Prospective Indonesian Plywood in the Global Market

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Abstract—Since the mid-1980s, Indonesia has emerged as one of the biggest plywood suppliers in the world. Indonesian plywood has dominated many major markets around the world. However, due to economic crisis in 1997/1998 and other factors, the industry experienced a decline in overseas markets which in which influenced the production and trade sectors. In the last few years, Indonesian plywood industry has done many efforts of recovery, find new market and continue enhancement of products image in international market. To determine the potential future market for Indonesian plywood, current of Indonesian plywood and trend of plywood exported were investigated. For the purpose of the study, data export plywood to sixteen countries for five years (2008-2012) were collected. The obtained data was analyzed by using single exponential smoothing method. Mean Absolute Percentage Error (MAPE) and Mean Squared Error (MSE) are also used to calculating demand sales forecast accuracy. The average of total production plywood from Indonesia will significantly increase from 3.3 million m3 in 2012 to 3.5 million m3 in 2014. The most prospective market of Indonesian plywood is Japan and followed by China, Saudi Arabia, the United Kingdom and the United Arab Emirates.

Index Terms—indonesian plywood, demand market, single exponential smoothing method

I. INTRODUCTION

Indonesian plywood industry was set up in the later part of the 1960s and began to develop rapidly in 1980s, when the government issued a policy requiring every forest concessionaire to establish a wood-processing plant. This policy was followed by on the banning of logs export in 1985 [1]. Over this period, Indonesia increased the value of its timber exports by applying heavy export taxes to discourage log exports and develop wood product exports especially plywood [2]. Immediately, after the log export banning policy was effectively applied in 1985, some industries which imported logs from Indonesia faced difficulty in continuing their production [3]. The banned log exports giving subsidies for plywood export to new markets especially to Japan

and Korea. Indonesian industry policy made it as the largest plywood exporter in globally [4] with about 30 million m^3 shipped out annually [5]. The government policy encouraged the growth of domestic wood industries, mainly the plywood industry, were only three companies, and it increased to 101 companies in 1980. It further increased in 1987 to 118 companies, and in 1992 the number of companies reached 120 [6].

During the period 1980-2007, Indonesian forest product industry mainly plywood industry has experienced rapid growth and structural change and played important part in Indonesia economy through a significant role as a gross domestic product, foreign exchange, government revenue, and employment contributors [7]. In rural areas, forestry and forest industries are even more important contributors to the regional economy [8]. The industrial country has absorbed the plywood from development country such as Indonesia. This trend has exploited the tropical rainforest and required attention for conservation field. The industry was developed to add value to raw material, to help industrialization, and to provide employment [9]. However, the rainforest products are not linear relationship between the demand and the supply capacities for the plywood. It needs more time to wait until the rainforest products can be utilized.

The direct impact due to the deficit of raw materials is the decrease of wood industrial capacity, especially plywood industry from 99% in 2007 to 42% in 2005[10]. Furthermore, the production has declined to 3.1 million m³in year 2008, a drop of 27% compared to 2007 [11]. In fact, growth in the plywood industry came at a cost. Domestic log production is tampered off as well as the trend of domestic log prices fell during 1980s and 1990s [12].

As increased the trend of economy in Asia, Japan ones of the country with positive economy, had put Indonesia as one of the largest rainforest products exporter with vary of products such as plywood, pulp, and sawn wood. Indonesian has export almost 40% plywood to Japan as potential market favorite. The next five largest importers of plywood at that time were, China at 14%, Europe at 10%, Korea at 9%, USA at 8% and Saudi Arabia at 4% of

European importers, the most significant were Belgium, the UK, Norway, Germany and Netherlands [13].

Exports of Indonesia plywood, veneered panels and similar laminated wood (2004-2008) had increased by an average of 0.40% annually. Export in 2004 valued at US$ 1,576.9 million. It declined in 2005 to US$ 1,374.7 million, but increased in the following year to US$ 1,527.3 million respectively [6]. In 2006, total exports amounted to 2.91 million m^3 with value of US$ 1.30 billion. The main destinations for plywood exports are Japan, the United States and the United Kingdom [14]. During the first half of 2010, Indonesian export of plywood totaled 73,000 m^3. The major markets for Indonesian plywood were Middle East and China 18% of total export volume was exported to Japan [15]. In 2010 it shipped 908,191 m3 of plywood to Japan, and in 2011 export rose by about 1 %. Annual plywood exports to Japan are worth about $ 2 billion [16].

In order to fulfill the potential market for Indonesian plywood, estimates demand market for plywood product were investigated. By knowing the future/potential market of the plywood product, the number of the plywood can be predicted to anticipate the sustainability of production. Due to this, Indonesian plywood industry will again be the biggest suppliers in the world.

II. METHODOLOGY

A. Data

The source of data for the study was from the monthly report on export of plywood as prepared by Badan Revitalisasi Industri Kehutanan (BRIK). BRIK is known as industry revitalization authority who has joint decree between the Minister of Industry and Trade and the Minister of Forestry. As stated in the decrees, the establishment of BRIK is a mutual understanding and joint actions between private forestry industry and the related government institutions in order to implement sustainable forest, sustainable raw material supply, creating job as well as business opportunities. To be acknowledged as exporter of wood products, forest industry must have legal permits based on Indonesian law and regulation. After completing requirements stipulated in the Ministry of Trade decree, the industry will be eligible to have an Eksportir Terdaftar Produk Industri Kehutanan (ETPIK) as the part of ministry of trade who has authority in Issue exporting license. Export of plywood product (HS 4412) is verified by independent surveyor assigned by the Minister of Trade with the objective to ensure wood product export fulfills all the government regulations and provides more value-added [17]. The Ministry of Trade has also issued a new regulation no. 64/M-DAG/PER/10/2012 concerning the Provision of Forestry Industry Products. The monthly report on the export of plywood then recapitulated into annual reports. The quantity (m^3) and the value (USD) of

plywood export to sixteen countries from 2008 – 2012 were used in this study.

B. Data Analysis

In order to find out the potential market of the Indonesian plywood, data analysis is done periodically (time series data) by using single exponential smoothing method (SES). The SES still a widespread method in different computer systems and forecasting programs [18] and should be used when the time series data has no trend and no seasonality [19]. The method of SES takes the forecast the previous period and adjusts it using the forecast error [20]. This method proposed that the historical data of value of plywood indicated the model can be used for forecasting. Mean Absolute Percentage Error (MAPE) and Mean Squared Error (MSE) are also used to calculating demand sales forecast accuracy. A SES, which produces an i-period-ahead forecast at time t (S_t) [21], can be calculated recursively, as follows:

$$S_t = \alpha X_t + (1-\alpha)S_{t-1,} = S_{t-1} + \alpha e_{t,} \dot{X}_t (m) = S_{t,} \; 0<\alpha<1, \; i \geq 1 \quad (1)$$

where: S_t = SES forecast of time t; Xt = Observed value of the time series in period t, $\dot{X}t(m)$ = Forecast for m periods ahead from origin t, α = smoothing coefficient.

When α is close to one, the new forecast would be equal to the previous forecast and a substantial proportion of the most recent forecast error; however, whenever Alfa value is close to zero, the new forecast would be equal to the previous forecast with little influence from the most recent forecast error [22]. In order to measure the effectiveness of future market, it is necessary to measure the forecast accuracy. Accurate forecasts are crucial to good revenue management [23]. The forecast accuracy, MAPE and MSE are measured by the formula [24]:

$$MAPE = \sum_{t=1}^{n} \frac{|PEt|}{n} \quad (2)$$

$$MSE = \frac{1}{n} \sum_{t=1}^{n} (y_t - \acute{y}_t)^2 \quad (3)$$

where: PE = Percentage Error, n = Number of units, y_t = Actual value index, $\acute{y}_t$ = Forecast value index, t = Period at time t.

Table I and Table II shows the linear coefficient Alfa (using values 0.1, α 0.3, α 0.5, α 0.7 and α 0.9) of MSE and MAPE for sixteen countries. Almost all countries except Australia have the smallest estimated for α 0.9 of the MSE and MAPE. The lowest number of coefficient α of MSE for Australia is value α 0.3 while the coefficient α 0.9 of MAPE is close to zero. It follows that all the coefficient α to forecast the potential demand markets of the Indonesian plywood are using Alfa 0.9.

TABLE I. SMOOTHING COEFFICIENT ALFA OF MSE

Countries	α 0.1	α 0.3	α 0.5	α 0.7	α 0.9
Australia	11,517,785.9	5,113.7	26,663.3	56,369.9	10,345.9
Canada	1,743,153.1	1,262,333.8	484,655.2	78,104.9	1,059.3
France	1,695,532.1	5,256,718.2	3,539,559.5	1,460,935.0	153,184.6
China	117,052,587,392.0	41,139,986,245.4	11,990,879,904.4	2,423,519,122.4	146,991,059.8
Germany	82,718,979.8	26,555,107.0	8,117,768.9	1,956,675.0	144,543.8
Japan	106,662,892.5	371,381,993.4	512,201,038.1	358,921,063.1	63,467,962.9
Korea	434,634,011.6	228,610,941.7	115,758,074.3	46,544,445.7	6,295,371.7
Malaysia	221,621,440.4	165,383,649.0	107,602,764.8	51,116,361.9	7,725,653.2
Netherlands	43,654,382.4	12,691,406.7	3,572,977.4	912,027.9	94,030.4
New Zealand	10,972.9	15,210.5	9,428.7	2,855.5	184.0
Singapore	3,292,971.9	13,187,521.2	17,704,444.9	11,647,926.1	1,890,174.8
Saudi Arabia	682,646,095.4	74,492,960.5	651,605.0	1,935,311.8	631,441.2
Taiwan	504,581,664.0	375,544,418.4	218,645,619.2	82,112,831.3	8,502,854.1
UAE	4,728,850,517.1	1,096,037,171.0	211,228,875.5	32,251,362.8	1,984,758.8
UK	3,320,758.6	222,753.1	571,220.0	53,213.8	16,180.2
US	3,748,928,267.0	100,965,250.6	45,097,928.2	11,869,346.0	681,412.4

TABLE II. SMOOTHING COEFFICIENT ALFA OF MAPE

Countries	α 0.1	α 0.3	α 0.5	α 0.7	α 0.9
Australia	-27.1	-2.9	-1.9	-0.0	-0.0
Canada	-211.2	-145.5	-92.0	-48.7	-14.2
France	-712.5	-1,3022	-1,077.6	-695.1	-225.6
China	63.7	43.7	27.7	14.8	4.4
Germany	-16.6	-10.2	-5.9	-3.0	-0.9
Japan	1.6	1.0	0.4	0.1	-0.0
Korea	-9.7	-6.5	-4.2	-2.4	-0.8
Malaysia	-60.1	-51.9	-41.3	-27.7	-10.3
Netherlands	-37.0	-22.1	- 12.3	-6.0	-1.7
New Zealand	5.9	-3.2	-5.7	-4.4	-1.5
Singapore	3.0	1.3	0.1	-0.5	-0.3
Saudi Arabia	17.8	10.5	5.6	2.6	0.7
Taiwan	-1.9	-1.9	-1.6	-1.1	-0.4
UAE	-126.3	-71.5	-37.4	-16.8	-4.4
UK	-220.2	-153.4	-98.4	-53.2	-16.0
US	-326.9	-3.9	- 2.9	-1.8	-0.6

III. RESULT AND DISCUSSION
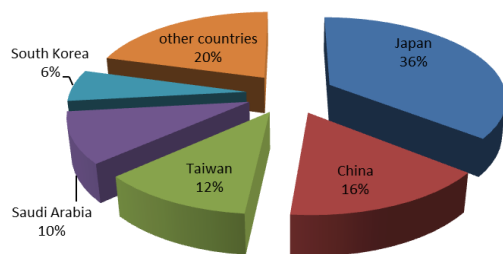
A. Trends of Plywood Production and Consumption

Figure 1. Major importers of Indonesian plywood over the period 2008-2012

The percentage of export capacity in quantity (m^3) of Indonesian plywood export for five years (2008-2012) is shown in Fig. 1. The major importer countries were Japan, China, Saudi Arabia, Taiwan and South Korea, which together accounted for 80% of Indonesia's plywood. On the other hand, other countries (Australia, Canada, France, Germany, Malaysia, Netherlands, New Zealand, Singapore, The United Arab Emirates (UAE), The United State (US) and The United Kingdom/UK) contribute only 20% or 3.08 million m^3 of total Indonesian plywood export.

The number of plywood exported to sixteen countries between the years 2008 and 2012 is shown in Fig. 2. The value (US$) of world's plywood consumption for Indonesian plywood totalled about US$7.07 billion. During this period, world's plywood consumption significantly increased from 2.6 million m^3 in year 2008 to 3.3 million m^3 in year 2012, a 21.25 increase.
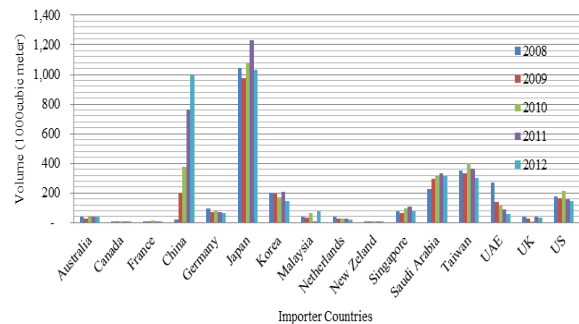

Figure 2. World's plywood consumption over the period 2008-2012

Japan was the biggest market with a value of US$3.1 billion accounted for 43.8% of total Indonesian plywood export. On the other hand, New Zealand contributes only 0.04 % (US$ 2.8 million) from the total of Indonesia plywood exports. Over the period 2008-2012, the 10 main markets for Indonesia in plywood were:

1. Japan (US$3.1 billion, 43.8%)
2. China (US$686.9 million, 9.7%)
3. Saudi Arabia (US$655.7 million, 9.3%)
4. The United Stated (US$ 478.7 million, 6.8%)
5. Taiwan (US$464.3 million, 6.6%)
6. South Korea (US$390 million, 5.5%)
7. The United Arab Emirates (US$328.7 million, 4.6%)
8. Germany (US$286 million, 4.0%)
9. Singapore (US$146 million, 2.1%)
10. Australia (US$ 139.8 million, 2.0%)).

Indonesia becomes Japan's largest plywood suppliers after Malaysia. In 2008 it shipped 1.04 million m³ of plywood to Japan, and in 2011 exports rose by about 14.8%. Annual plywood exports to Japan are worth about US$620 million. In 2008, Japan was the first market for Indonesian plywood, importing a value of US$563.3 million or 1.04 million m³. Mean awhile, the UAE was the second largest with a value of US$134.6 million.

In Japan market, Indonesian was the second market supplier of plywood in 2007. The first largest supplier to the country was Malaysia. Other main suppliers were China, New Zealand, the Philippines, Taiwan, Canada, Finland, Russia and Thailand. In addition, the number of plywood export to Japan for five years (2008-2012) totalled 5.3 million m³ worth at US$ 3.1 billion m³. Over this period, the number of plywood export to Japan significantly increased from 1.04 million m³ in 2008 to 1.22 million m³ in 2011. During this period, Japan is in urgent need of pre-fabricated house and manufactured wood products especially plywood in the aftermath of the tsunami.

In 2012, Japan is still dominant of consuming Indonesian plywood, importing a value of US$659.2 million, while China was the second market with a value of US$260.6 million. However, in term of value, plywood export to Japan decreased from US$823.8 million in year 2011 to US$659.2 million in year 2012, a 20% decrease. Furthermore, other important consumers, Taiwan and The United State were also dropped 12.1 % from 2011 to US$91.2 million in 2012 and 6.35% from 2011 to US$95.3 million in 2012, respectively. This was caused by a relatively low level of plywood production.

MOF [25], [26] reported that Indonesian plywood production has continued to remain at a relatively low level of 3.3 million m³ in 2011, less than half of the production's level in 2003 (Fig. 3). Indonesia's production has been affected by reduced log availability due to overexploitation of forests in previous years, crack downs on illegal log flows that have restricted log availability for plywood production, declining availability of logs of peeler quality and improvements in forest law enforcement. Furthermore, the low level of Indonesian plywood production has also been affected by lower demand in Indonesia's major export markets and declining price competitiveness in the global market
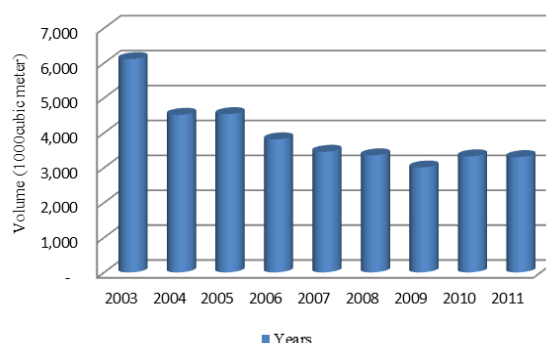

Figure 3.   Indonesian plywood production (2003-2011)

B.   Prospective Demand Market of Indonesian Plywood

Based on the world's plywood consumption in sixteen countries over the period 2008-2012, the number of demand market of Indonesian plywood for the next three years was calculated by using SES. Table III shows the consumption and demand market of Indonesian plywood. Indonesian total export of plywood will significantly increase from 3.3 million m³ in 2012 to 3.5 million m³ in 2014, a 5.7% increase and 4.0 million m³ in 2015, a 17.5% increase.

TABLE III.   CONSUMPTION AND DEMAND MARKET OF INDONESIAN PLYWOOD

Countries	Amount (cubic meter)							
	2008	2009	2010	2011	2012	2013	2014	2015
	Actual	Actual	Actual	Actual	Actual	Projected	Projected	Projected
Australia	37,693	24,873	43,094	39,996	37,862	37,884.74	37,864.27	37,862.23
Canada	5,396	611	855	8,156	8,156	8,148.72	8,155.27	8,155.93
France	926	8,374	12,329	8,492	77	164.52	85.75	77.88
China	22,622	199,292	377,114	762,181	992,820	990,108.99	992,548.90	992,792.89
Germany	92,994	71,897	85,998	73,476	66,107	66,192.01	66,115.50	66,107.85
Japan	1,043,884	972,862	1,075,100	1,228,093	1,033,702	1,035,483.40	1,033,880.14	1,033,719.81
Korea	202,618	194,317	170,303	207,255	147,704	148,265.04	162,960.83	996,665.99
Malaysia	40,681	32,913	64,434	8,526	75,961	75,339.48	75,898.85	75,954.78
Netherlands	40,524	29,741	26,023	27,605	20,638	20,706.57	20,644.86	20,638.69
New Zealand	684	1,042	1,458	770	531	534.03	531.30	531.03
Singapore	78,087	63,063	93,048	109,527	76,852	531.30	18,689.04	68,362.07
Saudi Arabia	224,636	295,508	313,968	334,368	314,304	314,481.69	314,321.77	314,305.78
Taiwan	353,992	334,394	398,927	363,970	301,637	314,321.77	31,910.35	31,908.75
UAE	272,445	142,251	111,415	86,540	57,964	58,279.02	286,224.55	20,011.01
UK	40,714	27,592	3,113	37,429	31,411	57,995.50	311,512.05	284,890.69
US	177,735	165,686	212,368	159,158	145,566	145,750.58	145,584.46	57,208.38

Japan is still potential market for the Indonesian plywood, in addition to other large markets such as China, Saudi Arabia, the UK and the UAE. Export of Indonesian plywood to Japan is projected to relatively stable around 1.03 million m^3 in 2014 and 2015 (Fig. 4).
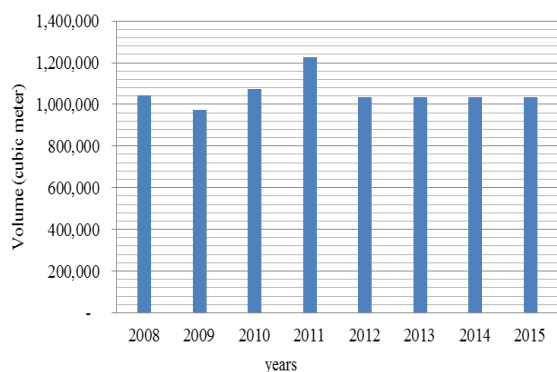

Figure 4. Consumption and Demand Market of Indonesian Plywood in Japan

Although Japan as a prospective market for the Indonesian plywood, Japan's consumption will continue to decline at 31.6% in 2013, 29.5% in 2014 and 25.8% in 2015 from the total of Indonesian plywood export, reflecting a decline in housing starts and construction spending over the period. However, Korea's as the fifth-largest importer of plywood over the 2008-2012 is projected to increase dramatically from 4.6% in 2014 to 24.9% in 2015.

Global trade in tropical plywood, which has contracted significantly in recent years, continues to be dominated by a small number of major players. Japan is still the dominant importer, accounting for about one-third of imports, with the USA, South Korea, China and Taiwan an accounting for a further 38% of imports. The bulk of tropical plywood imports are sourced from Malaysia and Indonesia, with most of the remainder coming from China [27]. The global market for plywood is forecast to reach 75.9 million m3 by the year 2015, according to a new report by Global Industry Analysts [28]. Indonesia share 5.3% (4 million m^3) of the world's plywood consumption in 2015.

IV. CONCLUSION AND RECOMENDATION

Since 1980s Indonesia has emerged as one of the largest plywood suppliers in the global market. Indonesian plywood has dominated many major markets around the world. However, due to the economic crisis in 1997/1998, Indonesian plywood industry experienced a decrease in overseas markets, which in turn affected the production sector. Some factories had to reduce theirs production lines. Indonesia has exported plywood products to many countries around the world. Major importer countries were Japan, China, Saudi Arabia, Taiwan and Korea which together accounted for 80% of Indonesian plywood export. In the last five years (2008-2012), Japan was the largest market for Indonesian plywood, importing a value of US\$ 3.1 billion or 5 million m^3 in quantity. Indonesian total export of plywood will significantly increase from 3.3 million m^3 in 2012 to 3.5 million m^3 in 2014 and in 2015, Indonesia share 5.3% of the world's plywood consumption. Japan is still prospective market for the Indonesian plywood, in addition to other large markets such as China, Taiwan and South Korea.

In order to fulfil the potential market of Indonesian plywood, to enhance market share and to improve the competitiveness in the global market, Indonesia need to improve the productivity of Indonesian plywood industry, improve forest product competitiveness and plywood industry efficiency. Imbalance of supply and demand for logs as raw material for plywood industry can be overcome by intensify forest plantation, continue to improve for the forest law enforcement and develop alternative sources of log supply and limit forest production to the level based on a sustainable log supply.

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