Marketing of Parica Wood (*S Chizolobium Amazonicum*) Production in the Plywood Industry through Empowerment of Farming Families in East Kalimantan Province

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Abstract— *This research aims to determine the long-term business of a Dipterocarpa.sp farming family, in marketing plantation forest production to support the plywood industry in East Kalimantan Province. The research was carried out from January 2021 to June 2021. The research location is PT. Melapi, East Kalimantan Province. This research utilized an area of 10,000 m2 planted with Parica (Schizolobium amazonicum) aged 4 to 6 years. The results showed that: (1) annual incremental growth of 43.88 m3/ha/year with production marketing of 351,03 m^3/ha within 8 years within 8 years. When marketed at annual prices. When marketed at a price Rp. 300.000/m^3, then the average income per year (EAA) / ha of Rp. 7.372.300 (7372,3 US$/ha/thn), while the business scale needed to meet the needs of a farmer's family is at least 45 ha; (2) Another advantage of plantation forest exploitation is that the price of wood is cheaper per m3 and the required forest area is smaller than natural forest exploitation.*

Keywords— Marketing, Parica Wood, Business Scale.

I. INTRODUCTION

The wood processing industry in East Kalimantan Province has recently experienced difficulties in obtaining log raw materials. The productivity of natural forests is decreasing both in terms of quantity and quality. Some of the causes are uncontrolled logging operations, rampant illegal logging, encroachment and conversion of forest land into other areas, as well as fires that occur either naturally due to prolonged drought or non-naturally due to irresponsible human activities.

One of the real impacts on the forest is that it is increasingly difficult to obtain wood from commercial species, and due to the large demand for wood, the production target has shifted by utilizing other types that are less commercial. To reduce this pressure on natural forests, the development of industrial tree plantations (HTI) has begun to flourish. However, it is very unfortunate that those that should be developed in degraded and less productive areas, in fact, not a few are using potential natural forest land under the pretext of land conversion because it is no longer potential. The types of HTI plants developed can still be counted on the fingers and fast growing species are generally selected. The purpose of using wood is still limited as raw material for pulp and paper or light construction, besides that in terms of area area it has not been able to cover the demand for wood raw materials. Several pulp and paper industries are still very dependent on the supply of wood from natural forests by utilizing timber utilization permits (IPK), so that the initial goal of reducing pressure on the remaining natural forests is still far from expectations.

Parica wood (*Schizolobium amazonicum* Huber Ducke) is a lesser-known type of wood from the Leguminosae family, a native plant from Brazil which is widely found throughout the Amazon rainforest. In Indonesia this tree species is still not familiar enough because of its limited existence. From the information obtained so far, this type of parica wood is only found in the Purwodadi Botanical Garden. This type of wood can be classified as fast-growing wood because it has a high diameter increment of 3.68 cm per year at the age of 8 years (Amin et al. 2008), even higher than that of acacia wood (2.4 cm per year). years, age 4 years) (Rossi et al. 2003).

The Paricá (*Schizolobium amazonicum* Huber Ducke) is a viable native species for recuperation of disturbed areas and with a role in the wood market, nationally and internationally. Its rapid growth and adaptation to areas with low nutrient levels allow

it to be optimum in agroforestry systems, being the second plant species used in reforestation in the state of Para (Ruivo, et. al. 2019).

The aim of the research was to find out the long-term business of a Dipterocarpa.sp farming family, in marketing plantation forest production to support the plywood industry in East Kalimantan Province.

II. RESEARCH METHODS

2.1 Time and Location

This research was conducted from January 2021 to June 2021. The research location is PT. Melapi, East Kalimantan Province.

2.2 Materials and tools

The materials used are Company Results Reports and consumable materials such as raffia rope, tree number paper, and others. The tools used in this research were poles, tape measure, machetes, hoes, 1.3 m wooden blocks, cameras, stationery and others..

2.3 Object of research

This research utilized an area of 10,000 m2 planted with Parica (*Schizolobium amazonicum*) aged 4 and 6 years.

2.4 Data collection

The data collected is primary data in the form of plant diameter and height; and secondary data, namely the results of company reports and estimated mathematically.

2.5 Data analysis

According to Ruchaemi (2019), calculating the volume of a log in a stand uses the following formula : V = [πd^2)/4] x h x f (with a dbh of 1.3 m above the ground, and form factor /f = 0.7-0.8) whereas to calculate the annual average volume growth increment of stands (MAI) the following mathematical formulation is used MAI =TV/n**,** where : TV is the total production of parica and waru in a period of n years, and n is the measurement period, while the incremental growth of the current annual average volume of Shorea sp and CAI uses the following formula, namely CAI =ΔTV/Δn, where ΔTV á is the increase in the total amount of parica production over a period of n years, and □n is the increase in the age of the parica.

Cash flow data related to cash out activities in the form of the initial planting process to the harvesting process. Meanwhile, the incoming cash component is the sales of parica wood per m3 which was valid at the time of the research.

Economic analysis in this research uses an investment approach as an analysis of long-term farming levels (Fillius, 2016; Avila.M, 2018 and Gregersen H, 1017 in Andayani W, 2021). This is because the types of commodities applied in the pattern in question are plants with long cycles (rotations), using the following parameters: (1) Payback Period; (2) Net Present Value; (3) Net Benefit Cost Ratio; (4) Internal Rate of Return, and (5) Equivalent Annual Annuity. The formula for each data analysis is as follows:

2.5.1 Payback Periods

$$PP = n_1 + (n_2\text{-}n_1)\left[\frac{a1}{(a1+a2}\right]$$

2.5.2 Net Benefit Cost Ratio (B/C Ratio)

$$Net\frac{B}{C} = \frac{\frac{\sum_{t=1}^{t=n} B_t - C_t}{(1+i)^t}0}{\frac{\sum_{t=1}^{t=n} B_t - C_t}{(1+i)^t}} \quad \rightarrow \quad B_t - C_t > 0 \quad \rightarrow \quad B_t - C_t < 0$$

2.5.3 Net Present Value (NPV).

$$NPV = \sum_{t=0}^{t=n} \frac{B_t - C_t}{(1+i)^t}$$

2.5.4 Internal Rate of Return (IRR)

$$IRR = i_1 + \frac{NPV^+}{NPV^+ - NPV^-}(i_2 - i_1)$$

2.5.5 Equivalent Annual Annuity (EAA)

$$EAA = NPVx\frac{i^+}{i-(1+i)^{-n}}$$

III. Results and Discussion

In theory, an increase in the volume of stands applies the Law of Diminishing Return, where the calculation of projected wood production at the end of the cycle must be carried out in a 'time series' so that the shape of the production growth curve can be identified. The projected volume of Parica wood can be seen in Table 1 below:

Table 1
PT. Melapi Parica Volume in East Kalimantan Province

Age (Year)	n	d	h	F	V	TVst	MAI_{st}	CAI_{st}
		(cm)	(m)		($M^{3)}$	M^3/ha	$M^3/_{Ha/thn}$	$M^3/_{Ha/thn}$
2	1500	10,0	12,0	0,52	0,049	73,48	36,74	
4	1300	15,0	13,0	0,51	0,117	152,23	38,06	39,38
6	1000	21,0	14,0	0,50	0,242	242,33	40,39	45,05
8	900	26,0	15,0	0,49	0,390	351,03	43,88	54,35
10	500	29,0	16,0	0,48	0,507	253,51	25,35	48,76

Note :
TVst : Total Volumes (m^3) standing stock
St : Standing Stock (m^3. $ha.^{-1}$. th^{-1})
tot : Total (m^3. $ha.^{-1}$. th^{-1})
N : Number of trees per hectare

Based on Table 1 above, it shows that Parica plants are expected to be harvested at the age of 8 years and have a total volume of 351,03 m^3 $year^{-1}$, with an average diameter of 26 cm and an average increase in increments 43,88 m^3. ha^{-1} $year^{-1}$

The growth graph of the incremental volume of the average standing stock can be seen in Figure 1 below:

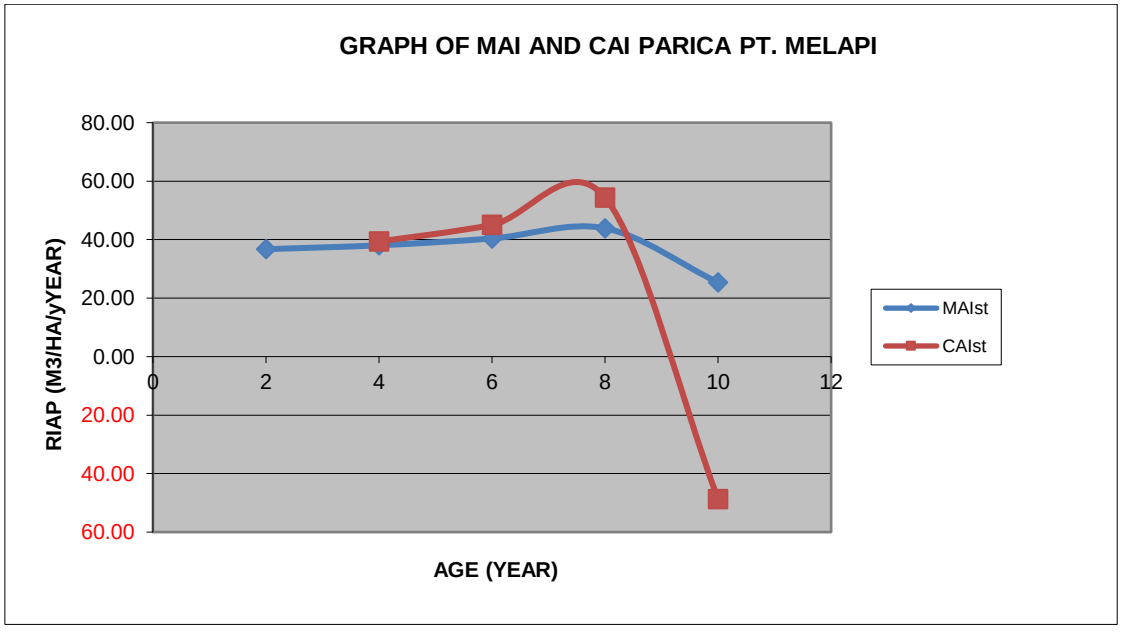

Figure 1: MAI and CAI Parica at PT.Melapi, East Kalimantan Province

Growth increments in average standing stock volume increased from 2 years to 8 years old, whereas after 8 years, MAI and CAI decreased. From the graph above it can also be seen that the reduced population of parica stands per hectare (under 2 years old) is due to natural death. Thinning is done at the age of 4 years 9,80 $m^3.ha.^{-1}$ after the age of 6 there is an intermediate harvest of 35,13 $m^3.ha.^{-1}$ it is estimated that the parica stands will reach the highest increment with the largest log diameter of 26 cm in the 8 year logging year with a marketing volume of 351,03 $m^3.ha.^{-1}$, The tree height is 15 meters and the shorea's annual average increment is 43,88 $m^3.ha.^{-1}.th^{-1}$.

The parica business cash flow which has been processed from start to finish involving all cost and income components is used as the basis for calculating various financial analysis criteria. The parica business at an interest rate of 5% has a Net Present Value (NPV) and Net B/C of Rp. .7,372,300 and 1.29. This statement is reinforced by the analysis of the Internal Rate of Return (IRR) model with a value of 9.5% and an average annual income (EAA) of IDR 1,140,495 and a business scale of 45 ha/family. The results above show that the parica business at an interest rate of 5% is feasible to try because the value is positive and greater than the Minimum Accessibility Rate (*MAR* = 4,5%).

IV. CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusion

1. Decreased standing population per hectare due to natural mortality and thinning. Natural death takes place before the age of 2 years, thinning is done at the age of 4 years, intermediate harvest is done at the age of 6 years and the optimal volume increment is at the age of 8 years because the parica cycle in East Kalimantan is 8 years long.
2. The parica business is feasible to develop, this can be seen from the value of the Internal Rate of Return which is greater than the Minimum Accessibility Rate (MAR = 4.5%), which is 9.5% and the business scale needed to meet the needs of farming families minimum of 45 ha.
3. Another advantage of plantation forestry is that the price of wood is cheaper per m^3 and the required forest area is smaller than that of natural forest.

4.2 Suggestion

Parica plantation forest is feasible to be cultivated and developed because besides the price of wood per cubic meter is cheaper, the required area of land is also smaller than natural forest.

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