38_Availabity Raw Materials Plywood in the Province of East Kalimantan

by Akas Yektih Pulih Asih

Submission date: 24-Jun-2024 03:56PM (UTC+0700)
Submission ID: 2407779693
File name: ity_Raw_Materials_Plywood_in_the_Province_of_East_Kalimantan.pdf (533.42K)
Word count: 3416
Character count: 16676

OPEN ACCESS
Global Journal of Research in Agriculture & Life Sciences
Volume 02| Issue 03 | May-June | 2022
Journal homepage: https://gjrpublication.com/gjrals/
Original Research Article

Availabity Raw Materials Plywood in the Province of East Kalimantan

Ismail[1], Akas Pinaringan Sujalu[1]*, Zikri Azham[1], Taufan Tirkaamina[1] and Akas Yekti Pulihasih[2]

[1]University of 17 Agustus 1945 Samarinda; Faculty of Agriculture
[2]University of Nahdlatul Ulama Surabaya; Faculty of Health

Submission Date: 19th March 2022 | Published Date: 21st May 2022

*Corresponding author: Akas Pinaringan Sujalu

Abstract

This research aim to examine the wood potential production and its volume which derive from the plantation forest in order to fulfill the needs of raw materials for the plywood industry. Data obtain from the previous collected run through the existing data subject to the direct observation then by using this collected data it is analyzed using the statistical method. The result of this analysis shown that subjection Means Annual Increment (MAI) as for the Parica (Schizolobium amazonicum) reached up to 35,72 m3ha-1 in 8 years rotation; Sengon (Paraserianthes falcataria) up to 30,60 m3ha-1 in 10 years rotation; Waru (Hibiscus sp) about 15,57 m3ha-1 in 17 years rotation; and Dipterocarpa (Shorea leprosula) potentially reached up to 8.84 m3ha-1 in 40 years of rotation.

Keywords: Standing Stock, Increment, raw material, plywood

INTRODUCTION

Since in the mid of 1990s, importing processed wood (mainly from The European countries) imported mainly on the plywood products that have been requiring the use of wood from community forests. For each sheet of plywood imported should contain at least one sheet fenir of wood that derives from forests. With this policy that means that the company should look for wood raw materials that derived from forest plants and forest species written on the document as exact as in the form order on plywood from the importers. Utilization of forest should therefore support by the issuance of policies Timber Utilization Permit People (IPKR) and Timber Utilization Permit Land Ownership (IPKTM).

The community forest in Indonesia has great potential, neither in terms of tree population nor does the number of households working on it which is enable to provide the raw material for the forest industry. According to the data obtained from the Ministry of Forestry office estimated that potential forest area in Indonesia reach up to 39,416,557 m^3 with area reach up to 1,568,415.64 Ha whilst the potential community forests based on agriculture census conducted by the Central Statistics Agency (BPS) indicates that the potential community forest area reached up to 39,564,003 m^3 with area reach up to 1,560,229 Ha. The number of existing trees reached up to 226,080,019 whereby the number of trees ready to cut as many as 78,485,993 logs (Anonymous, 2007 in Darusman, 2019).

Total industrial wood raw material required as much as it is estimated about 72 million m^3ha^{-1}. This expectation if specified will consist of sawn industry without permission about 8 million m^3ha^{-1}; sawmill industry that has a license of 22 million m^3ha^{-1}; plywood industry of 18 million m^3ha^{-1}; wood fiber and paper industry 24 million m^3ha^{-1}. Referring to the raw material needs, ITTO estimated that the supply of analysis gap and its need is about 50 million m^3ha^{-1}. That means that if this is proved, a large number of industries have no guaranteed to able supply the raw materials. In fact, not all companies have the Acreage of Timber Estate (HTI) and community forests that may allow to supply the industrial materials. The reason may vary from Forest Concession Area (HPH) itself such as; the permit is not valid, not able to implementing the HTI program, some implementation on the HTI program included Holder or Unit Management Enterprises Timber Estate (HPHTI) but less success or not perform as per expectation, the species of wood that grown in the area of industrial tree plantations which are not complying to the needs of the importers and/or many more obstacles. Thus, to meet the needs of one's company plywood industry they must seeking an alternative from outsider parties, whether to purchase neither directly from the company's industrial plantations nor from the community forest.

Calculation species of HTI species in which developed is very few and it is usually selected from the fast growing species. The purposes of the wood usage remain standardize and it is for limited paper as well as pulp or just for a light construction. Besides those which are coming from wide area had not comply yet to the wood raw material requirements. Some pulp and paper industries are still highly depend on natural forest wood stock and they only use their permission facility on wood exploiting (IPK). By doing this short cut to meet its need target faster, we are actually still far away from our expectation.

MATERIAL AND METHOD

This research located in KM. 14 Karang Joang, Balikpapan Sub District, PT Belantara Subur, PT Inhutani I KM 17 Longnah Village, PT Melapi Timber and PT Rimba Raya. The land area of each location is about 10,000 m^2 which contains of stands and sampling of plants using the methods of Systematic Sampling.

This research objects are using the raw materials of industry where lot of plywood in each plants are cultivated by farmers or companies and/or communities around the company site, such as:

1. Standing Stock Sengon (*Paraserianthes falcataria*) from 2, 4, 6, 8 and10 years
2. Standing Stock Parica (*Schizolobium amazonicum)* from 1, 2, 4, 6 and 8 years
3. Standing Stock Waru (*Hibiscus* sp) 6 and 8 years
4. Standing Stock Meranti Tembaga/ Dipterocarpa (*Shorea leprosula*) from 3, 5, 10, 15, and 20 years

Table-1: Forest Research Plots

Plot Name	Location	Spacing	Plots area	Population	Sampling
Shorea leprosula	Karang Joang	5m x 3m	4320 m^2	288	144
Shorea leprosula	Inhutani I	5m x 5m	1250 m^2	50	50
Shorea leprosula	Inhutani I	5m x 4m	1250 m^2	63	63
Schizolobium Amazonicum	PT Melapi Timber	3m x 2m	2500 m^2	100	100
Paraserianthes Falcataria	PT Belantara	3m x 3m	2500 m^2	277	138
Hibiscus similis	PT Belantara	3m x 3m	2500 m^2	277	138

The variables measured within the plots to obtain estimates of the potential production of standing stock plant were as follows: tree volume, total volume per hectare. The data were consolidated and tabulated for statistical analyses to determine arithmetic means of height and DBH and price per tree. These arithmetic means were used to calculate other parameters like Mean Annual Volume Increment (MAI), and Current Annual Increment (CAI) (Van Gardingen et al. 2003).

$$MAI = Vt/t$$

Where,
MAI = Mean Annual Increment ($m^3ha^{-1}year^{-1}$),
Vt = total volume at age-t (m^3ha^{-1}),
t = tree age (in years)

$$CAI = \{V_t - (V_{t-1})\}/n$$

Where,
CAI = Current Annual Increment ($m^3ha^{-1}year^{-1}$),
Vt = Total volume at age-t (m^3ha^{-1}),
Vt-1 = Previous total volume (m^3ha^{-1}),
t = Second age minus the first age (in years).

(Nghiem N and Tran H. 2016; Zahabu et al. 2015).

RESULTS AND DISCUSSION

Given the fact that the appalling conditions with the declining role of the forestry sector in the economy of East Kalimantan province, it calls for an action to prevent deterioration of the forest industry in East Kalimantan. Based on the long-term forestry development strategy, the government has sought to optimize returns from unproductive forests by utilizing them for plantation forests (Prasetyo et al. 2014). This strategy has been able to attract a lot of investors because plantation forests have high economic value (benefits). Plantations are generally managed by private entrepreneurs, with

the government only acting as a regulator (Anjasari 2009), one solution is to develop HTI. HTI is more productive in the wood supply for industrial processing compared with plantations. Average production reaches 30-70 m^3 /acres/year of forest plantations, while only 0.5 to 3.0 m^3 /ha/year natural forests. Plantation development in the area of plantation in East Kalimantan overall reached 1.9 million acres. Development of HTI area should be pursued seriously. The key to success lies in cost control, marketing, and product certification. Besides, the problem of illegal logging must be immediately eradicated. It is very detrimental to the country from both an economic perspective and point of view of environmental sustainability. HTI development must also be supported by all levels of society. That way East Kalimantan forestry industry is expected to be felt again the wealth as in the time before the monetary crisis industry is expected to be felt again the wealth as in the time before the monetary crisis.

Society's need for wood tends to increase from year to year, while the stock of wood from natural sources in recent decades has been decreasing. The analysis shows the national demand for logs used in processed wood commodities such as woodworking timber, block board, veneer, chip wood, pulp, except plywood (Widyanto et al. 2014) increased up to the year of 2014 (the period when the analysis ended) reaching 115,633,444 m^3 $year^{-1}$. On the other hand, the stock of logs was only 13,873,734 m^3 $year^{-1}$ trending downwards. Wood product consumption will keep increasing, thus a method to reduce wood harvesting from native forest has become essential if the biodiversity of tropical forests is to be preserved (Ruslim et al. 2016). Forest industry production capacity of more than 6,000 $m^3 year^{-1}$ is still prospective for further development. The problem of raw materials that exist begins to be addressed with wood supply from forest plantations, forest community forests, and cut production quota established by the Department of Forestry every year. The performance of the timber industry had fallen short not because of shortage of raw materials, but because it reduces the supply of illegal timber. With the growth of forests and forest plantations, timber industry still has a prospective business to be developed and not just a sunset industry (Price C. 2011).

Periodic annual volume increment analysis

Theoretically an increasing of stands volume should accordingly to the law of diminishing returns in each calculation of projection of timber production at the end of its cycle. It must be "Time Series" which can be seen from the growth curve of its production Analysis on MAI (Mean Annual Increment), CAI (Current Annual Increment) and TV (Total Volume) using the assumption of the reduced population of stands per hectare in each year, generally range between 10-15%. For the species of *Shorea leprosula* is between 20-25% and for the species of *Schizolobium amazonicum* between 15-20%. The number mentioned above, in order to avoid the competition between each stands on this particular species; *Paraserianthes falcataria*, and species of *Hibiscus similis* are resulted from its natural mortality and also due to the process of it's thinning. By doing so, the stands stock will grow normally. The result of this projection on the various species of wood raw materials for plywood industry are as follows:

Table-2: Analysis of MAI, CAI and Total Volume ($m^3 ha^{-1}$) *Shorea leprosula*

Location		Age (year)								
		3	5	10	15	20	25	30	35	40
Karang Joang	**MAI**	4.08	4.67	6.20	7.29	8.31	9.21	8.88	8.54	8.24
	CAI		5.56	7.73	9.47	11.35	12.83	7.20	6.51	6.17
	TV	**12**	**23**	**62**	**109**	**166**	**230**	**266**	**299**	**330**
PT Inhutani I KM 17 Longnah	**MAI**	5.50	5.99	6.49	7.15	8.13	9.30	9.83	9.44	8.80
	CAI		6.73	6.91	8.94	11.08	13.98	12.51	7.05	4.35
	TV	**16**	**30**	**71**	**107**	**163**	**232**	**295**	**330**	**352**

Thinning stands of *Shorea leprosula* is in the district of Karang Joang performed at the age of 16, 21 and 26 consecutive years of 111 m^3, 177 m^3 and 247 m^3. Harvest obtained at the age of 30 years with its result about 266 m^3 and 299 m^3 for 35 years. Perhaps it is estimated to reach the highest increment at logging 40 years with a total volume of 330 m^3. As for the thinning stands located at Inhutani I KM 17 Longnah performed at the age of 16, 21 and 26 years in a row by 114 m^3, 173 m^3 and 248 m^3. And the harvest obtained at the age of 30 years with its result reached up to 295 m^3 and 330 m^3 in 35 years. Looking at the data shown above the estimation of the highest increment of each logging is about 40 years with the total volume of 352 m^3.

Table-3: Analysis of MAI, CAI and Total Volume (m^3ha^{-1}) *Schizolobium amazonicum*

Location		Age (year)				
		2	4	6	8	10
PT Melapi Timber	**MAI**	32.65	343.31	37.40	35.72	34.15
	CAI		35.96	43.59	30.67	27.87
	TV	65	137	224	286	341

Thinning process of stands Schizolobium amazonicum in PT Melapi Timber finished in 4 years with the total of 150 m3. Harvest obtained after 6 years with the total of 252 m3. It is expected to reach the highest increment in logging 8 years with a total volume of 335 m3.

Table-4: Analysis of MAI, CAI and Total Volume (m^3ha^{-1}) species *Paraserianthes falcataria*

Location		Age (year)				
		2	4	6	8	10
PT Belantara Subur	**MAI**	32.1	33.7	35.4	33.8	30.6
	CAI		35.3	38.9	29.0	17.7
	TV	64	135	213	271	306

Thinning process of stands Paraserianthes falcataria in PT Belantara Subur finished after 6 years with total volume of 213 m3. Harvest obtained after 8 years with total volume of 271 m3 and the expectation of the highest increment is in logging 10 years with a total volume of 306 m3.

Table-5: Analysis of MAI, CAI, and its total Volume (m^3/ha) Species *Hibiscus similis*

Location		Age (year)						
		3	5	8	10	15	17	20
PT Belantara Subur	**MAI**	8.80	8.94	10.37	11.16	14.69	15.57	14.70
	CAI		9.14	12.76	14.31	21.75	22.14	9.79
	TV	26	45	83	112	220	265	294

Thinning process of stands *Hibiscus similis* in PT Belantara Subur finished after 6 years with total volume of 213 m^3. Harvest obtained after 8 years with total volume of 273 m^3 and the expectation of the highest increment is in logging 10 years with a total volume of 306 m^3.

Table-6: The volume increment per hectare Species of Wood Raw Material Plywood

Species	Years						
	2	4	6	8	10	12	14
Acacia mangium	23.98	31.25	40.38	45.24	38.20	35.12	30.29
Gmilina arborea	18.48	26.79	35.38	42.25	38.65	34.28	28.80

Source: Widyantoro, (2016)

As a comparison, the classical wood raw material plywood obtained from the species of *Acacia mangium* and *Gmelina arborea* to the species mentioned above used as a subject in this research can be observed in table 6. Source taken from the research of Widyantoro, (2016).

Based on the data taken from Table 7, the row plywood material spesies *Shorea* sp stands shown an average total increment on each timber concession which located in the distric of Karang Joang about 8,24 m^3ha^{-1} and in Inhutani I KM 17 Longnah reached up to 8.84 m^3ha^{-1} whereby its cycle is 40 years. On *Schizolobium amazonicum* the result is 35.72 m^3ha^{-1} within 8 years cycle, on *Paraserianthes falcataria* is about 30.6 m^3ha^{-1} within 10 years cycle and

on *Hibiscus similis* is about 15.57 m^3ha^{-1} within 17 years cycle. The overall prognosis research plots can be seen in the following Table 7.

Tabel-7: Prognosis Research Plots at Any Stands Stock

Plot Sampel	Cycle (thn)	diameter (cm)	Hight (cm)	Total Volume (m^3)	MAI (m^3ha^{-1}/year)
Shorea sp	40	42.2	17.6	330	8.24
Shorea sp.	40	54.3	21.3	352	8.84
Schizolobium amazonicum	8	26.0	16.5	286	35.72
Paraserianthes falcataria	10	36.0	13.8	360	30.60
Hibiscus similis	17	33.4	16.3	265	15.57

Regression analysis between diameter of the volume in each plot shows that there are a positive relationship and direction, which indicated that the greater the value of the diameter of a stand means the better volume we get, in details can be seen in Table 8 below;

Table-8: Relationship between Regression Models Diameter (X) and Volume Stand (Y)

Standing Stock	Regresion Models	r^2
Shorea leprosula **– Karang Joang**	Y = - 62.9 + 7.57 X	98%
Shorea leprosula **– Inhutani I**	Y = - 0.72 + 0.047 X	96%
Schizolobium amazonicum	Y = - 0.22 + 0.024 X	98%
Paraserianthes falcataria	Y = - 0.56 + 0.035 X	97%
Hibiscus similis	Y = - 0.35 + 0.034 X	96%

CONCLUSION

The decreasing of the population of stands stock per hectare was detected by its natural immortal and its cutting. Mean Annual Increment (MAI) increased significantly with increasing spacing while spacing did not have significant effect on total volume production and basal area. Stand density is also not affected by spacing while wood proportion increases as planting spacing increases. The natural immortal usually happen before the age of 10, whilst cutting was conducted at the age of 26. Harvesting should be conducted at the age of 31 and 36 although the volume increment reached its optimal at the age of 40 years.

REFERENCES

1. Anonymous, (2014). Potential Forest Indonesia. Central Bureau of Statistics, Jakarta.
2. Anonymous, (2015). Stages of the Forestry Sector Revitalization and Success Indicators. Directorate General of Forestry, Jakarta.
3. Anonymous, (2017). Opening Speech of the Minister of Forestry in Forest Plantation Development Workshop. 21 to 22 February 2007 and the Directorate General of Forestry Production Development, Jakarta.
4. Anonymous, (2018). Executive Summary of Forestry Sector Revitalization Policy. Secretary of Directorate General of CPC, Jakarta.
5. Anonymous, (2019). Portrait of Indonesia Volume I, State Forest Jakarta.
6. Avery, T.E. and Burkhart, H.E. (2015). Forest Measurements. 5th ed. Waveland Press.
7. Darusman, (2013). In Proceedings of Forest Products Research 2016, Cooperation between the Center for Forest Inventory and Statistics, Ministry of Forestry with the Directorate of Agricultural Statistics.
8. Emilia, S. (2017). Forest Plantation (HTR) New Agenda for Poverty Reduction. News Tenura Number 4, February.
9. Hidayat, P.K, and Suarga R. (2014). Forestry Revitalization Indonesia. Retain its existence and strengthening the Role of the Future. Jakarta.
10. ITTO, (2011). Achieve Sustainable Forest Management in Indonesia. Report the International Tropical Timber Council in meeting ITFC to XXXI. in Isaac, 2013. Yokohama.
11. Isaac, A.F. (2013). Paradigm of Sustainable Forest and Local Community Empowerment. Indomedia, Jakarta.

12. Muliadi M, Lahjie AM, Simarangkir BDAS, Ruslim Y. (2017). Bioeconomic and environmental valuation of dipterocarp estate forest based on local wisdom in Kutai Kartanegara, Indonesia. Biodiversitas 18 (1): 401-408.
13. Nghiem N and Tran H. (2016). The biodiversity benefits and opportunity costs of plantation forest management: A modelling case study of Pinus radiata in New Zealand. J For 7 (12): 297.
14. Prasetyo E, Hardiwinoto S, Supriyo H, Widiyanto. (2014). Litter production of logged-over forest using Indonesian selective cutting system and strip planting (TPTJ) at PT. Sari Bumi Kusuma. Procedia Environ Sci 28: 676-682
15. Price C. 2011. Optimal rotation with declining discount rate. J For Econ 17 (3): 307-318.
16. Ruslim Y, Sihombing R, Liah Y. (2016). Stand damage due to mono-cable winch and bulldozer yarding in a selectively logged tropical forest. Biodiversitas 17 (1): 222-228.
17. Sutisna, M. (2015). General Silviculture. Hand book. Faculty of Forestry-Mulawarman University. Samarinda.
18. Widyanto, Sokotjo, Naiem M, Purnomo S, Setyanto PE. (2014). Early performance of 23 dipterocarp species planted in logged-over rainforest. J Trop Forest Sci 26 (2): 259-266.
19. Widyantoro, B. (2016). Growing Toward Successful Stock THR. www.aphi-net.com.
20. Zahabu E, Raphael, T, Chamshama SAO, Iddi S, Malimbwi RE. (2015). Effect of spacing regimes on growth, yield, and wood properties of Tectona grandis at Longuza forest plantation, Tanzania. Intl J For Res 2015: 469760. DOI: 10.1155/2015/469760

38_Availabity Raw Materials Plywood in the Province of East Kalimantan

ORIGINALITY REPORT

19%	19%	4%	4%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

MATCH ALL SOURCES (ONLY SELECTED SOURCE PRINTED)

7%

★ 1library.net

Internet Source

Exclude quotes	On	Exclude matches	Off
Exclude bibliography	On		