

CURRENT STATUS, CHALLENGES AND OPPORTUNITY OF FOREST PLANTATION

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CURRENT STATUS, CHALLENGES



FOREST PLANTATIONS

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REPLANTING SABAH'S FOREST FOR **FUTURE GENERATIONS**



A RENEWABLE FUTURE

"THE REPLACEMENT AND SUBSTITUTION OF TROPICAL TIMBER THROUGH ITP CAN AND WILL RESULT IN GREATER CONSERVANCY, SUSTAINABILITY AND RENEWABILITY OF OUR FOREST RESOURCES. THIS IS JAWALA'S MISSION" – Rahman Khan, Group CEO

TABLE OF CONTENT:

Executive Summary -----	1 - 2
1. World Wood Demand -----	3
1.1 Malaysia's Timber Sector -----	3 - 4
1.2 Sabah Timber's Industry -----	5 - 6
1.3 Sabah's FMUs and ITP -----	6 - 7
2. JPISB at Part of FMU 14 -----	7 - 8
2.1 Environmental Social & Governance (ESG) -----	8 - 9
2.2 Research & Development -----	9 - 10
2.3 Laran & Albizia Trial Harvest -----	10 - 12
3. ITP Economics -----	12 - 15
3.1 Conclusion on ITP Economics -----	15 - 16
3.2 Size & Scale -----	16
4. Investments in ITP Processing -----	16 - 17
4.1 Potential Investments in ITP Processing -----	17 - 19
5. Regional ITP Development -----	20
6. Potentials of ITP in Sabah -----	20 - 21
7. Palm Oil & ITP -----	21 - 22
8. Benefits & Advantages of ITP -----	22
9. Conclusion -----	23
10. Sources -----	24

Executive Summary

The Sabah Action Plan on Forest Plantation or Industrial Tree Plantations (ITP) Development was launched back in the year 2022. An annual planting target of 40,000 hectares per year over a period of ten years with a total development of 400,000 hectares. The yearly production was targeted to produce 6 to 8 million cubic metres per annum of fast - growing trees from a variety of species. This translates to an average yield of between 150 to 200 cubic metres per hectare over a growing period of ten years. The action plan was launched to supplement the dwindling tropical timber production. The action plan is timely where the plan outlines environmental issues such as reducing pressure on our natural forest, social economic well-being, creation of employment, value addition and a new source of export earnings that is sustainable.

The ITP project was introduced and included in the Sustainable Forest Management License Agreement (SFMLA) signed by existing and new Forest Management Units (FMU) licensees back in the year 1997. However, twenty-six years later, in the year 2023, ITP log production from the FMUs was a measly volume of only 39,552 cubic metres for the year 2023. The total production of ITP logs was from 498 hectares giving an average yield of only 79 cubic metres per hectare. The harvest came from trees aged twelve years and above. This is worrying and a cause for serious concern. The commercial viability of current ITPs within the FMUs requires urgent attention and immediate engagement with ITP FMU licensees is critical to assist them to get back on track.

The 2023 annual report of Sabah Forestry Department had stated that to date, 177,000 hectares have been developed. It is critical and imperative to re-look at this mismatch in the production to planted figures urgently to determine whether previous planting system or practices known as "Mosaic" has produced the desired results. It is imperative to identify causes of the mismatch as this will impede not only the growth and development of Sabah's timber industry but also the economic well-being of the communities in the interiors.

Sabah, at its peak, was producing between 11 to 18 million cubic metres of wood annually. Known for its high quality timber, the industry has been reduced to only producing 800,000 cubic metres of tropical logs in 2023 producing only 40 % of Sabah's wood processing installed capacity. Log export is still allowed at 20 % of total log production leaving only 80 % for domestic processing. It is evident that the purpose, objective and implementation of the SFMLA in sustaining the wood industry did not achieve the desired results. The ITP project is supposed to be in its third rotation with annual production of 6 to 8 million cubic metres per year since 2008.

The wood industry is a global commodity where producers from different nations compete aggressively. Vietnam is a proven model for ITP where it was once importing ITP logs from Sabah just only twenty-five years ago. Today, Vietnam is a global powerhouse for timber production where 75 % or 30 million cubic metres of its log supply comes from ITP. It has successfully developed close to 4.1 million hectares of ITP plantation.

The ITP project is very capital and labour intensive. It also has a long gestation period ranging from eight to fifteen years. It requires attaining economies of scale where land size, volume ensures continuity without any gap periods. Gap periods will result in retrenchments and most importantly loss of skills where livelihoods of rural communities will be impacted. Meticulous financial planning is of paramount importance, requiring detailed planning of ground resources and development of infrastructure to ensure efficiency providing optimal yields. Sourcing of financing schemes at feasible interest rates can be challenging. The economic assumptions in this paper had shown that land size, volume and shorter gestation is critical to the viability of this project.

Jawala Plantation Industries Sdn Bhd (JPISB) a subsidiary company of Jawala Inc (JI), a company listed on the Singapore Exchange (SGX) specialising on sustainable forest management with focus on ITP, currently manages part of FMU 14 in Sapulut. JPISB has to date developed 4,000 hectares of ITP with 1.6 million trees planted since 2018. Its trial harvest back in September 2023 from its industrial planting compartment had resulted in a yield of 210 m³ per hectare for Albizia and 135 m³ per hectare of Laran at 5 years old averaging 171 m³ per hectare.

JPISB is of the opinion that the ITP project in Sabah is viable and can be a game changer for the timber industry and is of the view that it is not too late to turn the tide to make this project into a success. There are also opportunities and low hanging fruits in the Government's quest to eradicate poverty and this can be achieved through ITP. The JPISB experience has proven that local communities have the necessary skills to uplift their socio- economic status. However, the necessary scale is required to avoid gap periods which can and will result in retrenchments.



*High Conservation Value (HCV) area Compartment 30 at Jawala
Laran plantation at Compartment 32 in the background*

1. World Wood Demand

The Food and Agriculture Organisation (FAO) of the United Nations (UN) had prepared a report entitled "Global Forest Sector Outlook : Assessing future demand and sources of timber for a sustainable economy". The paper was prepared for the State of the World's Forests in 2022. It was forecasted that the global consumption for primary processed wood will reach 3.1 billion m³ of roundwood equivalents (RWE). This is an increase of 37 % compared to the global consumption of the year 2022 of 2.3 billion m³. The current crisis will also require additional demand for wood products to substitute non-renewable materials with mass timber in construction and natural fibres replacing man-made fibres. This additional demand amounts to 272 million m³.

The demand for industrial roundwood (IRW) is expected to reach between 2.5 to 2.9 billion m³ where IRW is seen as the most viable alternative to non-renewable material substitution. According to the FAO report additional 33 to 40 million hectares of forest plantation is needed to supply this demand to the current planted area of 290 million hectares. Immediate and urgent attention must be given to this requirement failing which the utilisation of non-renewable materials will continue causing serious repercussions to achieving our net zero targets.

The fossil-fuel based energy sector is one of the major contributors to greenhouse gas emissions. Wood is a viable alternative for substitution and is already being utilised for power generation. The report indicated a projected consumption of between 2.1 to 2.7 billion m³ in the year 2050. Malaysia's energy transition plans had somehow missed or overlook the importance of ITP for its plan. The utilisation of ITP wood can expedite the transition plan where shorter gestation can be achieved for the production of wood pallets for energy.

It is highly and strongly recommended that Sabah take immediate steps to capitalise on this huge potential. Sabah's geographical location and favourable climate providing shorter rotations versus temperate climate forest, gives it strong advantages to be a major producer.

1.1. Malaysia's Timber Sector

Malaysia has done exceptionally well in the global timber sector. It is currently one of the major world producers of wooden furniture. Interestingly, its wooden furniture is mainly produced from rubber wood, one of the ITP species. The wooden furniture exports generated RM 11.1 billion in the year 2022.

The total timber trade generated was RM 31.4 billion for the year 2022 with total exports valued at RM 23.3 billion. The trade balance was RM 15 billion in Malaysia's favour. According to Malaysia Timber Industry Board (MTIB) a total of 8 million m³ was processed in Malaysia. This translates to a wood value of RM 3,925 per m³ and export value of RM 2,913 per m³. The sector currently employs 250,000 workers

The imports statistics showed slight concern especially in plywood where the trade balance is the narrowest amongst other wood products. The importation of plywood was valued at RM 2.4 billion with Indonesia, Vietnam and China being the top three producers. These plywood imports were made mostly from ITP timber. The utilisation of ITP material in plywood manufacturing by these three countries has far superseded Malaysia in terms of competitiveness. Sabah in particular still has its advantages to reposition itself as a competitive producer of wood products via ITP.

The Malaysian Timber Council (MTC) had projected a wood demand of 15 million cubic metres by the year 2030. Malaysia's current log output is only between 6 to 7 million m³, a shortfall of 54 %. The importation of wood will result in the outflow of the Malaysian Ringgit and with global

uncertainties focus should be given to sourcing for domestic supply. For quick ease of reference, only 100,000 hectares per year and a total development of 1 million hectares over ten years is needed to meet this demand. It would require a total harvest of 500,000 hectares of natural forest or 12.5 million hectares over a rotation of 25 years to sustain this demand.

Table 1. Malaysia's Timber Trade

	2022 (RM)	2023 (RM)
Total trade	31,400	26,600
Exports	23,300	19,800
Imports	8,100	6,800
Trade Balance	15,100	13,000

Table 2. Malaysia's Timber Exports & Imports

Exports	2022 (RM million)	2023 (RM million)
Furniture	11,100	9,100
Plywood	3,300	2,500
Sawn timber	2,700	2,300
Fibreboard	939.3	820.2
BJC	1,400	1,300

Imports	2022 (RM million)	2023 (RM million)
Furniture	2,200	1,600
Plywood & Veneer	2,400	2,200
Sawntimber	908.1	724.7
Panelboards	547.1	639.7
BJC	195.5	205.3
Mouldings	166.4	143.3
Other	2,200	1,900

1.2 Sabah's Timber Industry

Sabah was from the 1960s to the 1990s the biggest producer and exporter of tropical logs. The production peaked at 18 million cubic metres per annum. There was a short stint of the permanent log export ban from 1993 to 1997 where wood manufacturers from Japan, Taiwan and South Korea had relocated their factories to Sabah. This can be considered the golden years of Sabah's timber industry where only processed wood products were exported. Timber mills peaked at 465 factories which are now down to only 163 mills employing 6,894 individuals of which approximately 50 % are Malaysians.

In the year 2023 Sabah only produced 816,287 m³ of tropical logs and 193,310 m³ of plantation logs for a total of 1,009,598 m³ of logs. Only 39,552 m³ of plantation logs came from the FMUs and the balance coming from Sabah Softwoods Berhad. Lembaga Industri Getah Sabah and wild or natural Acacia Mangium considered as plantation logs. Sabah's current wood processing installed capacity is at 2 million m³. The allowance of 20 % tropical and 100 % plantation log exports, leaves only 858,690 m³ of logs or 85 % for domestic processing leaving mills running at below 50 % capacity.

Table 3. Sabah Log Production 2023

Natural logs (m ³)	Plantation logs (m ³)	Total (m ³)
816,287	193,310	1,009,597

The wood processing industry in Sabah is shrinking every year due to bad market conditions and shortage of supply due to operating below capacity. As of October 2024, two major plywood producers have ceased operations and another plywood mill in the process of closing down.

Table 4. Sabah Wood Products Exports 2023

Products	Volume (m ³)	Value (RM)
Sawn timber	108,539	273,302,737
Plywood	263,122	572,188,322
Veneer	22,101	34,228,930
Moulding	10,058	36,557,647
Others	405,843	140,359,604
Total	NA	1,056,639,263

The log conversion to product value translated to only RM 1,046 per m³ in comparison to the national average of RM 3,925 per m³, a difference of 3.75 times. It can be seen that the only downstream products produced are mouldings and the rest are primary and secondary products of minimal value. The recovery rate from logs to products are low at 40 %. There are little to no production of Building/Joinery & Carpentry (BJC) products and furniture in great volumes. The 2023

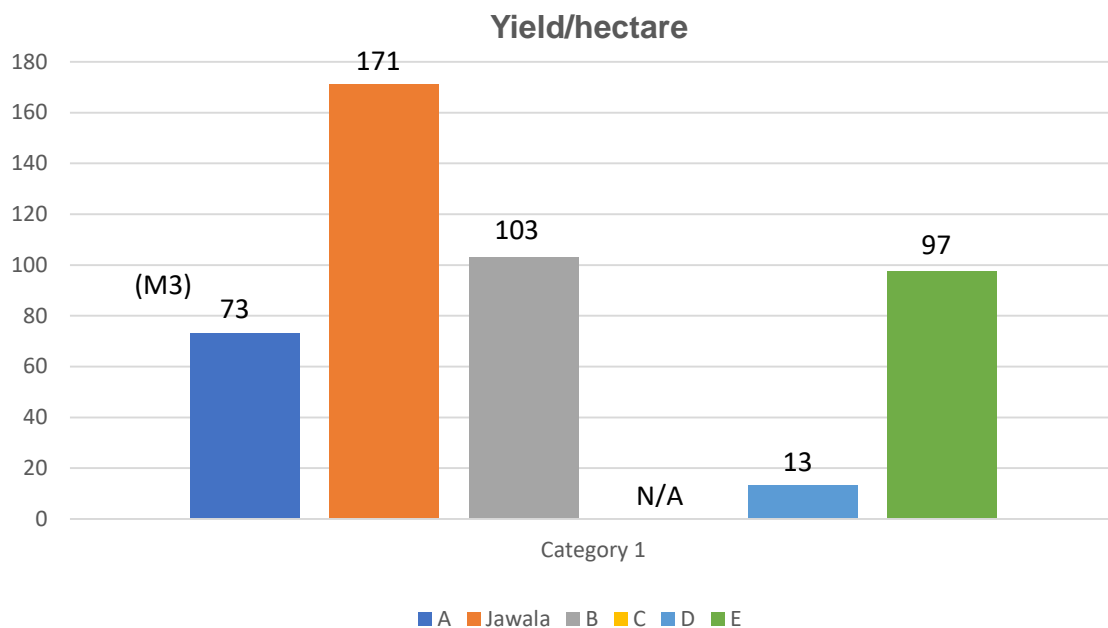
timber trade value contributed to only 1.1 % to Sabah’s GDP of RM 81.9 billion. There needs to be a concerted effort to revive this ailing industry where the solution which is ITP and land which is readily available is facing issues which can be difficult to resolve but not impossible.

1.3 Sabah’s FMUs & ITP

The SFMLA which was introduced back in the year 1997 covered an area of 2 million hectares. There were 600,000 hectares within the SFMLA set aside for ITP development. However, taking the gross to net planting area, 400,000 hectares were suitable for planting. To date 177,000 hectares have been planted giving an annual planting rate of 7,080 hectares per year over the last 25 years. There were various species selected such as Rubber, Laran, Albizia, Acacia Mangium, Binuang and Eucalyptus Pellita. The “Mosaic” system was applied where salvage logging ITP compartments were conducted and only a portion of the compartments were planted, ranging from 30 to 50 %.

In the year 2023, according to the annual report of the SFD, only 498 hectares of plantation timber were harvested producing 39,552 m3 of plantation logs. This translates to a yield of only 79 m3 per hectare from trees ranging from 12 to 15 years. The annual planting rate of 7,080 hectares should have produced 562,306 m3 of plantation logs even with the mosaic system. A full-fledged industrial planting could have produced between 1,062,000 m3 to 1,416,000 m3 of logs.

Table 5. ITP Harvesting Yield



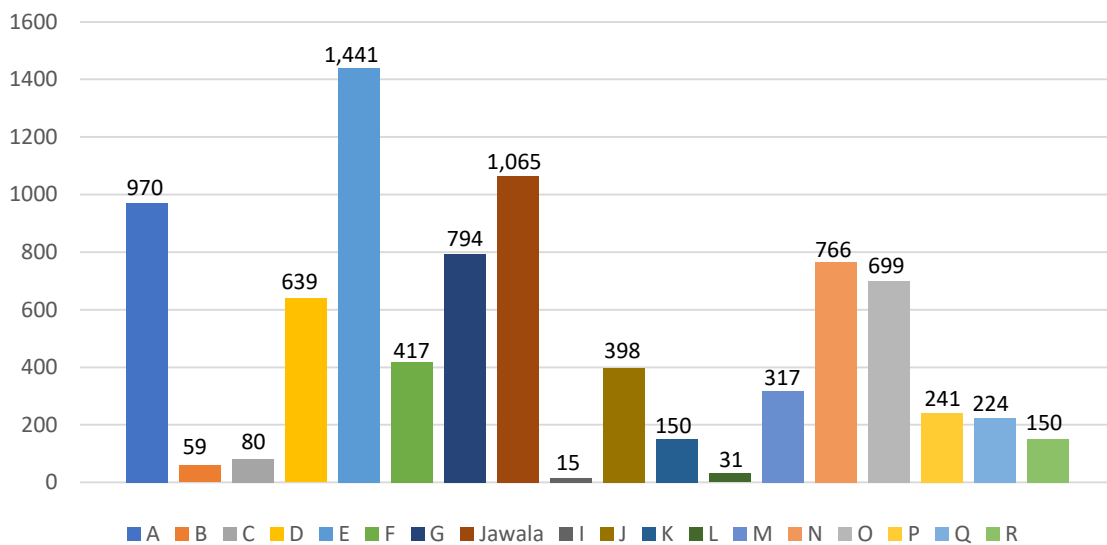
- *Jawala trees harvested at 5 years old whereas others known to be 10 to 15 years old*

Table 6. ITP Area Harvested

	FMUs	Sabah Softwood	LIGS	Alienated land YS	Total
Hectarage	498	812	NA	NA	1,310
Volume (m3)	39,552	79,119	10,157	64,483	193,311

An area of only 8,457 hectares were developed in the year 2023, far below the initial target of 40,000 hectares and revised target of 27,000 hectares. The targets in the Action Plan on Forest Plantation are likely to remain wishful. It is unclear if the planting system has changed or the mosaic system remains as per their Forest Management Plan (FMP).

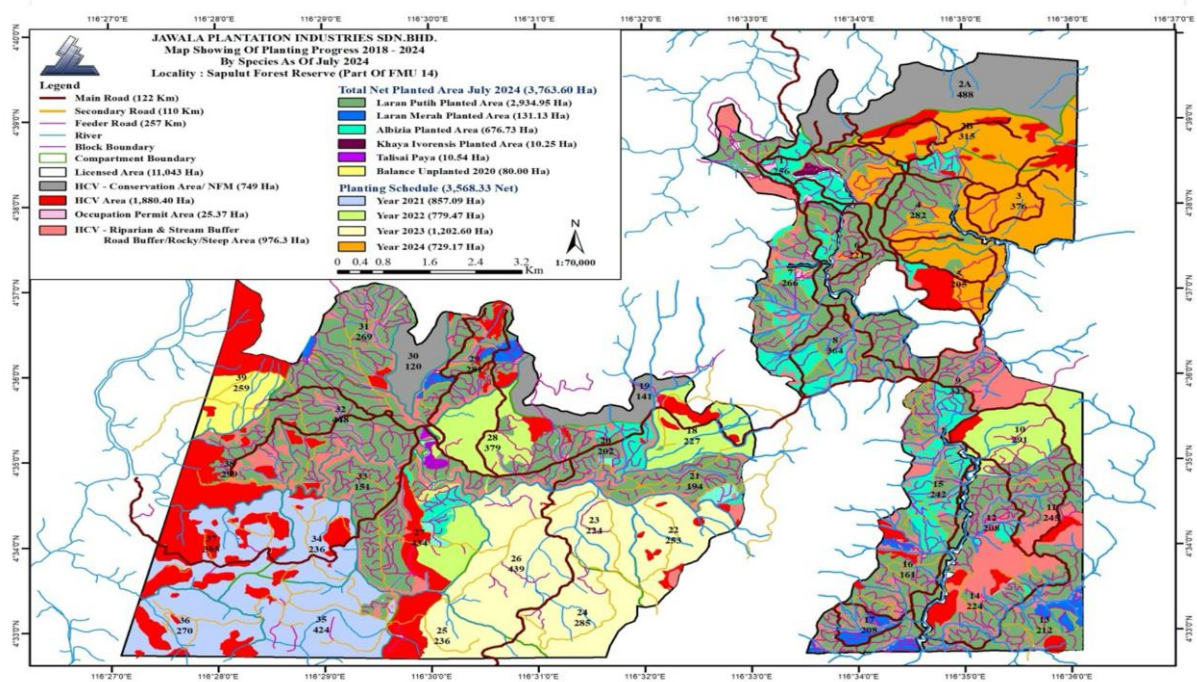
Table 7. Planting Rate in Hectares 2023



2. JPISB at part of FMU 14

JPISB had signed the SFMLA back in the year 2025. The concession measuring 11,043 hectares is situated at Sapulut. Salvage logging operations commenced in 2016 and planting operations commenced on April 2018. A High Conservation Value assessment of the area was conducted and through its findings, an area measuring 3,375 hectares or 31 % was set aside for HCV. A balance of 7,668 hectares is left for ITP development. To date, 4,000 hectares have been developed with 1.6 million seedlings consisting of White Laran, Red Laran, Albizia and Khaya Ivorensis planted. The White Laran is the most dominant species with 78 % of total planted seedlings. A total of 440 kilometres of main, secondary and feeder roads have been developed and a nursery with capacity of 100,000 to 150,000 seedlings per month. A hostel for use by Universiti Malaysia Sabah (UMS) has also been built with the capacity to house twenty students. A dry lab and a library will be constructed in the near future.

Table 8. Map of JPISB



2.1 Environmental Social & Governance (ESG)

JPISB is an ESG compliant company, reporting its ESG initiatives on a yearly basis to the SGX and the public. Its sustainability reporting is audited by internal auditors from Malaysia and Singapore. Its reporting standards is in accordance to Global Reporting Initiatives (GRI). As part of its environmental initiatives, 31 % of its concession area has been set aside for HCV, the highest among FMU licensees by proportion of land. JPISB is committed to the use of renewable energy where electricity is fully powered by its J8K solar panels. Its electrical usage and emissions are audited by internal auditors. JPISB has its sustainability policy and committee in place chaired by its CEO.

On the social front, JPISB has made it a priority to provide job opportunities to communities in Sapulut and also Sabahans. The maintenance of roads to villages, schools and houses of worship are provided with repairs and cash assistance. JPISB had initiated its internal “Out of the B40” programme for its workers where workers are incentivised via productivity. The average salary of our husband and wife employee is at RM 4,100 per month. Workers are provided with trainings to upgrade their knowledge and skills.

JPISB has set in place Standard Operating Procedures (SOP) and policies guiding its governance. It is an Anti-Bribery Anti-Corruption (ABAC) compliant company with a strong whistle blowing policy in place. Our governance targets and achievements are audited and reported on a yearly basis.

Table 9. JPISB “Out of B40” Programme

SENARAI PENDAPATAN PEKERJA NURSERY JPISB (SUAMI DAN ISTERI) - MEI 2024

	NAMA ISTERI	NAMA SUAMI	TOTAL (RM)
PASANGAN 1	JESSEYKA AMPALUS	AJISNO JOIL	
	NURSERY SUPERVISOR	BUILDING & MAINTENANCE SUPERVISOR	
JUMLAH GAJI (RM):	2,410.00	2,000.00	4,410.00

	NAMA ISTERI	NAMA SUAMI	TOTAL (RM)
PASANGAN 2	REZI BINTI MOKIN@MOKSIN	HASMADIE PILIN	
	NURSERY GENERAL WORKER	FIELD CONDUCTOR (BELIAR)	
JUMLAH GAJI (RM):	2,126.46	2,000.00	4,126.46

	NAMA ISTERI	NAMA SUAMI	TOTAL (RM)
PASANGAN 3	JINAJIAH JOIL	RICHARO BIN OKON	
	NURSERY GENERAL WORKER	GENERAL WORKER	
JUMLAH GAJI (RM):	2,259.15	1,788.39	4,047.54

	NAMA ISTERI	NAMA SUAMI	TOTAL (RM)
PASANGAN 4	ROGENA MALAPI	ROME ANGKASANG	
	NURSERY GENERAL WORKER	CENSUS IN-CHARGE	
JUMLAH GAJI (RM):	1,846.08	2,192.22	4,038.30

	NAMA ISTERI	NAMA SUAMI	TOTAL (RM)
PASANGAN 5	RISAH BINTI ANTIR	ANANG LUMBUR	
	NURSERY GENERAL WORKER	NURSERY GENERAL WORKER	
JUMLAH GAJI (RM):	1,977.08	1,800.00	3,777.08

	NAMA ISTERI	NAMA SUAMI	TOTAL (RM)
PASANGAN 6	SONIA OKON	DUDUWIN SOKON	
	NURSERY GENERAL WORKER	ELECTRICAL IN - CHARGE	
JUMLAH GAJI (RM):	1,759.55	3,000.00	4,759.55

	NAMA ISTERI	NAMA SUAMI	TOTAL (RM)
PASANGAN 7	NAUH BINTI ANSAKOI	YUNSUN BIN ABOH	
	NURSERY GENERAL WORKER	SECURITY GUARD	
JUMLAH GAJI (RM):	2,012.43	2,480.67	4,493.10

	NAMA ISTERI	NAMA SUAMI	TOTAL (RM)
PASANGAN 8	JENITA BINTI AMPARANG	MATIUS ANGKASANG	
	NURSERY GENERAL WORKER	SECURITY GUARD	
JUMLAH GAJI (RM):	1,557.63	1,961.46	3,519.09

	NAMA ISTERI	NAMA SUAMI	TOTAL (RM)
PASANGAN 9	JENNILI JEREMAS	ROLLIE ANDAMI	
	NURSERY GENERAL WORKER	STORE CLERK	
JUMLAH GAJI (RM):	1,908.77	2,000.00	3,908.77

	NAMA ISTERI	NAMA SUAMI	TOTAL (RM)
PASANGAN 10	RUSTINAH YAPING	AJUMAN SIMON	
	NURSERY GENERAL WORKER	FIELD CONDUCTOR (SALUNG)	
JUMLAH GAJI (RM):	1,846.08	2,260.00	4,106.08

2.2 Research & Development

Research and Development (R&D) is at the heart of our project. The Jawala-UMS Forestry Living Lab was launched back in January 2023. It is the first forestry lab of its kind in Malaysia. The project is fully funded by JPISB. The collaboration with UMS covers five areas :

1. Nursery research, operations and techniques
2. Growth and yield performance
3. Management of HCV areas
4. Community development
5. Student industrial placement

The other research institutions collaborating with JPISB are the Kyoto University and Sweden University of Agricultural Sciences. The research covers the genetics of Laran and wildlife corridors and carbon related projects.

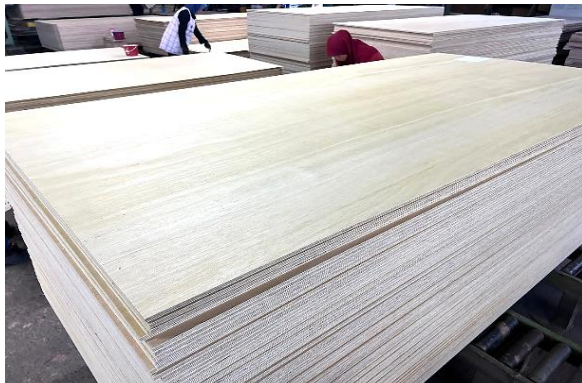


Dr. Ulrich & team of SLU



Professor Kitayama of Kyoto University

JPIB also conducts R&D with its customers on product development of planted Laran and Albizia since the year 2020. To date several products such as Laminated Veneer Lumber (LVL), combi plywood, thick and thin panels, door jambs and floorings. The products were tested and verified by research institutions and in accordance to various standards such as Japan Agricultural Standards (JAS).



ITP Laran Plywood



ITP Laran LVL Door Jamb

2.3 Laran & Albizia Trial Harvest

JPIB had conducted its first trial harvest of Laran and Albizia from its industrial planting compartment back in September 2023. The trees were five years old but had already attained merchantable size and height. Both Laran and Albizia attained impressive gross standing volume of 155 m³ per hectare and 276 m³ per hectare respectively. The final merchantable volume was Laran at 132 m³ per hectare and Albizia at 211 m³ per hectare respectively. The harvesting trials were conducted in collaboration with Integrated Wood Processing Sdn Bhd (IWP), UMS and Universiti Putra Malaysia (UPM). The collaboration was to test the economics, product development, quality, properties and strength of wood.



Albizia



Laran

Species	Gross Volume/HA	Net Merchantable Volume/HA
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Table 10. Data of Trial Harvest

Albizia		273.16 m ³	210.55 m ³ (77%)
Diameter Class	No. of logs	m ³	%
50 cm & up	0	0	0
40 cm – 49 cm	9	5.98	2.84
<i>* 371 trees per HA with average volume of 0.74 m³ per tree</i>			
30 cm – 39 cm	78	49.54	23.53
<i>* 270 trees per HA with average volume of 0.58 m³ per tree</i>			
20 cm – 29 cm	326	137.80	65.45
10 cm – 19 cm	80	17.23	8.18
Total	493	210.50	100

Table 10.1. Data on Albizia Diameter Class

**Albizia net average volume per log is 0.43 m³*

Table 10.2. Data on Laran Diameter Class

Diameter Class	No. of logs	m ³	%
50 cm & up	0	0	0
40 cm – 49 cm	2	2.27	1.72
30 cm – 39 cm	6	6.68	5.07
20 cm – 29 cm	206	108.25	82.19
10 cm – 19 cm	67	14.50	11.01
Total	281	131.70	100

**Laran net average volume per log is 0.47 m³*

The above trial harvest gave an impressive average yield of 171 m³ per hectare at 5 years old. The above yield will demonstrate the feasibility of this project and various sensitivity such as price, gestation and volume will be tested in the economic assumptions later in this paper.

Table 10.3. Current Growing Stock at JPISB

Age	Species	Volume/ha (m3)	Mean Annual Increment MAI m3/ha
4	Albizia	249.72	62.43
	White Laran	106.04	26.51
	Red Laran	49.20	12.3
5	Albizia	242.60	48.52
	White Laran	139.38	27.88
	Red Laran	-	-
6	Albizia	201.95	33.66
	White Laran	136.35	22.73
	Red Laran	-	-

The above table is a yearly data collected for evaluation of JPISB's growing stock of its biological asset which is evaluated by an independent forester, independent valuer and verified by external auditors. The volume is based on gross standing volume of the trees. The growing stock has displayed impressive growth on course for a profitable harvest barring any unforeseen circumstances.

3. ITP Economics

The development of ITP is very time consuming, labour intensive and a capital-intensive business. Gestation periods range from between five to fifteen years depending on application and species. Growth is determined by specific site, soil and rainfall conditions. A detailed and meticulous planning is required to forecast expected outcomes which will vary from compartments to compartments due to soil and rainfall conditions from one particular area to another. Financing ITP also requires equally meticulous planning where loans or capital required is scarce for such long gestation projects.

The Sabah Forestry Department (SFD) only allows development of ITP on degraded forest. This is environmentally a good policy but the constraints are poor timber stands that can be salvaged to part finance the development of the ITP. JPISB is grateful that SFD allows companies developing ITP to market the salvaged logs for ITP development. This is a very welcoming incentive. It currently cost RM 20,000 per hectare for ITP development over ten years. Currently, the only attractive financing scheme is from the Forest Plantation Development Sdn Bhd (FPD), a wholly owned subsidiary of Malaysian Timber Industry Board (MTIB). The previous interest rate was at 3 % per annum but to date has been increased to 5 % per annum. However, its scheme only finances between RM 6,000 to RM 8,000 per hectare which at today's cost only finances between 30 to 40 % of the total

development cost. According to FPD the current development cost has increased to between RM 22,000 to RM 25,000 per hectare. On a downturn market trend, the salvage logging proceeds finances zero to 5 % of the planting cost. The balance of between RM 12,000 to RM 14,000 per hectare is required to be injected by the company and on market downturn, between RM 16,000 to RM 20,000 per hectare is required to borne by the company.

JPI SB finances its ITP project through three sources. The proceeds or profit after tax (PAT) from the salvage logging operations and soft loan from FPD covers 60 % of the development cost. 7 Page 12 of 40 % is raised through the equity market due to Jawala Inc’s listed status at SGX. However, as mentioned, a downturn on the timber market will cause serious constraints to development plans where delay in yearly planting targets or zero planting can have serious consequences in the future.

Cost per hectare	18,000 (60,000)	20,000 (60,000)	22,000 (60,000)
Development & Maintenance	90 (18,000)	100 (20,000)	110 (22,000)
Harvesting & Hauling	80 (16,000)	80 (16,000)	80 (16,000)
Royalty	15 (3,000)	15 (3,000)	15 (3,000)
Total (Direct cost)	185 (37,000)	195 (39,000)	205 (41,000)
Admin	40 (8,000)	40 (8,000)	40 (8,000)

This will result in higher production cost or zero revenue with a heavy carry cost.

Table 11. Economic Assumptions (Development Cost Variance Sensitivity)

Finance Cost	20 (4,000)	20 (4,000)	20 (4,000)
Total cost	245 (49,000)	255 (51,000)	265 (53,000)
Profit Before Tax	55 (11,000)	45 (9,000)	35 (7,000)
1,000 hectares	11,000,000	9,000,000	7,000,000

* Cost per m3 (hectare)

* Yield at 200 m3 per hectare at 10 years

* Harvesting rate of 1,000 hectares per year

* Financing of RM 8,000 per hectare at 5 % per annum

* Log price at RM 300 per m3 ex-stumping

* Administrative cost at RM 8 million per year as per JPISB

Table 11.1. Economic Assumptions (Log Price Sensitivity)

Log price (RM)	240 (48,000)	260 (52,000)	280 (56,000)	300 (60,000)
Development & Maintenance	100 (20,000)	100 (20,000)	100 (20,000)	100 (20,000)
Harvesting & Hauling	80 (16,000)	80 (16,000)	80 (16,000)	80 (16,000)
Royalty	15 (3,000)	15 (3,000)	15 (3,000)	15 (3,000)
Total (Direct cost)	195 (39,000)	195 (39,000)	195 (39,000)	195 (39,000)
Admin	40 (8,000)	40 (8,000)	40 (8,000)	40 (8,000)
Finance Cost	20 (4,000)	20 (4,000)	20 (4,000)	20 (4,000)
Total cost	255 (51,000)	255 (51,000)	255 (51,000)	255 (51,000)
Profit Before Tax	15 (3,000)	5 (1,000)	25 (5,000)	45 (9,000)
1,000 hectares	(3,000,000)	1,000,000	5,000,000	9,000,000

Table 11.2. Economic Assumptions (Yield Sensitivity)

Yield (m3)	120 (36,000)	160 (48,000)	200 (60,000)	240 (72,000)
Development & Maintenance	167 (20,000)	125 (20,000)	100 (20,000)	83 (20,000)
Harvesting & Hauling	80 (9,600)	80 (12,800)	80 (16,000)	80 (19,200)
Royalty	15 (1,800)	15 (2,400)	15 (3,000)	15 (3,600)
Total (Direct cost)	262 (31,400)	220 (35,200)	195 (39,000)	178 (42,800)
Admin	67 (8,000)	50 (8,000)	40 (8,000)	33 (8,000)
Finance Cost	33 (4,000)	25 (4,000)	20 (4,000)	17 (4,000)
Total cost	362 (43,400)	295 (47,200)	255 (51,000)	228 (54,800)
Profit Before Tax	62 (7,400)	5 (800)	45 (9,000)	72 (17,200)
1,000 hectares	7,400,000	800,000	9,000,000	17,200,000

Table 11.3. Economic Assumptions (Gestation Sensitivity)

Year	6 (48,000) (160 m3)	8 (54,000) (180 m3)	10 (60,000) (200 m3)	12 (66,000) (220 m3)
Development & Maintenance	75 (12,000)	89 (16,000)	100 (20,000)	100 (22,000)
Harvesting & Hauling	80 (12,800)	80 (14,400)	80 (16,000)	80 (17,600)
Royalty	15 (2,400)	15 (2,700)	15 (3,000)	15 (3,300)
Total (Direct cost)	170 (27,200)	184 (33,100)	195 (39,000)	195 (42,900)
Admin	50 (10,000)	44 (8,800)	40 (8,000)	36 (7,920)
Finance Cost	15 (2,400)	18 (3,200)	20 (4,000)	22 (4,800)
Total cost	235 (39,600)	246 (45,100)	255 (51,000)	253 (55,620)
Profit Before Tax	65 (8,400)	54 (8,900)	45 (9,000)	47 (10,380)
1,000 hectares	10,400,000 22 %	9,720,000 18 %	9,000,000 15 %	10,380,000 16 %

Table 11.4. Extraction & Hauling Cost & Value Comparison

Commodity	Rotation (Years)	Tree Stands	Volume per Hectare (m3)	Harvesting & Hauling per Hectare (RM)	Value per Hectare (RM)
ITP	6-15	400	200	16,000	60,000
Tropical	25-30	15	35	5,250	17,500

**ITP rate at RM 80 per m3*

**Tropical logs at RM 150 per m3*

3.1. Conclusion on ITP Economics

The above table indicated that 200 m3 per hectare over ten years is the ideal volume for ITP. The internal rate of return (IRR) with development cost of RM 20,000 over ten years is 12 %. The breakeven price is RM 260 per m3 and the breakeven yield is 165 m3 per hectare over 10 years. The return margin from 6 years old trees at 160 m3 per hectare is 6 % higher than a yield of 240 m3 per hectare from 12 years old trees. This is a clear indication that early gestation besides volume is key to a profitable and viable ITP investment.

Sabah's FMUs ITP production recorded an average yield of 79 m3 per hectare from harvests of ten to fifteen years old trees. The lower volume per hectare will cost more to harvest and haul. It is plainly clear that this level of production is operating at a loss. In contrast, JPISB's yield was recorded at 171 m3 from five years old trees. This is a clear indication of a profitable operation as per Table 11.3, surpassing year 6 at 160 m3 per hectare.

It can be concluded that the ITP project is viable given the right scale and the right volume. Attaining the right volume is determined through effective management and the development of high standards infrastructure such as roads. JPISB has developed a total of 489 kilometres of roads consisting of main, secondary and feeder roads representing a ratio of 8.2 hectares to 1 kilometre of road based on 4,000 hectares planted to date.

3.2. Size & Scale

The right size of land is critical to attain volume. As can be seen in Table 11, 1,000 hectares yearly harvest resulted in a yearly profit before tax (PBT) of RM 9 million. This profit level requires a gestation of ten years translating to yearly profit of only RM 900,000 per year. All can agree that the effort, time and energy put in does not commensurate with the profit it provides. The next major issue is the right size of land to ensure that there is no gap period. JPISB is a case in point where net planting area is only 6,000 hectares. At a planting rate of 1,000 hectares per year, planting is completed in six years and if maturity reaches between eight or ten years, there will be a gap period of between two to four years. This gap period will result in retrenchment and zero revenue with depreciation cost and heavy administrative cost to carry. The biggest loss will be the loss of skills and economic spin off to Sapulut. Sourcing of workers and retraining will be difficult, costly and time consuming.

The illustration on Table 12 would be the most ideal size for a sustainable and viable ITP operations with the right economies of scale. As can be seen the total operation shows continuity with no gap

period. The annual harvest of 2,500 hectares per year with production volume of 500,000 cubic metres per year provides a comfortable margin and can cushion effects on price and yield sensitivities as shown in Tables 11.1 and 11.2. The sizeable volume will allow for in situ processing of the logs with further investments and greater economic and employment opportunities.

4. Investments in ITP Processing

There are currently very little investments from conventional wood processing mills into ITP processing. Existing plywood mills have invested into smaller spindleless lathe peeling lines due to smaller tropical logs that are currently produced in the market. It would require specialised plywood or lathe processing lines to produce plywood or other products in mass volumes. There is only one such plywood mill that has invested in such lines in Sabah. Integrated Wood Processing Sdn Bhd (IWP) -

situated in Tawau is the sole company in Sabah that has invested in the processing of ITP. IWP's annual processing capacity is between 60,000 to 70,000 m³ per year. However, its ITP log supply only reaches between 12,000 to 20,000 m³ per year. The inconsistent and small annual supply discourages mills or potential investors to invest into the processing of ITP. There were many engagements and consultations carried out with the existing mills but response had been, "show me the trees". Any investments will only take place when planted trees can be seen on the ground.

The Sabah Timber Industries Association (STIA) is very actively assisting the Government in realising the targets of the forest plantation action plan. STIA has continuously participated in meetings, discussions and conferences to spur the development of ITP in Sabah. Through the various engagements with its members and data collected, Sabah has the capacity to process between 400,000 to 500,000 m³ of ITP logs per year. However, the current demand is between 200,000 to 250,000 m³ per year for mills that are ready or willing to utilise ITP logs.

4.1 Potential Investments in ITP Processing

The Action Plan on Forest Plantation launched has set a target to produce between 6 to 8 million m³ of ITP logs by the year 2032. The ITP project is part of the Sabah Maju Jaya development plan launched by the Chief Minister of Sabah YAB Datuk Seri Panglima Hajiji Haji Nor. The plan is to encourage and induce investments into downstream processing of ITP. The potential investments can be realised from within the FMUs. There are some species planted by the FMUs which require immediate processing at site such as Laran and Albizia. These species are prone to blue stain within 8 days of harvest and requires immediate processing. The production in mass volumes will require processing to be done at site. Delay in processing will result in lower recovery and lower value products. The other major obstacle is the low-density characteristics of the Albizia making it highly costly to transport the logs to mills in Tawau and Keningau. FMUs that have planted Albizia will surely have to make investments in processing once it reaches maturity.

The illustration in Table 12 provides a yearly production volume of 500,000 m³ of ITP logs which can be processed into various wood products. The volume provides for the production of veneer, plywood, laminated veneer lumber (LVL) and sawn timber. The LVL can spur the development of the furniture industry in Sabah in the future. LVL is heavily used as furniture components and the

construction industry. JPISB in collaboration with IWP and UPM had conducted extensive R&D into these products made from the two species with very promising results.

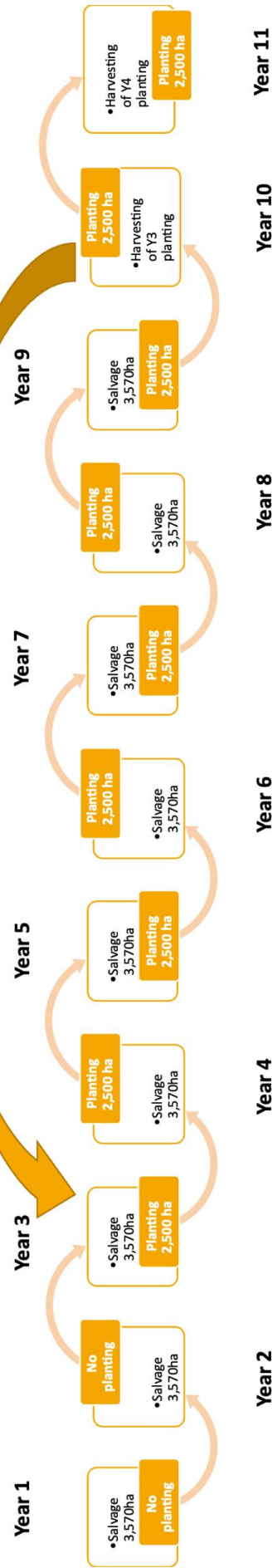
The above products were part of JPISB's R&D and product development of Laran with other mills such as Focus Lumber Berhad, Perusahaan Kosinar Sdn Bhd, Veisheng Timber Sdn Bhd and Bidasari Sdn Bhd.



The recovery rate from ITP logs to these products is approximately 40 % translating to 200,000 m³ of wood products per year. The waste amounting to 300,000 m³ is no longer considered waste with today's technology. 300,000 m³ of wood "waste" can be utilised into cost efficient and environment-friendly energy with a five megawatts turbine to power the factory. Excess energy can be tapped into other consumers assisting the Government achieve its energy transition plan. The excess waste can also be produced into wood pallets for export. The utilisation of ITP logs will also allow for automation of the manufacturing process using state of the art technology due to homogeneous species input. This will allow production at very competitive cost.

A factory of this size will require an investment of RM 750 million where the development of the ITP will cost RM 500 million and RM 250 million for the development of the mill. The total royalties to be collected from the SFD will be RM 2 million from the export of wood products and RM 7.5 million from log royalties. The total collection of RM 9.5 million will come from a single FMU. The foreign exchange earnings through exports are projected to fetch USD 60 million per year.

RIGHTSIZING OF ITP



- Assumption is a 70% net planting area of 25,000 hectares with a gross area of 35,700 hectares.
- Annual production of 500,000 m³ ITP logs

T a b l e 1 2

5. Regional ITP Development

Indonesia and Vietnam are known to be the leading producers of ITP in the ASEAN region. To date Indonesia has developed 5.1 million hectares of ITP with an annual production of 47 million m³. Its production goes into two segments, pulp and paper and the wood products segment on a 50:50 basis. Its utilisation of ITP logs in plywood manufacturing has rendered producers in Sabah uncompetitive in many markets. Indonesia has successfully developed plywood and panel products with full ITP panel composition. Sabah is still utilising full tropical timber for plywood processing at higher raw material cost.

Vietnam has developed approximately 4.1 million hectares producing 30 million m³ per year where majority are produced for wood products such as furniture, plywood, sawn timber and wood pallets. Vietnam has emerged as one of the world's leading furniture manufacturer, a timber powerhouse due to its ITP.

In this paper, Vietnam is chosen as a case in point due to its past activity and trade relations with Sabah on ITP. Interestingly, Vietnam was importing Acacia Mangium logs from Sabah. The importation began in the late 1990s up to early 2000 from Bengkoka, Pitas and Kudat. It only took twenty-five to thirty years or one generation for them to develop the ITP industry and positioning themselves as a global leader in wooden furniture manufacturing. Sabah's SFMLA and ITP development commenced during this period.

Vietnam's annual wood consumption is approximately 40 million m³ of which 10 million m³ are from imports. In the year 2023 Vietnam generated USD 13.5 billion or RM 59.4 billion worth of exports from its wood industry. The yearly production of 30 million m³ ITP translates to 75 % of total wood consumed. Should the ratio of 75 : 25 be used into the earnings generated through the wood processed, the earnings will be USD 10. 3 billion (RM 43.2 billion) to USD 3.2 billion (RM 13.44 billion). This translates to a conversion value of 1 m³ of ITP logs to USD 343 (RM 1,440) of wood products. This is the reality of the potentials of ITP. Sabah currently has not looked or tapped into

which model would be suitable for its plans to develop the ITP project. Vietnam fits the bill well when looking for inspiration.

6. Potentials of ITP in Sabah

Sabah is blessed with abundance of good soil and rainfall for ITP development in Sabah. Laran is indigenous to Sabah and can be multiplied into fast growing trees with proven utilisation and useful characteristics and properties. The dry and sandy soils of Kudat and Pitas have proven to be useful for the development of Acacia Mangium and Eucalyptus Pellita. A multitude of fast-growing species ranging from light to heavy density species suitable for many wood applications have been proven to grow successfully in Sabah. This is a valuable asset not enjoyed by many in other Malaysian States and countries.

In demonstrating the potentials of ITP for Sabah, it is imperative to look to Vietnam as a model especially on ITP. Sabah's planned output of between 6 to 8 million m³ per year can be simulated and projected into how and what a Sabah ITP industry can become. The targeted annual output of 6 to 8 million m³ if taken with the log to product conversion value at RM 1,440 can translate to between RM 8.6 to RM 11.5 billion per year for Sabah. Should the Malaysian average of RM 3,925 be used this will translate to RM 23.6 to RM 31.4 billion per year. This potentially constitutes a 38 % share of Sabah's 2023 RM 81 billion gross domestic product (GDP) and which only comes from 40,000 hectares of land required.

The investments into ITP should be focused on existing wood mills and mills that have suspended operations. Incentives should be provided to spur the development at speed. Existing mills can induce other investors, local and foreign to relocate or develop new industries in Sabah. Sabah has the advantage where a multitude of fast-growing species can be capitalised to produce a multitude of application products to cater to the world market. One only needs to imagine what a revenue of RM 23 billion a year can bring to the rural and interiors of Sabah. Why so ? it is because these mills need to be situated near the raw material to cater for biomass wastes that can be generated to provide electricity to maximise output and to reduce logistics cost. This is also required for the wood to be processed at site due to quick degradation of the various species.

JPISB and its team had recently visited Sarawak Planted Forest Sdn Bhd (SPF) and GP Pusaka (GPP) in Sarawak where an ITP project was intended for a development of pulp and paper investment. The project had not succeeded in realising a pulp and paper mill but in turn is now producing logs for wood chips. The concession measures 480,000 hectares where 129,000 hectares have been planted over the last twenty years. It is unfortunate that soil conditions in Sarawak is not favourable for ITP. The eye-opening experience had taught JPISB to adopt a "boutique" operation to cater for higher value wood products at optimum yield levels.

It is clear that the ITP project offers immense opportunities and a promising future for Sabah. Its economics and viability had been proven through the JPISB model. The model for ITP should be focused on sawlogs for plywood, LVL, sawn timber, wood pallets for energy and possibly a furniture industry in the near future. The forest landscape in Sabah is certainly not conducive for a pulp and paper project.

The employment opportunities are immense. Malaysia's current processing of 8 million m³ of wood employs 250,000 workers. Sabah's 6 to 8 million m³ per year production could also employ the same amount of workers once it reaches the level of producing furniture and finished products. There will also be opportunities for smallholder ITP farming. However, a detailed planning needs to be carried out to ascertain land size and logistics. The FMUs can play its part as anchor for the project.

7. Palm Oil & ITP

This paper is of the opinion that Sabah's palm oil industry is the biggest beneficiary of the dwindling forest resources. The infrastructure to develop the palm oil industry was first developed by the logging industry. Sabah today has become the largest producer of palm oil providing the Government a major portion of its revenue. According to Malaysian Palm Oil Board (MPOB), the palm oil industry has contributed RM 6.2 billion to the Sabah Government since 2018. The industry has done very well.

It is imperative to gauge the potential of ITP against oil palm or palm oil as a whole. In gauging its performance, only then we will realise its true potential. The ITP is the only viable option or alternative left in our quest to assist or develop the rural communities especially the interiors. The case in point is the monthly household income earned by families working at JPISB. The palm oil industry is one of the largest employer of foreign workers.

The MPOB through its report, "Overview of the Malaysian Palm Oil Industry 2023" had recorded that Sabah's planted hectareage stands at 1.5 million hectares as of 2023. Its crude palm oil production was 4.5 million tonnes. Its oil extraction rate was the highest at 20.4 %. This translates to a Fresh Fruit Bunch (FFB) production of 22.1 million tonnes per year. This production is derived from 1.5 million hectares of oil palm plantation.

Sabah's ITP project should it come to reality in reaching its targets of yearly production of between 6 to 8 million m³ per year, will come from only 40,000 hectares of land of which only 40,000 hectares required to produce or sustain this level of production.

Table 13. Palm Oil & ITP Comparison

Commodity	Yield per Hectare (Volume)	Value per Hectare (RM)
ITP	200 m ³	60,000
FFB	14 tonnes	10,900
CPO & others	2.8 tonnes	10,000

**Average price of FFB at RM 778 per ton (MPOB)*

**Average price of CPO and others at RM 3,555 per ton (MPOB)*

**ITP price at RM 300 per m³*

The above clearly indicates the superiority of ITP on a per hectare per year basis. Should the log conversion to product value of Vietnam's ITP be taken into account, the value would be RM 288,000 per hectare per year. It should be noted that ITP versus oil palm on an economic life span basis is not taken into account. This is clearly on a yearly basis comparison. However, it can be clearly seen the longer gestation of ITP versus oil palm at three years does bear fruits for ITP.

8. Benefits & Advantages of ITP

It has been proven that a full-fledged ITP development can yield five to seven times more timber than tropical forest. The rotation advantage can reach four to six times versus tropical forest where a single rotation can take between twenty-five to thirty-five years. The development of ITP will allow for more forest areas to be set aside for conservation opening opportunities for carbon sequestration projects. The various fast-growing species that can be grown in Sabah can replace and substitute a multitude of species of various densities for various applications for timber.

The development of ITP in Sabah can play many roles in terms of sustainability and renewability. The FAO report had stated there will be a growing demand for wood to substitute non-renewable materials in the construction industry. Sabah should take immediate steps to capitalise on this growing demand and trend. It was also stated that demand for wood in the energy sector is set to grow and can spur Malaysia's energy transition goals and targets. This can also solve Sabah's perennial electricity problems. The ITP wood is clearly a viable and environmentally-friendly candidate in solving the climate crisis issue. An additional 33 million hectares of forest plantation or ITP is required to fulfil these global demands.

9. Conclusion

Firstly, the efforts of the current Sabah Government under the leadership of YAB Datuk Seri Panglima Hajiji Haji Noor and YBhg Datuk Frederick Kugan must be commended. The author of this paper is a member of the ITP steering committee headed by Datuk Frederick who regularly attends the meetings with many serious steps already taken to address many issues related to ITP. His contribution is immense.

It is clear that the ITP project in Sabah has not achieved its desired results. One only has to look at Vietnam's wood and ITP industry achievement to gauge Sabah's achievements. Sabah's ITP project had commenced back in the year 1997 but had only managed to produce 39,552 m³ of logs per year twenty-seven years later. The "Mosaic" model has not achieved the desired results and has not succeeded economically. It is imperative to relook into the commercial viability of the current ITP areas.

The planting rate, size and volume produced clearly demonstrates that the operations do not meet the economies of scale of a viable ITP operation. The available data also shows planted trees of over 20 years are left to grow and not harvested. The reason is obvious, as it is not economically viable to harvest due to low volumes and low harvesting efficiency translating to higher cost. These planted trees are revenue to the Government in the form of royalties. There is also the concern of continuity in terms of yearly planting which will result in future harvesting and supply. Are the licensees capable of continuously financing their project is the question that needs to be addressed. Is there still belief and confidence in the project by the licensees is also a status that must be addressed. The level of confidence is key in the ability to proceed with a project of this magnitude.

The setbacks should not be a deterrence for Sabah to miss the growing and promising opportunities that the ITP project has to offer. An in-depth understanding of the situation on the ground is of paramount importance. In this case, a microscopic view of the situation can and will lead to openings for solutions. The timber industry community must work hand in hand openly to address and to accept the reality that its timber industry may vanish sooner than expected.

Sabah is well positioned to succeed in the ITP industry due to its geographical location and good soil conditions. The ITP project if planned carefully will be worth RM 23 billion per year for Sabah. The economics and the global market potential of 5.2 billion m³ by the year 2050 must not be ignored as

this project provides solutions to Sabah's poverty eradication initiatives, electricity shortage and ultimately it is the best candidate to fight global warming.

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