

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Enhancing The Development Of Engineered Wood Products From Planted Timber Species In Sarawak.

Razak Wahab*, Mohamad Saiful Sulaiman, Rashidah Kamarulzaman, Nasihah Mokhtar, and Sofiyah Mohd Razali.

Centre of Excellence in Wood Engineered Products, University of Technology Sarawak (UTS), 96000 Sibul, Sarawak, Malaysia.

ABSTRACT

The Centre of Excellence in Wood Engineered Products (CeWEP) established in early 2017 aimed in making Sarawak the hub of the down-stream industry especially for the planted timber species. Wood engineered products generally produced by binding the strands, particles, fibres, veneers or boards of wood, together with adhesives to form composite materials. They are products precisely design with specifications and tested to meet national or international standards. Sarawak with land areas of 124,500 sq km, generated wood and timber products of more than 5 million metric tons since 2012 onward. These forest products catered mostly for the upstream industries such as sawn timbers, plywood, veneer, wood moulding, laminated boards, particleboards, MDF, woodchip, charcoal/briquette, laminated flooring and wood pellets. Advanced timber products have not been fully emphasized yet. It is high time for the Sarawak state to shift gear in the timber downstream industries focusing in wood engineered products from planted timber species. The state has for the past decade involved in timber plantation activities. Seven (7) timber species namely the *Acacia mangium*, *Azadirachta excelsa*, *Kyaya ivorensis*, *Neolamarckia cadamba*, *Octomeles sumatrana*, *Paraserianthes falcataria*, and *Tectona grandis* have been planted in various location in the state. With an area of 2.8 million ha of planted forest, the state is seriously intended to increase the production of the downstream timber industry which is equivalent to the existing industry in Peninsular Malaysia. Timber downstream industries, such as laminated/composited furniture & construction materials that generate high income, are expected to be actively produce in 2030. The CeWEP is still at an early stage of its establishment. The occurrence of the Covid-19, especially from 2020 to 2022, has slowdown the progress pace of the centre. As of now, CeWEP has managed to reach stage 2 in the ten years of strategic planning. The repercussion progress will somehow be made to ensure the planning is completed successfully in 2030. With efforts being currently made by those involved in the University of Technology Sarawak (UTS) and with close cooperation and support by other internal and external agencies/networking, the CeWEP will play an important in utilizing the planted timber species in generating income for the rural people and Sarawak state government.

Keywords: Forest plantation, enhancing wood down-stream industry, engineered wood products, Centre of Excellence Engineered Wood Products

<https://doi.org/10.33887/rjpbcs/2022.13.3.22>

*Corresponding author

INTRODUCTION

The government is encouraging the development of large-scale commercial forest plantations to relieve pressure on natural forests as a source of raw materials and ensure continued availability for the local timber industry. Following this policy, the Cabinet charged the Ministry of Plantation Industries and Commodities (MPIC) in March 2005 with implementing aggressive programmes to develop forest plantations in Malaysia [1].

Plantation forest is slowly becoming important to the timber-based industry worldwide. The supply chain of timber is still 80-90% of the natural forests [2]. The phenomenon is especially true, particularly in tropical regions. In Malaysia, the planted timber species focus on eight (8) species: *Acacia mangium*, *Azadirachta excelsa*, *Hevea brasiliensis*, *Kyaya ivorensis*, *Neolamarckia cadamba*, *Octomeles sumatrana*, *Paraserianthes falcataria*, and *Tectona grandis*. Some of these species have been planted since the early nineteen eighties. Species like *Acacia mangium* [3]; [4]; [5]; [6]; [7]; [8], *Hevea brasiliensis*, and *Tectona grandis* [9]; [10]; [11] have already been harvested for studies to compare their wood qualities to those harvested from the natural forests. Preliminary investigations suggest that since these timbers were harvested at a much lower age than those harvested from the forests, their quality possesses properties that were much less, especially in the physical and strengths [3]; [4]; [5]; [10]. However, the timbers are turned into laminated or composites forms to improve their properties [12]; [13]; [14]; [15]; [16]; [17]; [18]; [19].

The Ministry established Forest Plantation Development Sdn. Bhd. (FPDSB), which is now managed by the Malaysian Timber Industry Board (MTIB). The FPDSB oversees the distribution of government loans, the auditing of plantations, and the provision of technical assistance and training for the programme [2].

The University of Technology Sarawak (UTS) has embarked on a ten (10) year plan commencing from 2020 onwards to promote the utilization of the planted tropical timber species (Figure 1). By 2030, we expected the plan to succeed, especially the utilization of the planted timber species for house construction.

The Centre Of Excellence For Wood Engineered Products (CeWEP)

CeWEP was established and launched at UTS in late 2017. However, CeWEP was only officially established and promoted in 2020 as a catalyst to increase the participation and engagement of the local timber industry in producing and exporting more finished products rather than upstream products. Sarawak is one of Malaysia's states with abundant natural resources, notably wood. However, upstream products such as sawn timber, plywood, veneer, laminated boards, particleboards, and so on continue to dominate the wood product manufacturing industry [2]. The downstream industry of wood products, particularly furniture, which would bring more profit to the state, is still underdeveloped. The timber-based industry has been identified as one of the priority industries to be developed by the Sarawak Corridor of Renewable Energy (SCORE).

The CeWEP will focus not only on timber processing to produce high-quality engineered wood products but also on the most current specifications and design. The centre will concentrate on planted and lesser-known timber species and local wood species [2].

This CoE is currently collaborating with various agencies and organisations to achieve its goal and key performance indicator (KPI). Sarawak Timber Industry Corporation (STIDC), Sarawak Timber Association (STA), Forestry Research Institute of Malaysia (FRIM), Sarawak Forestry Department, Sarawak Forest Corporation (SFC), and the local wood industry are among those involved [2].

The Main Objectives Of The Centre

- To characterizing the potential of selected timber species planted in Sarawak as advanced wood engineered products.
- To developing advanced engineered wood products from local timber especially those seven (7) planted species.

- To produce engineered wood products from lesser-known timber species with low maturity age for advance construction and furniture products involving laminated and composite processing techniques.

Niche Areas

- Sustainable and renewable materials
- Biodiversity Management,

Short-Term KPI

- Non-Wood Veneer and Thermoplastic
- In-house development of engineered wood products.
- Acquiring new skills among members of CeWEP.
- As the leading research centre for wood based.
- Conduct training for local timber-based industry.

Long-Term KPI

- Increase the export of engineered wood products in the timber industry around Sarawak.
- Utilization of engineered wood products as one of the main building and construction materials.
- Increased the income for local communities and state government.

A Ten Years Of Strategy Planning (2020-2030)

- Training the members in the center of excellence and industry regarding the new products.
- Analysis or assessment in producing or utilizing:
 - i. New engineered products or
 - ii. New product design or new wood
- Laboratory works or field works about interest
- Introduction of new engineered products or product design or wood species through the exhibition.
- Getting feedback
- Evaluation of the new wood species or new wood products for their marketability and marketing



Figure 1: A ten (10) years of Strategy Planning for CeWEP from 2020 to 2030

RESEARCH

Some of the research that has been conducted and currently ongoing in the CeWEP are listed below.

- The Characterizations and their Effects on the Durability of Cultivated 10 and 15-year-old Teak (*Tectona grandis*) via the Heat Treatment Process [9]; [10]; [11].
- Thermoplastic wood composite from agriculture residues of Kenaf bast, *Elaeis guineensis*, Cassava bagasse and *Thermeda arguens* [12]; [15]; [16]; [17]; [18]; [19].
- Evaluation of Four Composts from Wood Waste of Planted Timber Species for Peat Substitution in Nursery Utilization.
- Wood Plastic Laminates from *Acacia mangium* Veneer and Thermoplastic Starch Sheet with Nanocellulose Fibril Filler.
- Bamboo and Gypsum Boards for Sound-Absorbing Application [20]; [21].
- The Parallel and Cross Laminated Boards as the main Construction Materials for Low and Medium Cost Houses from Cultivated Timber Species in Sarawak Assessment on Four Wood Waste of Planted Timber,
- Peat Substitution in Nursery,
- Plastic Laminated Panels (PLP) from Wood and starch Sheet,
- Hybrids of Acoustical Composites from *Bambusa vulgaris*
- Starch Sheet with Nanocellulose Fibril Substitute,
- Gypsum Board for Sound Absorption products.

CONCLUSION

The CeWEP is still at an early stage of its establishment. The occurrence of the Covid-19, especially from 2020 to 2022, has slowdown the progress pace of the centre. As of now, we have managed to reach stage 2 in the ten years of strategic planning. The repercussion progress will somehow be made to ensure the planning is completed successfully in 2030. With efforts being currently made by those involved in the University of Technology Sarawak (UTS) and with close cooperation and support by other internal and external agencies/networking, the CeWEP will play an important in utilizing the planted timber species in generating income for the rural people and Sarawak state government.

REFERENCES

- [1] Malaysian Timber Institute Board (MTIB). Wood Industry and forest plantation in Malaysia. <https://www.mtib.gov.my/industry/forest-plantation>.
- [2] R. Wahab (2019). Borneo Journal of Sciences and Technology 1 (1): 01-02. e-ISSN: 2672-7439.
- [3] M.S. Sulaiman, S.M. Razali, R. Wahab, T. Edin, N. Mokhtar, A.F. Ab Razak, and M.S. Abdullah (2022). International Journal of Mechanical Engineering (7). Special Issue 4, 2022. Pp. 218-226. Kalahari Journals.
- [4] R. Wahab, T. Edin, N. Mokhtar, M.S. Sulaiman, R.S.M. Ghani and M.H. Razak (2020). Chapter 5 in a Book "Recent Research Advances in Biology Vol. 4". DOI: 10.9734/bpi/rrab/v4. Book Publisher International. ISBN: 978-93-90516-91-9. eBook ISBN: 978-93-90516-92-6.
- [5] R. Wahab, R.S.M. Ghani, M.S. Sulaiman, T. Edin, N. Mokhtar and M.H. Razak. Chapter 7 in a Book "Cutting-edge Research in Agricultural Sciences 2020, Vol. 5". Pages 92-106. DOI: <https://doi.org/10.9734/bpi/cras/v5>. Book Publisher International. ISBN-13 (15) 978-93-90516-76-6.
- [6] R. Wahab, I.N.S.A. Mazalan, H.W. Samsi, M.S. Sulaiman, R.S.M. Ghani & N. Mokhtar (2020). Chapter in Prime Archives in Agricultural Research. 18 pages. Vide Leaf Publication 2020. ISBN: 978-81-944664-0-6.
- [7] R. Wahab, M.S. Sulaiman, H.W. Samsi, R.S.M. Ghani, and N. Mokhtar (2020). Asian Journal of Science and Technology 10 (12). ISSN: 0976 3376.
- [8] Izyan, K., R. Wahab, Mahmud, S., Othman, S., Affendy, H., Hanim, R.A. & Andy, R.M. International Journal of Chemistry 2010; 2 (1). Pp. 97-107. Feb. 2010. ISSN: 1916-9701. Canadian Center of Science and Education.
- [9] M.S. Sulaiman, R. Wahab, N. Mokhtar, T. Edin and S.M. Razali. Key Engineering Materials 2022, Vol. 908, pp 92-104.

- [10] N. Mokhtar, T. Edin, R. Wahab, R.S.M. Ghani, M.S. Sulaiman, M.H. Razak & S.M. Razali: A book chapter in "New Visions in Science and Technology" 2021. Vol. 1. Pp. 64-84. Book Publisher International. ISBN-13 (15) 978-93-90516-76-6.
- [11] M.S. Sulaiman, R. Wahab, N. Mokhtar, T. Edin, S.M. Razali and R.S.M. Ghani. Borneo Journal of Sciences and Technology 2021; 3 (2): 24-32. e-ISSN: 2672-7439.
- [12] R. Wahab, M.S.M. Rasat, N.M. Fauzi, H.W. Samsi, M.S. Sulaiman, N. Mokhtar, R.S.M. Ghani & M.H. Razak: A book chapter in the book *Elaeis guineensis* 2021. 32 pages. IntechOpen Publication. DOI: <http://dx.doi.org/10.5772/intechopen.98222>.
- [13] R. Wahab, N. Mohd Fauzi, N. Mokhtar, M.S. Sulaiman, R.S. Mohd Ghani, T. Edin. The Journal "Agriculture and Forestry" Časopis "Poljoprivreda i šumarstvo"2020; 66 (3): 53-64. ISSN 1800-9492 (Online) DOI: 10.17707/AgricultForest.
- [14] N. Mokhtar, R. Wahab, M.S. Sulaiman, R.S.M. Ghani & T. Edin. Borneo Journal of Sciences and Technology 2020; 2 (1): 41-47. e-ISSN: 2672-7439.
- [15] R. Wahab, M.S. Sulaiman R.S.M. Ghani, N. Mokhtar, S.M.M. Don and H.W. Samsi (2019). Properties of Composite Boards Properties from *Elaeis guineensis* Empty Fruit Bunch. Borneo Journal of Sciences and Technology 1 (1): 56-61. e-ISSN: 2672-7439.
- [16] R.S.M. Ghani, R. Wahab, N.M.C. Mustafa, N. Mokhtar & M.S. Sulaiman. Journal of Engineering and Science Research 2018; 2 (6):06-09. e-ISSN 2289-7127. ©RMP Publication. DOI: 10.26666/rmp.jesr.2017.2.1.
- [17] R.S.M. Ghani, R. Wahab, S.N.B. Azmi, K.M. Wi, N. Mokhtar, M.S. Sulaiman. Advanced Journal of Technical and Vocational Education 2019; 2 (2): 24-28, 2018 e-ISSN: 2550-2174 © RMP Publications, 2018 DOI: 10.26666/rmp.ajtve.2018.2.4
- [18] Izyan Khalid, Othman Sulaiman, Rokiah Hashim, R. Wahab, Nadiah Jumhuri & Mohd. Sukhairi Mat Rasat. Journal of Materials and Design 2015; 68: 24-28. DOI:10.1016 / j.matdes. 2014.12.007, Elsevier Science Direct UK
- [19] Mohd Sukhairi Mat Rasat, R. Wahab, Awang Mohd Yunus, Janshah Mokhtar, S.F.M. Ramle, Zulhisyam Abdul Kari & Mahani Yusof. Advances in Natural and Applied Sciences 2014; 7 (5): 572-582. ISSN 1995-0772.
- [20] M.S. Sulaiman, R. Wahab, R.S.M. Ghani, N. Mokhtar, S.F.M. Ramle, and S. Kahar. Research Journal of Pharmaceutical, Biological and Chemical Sciences 2019; 10 (5): 59-68. doi.org/10.33887/rjpbc/2019.10.4. 36. ISSN: 0975-8585. Doi.org/10.33887/rjpbc.
- [21] R. Wahab, Hashim W. Samsi, M.S. Sulaiman, R.S.M. Ghani and N. Mokhtar. Research Journal of Pharmaceutical, Biological and Chemical Sciences, 2019; 10 (4): 257-274. doi.org/10.33887/rjpbc/2019.10.4.36. ISSN: 0975-8585. Doi.org/10.33887/rjpbc.