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HIGHLIGHTS

PLANTED TIMBER- PROPERTIES, TECHNOLOGY AND OPPORTUNITIES

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FOREST PLANTATION PROGRAMME IN THE EARLY 80'S

Forest plantations have long been recognized as an essential part of the strategic development plan for the suitable management of forest resources in Malaysia. This strategy dates back to the beginning of the century when efforts were made to test out both indigenous and exotic species in the country. In early 80's, the Forestry Department of Peninsular Malaysia (JPSM) had embarked on planting general utility timbers under the 'Compensatory Plantation Project' covering 188,200 ha based on a 15-year rotation. Due to difficulty in procuring planting material, the majority of the areas were planted with mainly *Acacia mangium*. Unfortunately, its growth has remained below expectations, and many of the trees appeared to be susceptible to heart rot damage in some sites (Hashim et al. 1990), along with marginal performance for sawlog production (Weinland and Zuhaidi 1990).

ESTABLISHMENT OF INDUSTRIAL-DRIVEN FOREST PLANTATION

In 2005 the Ministry of Plantation Industries and Commodities (MPIC) established a large- scale forest plantations programme to alleviate the pressure on the country's natural forests. The target is to plant 25,000 ha of forest plantations per year for 15 years, or a total of 375,000 ha of forest plantations by 2020. Out of the nine selected species, two major species related are Rubberwood (Timber Latex Clone) and Acacia spp. (mangium /hybrid). Other additional fast growing timber species recommended are Tectona grandis (Teak); *Azadirachta excelsa* (Sentang); *Khaya* spp. (*Khaya ivorensis/Khaya senegalensis*), *Neolamarckia cadamba* (Kelempayan/Laran); *Paraserianthes falcataria* (Batai), *Octomeles sumatrana* (Binuang) and Bamboo (five selected commercial bamboo species). Figure 1 presents the description of these species.

PROPERTIES OF PLANTED TIMBERS

Generally, planted forests yield relatively more wood at lower cost than natural forest, the natural forest provides more valuable environmental services such as climate moderation and biodiversity. Nevertheless, the high growth rate and yield of planted forests were also offset by low wood quality and price, while manpower constraint was caused by high dependence on imported labour. While solid timbers from natural forests can be used for specialty products due to its special appearance, decorative value or technical specifications, planted timbers can be converted into laminated products, plywood or other engineered products such as laminated veneer lumber (LVL), cross laminated lumber (CLT) where appearance is of less importance. The choice of the products depends on the available technology, capital investment, logistics and the properties of the timbers. Table 1 compares some properties of planted timbers with other commercial timber species.

Figure 1. List of species and general information under the Forest Plantation Programme, MTIB. (extracted from JPSM, 2017).

Table 1. Comparative strength properties of planted timber

Species	Air-dry Density (kg/m³)	Static bending (MPa)		Compression // to grain (MPa)	Shear strength // to grain (MPa)
		MOE	MOR		
A.mangium[1,4]	260-580	12310	78.1	34.0	9.7
Rubberwood	400-750	9240	60	32.3	9.5
Sentang[5]	482-648	6770	60	31	
Khaya[3]	580-650	8700-10800	71-126	37-48	8-12
Teak[3]	610-750	8600-13400	85-106	43-72	8-15
Batai[1,3]	220-430	6890	48	26.5	6.5
Kelampayan[1] Laran[5]	370-465	7730	50	37	15
Binuang[4]	**270-465**	**6700**	**49**	**32**	**5.4**
		COMMERCIAL TIMBERS			
Pinus radiata[2,6]	500	10000	81	37	12
Yellow Poplar[7]	380	8340	38.6	38	5.5
E. pellita[3]	715	13000	63.2	-	-
Sesendok[1,3]	305-655	8530	39	20.8	5.4
Kedondong[1]	460-760	12100-12900	81	43.1-43.7	10.9-11.8

Source: [1] C.C. Lim et al. (2016); [2] NorOshiaee et al. (2014); [3] NorOshiaee et al. (2013); [4] Mateob (2019); [5] Balleres et al. (2008); [6] Moya' & F Munoz 2010; [7] Geem (1992)

▶ PROCESS TECHNOLOGY

Traditional processing approaches have not been either to accommodate small diameter logs or to create profitable production due to low product recovery. Hence alternative processing approaches are necessary to enable the efficient recovery of wood from this source in the form that is usable for high-value product manufacturing. For instance, the use of spindleless veneering technology was able to produce good quality and high yield veneers from small diameter logs compared to the traditional rotary peeled veneers. To ensure efficient use of planted timbers, the right technology to produce suitable and new products with acceptable global quality should be used (Figure 2). Technology can also shift the industry from labour-intensive sector to automated manufacturing. The industry players must align themselves to the external changes and must be ready to adopt new ways of doing business. The beneficiaries of timber from plantation forests will not only be the obvious downstream woodworking mills that produce indoor and outdoor furniture, but also mills that manufacture mouldings, doors and flooring, as well as, engineered wood products.

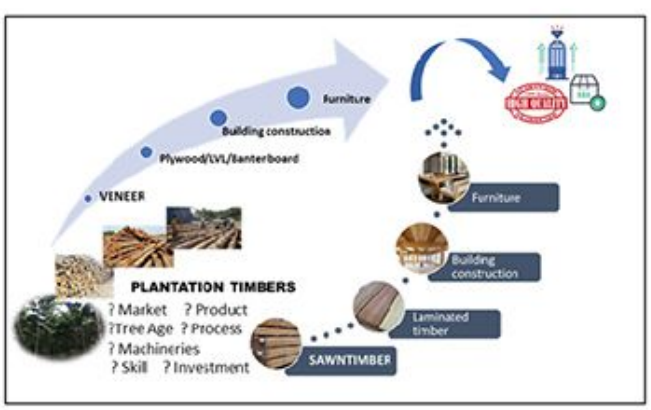

Figure 2. Product-Technological pathways for planted timbers

▶ OPPORTUNITIES

According to MTIB, Malaysia has over 4,000 mills comprising furniture, sawmills, mouldings, plywood, veneer, wood chip, kiln drying, builder's joinery carpentry and medium density fibreboard. About 83% of these mills are located in Peninsular Malaysia and 17% in both Sabah and Sarawak (MTIB, 2018) mainly using timbers from natural forest except for rubberwood, which is the major wood raw material for furniture, particleboard and medium density fibreboard. Conversely, the use of *A.mangium* in furniture is declining whilst both *Eucalyptus spp.* and batai are gaining interest from the local manufacturers particularly those of plywood and lamination sectors.

Investments on R&D in developing methods to use juvenile hardwood timbers, specifically for the eight plantation species under the Malaysian Forest Plantation programme is crucial to ensure maximum value can be benefited from the investment. Fundamental studies such as wood quality, strength, dimensional stability, sawing, drying, gluing and finishing of these timbers are of prime importance in providing guidelines for the industries when making decisions on the end product. Concurrently, investment should be made in identification of marketable opportunities for such products. At the same time, efforts towards 'zero waste' should be encouraged by converting the wood wastes into biorefinery and power generation.

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