



RESEARCH PAPER

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Economic value of agroforestry management sengon (*Paraserianthes falcataria*) and singkong gajah (*Manihot esculenta*) in PT. Inhutani II Pulau Laut

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Abstract

PT. Inhutani II is a holder of Timber Forest Product Utilization Permit (IUPHHK-HT) covering an area of 48,720 hectares in Pulau Laut Kabupaten Kotabaru, South Kalimantan Province. Crop management can develop products produced in the form of wood and allow to be combined with agroforestry agricultural products. The planting of 51.4 hectares planted with the pattern of planting 30% of the land is planted with forestry plants namely sengon while 70% of the land is planted with life crops namely elephant cassava. The pattern of planting will of course affect the revenue. The financial analysis of the product model is needed to give an idea to the company whether the pattern will provide the economic value of a maximum profit picture or vice versa. This study aims to analyze the economic value of agroforestry management of sengon and elephant cassava. By using product financial analysis method know the value of NPV, BCR and IRR. The result of the research got the economic value based on the pattern used to give the profit of IDR. 2.949.051.809, -. Agroforestry design pattern applied in PT. Inhutani II Pulau Laut is a block system with 30% sengon plant composition and 70% elephant cassava in terms of financial benefits and provide more jobs for the surrounding community.

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Introduction

Crop management can develop products produced in the form of wood and allow to be combined with agroforestry agricultural products. In this regard, land use pattern with agroforestry system is one of the best choice in fulfilling the demands of ecological functions and agricultural land needs, especially in the area of IUPHHK-HT PT. Inhutani II Pulau Laut Kalsel. PT. Inhutani II is a holder of Timber Forest Product Utilization Permit (IUPHHK-HT) covering an area of 48,720 hectares in Pulau Laut Kabupaten Kotabaru, South Kalimantan Province.

In line with the government program in the framework of food and energy security, PT. Inhutani II as the holder of IUPHHK-HT utilizes IUPHHK-HT area in order to increase the productivity of forest land owned to develop forestry industry that supports food and energy industry, besides development of production of wood forest products that have been running for this. This is in line with several regulations in the forestry sector that provide opportunities/support for business development in plantation land as Minister of Environment and Forestry Regulation no. P.12/Menlhk-II/2015 and P.17/Menlhk/Setjen/Kum/12/2017 on Industrial Plantation Forest Development and PHPL Perdirjen No. P.3/VI-SET/2015 on the Application of Plant Types and Planting Patterns in Industrial Plantation Activities.

According to Mahendra (2009) pattern of block system agroforestry is the pattern of planting between forest crops and agricultural crops planted side by side like two different plots. The planting of 51.4 hectares planted with the pattern of planting 30% of the land is planted with forestry plants namely sengon while 70% of the land is planted with life crops namely elephant cassava. The pattern of planting will of course affect the revenue.

The financial analysis of the product model is needed to give an idea to the firm whether the pattern will give a maximum profit picture or vice versa that focused the aim of the study.

Materials and methods

Materials

Subjects are Managers, Field Executors and the communities involved, Objects are elephant and sengon cassava plants. While the tools used in this study are stationery, calculators, cameras, laptops, GPS, research location maps, questionnaires, and statistical data processing program.

Methods

The location of the research was conducted in the concession area of Forest Timber Forest Product Utilization Permit (IUPHHK-HTI) of PT. Inhutani II Pulau Laut located in Terangkih Village, West Pulau Laut Sub-district Kotabaru Regency, South Kalimantan Province.

The data has been obtained then checked, compiled and processed in tabulation to obtain information and description of the relationship and cost of the activity by considering the variables that have been determined using statistical data processing software then analyzed according to indicators. Details of data to be processed stages are as follows:

1. Identification of revenue from the sale of elephant cassava and sengon.
2. Identification of investment costs that include the cost of facilities and infrastructure.
3. Identify operational costs consisting of: land preparation costs, seed procurement, planting, maintenance, pest and disease eradication, harvesting and marketing.
4. Identify general and administrative costs such as: salaries and incentives, office operating expenses, and so on
5. Estimation/projection of production and income which includes the set price and production annually.
6. Preparation of cash flow for some period of time so that the business profit/loss is known.
7. After the value of NPV, BCR, IRR is obtained in per hectare, then financial analysis of product as in table 3 to find out the value of NPV, BCR and IRR.

Table 1. Product financial analysis.

Model	NPV		BCR		IRR	
	Sgn	SG	Sgn	SG	Sgn	SG

(Sgn: 30%; SG: 70%)

Note: Sgn = Sengon, SG = Singkong Gajah.

Results and discussion

Cost Analysis

Cost analysis is performed to determine the costs incurred by the company during the period of exploitation. The cost in question is any expenditure for an ongoing activity. Cost analysis can be done by knowing all the cash outflows. Outflow of cash is basically a projection of the costs that will and has been issued during the period of business to be analyzed (Adi Nugroho, Ilham *et al* 2013). Costs incurred in the management of agroforestry of sengon and elephant cassava in PT. Inhutani II Pulau Laut includes taxes and operational costs that include overhead costs, as well as the cost of facilities and infrastructure such as cottage making, land processing costs, seed costs, planting costs, maintenance costs, harvesting costs and protection costs for pests and diseases. Maintenance costs consist of the cost of fertilizing, embroidery, weeding and spraying herbicides. Maintenance for sengon is done until the age of 4 years, while the maintenance cost for cassava elephant is done until the age of 7 months and is done every year. The cost for harvesting is the cost incurred for harvesting cassava. The cost of harvesting of sengon will entirely be borne by the buyer so the company only makes a sale and purchase agreement, thereby no expenditure for the cost of harvesting sengon due to sengon purchased in stand stands. The labor cost for each activity is the wage and daily wage system. Daily wage system at PT. Inhutani II Pulau Laut by UMP South Kalimantan is IDR. 74,800 per day, whilst the wage system depends on the activities of each.

The costs incurred for the five cultivation patterns analyzed in this study will result in different costs. The difference in the amount of costs incurred by the difference in the number of plants in each pattern, so it will affect the cost of seed procurement, planting and maintaining. The price of sengon seeds is IDR. 2.000/seeds while the price for elephant cassava IDR.

429/batang. The average cost and total discounted costs incurred on 5 agroforestry management patterns are shown in Table 2.

Table 2. Costs on the pattern of planting Sengon 30% and 70% Singkong Gajah with an area of 51.4 ha.

No	Pattern (%)		Average cost (IDR/Year)	Total discounted costs (IDR)*
	Sengon	Singkong Gajah		
1	30	70	725,021,369	5,013,579,524

Description: * Total cost discounted for 8 years.

Source: Result of primary data analysis Year 2018.

Based on Table 2 above, the cost on the agroforestry pattern applied by PT. Inhutani II (30% Sengon and 70% Elephant Cassava) obtained an average cost per year of IDR. 725,021,369, - with total discounted cost of IDR. 5,013,579,524,

Revenue Analysis

Revenue analysis can be known through inflow or cash inflows. According to Adi Nugroho, Ilham., *et al* (2013) cash inflows are basically the projected income of money from various sources. The source to be taken into account is the income from the sale of the product. The products resulting from agroforestry activities are sengon wood and elephant cassava. The calculation of cash inflows is calculated from the amount of production of sengon wood and elephant cassava produced. The total discounted production and income generated on the applied pattern is shown in Table 3.

Revenue is obtained from the sales of 4-year-old sengon wood spawning, the sale of sengon wood harvests at the time of 8 years, and the harvesting of elephant cassava every year within a period of 8 years. Revenue of sengon from the results of thinning produced wood 22m³/ha with the sale price of IDR. 156,500 per cubic meter and timber harvesting at 8 year cycle is 180m³/ha with price at research place is IDR. 220,000 per cubic meter. Elephant cassava income is obtained from the harvest every year as much as 40 tons per hectare of cassava, with the price range of cassava at the research site of IDR. 900/kg. The price of sengon wood and elephant cassava is assumed to be unchanged until the end of the analysis over a period of 8 years.

Thus in the pattern applied by the company with the percentage of sengon plants 30% of elephant cassava 70% during the 8-year cycle generates a discounted

income of. IDR. 7.962.631.333. The discounted income on other patterns is shown in Table 3 above.

Table 3. Total and income production on planting pattern 30% Sengon and 70% Singkong Gajah with 51.4 ha area.

No	Pattern (%)		Total Production		Income		Total discounted income (IDR)
	Sengon	Singkong Gajah	Sengon	Singkong Gajah	Sengon	Singkong Gajah	
1	2	3	4	5	6	7	8
1	30	70	3114,84	1.439.200	633,723,060	1.295.280.000	7.962.631.333

Keterangan:

*Revenue of sengon at the end of cycle, ** Total income is discounted for 8 years

Price Sengon/M2 = IDR. 220. 000, -

Price of elephant Cassava/Kg = IDR 900, -

Source: Result of primary data analysis year 2018.

Financial Analysis

Financial analysis is the analysis of a project to know the estimates in funding and cash flow so that it can be known whether or not proper business run by a company. Financial analysis has the purpose to monitor cash flow so as to avoid the investment that is relatively large but does not provide the maximum profit (Gittinger 2008). According to Husnan S, Muhammad S (2000) financial analysis is an analysis that compares the costs and benefits to determine whether a business will be profitable during the life of the business. Financial analysis examines some of the feasibility analysis indicators used, namely Net Present Value (NPV), Benefit Cost Ratio (BCR) and Internal Rate of Return (IRR). NPV may illustrate the advantages of an activity that produces a particular product obtained during the period of exploitation.

The NPV of a project represents the present value of the difference between the benefit and the cost at a given interest rate (Choliq *et al.*, 1994). BCR according to Gittinger (2008) is a comparison between income and expenditure during the period of exploitation while still calculating the prevailing interest rates. IRR according to Gittinger (2008) is an interest rate that yields NPV = 0 (zero) or interest rate that causes the cost equal to the amount of income. The purpose of IRR calculation is to determine the percentage of profit from a business each year.

When conducting financial analysis it is necessary to obtain information related to the revenue earned by the company and the costs incurred during the period of exploitation discussed in the previous revenue and expense analysis. In addition to performing a financial analysis of the pattern agroforestry system implemented in PT Inhutani II Pulau Laut using the interest rate of 7.52% based on the real interest rate prevailing at Bank Indonesia in 2015 at the time of pre-research conducted. Financial analysis on agroforestry pattern applied by PT. Inhutani II Pulau Laut is shown in Table 4.

Table 4. Analysis of cash flow (cash flow) on the pattern of planting Sengon 30% and Singkong Gajah 70%.

No	Pattern (%)		NPV (IDR)	BCR	IRR (%)
	Sengon	Singkong Gajah			
1	30	70	2,949,051,809	1.59	67

Source: Result of primary data analysis Year 2018.

Based on social considerations, then in Table 5 presented if the data on the number of labor patterns analyzed are as follows:

Table 5. Application of labor on 30% planting pattern Sengon and Singkong Gajah 70%.

No	Pattern (%)		Total manpower (HOK)*	Note
	Sengon	Singkong Gajah		
1	30	70	21.732	Agroforestry

Note: * Take into account labor until the end of the cycle.

Source: Result of primary data analysis Year 2018.

Financial analysis of this pattern is a pattern applied by the company (UM Bio Energy & Agroforestry PT Inhutani II Pulau Laut). Based on Table 5 of the calculation of financial analysis obtained NPV of IDR. 2.949.051.809, BCR of 1.59 and IRR of 67%. The value of NPV obtained can categorize this pattern as feasible to cultivate because according to Choliq *et al.* (1990) a business is said to be worthwhile if it has a $NPV \geq 0$. Based on the IRR value indicates that at the interest rate of 67% the project can still be cultivated or in other words the rate of return on capital to the interest rate. Based on the analysis, the company has applied the best agroforestry pattern to run financially.

This agroforestry design is a suitable design to apply, because when applying conventional agroforestry designs financially not necessarily generate revenue such as agroforestry design perblok due to the type of plant. Based on the social considerations in Table 5, this pattern also has a large HOK so as to provide more employment to the surrounding community.

According to Mahendra (2009) the pattern of such plants including the early agroforestry system characterized by the percentage of agricultural crops

greater than the percentage of forest crops. This kind of pattern can not be separated from the landowner's thinking and the level of knowledge owned, but based on the need for food becomes a fundamental consideration of the formation of this system. But ecologically this system can not be expected as a guardian of ecosystem preservation, protection (conservation) of land and water because it has a low type of diversity is susceptible to pest and disease attacks.

Sensitivity Analysis

A project must be observed through sensitivity analysis to determine the uncertainty that will be faced in the business. According to Umar (1997), uncertainty in business leads to the decrease in the ability of a business project to operate in order to generate profits for the company. There are four main problems causing the project in the sensitive agricultural sector to fluctuate, namely price issues, cost increases, implementation delays and yield / production (Gittinger, 2008). In this research, the sensitivity test is done if there is an increase of management cost by 10% and income decrease 10%. The results of sensitivity analysis test with all the patterns are shown in Table 6.

Table 6. Sensitivity analysis on 30% Planting pattern sengon and Singkong Gajah 70%.

Description	Expenditure Type			Conditions		Percentage Change	
	Sgn	SG	Normal	Income dropped (10)	Cost Rise (10)	Income dropped (%)	Cost Rise (%)
1	2	3	4	5	6	7	8
NPV (IDR)	30 %	70 %	2.949.051.809	2.247.344.942	2.551.705.749	-23,79432146	- 13,47369

Note : Sgn = Sengon, SG = Singkong Gajah.

Source: Result of primary data analysis Year 2018.

Based on the results of sensitivity analysis Table 6 shows that with the decrease of income and the increase of production cost by 10%, the pattern applied by PT. Inhutani II Pulau Laut is still feasible to cultivate. It is shown that the pattern still has a positive NPV.

The most affecting conditions on corporate earnings is the decline in product prices. This is shown in the larger normal NPV decline when the 10% revenue

decrease condition is compared with the 10% increase in production cost. If there is a slight change in conditions and conditions that can change the value of NPV then the investment is sensitive to changes in conditions that occur (Adi Nugroho, Ilham., *Et al.*, 2013). Based on the economic analysis PT. Inhutani II Pulau Laut applies agroforestry pattern of sengon and elephant cassava with percentage of 30% sengon and 70% of elephant cassava. The economic advantages of these patterns can be seen in Table 7 below.

Table 7. Economic Value of Agroforestry Pattern of Sengon and Singkong Gajah applied by PT. Inhutani II Pulau Laut.

No	Economic Value	Advantages of Sengon Agroforestry and Elephant Cassava	Note
1	2	3	4
1	Cost Analysis		
	- Average cost (IDR / Year)	725,021,369	
	- Total discounted costs	5,013,579,524	For 8 years
2	Revenue Analysis		
	- Total production of Sengon (m ³)	3114,84	
	- Total production of Singkong gajah (Kg / year)	1.439.200	
	- Revenue of sengon (m ³)	633,723,060	At the end of the cycle
	- Elephant Cassava Revenue (Kg / year)	1.295.280.000	
	- - Total discounted income (IDR)	7.962.631.333	For 8 years
3	Financial Analysis		
	- NPV (IDR)	2,949,051,809	
	- BCR	1.59	
	- IRR (%)	67	
4	Sensitivity Analysis		
	- Normal	2.949. 051.809	
	- Revenue down 10%	2.247.344.942	
	- Cost Rise 10%	2.551.705.749	

Conclusion

From this research can be concluded that the pattern of agroforestry design applied in PT. Inhutani II Pulau Laut is a block system with 30% sengon plant composition and 70% elephant cassava in terms of financial benefits and provide more jobs for the surrounding community. The economic value based on the pattern used gives a profit of IDR. 2.949.051.809.

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