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APEC PUBLIC- PRIVATE DIALOGUE
WITH SMEs AND 11TH APEC EGILAT MEETING

EXCHANGE PROGRAMME
ON FLEGT VPA

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Cover: No company understands the importance of solid, luxurious flooring better than hardwood floor specialist Ekowood. To know more about the company, please refer to pages 18-19.

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APEC PUBLIC-PRIVATE DIALOGUE WITH SMEs AND 11TH APEC EGILAT MEETING



Opening remarks by Mr. Tran Kim Long, Director-General of International Cooperation/MARD.

The APEC Secretariat held its 2017 First Senior Officials Meeting (SOM1) and Related Meetings in Nha Trang City, Viet Nam from 18 – 21 February. In conjunction with SOM1, the APEC – EGILAT Meetings were also organised hand – in – hand with two related activities consequently. The first activity was the APEC Public– Private Dialogue with SMEs on Promoting Legal Trade in Harvested Wood Products and Strengthening Supply Chain Connectivity Towards Sustainable Growth held from 18 – 19 February. The second activity was the 11th Expert Group on Illegal Logging and Associated Trade (EGILAT) Meeting held from 20 – 21 February.

The APEC Public–Private Dialogue with SMEs was attended by more than 90 participants representing 17 economies from the Asia Pacific region which includes representatives from related ministries, agencies, academia, NGO's and international organisations such as TNC, WWF, HAWA, RECOFTC, RAFT and FAO. The dialogue was officiated by Viet Nam government representative, Mr Tran Kim Long, Director-General, Ministry of Agriculture and Rural Development (MARD) while the opening remarks were delivered by Dr. Ruth C.H. Turia, EGILAT Chairman.

The objectives of holding this open dialogue was also to increase the capacity of both APEC's public and private sectors/SMEs to promote regional integration and trade facilitation by encouraging private sector and SMEs to foster trade in legally

harvested wood products, increasing the capacity to implement APEC timber legality guidance template and supply chain connectivity framework. The dialogue also aimed to advance conservation and rehabilitation of forest resources in conjunction with sustainable economic growth, in turn, lowering the overall costs of import and export as well as increasing business competitiveness towards sustainable growth and development of forestry in the APEC economies, especially the developing economies.

The dialogue were divided into five sessions as follows:

Session 1 – Enhancing the Use of Innovative Science and Technology: Experience Sharing and Best Practice, moderated by Ms. Emma Hatcher, Director, Department of Agriculture and Water Resources, Australia.

- Resources and Tools for Helping Implement Timber Legality by Ms Dong Ke, Representative from TNC
- The Application of Technologies for Patrolling, Protecting Forestry and Illegally Logging in Viet Nam by Bui Dang Phong, VAF, Viet Nam
- Legal Tools for Combating with Illegal Logging and Promoting Legal Trade in Harvested Wood Products by Mr. Alexander Mariev, Chief Analysts, Russian Federal Forestry Agency
- Legal Timber Management and Assistance for Private Forest in Chinese Taipei by HSIU-Chuan, huang, Forestry Bureau, Council of Agriculture

**BELGIUM****Decline in Residential Construction**

According to the Walloon Construction Confederation, in 2016 residential construction in Wallonia declined to 9,500 new housing units, down 37% from 15,000 in 2007. The renovation market was more resilient and stable. In the ten first months of 2016, the number of new residential building permits issued in Belgium reached 19,725, including 14,854 in Flanders, 4,712 in Wallonia and 159 in Brussels. The permits accounted for 35,754 housing units in Flanders, 7,703 in Wallonia and 1,128 in Brussels.

La Libre Belgique, 20 February

CAMBODIA**Growth Rate Predicted to be Maintained**

It is expected that Cambodia will maintain the 7% growth rate it obtained in 2016 in the two years of 2017 and 2018, due to the expansion of construction, tourism and garment export. In 2016, the local tourism sector generated over USD3 billion (EUR2.83 billion) in revenue and received 5 million overseas visitors. Besides that, the value of exported apparels increased 4.5% year-on-year to USD6.9 billion in 2016. Meanwhile, the amount of investment attracted by the construction sector rose 156% year-on-year to USD8.5 billion.

VietnamPlus (in English), 17 February

CHINA**New Projects in Belt and Road Grow**

In a report published by Price Waterhouse Coopers (PwC), it shows that total new projects announced in China's Belt & Road initiative hit around USD400 billion (EUR376.83 billion) in 2016, up by 2.1% from 2015. Since the inception of the initiative in 2013, invested projects in the 66-member nation were growing at a compound annual growth rate (CAGR) of 33%. In 2016, average project value in those nations jumped 47% from 2015. Whereas, average project value in China only climbed by 14%. The report also projected that the gross domestic product (GDP) of Belt & Road member nations will grow 4.4% on average in 2017, as compared to 3.6% on average for emerging market.

South China Morning Post, 20 February

FRANCE**New Home Sales Up**

In 2016, sales of new homes rose 21% year-on-year in France, boosted by low interest rates, reports the sector federation, Fédération des promoteurs immobiliers (FPI). A total of 148,618 new homes were sold in 2016, or nearly 22,000 more than in 2015. FPI points to other factors keeping the market buoyant, such as the Pinel tax rebate law for investors and the zero interest loan system for new properties. The Loi Pinel was used in 53% of cases and the zero interest loans in 47% of cases.

FPI will present its proposals to the presidential candidates, requesting that they do not detract from the sector, which accounts for 6.3% of paid employment. FPI estimates that, to achieve the government objective of 500,000 homes built in a year, sales of developers must reach 200,000 units, or one third higher than the present rate. In 2016, the number of homes put on sale fell 4.6% and nearly 6% in the fourth quarter, leading to a delay in sales of stocks.

Les Echos, 21 February

INDONESIA**FSC Urged by Government to Evaluate 1994 Rule**

The Forest Stewardship Council (FSC) has been urged by the Indonesian government to evaluate its so-called "1994 rule" after it was deemed incompatible with the country. The 1994 rule was introduced to reject certifications for forest management units which have been converted from natural forests, including tree plantations. As such, industrial forests which were converted after 1994 will not be certified by the FSC. However, it has become the largest obstacle for local industry players seeking FSC certification. In order to launch new markets and boost its industrial reputation, the government aims to push for more timber players to get certified by FSC.

Jakarta Globe (The), 10 February

**LAO PDR/EUROPEAN UNION
VPA on FLEGT to be Signed in 2018**

In 2018, a Voluntary Partnership Agreement (VPA) on Forest Law Enforcement, Governance and Trade (FLEGT) will be entered by Laos with the European Union (EU). The deal will promote wood processing sector investment and provide access to

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EU, Australian, US and Japanese market for Lao PDR wood processing businesses.

Vientiane Times, 9 February

MYANMAR Foreign Trade Volume Increased

According to Myanmar's Ministry of Commerce, foreign trade volume increased year-on-year by USD61 million (EUR57.47 million) to more than USD23.5 billion. Over USD23.5 billion from foreign trade was obtained by Myanmar, up to 10 February 2017. Out of the total amount, USD17.3 billion stemmed from overseas trade, while over USD6.1 billion came from border trade. The foreign trade volume increased year-on-year to stand at USD108 million. The ministry said that the border trade volume was lesser year-on-year by USD47 million. Overseas trade volume came up to USD5.8 billion, while border trade volume came up to USD3.8 billion. Export volume, in 2016, came up to USD5.2 billion, while import volume went up to USD3.9 billion. Thus, comparatively, import volume declined by USD442 million, while overall export volume declined by USD504 million.

Eleven Myanmar, 22 February

SWEDEN Slight Increase in Exports of Wood

Figures from Statistics Sweden (SCB) show that Swedish export of sawn coniferous wood amounted to 12.1 million m³ in the period January to November 2016. This is 1% more than in the same period in 2015. Swedish saw mills expect a more positive development in 2017 due to increased demand on the European, US and Asian markets.

ATL, 11 February

SOUTH KOREA Anti-Dumping Duties Extended on Foreign Plywood

A decision has been made by the trade commission of South Korea to continue to impose anti-dumping duties on plywood from Malaysia and China for three more years. Such move is taken by the Korea Trade Commission (KTC) to provide protection to South Korean companies. Such decision has been made by the trade commission following on-sites hearings and inspections.

Since February 2011, the punitive duties of 3.96% to 38.10% have been slapped by the commission

on Malaysian products and 4.57% to 27.21% since October 2013 on plywood from China. Of the total South Korean market, Malaysian and Chinese plywood made up for 33% as of 2015.

Yonhap News Agency, 17 February

THAILAND GDP Growth to Hit

In 2017, Thailand's gross domestic product (GDP) growth is expected to hit 3% to 4%, excluding risks. During the year, the country's investment is expected to increase by 5.3%, of which private and government investment would increase 2.5% and 14.4% respectively. On the other hand, Thailand's private and government consumption will increase by 2.8% and 2.6% respectively, while their export is to rise by 2.9%. In October-December 2016, the country's GDP grew by 3% in annual pace. In 2016, Thailand's GDP reported at USD406.90 billion (EUR383.33 billion), up by 3.2%. In the meantime, its GDP per capital improved to USD6,032 from USD5,937 in 2015.

Nation (The) - Thailand, 21 February

UKRAINE Export and Import of Wood and Wooden Products Increase

According to the State Statistics Service of Ukraine, in 2016, export of wood and wooden products amounted to USD1.13 billion (EUR1.06 billion). The figure is 2.2% higher than in 2015. Imports of these products totalled USD196.70 million (+32.7% year-on-year).

Lesprom, 15 February

VIET NAM Economy in 2017 to Expand

Based on a report published by the Development and Policies Research Centre (DEPOCEN), it is projected that the gross domestic product (GDP) of Viet Nam in 2017 will expand 6.3%. This will be on the back of positive growth in industrial production and higher consumption. It is anticipated that inflation in the cited year will be 4.3% to 4.5%. The economy of the country will experience several challenges on ways to control inflation and how to attract private investments in programmes that support socio-economic growth.

Saigon Times Online (in English), 16 February

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GLOBAL Flooring Market Likely to Cross USD400 Billion

According to a market report by research firm Global Market Insights, the global flooring market is anticipated to grow beyond USD400 billion (EUR375.96 billion) at a 6.8% Compound Annual Growth Rate (CAGR) between 2015 and 2022. The residential sector is expected to generate USD220 billion (EUR206.78 billion) in revenue by 2022. In the commercial sector, flooring demand is expected to find a 6.5% CAGR by 2022. Also, the value of flooring solutions in the industrial sector is projected to exceed USD20 billion by 2022. In terms of market segment, resilient flooring, which is valued at USD60 billion, is reported to grow rapidly at a 7.5% CAGR over the forecast period.

The soft coverings market segment is forecast to increase up to USD150 billion by 2022. The volume of Asia Pacific's (APAC) flooring market is forecast to grow to USD180 billion by 2022 from USD100 billion in 2015, with consumer lifestyle changes and growing industrialisation listed as key factors. China and India are predicted as key market regions in APAC. The flooring market share of North America is predicted to rise to USD69 billion by 2022, compared to USD40 billion in 2014. Major companies dominating the global market include Mohawk Industries, Beaulieu of America, Interface and Shaw Industries.

Stock Market News / Marketplace, 1 February

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Timber News



Malaysian participants attending the dialogue session.

Session 2 – Public-Private Partnership to Improve Capabilities and Enhancing the Engagement of SMEs, moderated by Mr. Zhang Zhongtian, Director of Multilateral Affairs Division, SFA, China.

- Viet Nam Enterprises with Legal Timber Supply by Mr. Huynh Van Hanh, HAWA, Viet Nam
- Practical Experience and Case Study Report on the Forest Control System for Ensuring Legal Trade in Timber Products in Viet Nam by Tran Van Tien, VAFS Viet Nam
- Lessons Learned from Public-Private Partnership by Mr. Krirk Meemungkit, RECOFTC, Thailand
- Multi-Lateral Cooperation for Development of Responsible Wood Product Trade and Investment of SMEs by Mr. Jing Tao, Deputy Director, SFA, China

Session 3 – Model and Support Mechanisms to Increase Cooperation Among Economies to Promote Legal Trade in Harvested Wood Products and Strengthening Supply Chain Connectivity, moderated by Cik Hjh. Robiyah Husin, Senior Deputy Director of Trade Development, MTIB, Malaysia.

- Quang Tri Small Household Group- Sustainable Plantation Management and New Business Model by Mr. Le Thien Duc, Forests Program Manager, WWF Viet Nam
- Indonesia Achievement on TLAS (SVLK) by Dr. IB Putera Parthama, Director General, Sustainable Management of Production Forests, Ministry of Environment and Forestry, Indonesia
- Enhancing SMEs on Legal Trade in Timbers and Supply Chain Connectivity by Boonsuthee Jeravongpanich, Forestry Technical Officer, The Royal Forest Department, Thailand
- Public-Private Partnership in Developing Timber Legality System: Malaysian Experience by Cik Hjh. Robiyah Husin, Senior Deputy Director of Trade Development, MTIB, Malaysia
- Enhancing SMEs on Legal Trade in Timbers and Supply Chain Connectivity by Boonsuthee Jeravongpanich, Forestry Technical Officer, The Royal Forest Department, Thailand

With regard to paper by Cik Hjh. Robiyah of MTIB, she elaborated on the current status of the Malaysia's timber industry and timber trade, Malaysia Timber Legality Assurance System (MYTLAS), Malaysia Country Specific Guideline (MCSG) and the many challenges and way forward taken by Malaysia to ensure the overall continuous improvement and credibility of Malaysia's timber

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legality systems and forestry governance.

Session 4 – Panel on Enhancing SMES to Implement Timber Legality and Supply Chain Connectivity Framework, moderated by Mr Huynh Van Hanh, HAWA, Viet Nam

This session reviewed the key APEC Economies involved in strengthening implementation of timber legality guidance template and supply chain connectivity framework; Also touched were their responsibility for supply chains and/or recent efforts to help SMEs enhance their legal trade and the role of SMEs in timber supply and their importance, together with the identification of some of the key challenges facing SMEs in dealing with timber legality.

Session 5 – Discussions on initiatives and solutions, moderated by Mr. Leoncio Julio Ugarte Guerra, Director, Peru

Participants discussed on opportunities and the need to strengthen cross-fora collaboration to implement across the APEC's region. Also discussed were relevant experiences, initiatives and practices that had been developed to address various aspects of promoting legal trade in harvested wood products and to strengthen supply chain connectivity, as well as recommendations for a prospective APEC initiative.

The outcome and recommendations of this dialogue was also reported to the 11th EGILAT Meeting which was held from 20 to 21 February and also will be the input for the developing the EGILAT Work Plan for 2017 and its Strategic Plan 2018 – 2022.

The 11th EGILAT Meeting were attended by 60 representatives from 21 delegates of APEC economies and were opened and chaired by its current Chairman, Dr. Ruth C.H. Turia.

The EGILAT Meeting continued to discuss on the exchange of information related to policies,



Group photo with EGILAT Chairman, APEC Secretariat and representatives of Viet Nam and Taiwan.

regulations, governance and law enforcement relating to combating illegal logging and promoting trade in legal forest products. The EGILAT members also discussed on the scope of laws relevant to illegal logging which met with some concerns from the members due to its complexities. Further action are needed from the economies to be presented and discussed in the upcoming EGILAT 12 meetings.

The APEC Secretariat, Mr. Lu Zhiwei, make a summary report on the outcome of the Dialogue and conclusion from the EGILAT 11 and extended his thanks to all the economies for their fruitful participation and cooperation in making both the EGILAT Dialogue and Meeting successful. Dr. Ruth Turia, EGILAT Chairman, make a closing remarks on behalf of the host country and also thanks all the delegates from the economies for their contributions during the four - day activities. Viet Nam will be hosting the next 12th APEC - EGILAT meeting in August 2017 in Ho Chi Minh City.

The Malaysian delegation to the EGILAT Dialogue and Meeting were led by Puan Elaine Juliana Malek from the Ministry of Plantation Industries and Commodities. Also in attendance were Cik Hjh. Robiyah Husin and Encik Md Yusoff Ismail of MTIB; Encik Adam Mohd Nazri, Malaysian Timber Council; Puan Hjh. Eda Hj. Edan, Sarawak Timber Industry Development Corporation; and Puan Jaime Shin Syn, Sarawak Timber Association.



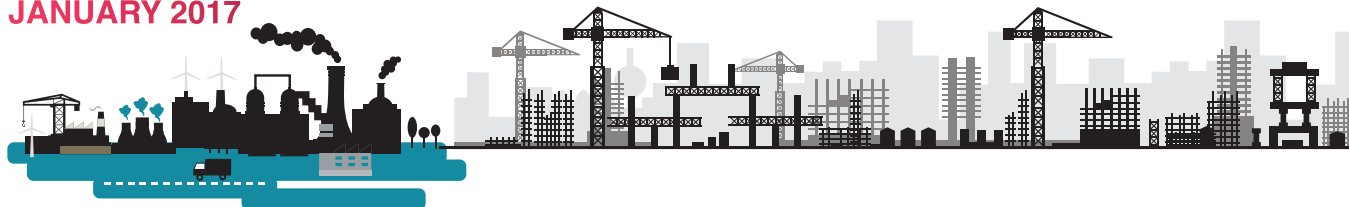


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Malaysia: Port Project Proposed in Carey Island

In Carey Island of Malaysia's Selangor state, a new port will be built with infrastructure investments worth over RM200 billion (EUR43.45 billion/USD48.80 billion). According to Maybank IB Research, the project is estimated to be completed in 20 years. Components of the project include residential units, commercial units, a port and associated infrastructure, free trade zones and industrial parks. The new port will have a larger capacity in handling cargoes when compared to the current Port Klang. Also, the project will benefit Sime Darby which is the biggest land owner in the area.

Source: The Edge Financial Daily, 10 January

Malaysia: Port Klang Sees Higher Transshipment, Container Troughput in 2016

Port Klang, the largest port in Malaysia, registered a 14.30% year-on-year increase in its transshipment throughput from 7.97 million to 9.07 million twenty-foot equivalent units (TEUs) in 2016, while its container throughput also grew by 10.80% from 11.89 million TEUs to 13.17 million TEUs, as disclosed by operator Port Klang Authority (PKA). In particular, transshipment and container throughput handled by Northport reached 1.66 million and 3.22 million TEUs respectively, while Westports managed

7.41 million TEUs of transshipments and 9.95 million TEUs of containers. Following the growth, the PKA expects to improve Port Klang's position in the 2016 World Container League from ranking 12 to 11.

Source: The Star Malaysia, 18 January

Malaysia: MMC Works on Expansion of Capacity at Port of Tanjung Pelepas (PTP)

MMC Corp (MMC) of Malaysia is carrying out an expansion of capacity at its flagship PTP, in a move to meet the higher demand from shipping companies and to counter the threat from the mega-port at Tuas, Singapore. Che Khalib Mohamad Noh, Group Managing Director of MMC, said the company is working on expanding the capacity at PTP immediately as it has reached nearly 80% of its full capacity. He said the company is working on an upgrading programme of two and a half years to boost the port's capacity to 13.5 million TEUs from 10.5 million TEUs. The upgrading programme has been allocated with RM1 billion (EUR217.23 million/USD243.99 million), involving the purchase of new equipment that consists of new and larger quay cranes and also the upgrade of several cranes.

Che Khalib also said, recently, MMC has awarded a deal for new cranes worth around RM400 million, and it has also purchased several new prime movers with RM100 million spending and bought 29 new rubber-tyred gantries for around RM300 million.

Shipments of Timber and Timber Products through Ports in Peninsular Malaysia, January 2017

Products	Port Klang		Kuantan		Pasir Gudang		Tanjung Pelepas		Penang		Total all Ports m ³	% Change Jan 2017/ Dec 2016
	m ³	% Change Jan 2017/ Dec 2016	m ³	% Change Jan 2017/ Dec 2016	m ³	% Change Jan 2017/ Dec 2016	m ³	% Change Jan 2017/ Dec 2016	m ³	% Change Jan 2017/ Dec 2016		
Sawntimber	59,643	-11	14,015	10	1,189	-10	438	-12	14,185	1,462	89,470	9
MDF	26,812	15	578	6	6,529	-8	2,280	-65	15,413	13	51,612	1
Mouldings	9,354	-20	107	-46	1,847	44	453	15	2,208	7	13,969	-11
Plywood	7,929	25	102	100	150	232	65	12	7,669	-37	15,915	-15
Veneer	722	-26	23	100	51	5,000	111	91	1,645	62	2,552	24
Particleboard	28,080	-38	336	239	253	26	82	-26	2,440	-14	31,191	-36
TOTAL	132,540	-14	15,161	11	10,019	1	3,429	-56	43,560	33	204,709	-6

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This means there is no need for MMC to expand the berth, which is more expensive and this will meet the requirements of PTP until 2020. Che Khalib said the cost to construct a new berth, including the facilities, will total at around RM1 billion. He said the new quay cranes could each have a handling capacity of 220,000 TEUs annually, compared to the existing cranes that could handle just 100,000 TEUs.

The expansion programme's second phase involves the dredging and expansion of the channel that costs RM600 million to facilitate the building of a new wharf. Che Khalib said the company will commence the channel's dredging and expansion in April 2017. He stated that the basic groundwork has already commenced and will begin expansion in 2020. The company will increase the depth of its draft to 18 metres, from the current 16 metres - 17 metres. By 2020, the company intends to expand the new berthing space by 3.5 million TEUs.

Source: The Star Malaysia, 27 January

South Korea: SM Shipping to Acquire 85.45% of Gyeongin Terminal

SM Shipping, a new South Korean container line made by Samra Midas (SM) Group, is planning to acquire 85.45% of the Gyeongin container terminal and 100% of the Gwangyang container terminal. It is predicted that the South Korean construction firm SM Group will run its shipping service from March 2017. Besides that, SM Group is also evaluating its plan to acquire the shares owned by Hanjin Transportation in Busan New Port. With a capacity of 110,00 TEUs, SM Shipping is the second-biggest container line after Hyundai Merchant Marine that has a capacity of 455,000 TEUs.

Source: The Korea Times, 13 January

Germany: Bremen Ports Sees Cargo Volume Increase

The German sea ports of Bremen and Bremerhaven, which are managed by bremenports, handled 73.8 million tonnes of cargo in 2016, up by 0.5% over the previous year. The container handling volume rose by 0.9% to 5.5 million TEUs. The company said that the performance was slowed down by a deceleration in China's economy growth and by economic sanctions imposed on Russia. Bremenports anticipates an increasing cargo

volume in the mid-term with the performance being supported by investments in infrastructure modernisation.

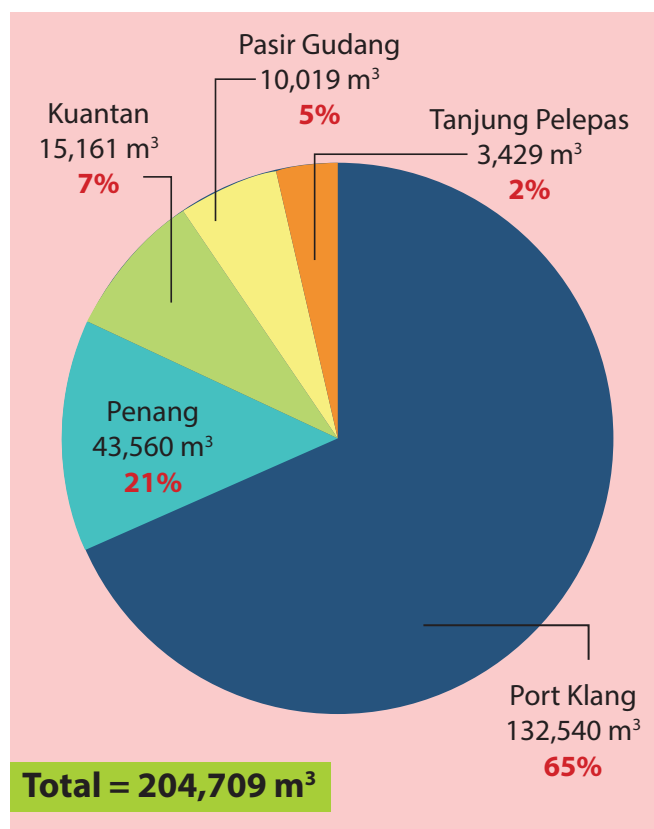
Source: Verkehrs Rundschau, 17 January

Sweden: Largest Volume of Sawntimber Handled at Karlshamn

The largest volume of sawntimber ever handled at the port of Karlshamn in Sweden has been loaded on Norwegian-based shipping company Grieg Star's ship. Around 45,000 m³ of timber was loaded on the ship which had Morehead City and Cape Canaveral in US as destinations. Exporters of the timber were Swedish companies, Vida Wood and ATA Timber.

Source: Svensk Sjöfartstidning, 25 January

Timber Shipment through Ports in Peninsular Malaysia, January 2017



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Total export of Malaysia timber and timber products in January 2017 decreased 7% valued at RM1.94 billion over the previous month. Meanwhile, compared to the previous corresponding period in 2016, export for the period of January 2017 decreased 5% valued at RM1.94 billion.

SAWNTIMBER

Export of sawntimber in January 2017 decreased 11% in volume and value to 171,566 m³ with a value of RM303.3 million as compared to the previous month due to declining intake from the EU, Middle East and ASEAN countries.

Export of sawntimber to the EU for the month decreased 17% to 10,229 m³ from 12,385 m³ in the previous month. Slowed economic recovery and holiday seasons affected demand of sawntimber from the region. Export to the Netherlands and Belgium declined 15% and 8% to 4,580 m³ and 1,254 m³ respectively from the previous month. Similarly, export to the UK decreased marginally to 1,986 m³ followed by France with 46% to 626 m³ and Germany with 45% to 872 m³.

Total exports to West Asia decreased 29% to 27,155 m³ from 38,262 m³ recorded in the previous month. Export of sawntimber to Yemen declined by more than three folds to 1,990 m³ from 15,590 m³ in the previous month due to the political instability in the country. Similarly, export to Saudi Arabia and Qatar declined 14% and 43% to 1,612 m³ and 806 m³ respectively. On the other hand, the UAE and Oman improved purchases of sawntimber by 2% to 7,341 m³ and 36% to 11,323 m³ respectively.

Buying from ASEAN decreased 13% to 63,933 m³ from 73,633 m³ registered in the previous month. Export of sawntimber to Thailand, major buyer of sawntimber from Malaysia increased 26% to 36,621 m³ from 29,170 m³ in the previous month. However, export to Singapore and the Philippines declined 11% and 45% to 7,156 m³ and 19,283 m³ respectively.

In the meanwhile, shipments to East Asia increased 13% to 37,352 m³ with export to China and Japan increased 52% to 20,105 m³ and 34% to 6,108 m³ respectively. However, export of sawntimber to Taiwan and South Korea declined 28% and 15% to 7,858 m³ and 3,246 m³ respectively.

Elsewhere, exports to the US increased 20% to 930 m³ while intake by Australia decreased 15% to 668 m³. Demand from South Africa increased 27% to 5,275 m³ from 4,163 m³ in the previous month.

The average FOB price of sawntimber decreased 1% to RM1,768 per m³ from RM1,778 per m³ in the previous month. Price of Dark Red Meranti (DRM) increased 90% to RM2,825 per m³ from RM1,488 per m³ in the previous month. Price of DRM to the Netherlands decreased 4% to RM3,093 per m³ from RM3,231 per m³ in the previous month. Keruing was traded at RM1,636 per m³, an increase of 4% from RM1,578 per m³ in the previous month.

PLYWOOD

Export of plywood in January decreased 18% in volume and 15% in value to 189,236 m³ valued at RM346.5 million as compared to the previous month.

Total exports to the EU decreased by 35% to 8,495 m³. Similarly, exports to Denmark, Ireland and the UK reduced by 43%, 35% and 40% to 171 m³, 332 m³ and 6,594 m³ respectively whilst France, Germany and Italy did not make any purchases. On the other hand, Belgium and Netherlands improved their intake by 27% and 62% to 220 m³ and 1,092 m³ respectively.

Exports to ASEAN region increased as Brunei and Thailand intake of plywood improved by 81% and 55% to 1,389 m³ and 6,912 m³ respectively. However, Singapore and the Philippines reduced their intake by 13% and 54% to 2,198 m³ and 1,943 m³ respectively whilst Indonesia did not make any purchases. In East Asia, China, Hong Kong, South Korea and Taiwan decreased their intake by 63%, 88%, 12% and 55% to 1,069 m³, 423 m³, 24,430 m³ and 11,082 m³ respectively. Conversely, Japan increased its intake by 0.3% to 107,294 m³.

Overall exports to West Asia decreased by 61% as compared to the previous month. Similarly, shipments to Bahrain, Saudi Arabia, and Kuwait reduced by 68%, 3% and 83% to 619 m³, 742 m³ and 86 m³ respectively whilst Yemen did not make any purchases. Meanwhile, the UAE and Qatar increased their intake by 62% and 416% to 2,096 m³ and 464 m³ respectively.

Elsewhere, exports of plywood to South Africa and Mexico increased by 439% and 11% to 458 m³ and 2,844 m³ respectively whilst Mauritius and New Zealand resumed their import. However, the US, Canada and Australia reduced their intake by 39%, 61% and 7% to 8,484 m³, 46 m³ and 2,414 m³ respectively whilst Algeria and Turkey did not make any purchases.

The FOB price of plywood increased by 3% to RM1,831 per m³ from RM1,770 per m³ in the previous

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month.

VENEER

Exports of veneer for January 2017 showed a decrease of 30% in volume and value to 17,906 m³ at RM27.0 million as compared to the previous month. Similarly, exports to China, Taiwan, South Korea, Viet Nam and Australia reduced by 36%, 52%, 14%, 94% and 36% to 2,380 m³, 5,689 m³, 6,642 m³, 3 m³ and 107 m³ respectively.

On the other hand, Singapore, the Philippines and India, improved their intake by 11 folds, 75% and 77% to 236 m³, 1,105 m³ and 590 m³ respectively whilst Canada, Italy and Chile resumed their intake.

The FOB price of veneer decreased to RM1,505 per m³ from RM1,522 per m³, a reduction of 1% from the previous month.

MEDIUM DENSITY FIBREBOARD (MDF)

Malaysia's exports of MDF for January 2017 increased 23% in volume and 21% in value compared to previous month. Export totalled 80,219 m³ at RM 96.3 million.

Exports to East Asia registered an increase of 2% to 13,441 m³ from 13,150 m³ in the previous month. Exports to Japan grew by 5% to 12,330 m³ followed by China (including Hong Kong) at 26% increased to 207 m³. Meanwhile exports to Taiwan recorded a negative growth with a decrease of 9% to 581 m³ followed by South Korea drop 44% to 323 m³.

Exports to West Asia also increased 61% to 33,218 m³ from 20,593 m³ in the previous month. Export to Qatar recorded a positive growth of 7% to 889 m³ followed by Oman at 9% increased to 515 m³ and Kuwait at 13% increased to 5,170 m³. Export to Bahrain, UAE, Syria and Lebanon also recorded positive growth by 21% to 793 m³, 29% to 10,329 m³, 100% to 9,556 m³ and 1,993% to 2,763 m³ simultaneously. However, export to Saudi Arabia and Jordan dropped by 46% to 3,120 m³ and 74% to 41 m³.

Furthermore, export to South Asia also recorded positive growth by 39%. Export to Bangladesh increased by 19% to 2,973 m³, followed by Pakistan grew by 23% to 6,343 m³, Sri Lanka by 60% to 1,607 m³ and India increased by 75% to 5,458 m³.

Elsewhere, exports to the US increase by 14% to 1,724 m³ However export to Australia fell 24% to 1,911 m³, Mauritius down by 50% to 64 m³, UK down by 63% to 121 m³ and South Africa decreased by 92% to 57 m³.

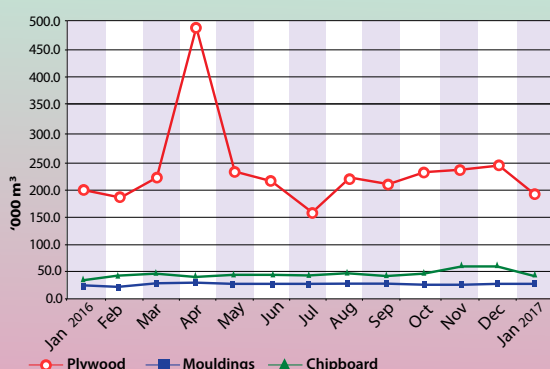
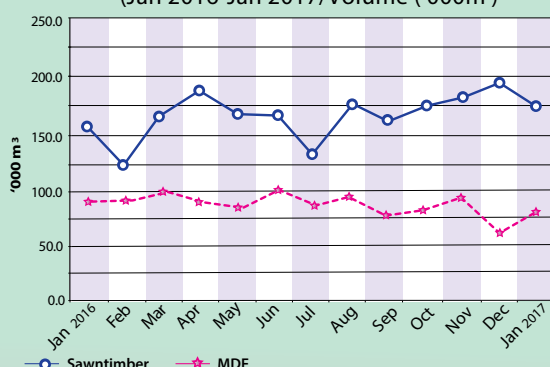
In ASEAN, total export to ASEAN region for the month of January decreased by 42% to 8,083 m³ from 13,961 m³ in the previous month. Exports to the Philippines increased by 18% to 1,969 m³. However, Indonesia, Singapore and Viet Nam decreased by 23% to 2,515 m³, 31% to 143 m³ and 61% to 3,411 m³ respectively.

MOULDINGS

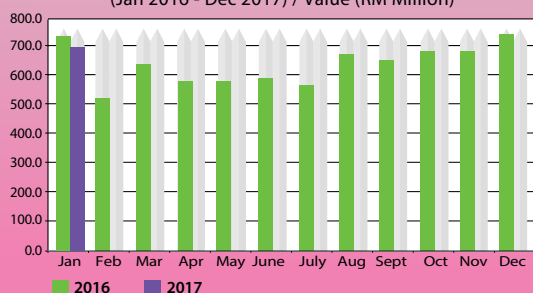
Exports of mouldings for the month decreased by 6% in volume and 14% in value to 19,813 m³ and RM65.9 million respectively. However, as compared to the previous corresponding period in 2016, exports for the period of January 2017 decreased by 5% in volume and 13% in value to 19,813 m³ and RM65.9 million respectively.

Exports to the EU for the month recorded at 7,206 m³,

Malaysia : Export of Major Timber Products
(Jan 2016-Jan 2017/Volume ('000m³)



Malaysia : Export of Wooden Furniture
(Jan 2016 - Dec 2017) / Value (RM Million)



Source : Department of Statistics, Malaysia

JANUARY 2017



LOGS

The logging activities particularly at the eastern part of Peninsular Malaysia were still affected due to rainy season since last month. Hence, the prices of logs for most of the species fluctuated in terms of pricing.

Log prices for the species of Chengal and Balau stood firm at RM4,000 per tonne and RM3,000 per tonne respectively. Prices for Red Balau and Merbau dropped by 6% to RM2,350 per tonne and 1.9% to RM2,650 per tonne. However, price of Kempas increased slightly by 1.2% to RM1,740 per tonne whilst Keruing fell by 5.6% to RM1,350 per tonne over previous month. Similarly, prices for Red Meranti and Yellow Meranti declined by 1.8% to RM1,650 per tonne and 4.2% to RM1,150 per tonne respectively. On the other hand, logs prices for Mixed Heavy Hardwood increased by 3.1% to RM988 per tonne whilst Mixed Light Hardwood remained at RM1,200 per tonne.

SAWNTIMBER

The average sawntimber prices has picked up for some species due to declining supply in the domestic market. Industry also reported weak demand from the overseas market for the month.

Sawntimber prices for Chengal increased by 4.3% to be traded at RM6,921 per m³. Meanwhile, prices of Red Balau and Merbau dropped by 5.4% and 1.8% respectively to RM2,825 per m³ and RM3,778 per m³. However, price for Keruing jumped by 33% to RM2,500 per m³ from previous month's level while Kempas remained at RM3,050 per m³. Prices for Dark Red Meranti, Yellow Meranti and Mersawa charted at RM2,013 per m³, RM1,342 per m³ and RM1,554 per m³ respectively. On the other hand, sawntimber prices for Mixed Heavy Hardwood and Mixed Light Hardwood remained at RM794 per m³ and RM1,130 per m³ respectively.

PLYWOOD

The supply of plywood to the domestic market remained adequate for the month under review. Plywood of 4mm, 6mm, 9mm and 12mm of thicknesses continued to be traded at RM14.60, RM22.00, RM34.50 and RM42.00 per piece respectively.

MEDIUM DENSITY FIBREBOARD (MDF)

The MDF industry reported that they were now continuously facing shortage supply of raw material due to stiff competition from other users of timber. The MDF of 4mm, 6mm, 9mm and 12mm of thicknesses were sold at RM12.10, RM16.55, RM22.15 and RM28.80 per piece respectively. 



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Malaysian Timber Industry Board
(Ministry of Plantation Industries and Commodities)

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JANUARY 2017

***AVERAGE DOMESTIC PRICES OF LOGS, SAWNTIMBER, PLYWOOD AND MDF IN PENINSULAR MALAYSIA
JANUARY 2017 (VALUE IN RM)**

SPECIES	LOGS/tonne	SAWNTIMBER/m³			
	18" UP	GMS	STRIPS		SCANTLINGS
HEAVY HARDWOOD					
Chengal	4,000	6,921	7,274		8,828
Balau	3,000	3,178	3,249		3,531
Red Balau	2,350	2,825	2,966		3,213
Merbau	2,650	3,778	3,814		3,955
Mixed Heavy Hardwood	988	794	851		975
MEDIUM HARDWOOD					
Keruing	1,350	1,766	2,020		2,203
Kempas	1,740	2,154	2,260		2,331
Kapur	1,700	2,248	2,260		2,331
Mengkulang	1,100	1,483	1,554		1,624
Tualang	1,400	2,472	2,542		2,585
LIGHT HARDWOOD					
Dark Red Meranti	1,900	2,013	2,154		2,707
Red Meranti	1,650	1,942	1,977		2,048
Yellow Meranti	1,150	1,342	1,448		1,554
White Meranti	1,070	2,119	2,189		2,260
Mersawa	1,480	1,554	1,624		1,660
Nyatoh	900	777	812		847
Sepetir	1,100	1,283	1,335		1,469
Jelutong	1,140	1,554	1,624		1,730
Mixed Light Hardwood	1,200	1,130	1,222		1,236
MALAYSIAN RUBBERWOOD <i>Hevea brasiliensis</i>	LOGS/tonne	SAWNTIMBER/m³			
	170	1" X 1"	2" X 2"	3" X 3"	4" X 4"
		761	1,160	1,230	1,285
PLYWOOD 4' X 8' (RM per piece)	4mm	6mm	9mm		12mm
	14.60	22.00	34.50		42.00
MDF 4' X 8' (RM per piece)	4mm	6mm	9mm		12mm
	12.10	16.55	22.15		28.80

Note: Log prices ex-batau. Sawntimber, plywood, MDF and Malaysian Rubberwood (*Hevea brasiliensis*) prices ex-mill

*Prices are only indicative



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a decrease of 5% compared to the previous month. The Netherlands and UK increased their purchased by 5% and 24% to 4,021 m³ and 636 m³. Meanwhile, Germany and Belgium decreased their intakes by 31% and 15% to 878 m³ and 469 m³ respectively. However, Italy did not make any purchases.

Exports to ASEAN region increased as Singapore and Indonesia intake of mouldings increased by 2% and 3% to 1,493 m³ and 36 m³ respectively. However, Viet Nam decreased its purchases by 26% to 207 m³ compared to the previous month.

Meanwhile, South Korea increased its intake by 23% to 2,186 m³ compared to the previous month. However, exports to Japan, China, Hong Kong and Taiwan decreased by 11%, 72%, 25% and 83% to 1,724 m³, 265 m³, 200 m³ and 29 m³ respectively.

Elsewhere, export to Australia, the US and Canada decreased by 17%, 42% and 71% to 2,825 m³, 997 m³ and 39 m³ respectively.

FOB unit value showed a decrease of 9% to RM3,328 per m³ compared to the previous month.

BUILDERS JOINERY AND CARPENTRY (BJC)

Total BJC cumulative exports from January 2017 decreased 6% to RM101.7 million as compared to RM107.9 million in the corresponding period last year. Export to the EU increased 11% to RM29.5 million. Export to Denmark, Belgium, Germany, France, Italy and Netherlands increased by 175%, 10%, 43%, 32%, 211% and 175% to RM3.5 million, RM3.1 million, RM2.3 million, RM2.1 million, RM1.2 million and RM902.3 thousand respectively. Meanwhile, export to the UK and Sweden decreased by 34% and 41% to RM11.3 million and RM724.2 thousand compared to the previous year. However, Turkey did not make any purchases.

In Asia, exports to Saudi Arabia, the UAE and South Korea grew 59%, 72% and 88% to RM1.2 million, RM889.3 thousand and RM687.6 thousand respectively. However, exports to Singapore, Japan, Pakistan, India, Thailand, Viet Nam and Taiwan decreased by 13%, 18%, 29%, 18%, 63%, 20% and 15% valued at RM11.0 million, RM7.0 million, RM4.5 million, RM4.1 million, RM2.5 million, RM1.3 million and RM948.6 thousand respectively. However, Qatar and Bahrain did not make any purchases.

Exports to Australia increased by 12% to RM20.3 million compared to the previous year. Meanwhile, South Africa decreased its purchases by 4% to RM1.1 million. Likewise, the US increased its intake by 5% to RM9.3 million from RM8.8 million

in the previous corresponding period. However, Mauritius did not make any purchase.

FURNITURE

Exports of wooden and rattan furniture for the first month of 2017 decreased of 6% compared to the previous year. Total shipments recorded at RM698.5 million against RM740.2 million in 2016. Purchase of wooden furniture from Malaysia for January 2017 decreased 5% from RM733.7 million to RM695.5 million compared to January 2016. There has been mix performance across most major markets. Imports of wooden furniture by the US drop slightly by 2% from RM273.2 million to RM266.9 million.

Japan decreased its consumption by 8% from RM73.9 million to RM67.8million. Australia imports also dropped 5% from RM57.5 million to RM54.4 million. Singapore also reduced its intake by 3% to RM42.1 million. Meanwhile exports to Canada and UAE in January 2017 also recorded a negative growth with a decrease of 19% and 43% to reach RM19.3 million and RM 13.2 million respectively.

Meanwhile, China intake of wooden furniture strengthened with an increase of 92% to reach RM8.7 million. India and Philippines saw positive improvements with an increased by 21% and 8% to reach RM14.6 million and RM10.6 million. Intake by Russia remained positive with a 68% increase from RM2.4 million in 2016 to RM4.0 million in 2017.

Meanwhile, rattan furniture shipments had a decrease of 53% to RM3.1 million in 2017 from RM6.5 million in 2016. Singapore is the top importer with an intake of RM573 thousand, despite a decrease of 33%. The UK decreased its intake to RM176 thousand, a decrease of 82%. Export from Thailand and Viet Nam also reduced by 92% and 82% to RM5, 781 and RM7, 348 respectively. However, India consumption is almost doubled in 2017, charting RM748 thousand. 

EXCHANGE PROGRAMME ON FLEGT VPA



Opening remarks from Mr. Indra Wiragana, Head of Provincial Forest Office, East Java Province and Mr. Sigit Pramono from Indonesia Ministry of Environment and Forestry.

The Indonesian Government through the Indonesian Ministry of Environment and Forestry (MoEF) together with GIZ and ASEAN Forestry and Climate Change (FOR-CC) organised an ASEAN exchange programme on FLEGT VPA. Participants from five ASEAN Member States (Indonesia, Malaysia, Viet Nam, Cambodia and Thailand) and GIZ-FOR CC attended the workshop, which was held from 19 to 23 February. Among the objectives of the workshop were to share practical experience between Indonesia and other ASEAN Member States' (AMS) delegations on its arrangements for FLEGT VPA implementation and the progress of developing its National Timber Legality Assurance System (TLAS). In addition, it is to increase multi-stakeholder collaboration to support the AMS national process on developing FLEGT-VPA, including the role of partner dialogues and community forest. It is expected that the AMS delegations would be able to acquire a perspective on timber legality issues from each other for input into their national process on FLEGT-VPA.

The opening remark was delivered by Mr. Indra Wiragana, the Head of Provincial Forest Office, East Java Province. He welcomed members of the programme and stated that approximately 3.1 million m³ of timber production in 2016 from the East Java Province were sourced from privately owned forest and only 300,000 m³ were from state-owned enterprise (Perum Perhutani). He further added that until December 2016, 462 SVLK-certified

units have been granted to enterprises, owners, and primary and secondary industries in the East Java Province, with the assistance and certification facilitation by the Ministry of Environment and Forestry/NGO/Civil Society Organisation.

Mr. Sigit Pramono, Deputy Director for Forest Product Certification and Marketing of MoEF then presented Indonesia's FLEGT VPA development to the floor. He noted that SVLK system covers all spectrum of timber production from Forest Management Units, Timber Industries and Timber Depots. Meanwhile, Indonesia has also taken its risk analysis and risk mitigation actions towards the import mechanism in the *Sistem Informasi Legalitas Kayu* (SILK) online system to meet the Due Diligence process as agreed with the EU. The document needs to prove import legality for imported consignments into Indonesia by either having: SFM and/or a timber legality certificate, a letter from Country of Origin on SFM and/or legality of timber products, Country Specific Guidelines (CSG), Mutual Recognise Agreement (MRA) between countries and Indonesia or a FLEGT License.

The representative from Cambodia then stated the status of VPA and TLAS with the EU, supporting the Joint Study on Timber Flow and Control in Cambodia in 2011. The study was conducted by GFS in collaboration with Forestry Administration, relevant ministries, the private sector and communities, and was supported by EU-EFI. It was

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learned that Cambodia still needed to do some alignment of legal framework and capacity building on FLEGT VPA and to get the involvement of stakeholders in the process. There was also a need to develop a National Forest Certification Scheme in the country to ease the negotiation process.

Malaysia then presented the current status of negotiation and way forward of the process. The options that Malaysia had was either to conclude the negotiation or to improve and strengthen the implementation of MYTLAS as an initiative to fulfill the due diligence requirements in EU Timber Regulations, pending the conclusion of the FLEGT VPA negotiation.

Meanwhile, Thailand stated that since it was the third largest forested area country in ASEAN, it was important for them to embark on the VPA negotiation with the EU. They were planning to use an electronic system for compliance verification namely using e-tree and e-registration, compared to currently using paper evidence (for land title and official certification) and verification by the officer on the field for land and species verification.

Viet Nam stated that they started negotiation in 2010 and concluded on 18 November 2016. They were planning to sign the VPA in March 2017 and hopefully the ratification and official signing of the agreement will take place in December 2017. They have listed seven major commitments including

formulating new regulations and procedures in order to comply with the VPA. Among them were verification of timber legality, control of imported timber and supply chain, risk-based management, FLEGT Licensing and Independent Monitoring.

The AMS participants comprised representatives from government offices, industries as well as members from civil societies and organisations. There was active participation, sharing comments and insights towards the development of VPA negotiations in the respective countries.

There was field and ground visits to community forests, timber manufacturing factories, as well as wood craft companies. The first visit was to Kayu Multi Guna, a company which manufactures a wide range of wood products such as veneer, plywood, doors, windows, finger joints and laminated products. It was learnt that they use 100% legal timber from responsibly managed forests including about 75% wood materials with FSC and PEFC certifications. They support the SVLK initiatives by the Indonesian Government which helps the company in producing legal timber products and easily market them to their export partners.

The second visit was to Sengon Agung Bersama (SAB), a community forest in Jombang. This was one of the direct benefits of SVLK in Indonesia whereby, the villagers had transformed their agriculture land to a community forest, working on



Visit Community Forest under Sengon Agung Bersama.

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an agro-forestry system by planting fast growing species in demand by the industry for V-legal timber. A total of 270 small scale planters/owners subscribes to the Sengon Agung consortium which supports them with seedlings and fertilisers. The consortium then will buy the mature trees at market price from the planters. While waiting for the tree to mature, the villagers will obtain their income on agro-based products such as vegetables, cocoa and poultry products.

Then, participants visited the PT. Sejahtera Usaha Bersama (SUB) which processes the raw material derived from the small holders. PT Sejahtera Usaha Bersama produces mainly plywood and veneers, which is from about 95% raw materials coming from the community forests. They received the SVLK certificate in 2011 and with the seven year validity period, they have also been audited to verify the legality of the product manufactured as legal timber by a certification body - PT Mutu Agong Bestari - and likewise, is qualified for V-Legal certificate. They work closely with MoEF and ensures that the community forest owner under them get all the facilities and benefits in order to sustain the raw material supply to their company. Their export destination is mainly to Japan and China.

The final visit was to PT. UD Ika Jati which mass produces handicrafts using Jati, Mahogany, Acacia and Sengon/Albizia. Although they are yet to be exported to the international market, they are

supported by MoEF and accredited with the SVLK certificate in 2014 with close consultations with local and government authorities. They agree that SVLK gives added value to their products. MoEF also provides financial aid, coaching and consultancy to them after they joined the SVLK initiative. The benefit they got from SVLK was the expansion of market through exhibitions and promotions, legal raw material and improved product quality. With this benefit, more jobs have been offered to the nearby community, contributing to the economic development of the nation.

About 17 participants from five ASEAN Member States (Indonesia, Malaysia, Viet Nam, Cambodia and Thailand) and GIZ-FORCC attended the programme. The exchange programme was designed for a half-day classroom session and one and a half day field trip for the first and second days. Malaysia was represented by MTIB officials namely Puan Sunita Muhamad and Puan Emie Syarina Norizan, and Encik Adrian Choo from WWF-Malaysia.

It was learned that Indonesia was promoting the SVLK schemes throughout Indonesia, regardless whether the company was interested in exporting to the EU or not. What is important is that, Indonesia is producing and supplying legal timber and it will facilitate the companies wanting to export to the EU in the future. They believe such effort will ascertain the legality of raw material and fulfill the world market demand. 



Group photo at PT. UD Ika Jati.



Various species of flooring samples.

FLOORING THE COMPETITION

When it comes to quality hardwood floors, Malaysia turns to one name: Ekowood



Merbau



White Oak



Hevea Stain Walnut Unica 3 Strip



Kempas

What's the most important feature of your home? The bed? The sofa? Perhaps the kitchen or bathroom? Sure, these are all important, but there's one feature in your home that sees more use than any other: the flooring. Often underappreciated and overlooked, the type of flooring in your home makes a huge impact on the look and feel of your living space – and no company understands the importance of solid, luxurious flooring better than hardwood floor specialist Ekowood.

A home-grown Malaysian brand, Ekowood has expanded to become the provider of choice for premium-quality wood floors in more than 35 countries around the world. With a complete tree-to-floor philosophy that sees the company handling the products from timber logs through to installation, both consumers and corporations have come to trust Ekowood to deliver the highest in quality and longevity. Indeed, Ekowood products have been named Best Engineered Solid Hardwood Flooring for three consecutive years, and Ekowood flooring can be found closer to home in the premium showrooms of Bufori and Mercedes-Benz in Malaysia, as well as in hotels like the Hilton KL Sentral, Westin KL and the Marriott Putrajaya.

For homeowners, quality real wood floors represent a solid investment and offer a sensation that cannot be reproduced by other materials. In fact, Ekowood's floors are a tactile and visual treat, with four different collections offering the ultimate in customisation and choice.



Timber flooring.



Use in a commercial gym

Exotic Selection

Ekowood's Exotic Selection features wood harvested from tropical forests, lending flooring in this range a welcoming allure. The warm browns of Ekowood Iroko from the durable African Iroko hardwood tree bring the beauty of nature indoors while the sultry reds of Ekowood Doussie can transform a space with their classy style. Alternatively, the traditional finish on Ekowood Teak makes living areas feel elegant and classic.

Temperate Favourites

Flooring in the Temperate Favourites collection is the choice of homeowners and designers seeking a smart, traditional look and feel. The timeless beauty of options like Ekowood Maple and Pecan has the ability to lift a space and creates a desirable rustic charm. The word here is variety; choose from Oak White Sand's lighter tones to make spaces appear brighter and bigger, or the luxurious deeper hues of Smoked Oak that add intimate style.



Winchester Coffee flooring

Winchester Style

The choice for discerning connoisseurs, all floors in the Winchester Collection are painstakingly handmade by master craftsmen. The result is the preservation of every grain in the wood, giving a high quality, unique finish. The reddish hues of Winchester Mesquite let designers make a lavish statement while the gorgeous browns of Winchester Suede and Pecan keep things looking classic. This is the last word in luxurious modern living.



Ekowood flooring in a residential office

Fine Seasons

The Fine Seasons range adds a touch of the whimsical to any space, creating a playful atmosphere by weaving together woods from different species. The technique forms unique, standout patterns, tones and grains that are perfect for funky and contemporary interiors. The orangey hues of Fine Cherry Blossom add light and warmth to a room, and Fine Winter, Autumn, Spring and Summer borrow from their respective seasons' tones and colours to spice up their living spaces.

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OIL PALM TRUNK PLYWOOD PRODUCTION VIA COPOLYMERISED UREA-FORMALDEHYDE WITH MODIFIED PHENOLIC RESINS: COULD IT BE?

INTRODUCTION

Phenol-formaldehyde (PF) resins dominate the market for the manufacture of exterior type wood composites such as plywood, fibreboard, laminated veneer lumber (LVL), oriented strand board (OSB) and particleboard. In fact, the main reasons PF resin is extensively used in the wood manufacturing industry are its resistance to water and weather, good bonding properties as well as minimal health problems of formaldehyde emission from the end products [1]. Based on research report, urea is incapable of condensing to (UF) resins in a fairly alkaline environment but its reaction with formaldehyde to form methylol urea is faster under alkaline conditions [2]. However, excessive amounts of (UF) applied also reduced its waterproof performance. The same is valid with any source or type of formaldehyde; including the methylol group of PF resin. Based on research report, pre-treatment of oil palm trunk (OPT) veneer with PF resin successfully improved the quality of plywood is shown in **Figure 1**. This study was to investigate the effectiveness of an experimental method of introducing UF into the synthesis system with adequate co-reaction to form a phenol urea-formaldehyde (PUF) resin system during the manufacturing process.

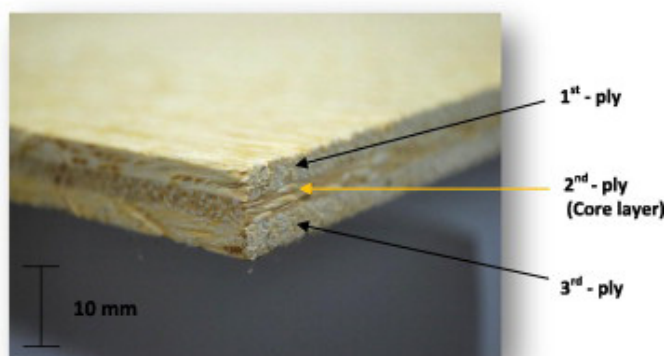


Figure 1: 100% oil palm trunk plywood

EXPERIMENTS

2.1 Material Preparation

OPT (around 25 years) veneer with 4.5 mm thickness were used as the raw material. The veneers were peeled into sizes of 920 x 1220 mm and then air-dried to a moisture content (MC) of 10-15 %. Only veneers from the middle, bottom parts of the trunk were used.

2.2 Production of Plywood Panels

A batch of three-ply treated OPT veneers were sent to a roller spreader for the gluing process with PF (32% solid content). Only the core layers were glued with UF resin which was mixed with industrial wheat flour and hardener (ammonium chloride). The adhesive mixture was spread on the veneers at 250 g/m² spread rate (single glue line). The assembled veneers were then cold pressed for 10 min and hot pressed at 140°C for 16 min.

2.3 Physical Property Testing on OPT Plywood

The density of plywood was determined in accordance with European standard EN 323: 1993 by measuring the mass and volume of each sample. Ten samples of each treatment were weighed using an analytical balance. The density was calculated using the following equation:

$$\text{Density, g/cm}^3 = \frac{\text{Mass}}{\text{Volume}}$$

2.4 Mechanical Properties and Bonding Integrity Testing on OPT Plywood

2.4.1 Static Bending Test

Static bending tests were carried out according to the European Norm EN 310: 1993. These samples were tested using the Shidmazu Universal Testing Machine with 100 kN capacity employed as bending strength. Statistical analyses were carried out to determine the effect of treatment, veneer type and adhesive spread amount on the bending (i.e modulus of rupture, MOR) and stiffness (i.e modulus of elasticity, MOE) of the plywood panel.

2.4.2 Bonding Quality Assessment of Panel

Adhesive bonding properties were evaluated according to European norms EN 314-1 and EN 314-2: 1993, respectively. All shear test plywood specimens were tested in dry (interior type bond) and WBP (exterior type bond) testing conditions.

2.5 Solid State ¹³C NMR Analysis

PUF resins were cured in a laboratory oven and ground into fine powder and analysed using

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OPT Plywood.

solid state CP-MAS ^{13}C NMR analysis. The spectrum was recorded at room temperature under CP-MAS (cross polarisation magic angle spinning) on a Bruker AV400 solid state NMR with a spectrometer frequency of 62.90 MHz.

2.6 MALDI – TOF a Mass Spectrometry Measurement

The spectra were recorded on a KRATOS Kompact with a MALDI 4 instrument. The irradiation source was a pulsed nitrogen laser. The wavelength of one laser pulse was 337 nm applied for 3 ns.

RESULT AND DISCUSSIONS

3.1 Mechanical Properties and Bonding Integrity

The physical properties, mechanical properties and bonding shear strength of commercial and treated OPT panels at different resin conditions are presented in **Table 1**. As can be seen from **Table 1**, the mechanical properties (MOE and MOR) and bonding shear strength (under dry and WBP test conditions) for all treated OPT plywood panels were significantly higher compared to the commercial OPT plywood (control). The results indicate that the MOR and MOE of the OPT plywood panels increased



Luissa coffee table from OPT.

with resin treatment. The MOR and MOE values of treated OPT plywood panels were higher than the control OPT panels. The mechanical properties for the OPT panels which were made via pre-treatment with PF + UF resin had the highest values with an improvement of 97% in MOR and 43% in MOE compared to the commercial OPT plywood and an improvement of 13.5% in MOR and 8.0% in MOE compared to the plywood treated with PF resin only.

The average bonding shear strength showed a similar trend to the MOE and MOR results where all treated OPT of plywood had higher values compared to the commercial OPT plywood panels. The average dry shear test results were 1.10 MPa, 1.20 MPa and 1.57 MPa for control, PF treated and PF + UF treated, respectively while WBP shear tests yielded the following results; 0.56 MPa, 1.02 MPa and 1.32 MPa for control, PF treated and PF + UF treated, respectively. Results for dry and WBP tests for all treated OPT panels achieved the minimum requirement set by EN 314-2, plywood bond quality for the bond quality of veneer plywood for interior use and outdoor applications.

Table 1: The Mechanical Properties, Physical Properties and Bonding Quality of OPT Plywood Treated with Different Resins.

Plywood	Mechanical Properties		Physical Properties	Bonding Integrity				Press Time min
	MOR (MPa)	MOE (MPa)		Dry Shear (MPa)	Wood Failure (%)	Wet Shear (MPa)	Wood Failure (%)	
OPT panel (control)	30.7 (4.8)	4,370 (330)	540 (47)	1.10 (0.3)	100	0.56 (0.32)	100	11
PF treated	53.3 (4.1)	5,855 (378)	630 (38)	1.20 (0.14)	20	1.02 (0.11)	20	18
UF + PF Treated	60.5 (3.6)	6,349 (273)	779 (43)	1.57 (0.11)	60	1.31 (0.15)	80	16

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An interesting finding was observed in this study where the performance of treated OPT plywood improved significantly especially for the bonding shear and mechanical properties. This might be due to the well co-condensed PF and UF resin at the glue line during the gluing process. Therefore, further fundamental investigation was carried out to study the resin bonding properties using solid state ^{13}C NMR and MALDI-TOF-MS.

3.2 Solid State ^{13}C NMR Analysis of PUF Resin

The solid state ^{13}C NMR spectra of PF resins and PUF resin are shown in **Figure 2**. An interesting feature can be observed from the ^{13}C NMR spectrum where both UF and PF resin co-polymers used to form PUF must have formed via methylene bridges between phenol and urea in the analysis sample. As can be seen in **Figure 2**, these linkages are present between urea and phenol and can be detected in peak regions of 40-42 ppm and this finding is confirmed by Schmidt et al. [3]. There are several published reports demonstrating that co-condensation process between phenolic components and urea components might or might not occur in the synthesis of PUF resin [4, 5]. It was noted that weak chemical shifts were found in the ^{13}C NMR spectra at 44.0 ppm, 48.0 ppm, 55.0 ppm, 68.0 ppm, and 71.8 ppm. These peaks, which clearly indicated that the methylene bridges were formed in between phenolic rings and urea components. Another

interesting finding was observed whereby no peak occurred in the region of 162-164 ppm, where the peaks were attributed to the carbonyl group of free urea. Indeed, this provides very useful information for UF resin in which urea was fully reacted and the amount of urea applied into the UF resin system was sufficient in the synthesis process of PUF resin.

Based on the study, two chemical shifts (33.3 ppm and 39.8 ppm) were identified and present in the region of 29.0 – 42.0 ppm for PUF resin. The chemical shift around this region showed that the co-condensation of phenol methylol was present in the system during the pre-drying or pre-curing stage of the treated OPT veneers with PF resins under 70°C.

The chemical shift at 71.8 ppm is attributed to linear methylene ether bridges between urea components, notwithstanding that the addition of methylol groups might reduce the resins ability to resist water. In fact, the addition of methylol groups might enhance the elasticity of the cured resin and improve shrinkage properties [6]. The chemical shift in the region 171.0-172.0 ppm in the PF resin is assigned to the carbon of formic acid, the formation of which might be caused by the oxidation of formaldehyde [7]. This finding proved that the mechanism of cross linking among the three components (phenol, urea, formaldehyde) by the addition of UF into the copolymer PF resin during the glue spreading

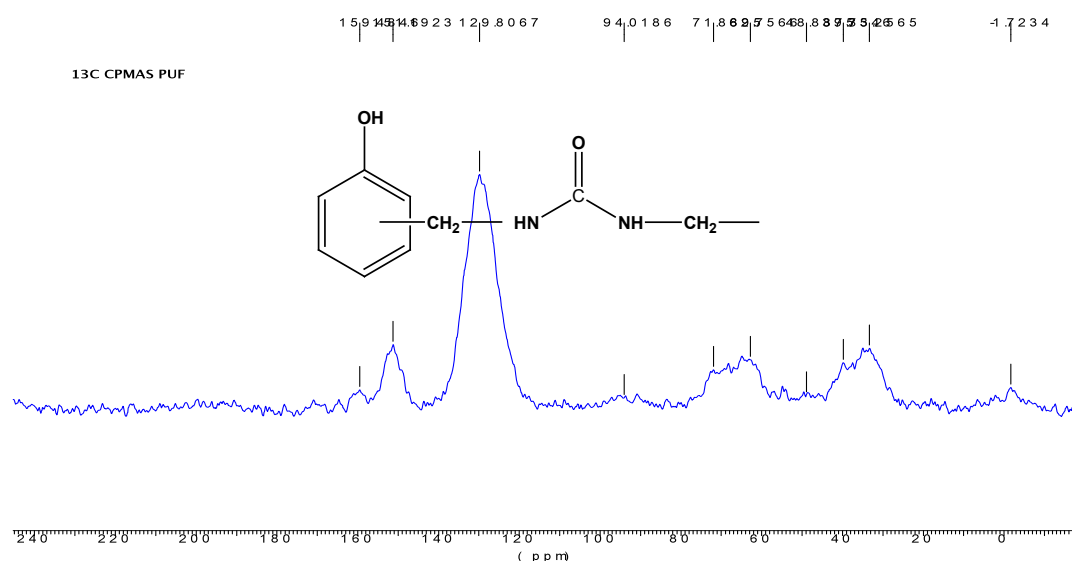


Figure 2: Solid State ^{13}C NMR Spectrum of the PUF Co-condensation Resin

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process was fully reacted in comparison to other processes of synthesis [6].

3.3 MALDI-TOF Mass Spectrometry Spectra Analysis of PUF Resin

MALDI-TOF mass spectrometry technique has been widely used to determine large and complex series of oligomers or macro-molecular level materials for wood adhesives (UF, PF, MUF) and others polycondensation resins, of which information provided by ^{13}C NMR is limited. The oligomer fragment distribution of synthesised PUF resin, which has been formulated by the addition of UF resin in the semi-cured PF resin.

The MALDI-TOF mass spectra showed clear repetitive patterns of peaks that allow for the identification of specific oligomer series present in the PUF resin. The MALDI spectra also showed that PUF resin oligomers prevalently contained repeating units of 72 Da (UF fragments, A unit) and 106 Da (PF fragments, B unit) in **Figure 3** and **Figure 4**.

The MALDI-TOF spectrum in **Figure 5** of oligomer distribution showed that co-condensation occurred and cross-linking was present during the PF oligomers reaction with UF oligomers when heat was introduced to the assembled plywood during the hot-pressing stage. For example, the peak at 178 Da for Phenol-CH₂-Urea-CH₂ is attributed to the 1

repeating unit of 106 Da (B unit) and 72 Da (A unit). Further addition of units of UF and PF fragments can obtain the peak of 364 Da or Phenol-CH₂-Urea-CH₂-Phenol-CH₂-Urea with Na⁺. An addition of repeating units of UF and PF fragments at this peak resulted in the peak at 539 Da. A very interesting pattern of a series of "block polymer" is illustrated from the MALDI-TOF spectrum in **Figure 5**.

Another interesting interpretation from the MALDI-TOF spectra at peaks 1213 Da, 1375 Da, 1551 Da, 1712 Da to 1888 Da indicated the end of co-condensation between phenol and urea through methylene bridges. The PUF oligomers at 1213 Da were formed by the addition of Phenol-CH₂-Urea-CH₂ repeating units into the oligomer chain at 1037 Da. Consequently, the addition of CH₂-Urea-CH₂-Urea-CH₂OH into 1213 Da repeating units formed longer PUF oligomers at 1375 Da. The added repeating units are attached to phenol or urea in the body of the main skeleton. Therefore the structure in **Figure 5** illustrated the start of branching with the addition of either 175 Da (-Phenol-CH₂-Urea-) or 160 Da (-CH₂-Urea-CH₂-Urea-CH₂OH-) in phenol or urea.

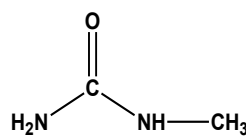


Figure 3: Repeating unit : A

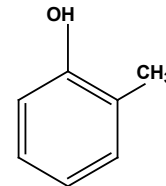
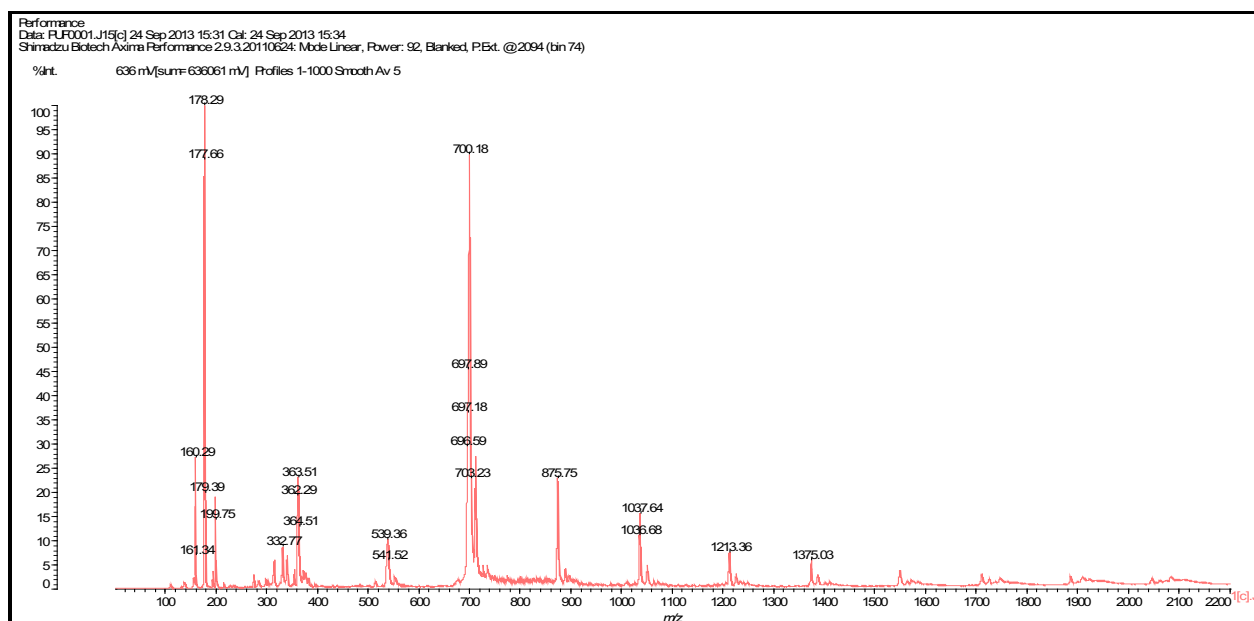


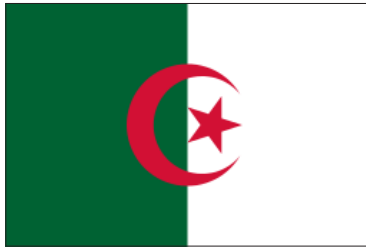
Figure 4: Repeating unit: B



The MALDI-TOF MS fragment spectrum of the PUF resin.

Figure 5. Elucidation of chemical structure linking between Urea-CH₂-Phenol-CH₂-Urea repeating units.

PROSPECTS OF ALGERIAN TIMBER AND TIMBER PRODUCTS



Algeria officially known as People's Democratic Republic of Algeria, is a country in the Maghreb region of North Africa on the Mediterranean coast. Its capital and most populous city is Algiers. With a total land area of 2,381,741 square kilometre, 90% of which is desert, Algeria is the 10th-largest country in the world, and the largest in Africa and in the Mediterranean.

The country is bordered in the northeast by Tunisia, in the east by Libya, in the west by Morocco, in the southwest by Western Sahara, Mauritania, and Mali, in the southeast by Niger, and in the north by the Mediterranean Sea. In 2013, Algeria's population was an estimated at 37.9 million, being mainly of Arab-Berber ethnicity. About 90% of Algerians live in the northern, coastal area. The inhabitants of the Sahara desert are mainly concentrated in oases, although some 1.5 million remain nomadic or partly nomadic. 28.1% of Algerians are under the age of 15.

Algeria's economy is largely based on hydrocarbons; the country supplies large amounts of natural gas to Europe, and exports in energy are the backbone of the economy. According to OPEC, Algeria has the 17th largest reserves of oil in the world, and the second largest in Africa, while it has the ninth largest reserves of natural gas. Sonatrach, the national oil company, is the largest company in Africa.

Algeria has the second largest military in North Africa with the largest defence budget in Africa. In addition, Algeria has had a peaceful nuclear programme since the 1990s. Algeria is a member of the African Union, the Arab League, OPEC, and the United Nations, and is a founding member of the Arab Maghreb Union.

Economy

In recent years, the Algerian Government has halted the privatisation of state-owned industries and imposed restrictions on imports and foreign involvement in its economy. Hydrocarbons



have long been the backbone of the economy, accounting for roughly 60% of its budget revenues, 30% of GDP and over 95% of its export earnings. Strong revenues from hydrocarbon exports have brought Algeria relative macroeconomic stability, with foreign currency reserves approaching USD200 billion and a large budget stabilisation fund available for tapping. In addition, Algeria's external debt is extremely low at about 2% of its GDP. However, Algeria has struggled to develop non-hydrocarbon industries because of heavy regulation and an emphasis on state-driven growth.

The government's efforts have done little to reduce high youth unemployment rates or to address housing shortages. A wave of economic protests prompted the Algerian Government to offer more than USD23 billion in public grants and retroactive salary and benefit increases, moves which continue to weigh on public finances. Long-term economic challenges include diversifying the economy away from its reliance on hydrocarbon exports, bolstering the private sector, attracting foreign investment and providing adequate jobs for younger Algerians.

Shipping Facilities

Algeria has 18 ports along the Mediterranean Sea capable of handling cargo including major ports such as Algiers, Annaba, Oran, Beni Saf, Cherchell, Dellys, Djen Djen, Ghazaout, Mostaganem, Skikda and Tenes. Algiers, Oran and Bejaia receive almost 80% of timber shipments destined to Algeria while

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Annaba, Mostaganem, Djen Djen and Skikda are major support ports for import of timber products. Meanwhile, Algiers and Oran have good berth facilities whereby huge container vessels can offload containerised shipments of timber products from Malaysia.

Major break-bulk shipments arrive at Port of Bejaia which is about 170 kilometres from Algiers, the capital of Algeria. The port is near Industrial areas in El Nedjma, Sidi Chahmi and Oran where major timber yards and wooden products and other factories are located receiving sawntimber, plywood, fibreboard, particleboard, BJC and other

timber products.

Forest Resources

According to the FAO latest statistics, Algeria's 2,380,000 square kilometres are distributed as shown in Table 1.

The land used by the agricultural sector is 40,000,000 hectares, 17% of the country: 31,000,000 hectares are for grazing, the home of Algerian pastoralism. Eight million hectares are farm land of which 94% are arable and 6% are under perennial crops. Farm land corresponds to 0.28 hectares per inhabitant.

Unit: 1,000 ha

Land	2010	2011	2012	2013	2014
Land area	238,174	238,174	238,174	238,174	238,174
Forest	1,918.0	1,925.6	1,933.2	1,940.8	1,948.4
Primary forest	0	0	0	0	0
Other naturally regenerated forest	1,420	1,416	1,412	1,408	1,404
Planted forest	498.0	509.6	521.2	532.8	544.4
Other land	194,882.0	194,860.4	194,842.6	194,801.6	194,794.7

Source : FAO Stats

Forest land covers are divided as follows:

- Natural forest: 1, 329, 000 hectares (32.4%)
- Maquis and scrub: 1, 844, 400 hectares (44.0%)
- Grassland: 800 hectares (0.1%)
- Plantations: 972, 800 hectares (23.5%)

The main forest trees are:

- Aleppo pine (*Pinus halepensis*): 800, 000 hectares (35.4%)
- Cork oak (*Quercus suber*): 463, 000 hectares (20.5%)
- Holm oak (*Quercus rotundifolia*): 354, 000 hectares (15.7%)

- Junipers (*Juniperus spp.*): 217, 000 hectares (9.0%)

Timber Production

According to FAO's latest forest statistics on Algeria (2015), the country produced quantity of logs around 25,000 m³ in 2015. Apart from log production, Algeria also produces 22,900 m³ of particleboard, 23,000 m³ of plywood, 2,300 m³ of veneer and 9,400 m³ of sawntimber. Details of production are as below:

Algeria: Production of Timber Products, 2011 - 2015

(Volume : m³)

Products	2011	2012	2013	2014	2015
Particleboard/ Chipboard	22,900	22,900	22,900	22,900	22,900
Plywood	23,000	23,000	23,000	23,000	23,000
Veneer	2,300	2,300	2,300	2,300	2,300
Logs	25,000	25,000	25,000	25,000	25,000
Sawntimber	9,400	9,400	9,400	9,400	9,400
Total	82,600	82,600	82,600	82,600	82,600

Source : FAO Stats

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Import of Timber and Timber Product

According to the latest UN Comtrade statistics, Algeria's import of timber and timber products decreased 17.8% to USD1.04 billion. Sawntimber was the main product imported valued at USD565.5 million followed by furniture (USD301.8 million), plywood (USD76.6 million) and fibreboard (USD53.7 million).

Sweden, Finland and Australia are major import partners for timber products while China, Turkey and Italy are major import partners for furniture. Malaysia ranked 44th import partner for timber and timber products with only 0.15% of market share while furniture ranked fourth with 8.82% of market share.

Algeria: Import of Timber and Timber Products, 2011 - 2015

(Value : USD'000)

Products	2011	2012	2013	2014	2015
Sawntimber	571,911	589,743	643,953	736,283	565,506
Wooden Furniture	219,511	231,307	245,884	311,153	301,822
Plywood	66,898	97,542	79,655	108,653	76,566
Fibreboard	27,632	31,167	53,714	54,692	48,264
BJC	25,796	17,642	23,507	48,121	37,092
Particleboard/Chipboard	19,781	29,527	18,610	29,990	26,250
Logs	1,331	1,293	541	1,048	3,148
Mouldings	1,292	709	764	1,096	1,772
Wooden Frame	873	479	631	956	983
Veneer	670	352	468	395	930
Others	9,326	11,529	15,997	17,075	13,642
Total	945,021	1,011,290	1,083,724	1,309,462	1,075,975

Source: UN Comtrade Stats

Export of Timber and Timber Products

Algeria exported a small value of timber and timber products valued only at USD190,000. Wooden furniture was the main product exported.

Algeria: Export of Timber and Timber Products, 2011 -2015

(Value : USD'000)

Products	2011	2012	2013	2014	2015
Wooden Furniture	29	45	13	75	136
Sawntimber	0	0	5	22	33
BJC	0	0	0	5	1
Logs	0	4	0	0	0
Fibreboard	0	1	0	0	0
Others	1	15	38	27	20
Total	30	65	56	129	190

Source: UN Comtrade Stats

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Malaysia's Export of Timber and Timber Products to Algeria

In 2016, Malaysia's export of timber and timber products to Algeria increased 6.2% to RM110.2

million over the previous year. Iran ranked 30th with 0.5% of Malaysia's total market share. Wooden furniture was the main product exported with a total value of RM 103.5 million, followed by plywood at RM5.4 million and BJC at RM1.3 million.

Malaysia: Export of Timber and Timber Products by Value to Algeria, 2012 -2016

(Value : RM)

Products	2012	2013	2014	2015	2016
Wooden Furniture	87,568,181	77,884,198	74,712,085	100,046,466	103,485,222
Plywood	12,566,970	15,208,192	2,734,494	2,432,048	5,365,717
BJC	213,166	392,905	1,043,497	937,737	1,262,609
Rattan Furniture	0	31,502	0	0	0
Fiberboard	0	0	0	0	126,619
Other Products	219,245	0	265,494	357,711	0
Total	12,999,381	15,632,599	78,755,570	103,773,962	110,240,167

Source: Department of Statistics Malaysia (DOSM) and MTIB

Malaysia: Export of Timber and Timber Products by Volume to Algeria, 2012 – 2016

(Volume : m³)

Products	2012	2013	2014	2015	2016
Plywood	8,315	10,215	2,012	1,500	2,741
Fiberboard	0	0	0	0	166
Total	8,315	10,215	2,012	1,500	2,907

Source: DOSM and MTIB

Timber Industry in Algeria

Algeria has a limited number of furniture manufacturers thus 95% of local demands are met by importing huge volume from China, Malaysia, Turkey, Italy, Spain and France. Locally produced furniture is mostly low-end products while customised furniture is made to cater to high-end clients for residential or government offices. Malaysian furniture is recognised for high quality and reliability and it caters to the mid-income group. Sofa sets in upholstered fabric with different coloured fabric cushions placed for extra support are gaining popularity on top of the leather upholstered sofa sets which are usually bought for offices and hotel lobby and reception areas.

The Algerian government is interested in setting up manufacturing facilities to create employment opportunities within the country and reduce dependence on furniture products imports. It will create support for the massive infrastructure and real estate development undergoing in many cities across Algeria.

Moreover, the furniture made in Algeria is expensive compared with China. Retailers mentioned that the quality and finishing is better than Malaysian made furniture while designs of Chinese furniture which incorporate attractive colours, modern and innovative designs are appreciated by their buyers. Some large retailers in Algeria import previous year's stock of premium range of furniture from their European suppliers based in France, Italy, Spain and Germany to avail the huge discount offered and the extended credit facilities. The premium range is then sold to up-market clientele through retail outlets in Algiers, Constantine and Iran.

In Algeria, there is a big market for commercial plywood which is required by building contractors and factories producing kitchen cabinets, drawers, cupboards and wardrobes for residences as well as cabinets for offices. Malaysian plywood is much sought after due to its high quality and strength properties compared with China's. Algerian importers prefer to buy Malaysian and Indonesian plywood from Asian suppliers to supply to contractors for prestigious projects, wood working

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factories and other end-users.

Malaysian suppliers of BJC products are wooden floorings, doors and doorframes for high-end houses and villas as some doors are produced locally, using softwoods such as Pine and Beech. Most joinery workshops and mouldings products in Algeria such as doors, doorframes, windows, biddings, skirting are produced locally in accordance with customised designs and specifications. Imported timbers such as Beech and Swedish Pine are used for manufacturing doors and doorframes while carpentry units use whitewood extensively.

Generally door, flooring and window makers in Algeria produce small quantities for residential projects. The bulk of these mouldings and joinery products are imported from China, Spain, Italy, France, Portugal and Turkey. Solid timber doors of species such as Red Meranti and Nyatoh are imported from Malaysia and engineered wooden doors in veneer (Oak, Red Meranti, Nyatoh, Cherry, Maple) finishes are offered by a few Algerian

companies for retail sale and on project basis.

Doors and windows requirements in Algeria are mostly made from yellow Pine and Red Pine. There are many retailers selling locally produced but cheaper aluminium and PVC windows in apartments and offices. However, the local rich population is still using traditional windows with shutters in houses and villas. Solid wooden exterior doors and frames are mostly made from African hardwoods while interior doors are made of Yellow Pine and Red Pine or plywood flush doors. Some wooden doors are imported from Italy, Turkey, China and Malaysia for apartments and public housing projects. Engineered wooden doors made in a combination of solid wood and MDF are available from Spain, China and Turkey.

Wooden flooring is getting popular in Algeria due to its aesthetic look. However, solid wooden flooring is expensive and used in certain projects only such as in 5-star hotels, high-end apartments and villas.



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Malaysian Timber Industry Board
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Import Tariffs

Algeria's import duty on timber and timber products ranges from 5 – 30%. Details are as follows:

HS Code	Products	Duty (%)
4401	Fuel Wood	15
4402	Wood Charcoal	15
4403	Logs	5
4404	Hoop Wood	15
4405	Wood Wool and Wood Flour	15
4406	Sleepers	5
4407	Sawntimber	15
4408	Veneer	15
4409	Mouldings	15
4410	Chipboard/ Particleboard	15
4411	Fibreboard	15
4412	Plywood	15
4413	Densified Wood	15
4414	Wooden Frames	30
4415	Packing Cases	30
4416	Casks, Barrels, Vats and Tubs	30
4417	Tool Bodies and Handle	30
4418	Builders Joinery and Carpentry	30
4419	Tableware and Kitchenware	30
4420	Wood Marquetry	30
4421	Other Articles of Wood	30
940, 194, 029, 403	Wooden Furniture	15 - 30

Source: WTO

Prospects and Challenges

The Algerian construction industry will continue to expand in real terms over the forecast period (2016–2020), with investments in infrastructure construction, healthcare, the manufacturing industry, education facilities and housing projects. Forecast-period growth will also be driven by the country's five-year investment programme, 2015–2019, under which the government aims to develop

the country's road, rail and airport infrastructure.

Residential construction was the largest market in the Algerian construction industry during the review period, accounting for 40.6% of its total value in 2015. The market is expected to remain the largest over the forecast period, and will account for 41% of the industry's total value in 2020, driven by government policies to support social housing. Affordable housing projects and government plans to develop underprivileged areas will also support this growth. Government subsidies will also help low- and middle-income earners purchase houses.

The government's focus on providing affordable houses via social housing programmes is expected to drive the growth of the residential construction market over the forecast period. In 2015, the government launched a new five-year investment plan 2015–2019 worth DZD25.9 trillion (USD262.0 billion). Under this programme, the government aims to develop transport infrastructure, healthcare facilities, housing, education and energy infrastructure.

The government is investing in the construction of new commercial and cargo ports to address congestion. In 2015, it announced plans to build a new commercial port in Cherchell and Ténès by 2025, with an expected investment of DZD200.0 billion (USD2.0 billion).

This will create a continuing demand for wooden based products. Malaysian exporters should promote their superior products and arrange for bulk shipments of sawntimber, panel products and BJC besides the furniture which already has a noticeable presence in Algeria. Malaysian timber product suppliers should collaborate with importers, real estate developers, joinery workshops/factories and building contractors based in Algeria to supply their finished and semi-finished products thereby fulfilling the demand of various timber products. As such, Malaysian suppliers should explore methods for bulk shipment through a consortium of suppliers in order to take advantage of economies of scale.

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AGARWOOD - SUITABLE FOR PERFUME AND INCENSE



Agarwood grains

Introduction

Otherwise known as Aloes wood and Malacca eagle-wood, Agar wood (*Aquilaria malaccensis*) is a tropical small tree that grows up to 40 m high and spreads up to 12 m wide. It has a pale, thin and smooth trunk, silky young shoots, and leathery, long, sword-shaped leaves that are arranged alternately. Its white flowers are in clusters while its fruits are egg shaped and velvety. Edible parts are the seeds and bark. It is used to flavour curries.

Aquilaria malaccensis, like other species from the *Aquilaria* genus, is a major source of Agarwood resin that is used for perfume and incense. The resin is produced when the tree is infected by a parasitic fungus, *Phaeoacremonium parasitica*, in which it was used against cancer in Western, Chinese, and Indian medicine. Agarwood is used to relieve spasms and to lower fever.

In China, it is used as a sedative against abdominal complaints, asthma, colic and diarrhoea. It also is an aphrodisiac and carminative. The incense also functions as an insect repellent. The inner bark is used in making cloth, ropes, and writing materials while the timber of healthy trees is used for making boxes, in light construction and veneer.

The genus *Aquilaria* of the *Thymelaeaceae* (Daphne family) consists of generally fast-growing trees; which is found in lowland tropical forests. It occurs naturally in South and Southeast Asia, from the foothills of the Himalayas and northern India, including Myanmar, IndoChina (Lao PDR, Cambodia, Viet Nam), Thailand, Malaysia, the Philippines and Indonesia to Papua New Guinea.

Seedlings of most species establish best in shady, moist conditions, but large adult trees sometimes become emergent in the forest and can withstand the full sun. Some species can be found growing on steep, rocky, exposed slopes, and in regions

that experience a hot, dry season. Wherever they occur naturally, they provide an important source of livelihood for local communities who harvest the fragrant Agarwood to sell.

Uses

There are many names for the resinous, fragrant heartwood produced primarily by trees in the genus *Aquilaria*. The commoner names include Agarwood, Aloeswood, Eaglewood, gaharu or oudh. It is also mentioned classically as 'aloe' or 'ahaloth'. This valuable and highly fragrant wood has been used in many ways for over 2,000 years, especially as incense in religious ceremonies, most likely in Buddhist, Hindu, and Islamic traditional ceremonies, and as a significant component of traditional body therapy namely Ayurvedic, and Far Eastern medicine and Middle Eastern perfumes.



Checking resin creation by open wood between drilled hole.

The odour of Agarwood is complex and pleasing, with few or no similar natural analogues. In the perfume state, the scent is mainly distinguished by a combination of "oriental-woody" and "very soft fruity-floral" notes. The incense smoke is also characterised by a "sweet-balsamic" note and "shades of vanilla and musk". As a result, Agarwood and its essential oil have gained great cultural and religious significance in ancient civilisations around the world.

Although it may be possible to use healthy *Aquilaria* wood to make simple ornamental boxes, this wood is typically too light and fibrous to be suitable for furniture, construction or even carving. As with carvings, most Agarwood rosary and 'worry beads' offered for sale are fake, owing to the cost of shaping and drilling perfectly round beads of authentic Agarwood. Instead, other dark woods may be submerged in Agarwood oil for several

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CONCLUSION

The MALDI-TOF mass spectrometry illustrated and identified a series of PF, UF and PUF resins oligomers repeating units up to 1833 Da. Besides that, the solid state ^{13}C NMR interpretation indentified that the signal at 44-45 ppm and 54-55 ppm corresponding to methylene bridges were co-condensated in between phenol and urea in the PUF resin system. The ^{13}C NMR investigation showed that the synthesis process of PUF resin contained no free formaldehyde elements. Furthermore, the proportion of urea and methylolureas in the mixture to synthesize PUF resin were sufficient and incorporated well into the formulation by reacting with PF units to form co-condensed methylene bridges.

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The details research report has been published in *International Journal of Adhesion and Adhesives*. 

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Timber Species

weeks until the fragrance of Agarwood has been absorbed and these are then used in place of Agarwood. Despite its characteristics, Agarwood timber is not widely used for furniture; because this species focuses on the production of the fragrance resin, rather than furniture, as the price is higher than what it can get as furniture.

How the Agarwood Resin is Produced by the Tree

It has long been known that the production of the fragrant resin is associated with wounding and associated fungal invasion, possibly assisted by insects. As a response to the fungal infection, the tree produces a resin high in volatile organic compounds that aids in suppressing or retarding the growth of the fungus. Various fungi are associated with agarwood formation although it is still not completely clear which ones make the plant generate the resin.

While the unaffected wood of the tree is light in colour, the resin dramatically increases the mass and density of the affected wood, changing its colour to dark brown or black. In natural forests, only an estimated 7-10% of the trees are infected by the fungus (Ng et al., 1997). The major constituents of Agarwood oil are sesquiterpenes, which are difficult to synthesise artificially, and therefore there are presently no good substitutes for high quality Agarwood.

Markets and Prices of the Resin

The majority of Agarwood harvested is exported, with only relatively small quantities of agarwood being used locally, primarily for the production of incense. Muslims use Agarwood incense during important religious occasions, especially at gatherings. *Aquilaria malaccensis* is also used occasionally for medicinal purposes. The main forms of Agarwood for trade in Malaysia are wood sections, flakes, chips, incense and occasionally powder (Yaacob, 1999). Finished products such as perfume are also traded.

Chakrabarty et al. (1994) stated that the lowest grade of Malaysian Agarwood could be obtained for USD19/kg in the Middle East. The high grades, normally reserved for exclusive buyers, are said to cost up to USD9,589/kg. More expensive grades are also available and can sell for as much as USD27,400/kg. Meanwhile Ng et al. (1997) reported that, in 1991, South-East Asian countries exported approximately MYR48.3 million (approximately USD17.6 million) worth of Agarwood to Saudi Arabia, of which approximately 26% was sourced from Malaysia. Meanwhile in Kelantan, market values of Agarwood may reach to RM10,000 to RM12,000 (per kg) for Double Super Grade wood; essential oil may cost from RM19,000 to RM38,000 (per kg).

References:

- Donovan, D. and Puri, R. 2004. *Ecology and Society: Learning from Traditional Knowledge of Non-timber Forest Products: Penan Benalui and the Autecology of Aquilaria in Indonesian Borneo*.
- IUCN 2007. 2007 IUCN Red List of Threatened Species. IUCN, Gland, Switzerland. 



MTIB officials posing with Encik Kumar T. Balan from Procentric Sdn. Bhd. during a workshop to review MTIB's Strategic Planning on 3 February 2017 at MTIB, Kuala Lumpur.



Encik Maniyarasan Munusamy from Sime Darby (right) briefing YBhg. Dato' Dr. Jalaluddin Harun, MTIB Director-General and MTIB officials on the area coverage of Lembah Acob in Kapar, Klang during a visit on 14 February 2017.



MTIB's course on Wood Identification customised for TNB officials from 14 to 17 February 2017 at WISDEC Selangor in Banting.



YBhg. Dato' Dr. Jalaluddin Harun, MTIB Director-General (right) being interviewed by the host of Biz Malaysia, TV1, aired live on 22 February 2017. The topic discussed was on the Empowerment of Bumiputera SMEs in Furniture Industry.



YB Anyi Ngau, MTIB Chairman (centre) posing with MTIB Sabah officials during his visit to WISDEC Sabah in Kota Kinabalu on 28 February 2017.