywood export prices and domestic prices. However, only the plywood export price (P) was used in this modeling as the plywood industry in Malaysia was heavily export-oriented.

Another independent variable used in this model was exchange rate (ER). The exchange rate (ER) may influence trade behavior. Amina and Gao (2014) stated that a change in the exchange rate will increase or decrease the cost of goods. When Ringgit appreciates, this would increase the global demand for goods as well as increase the value of Ringgit. A rise in the price of goods will lead to a reduction in exports.

A dummy variable (DM) was introduced to capture the structural changes due to Sarawak's log export quota intensified on 1992-1993. The log export quota had been in force since then.

Therefore, the expected direction of effects on the independent variables P , ER and DM are all positive in this study.

The Equation (2) was specified as log-linear in both sides. To estimate the coefficients of these equations, the method of ordinary least squares (OLS) was used.

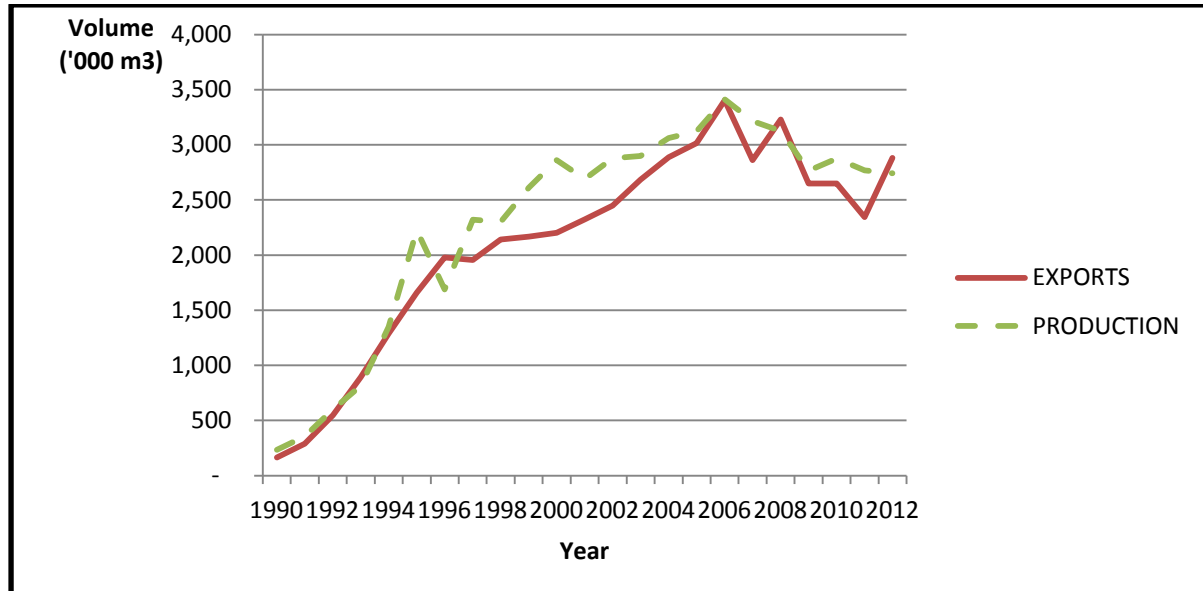
4. RESULT

In order to examine the trend of Sarawak plywood's production volume and export volume, a line chart was plotted. In Figure 3, there is a clear trend of increasing in both production volume and export volume of plywood in Sarawak from 1992 - 2006.

The production volume and export volume of plywood in Sarawak dipped during Global Financial Crisis in year 2007. Since then, both production volume and export volume of plywood in Sarawak maintained between 2000-3500 thousand cubic metre per year.

To conclude the trend, it was showed that the volume of plywood exported was in line with the volume of plywood produced for the period of more than two decades. This evidence suggested that the plywood in Sarawak was heavily export oriented.

Figure 3: Production and Export Volume of Plywood in Sarawak



Source: Department of Statistics Malaysia (DOSM), Sarawak, 2014 and Sarawak Timber Industry Development Corporation (STIDC)

The next section of the analysis was concerned with the summary statistics for all the variables. As Table 1 showed, the plywood exports volume, Q had a mean of 2,141,208 m³ with maximum volume of 3,404,000 m³ exported in year 2006 and minimum of 165,000 m³ in year 1990.

The export price of plywood, P had a mean of RM1160.094 with standard deviation of 235.421. The export price hiked in year 2011 to RM1634.958 per cubic metre whereas it recorded lowest price of RM 779.923 per cubic metre in year 1992.

From Table 1, the analysis of foreign exchange rates of Ringgit to the dollar from 1990 to 2013 showed a mean of 3.251 and a standard deviation of 0.515.

Table 1: Summary Statistics

Variable	Observations	Minimum	Maximum	Mean	Std. deviation
Q ('000 m ³)	24	165.000	3404.000	2141.208	907.222
P (RM)	24	779.923	1634.958	1160.094	235.421
ER	24	2.508	3.923	3.251	0.515
DM	24	0.000	1.000	0.875	0.338

In the final part of the analysis, the econometric model was developed as follows:

$$\log Q = -1.321 + 0.873 \log P + 1.212 \log ER + 1.426 DM$$

(2.273*) (3.024**) (5.709**)

The coefficient of determination $R^2 = 0.885$ indicated that 88.5 per cent of the variability of the plywood exports was explained by the explanatory variables. The Durbin-Watson d statistic, which indicated the estimated residuals was 2.056. We concluded that there was no positive or negative autocorrelation in the regression residuals.

The numbers in the parenthesis under the estimated coefficients indicated t-statistics of the coefficient. Superscripts ** indicated significance at 1 per cent level and * at 5 per cent level.

As these result showed, the coefficient of export price was significant at 5 per cent level with the expected sign. There was positive association between export volume and export price, which accorded with prior expectations. By holding other variables constant, if the export price goes up by 1 unit, on average, the export volume goes up by 0.873 units or about 873m³. The value of intercept has no practical economic meaning.

From the results, the coefficient of exchange rate was significant at 1 per cent level. The exports volume was positively related to the exchange rate of Ringgit to US dollar. By holding other variables constant, if the exchange rate of Ringgit to US goes up by 1 percentage point, the average exports volume will go up by about 1.212 marks, or 1,212 m³.

Furthermore, a positive correlation was found between the plywood export and log export quota. In summary, these results showed that the model was significant with all coefficients had the expected sign.

5. DISCUSSION AND CONCLUSION

This study was designed to determine the trend of plywood production and export, and the factors that affecting Sarawak's export of plywood. The results of the study suggested that there was an overall uptrend for both plywood produced and exported in Sarawak. The study also successfully developed a model to estimate the export of plywood in Sarawak. The export price, exchange rate and implementation of log export quota policy had positively affected the export of plywood. The study will serve as a base for future studies and analyses of plywood exports.

Due to data limitations, it was only possible to estimate relatively simple econometric model. Further econometric study in plywood demand and supply within a simultaneous equation model was recommended to better estimate the economy structure of plywood industry in Sarawak. The findings that emphasising on the important factors in the plywood exports can serve as a useful reference for government agencies and public authorities, as well as wood products companies.

REFERENCES

- Amina K. & Yongqiang Gao, (2013). Relationship between RMB to U.S Dollar ExchangeRate and Prices of US Textile Exports from China', International Journal of Business and Management, Vol. 9, No. 3 pp179 – 184
- Angles S., Sundar A., Chinnadurai M. (2011). Impact of Globalization on Production and Export of Turmeric in India – An Economic Analysis', Agricultural Economics Research Review Vol. 24 July-December 2011 pp 301-308
- Ajang T, Jafar; Ghajebeigoo Jafar G (2013). Venner supply and demand using simultaneous equations model', Journal of Bussiness & Industrial Marketing, Vol. 28 Iss 7 pp547-553
- Annette, JD. (1982). An Introduction to Statistical Modelling, Chapman and Hall, New York, NY.
- Cabuk, Y,Karayilmazlar, S, Onat, S M & Kurt, R (2013). Econometric modeling and projection of production, import and export of particle board industry in Turkey', International Journal of Physical Sciences, vol. 8(5), pp. 199-209.
- Damodar, NG & Dawn, CP (2010). Essentials of Econometrics, 4th Ed, McGraw-Hill, New York, NY.
- Department of Statistics Malaysia, Sarawak State. (2014). Yearbook of Sarawak External Trade Statistics, Sarawak.
- He, Hui, Xu, Jintao, (2011). Projection of timber supply and demand trends in China based on an econometric model', Forest Products Journal.
- Makkarennu & Nakayasu, A (2013). Prospective Indonesian Plywood in the Global Market', Journal of Life Sciences and Technologies, vol. 1, no. 3, pp. 190-95.
- Mark S., (2004). Impact of the Exchange rate on export volumes', Reserve Bank of New Zealand: Bulletin Vol 67 No. 1 pp. 5-13.
- Minli, W, Anne, T & Riitta, H (2010). Econometric Analysis of China's Plywood Market', Joint Pre-Conference to the IUFRO World Congress, Seoul.
- Pakhriazad, H.Z. & Mohd Hasmadi, I (2010). A study on Trend of Logs Production and Export in the State of Sarawak, Malaysia', International Journal of Marketing Studies, vol. 2 No 1, pp. 92-95.
- Qazi M.A.H. (2014). Export, imports and economic growth in China: an ARDL analysis', Journal of Chinese Economic and Foreign Trade Studies', Vol. 5 Iss 1 pp.42-55
- Tachibana, S. (2000). Impact of Log Export Restrictions in Southeast Asia on the Japanese Plywood Market: An Econometric Analysis', Journal of Forest Research 5(2), pp. 51-57.

- Tachibana, S. (1999). Forest-related Industries and Timber Exports of Malaysia: Policy and Structure, The third IGES international workshop on forest conservation strategies for the Asia and Pacific region, Institute for Global Environmental Strategies (IGES), pp. 60-79.
- Tachibana, S. & Nagata, S. (1998). Impacts of South-east Asian Log Export Ban Policies on Japanese Plywood Market', Proceedings of International Symposium on Global Concerns for Forest Resource Utilization - Sustainable Use and Management – Vol. 2, pp.449-458.
- Wong,KN & Tang TC, (2007). The effects of exchange rate variability on Malaysia's disaggregated electrical exports', Journal of Economics Studies Vol. 35 No. 2 pp.154 – 169.
- Yusuf, A.S. & Edom, C.O (2007). Determinants of timber exports in Nigeria: an error correction modeling approach', Department of Agriculture Economics, University of Ibadan, Nigeria.