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ECONOMIC FEASIBILITY ANALYSIS OF SAGO PALM DEVELOPMENT IN SUNGAI APIT AND SABAK AUH SUB-DISTRICT, SIAK REGENCY

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ABSTRACT
Sago is a native Indonesian plant that grows in the Indonesian Archipelago Coastal Zone. In Indonesia the centers of sago plantations are spread in Papua, West Papua, Maluku, North Maluku, Riau, Sulawesi and Kalimantan. Sago can be an alternative to meet food and energy needs. The current development of sago is urgent because the fulfillment of food in Indonesia currently only leads to one commodity, namely rice, while the rice diversification program has not gone well.The development of the plantation sector, especially sago plants in Siak Regency, is part of regional development, which aims to increase the production, income, welfare and prosperity of the community in harmony with regional potential so that the plantation sector, especially sago plants, can play an important role to develop regional economy, support regional development, create job opportunities, encourage the development of downstream industries and support the preservation of natural resources and the environment.The availability of food which is not the main food in Siak Regency, especially the sago plant has an area of 11,557.00 ha with production reaching 19,904.00 tons. In realizing the above role in an effort to increase the production of sago plants, it is necessary to have an economic feasibility study of sago plant development activities in the Sungai Apit and Sabak Auh Sub-district, Siak Regency. Economic feasibility analysis aims to assess whether the development of sago plants is feasible or not economically to be developed in the coastal areas of Sungai Apit and Sabak Auh Sub-district, Siak Regency. The analysis used uses the Payback period method, Return on investment, Net present value, and Internal rate of return.
Keywords : *Sago, Economic Feasibility, Return on investment, Net present value, and Internal rate of return*.

INTRODUCTION

Sago is a native plant of Indonesia with one of the planting center locations in Riau. Sago can be used as an alternative to fulfill food and energy needs.

The development of the plantation sector, especially sago plants in Siak Regency, is part of regional development, which aims to increase the production, income, welfare and prosperity of the community in harmony with regional potential so that the plantation sector, especially sago plants, can play an important role to develop regional economy, support regional development, create job opportunities, encourage the development of downstream industries, support the preservation of natural resources and the environment and support food security / fulfillment of food consumption other than rice plants.

In realizing the various roles above, it is necessary to have a study related to the economic feasibility of sago

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plant development activities in the Sungai Apit and Sabak Auh Sub-Districts.

METHODOLOGY

Sago is a native Indonesian plant that grows in the Indonesian Archipelago Coastal Zone (Bakhtiar, 2017). The analysis carried out in the People's Sago Plant Development Study in Coastal Areas in Siak Regency is by conducting a Socio-Economic Analysis which aims to identify the social component in the sago development plan, because this plant is an economic value plant to be developed (Bintoro, 2010). This analysis looks at the desires, readiness, expectations, and wisdom of the community in developing sago plants, so that it can be seen whether the development of sago plants is feasible or not economically to be developed in the coastal areas of Siak Regency. The economic analysis specifically uses the Payback analysis, Return on investment, Net present value, and Internal rate of return.

RESULTS AND DISCUSSION

Residents in the coastal area of Siak Regency still have low interest in planting sago and still less dominant than oil palm and rubber cultivation. Most people replace sago palm trees to oil palm plantation. This is because the palm oil harvesting cycle is faster than the sago plant. But if asked about the benefits of sago farming and oil palm, the community acknowledges that sago farming is more mathematically beneficial. However, the majority of people's livelihoods are farmers and fishermen / sellers of water transportation services so that they will be mutually beneficial in the development of sago plants. Farmers who are encouraged to develop sago plants will be helped by the existence of water transportation services to transport the sago products to the refinery site. Knowledge about the cultivation of local sago plants is quite good, but it needs to be equipped with better cultivation techniques.

a. Payback period

Payback period is a quantitative test used to calculate the period of time needed to repay the investment costs that have been incurred (Husnan, 2005).

In analyzing the payback period, it is carried out on the following assumptions:

1. Analysis is carried out per hectare of sago land.
2. Initial analysis is assumed for 20 years.
3. Land price per hectare = Rp. 15,000,000.00.
4. The cost of clearing land using heavy equipment = Rp. 5,000,000.00.
5. 1 hectare of land can be planted 134 tree seedlings with planting costs of Rp 20,000.00 per tree and seed price of Rp 10,000.00.
6. 1 sago tree can produce 10-13 tual sago, but in this analysis 11 assumptions are taken.
7. Harvesting costs of Rp. 7,300 per tual, assuming a 5% increase per year.
8. Transportation costs for transporting sago to the factory = Rp. 3,000 per tual, assuming a 5% increase per year.
9. The price of sago per tual of Rp. 40,000.00 is assumed to increase by 2.5% per year.
10. The price of fertilizer per kg for the Apit River area is based on the results of the survey, the price of Non-Subsidized Urea is Rp. 5,000.00; Organic Phosphate price of Rp. 1,750.00 TSP price of 5,600.00; the price of KIES is Rp. 1,400. The price of this fertilizer is assumed to increase by 2.5% per year.

The following is an analysis table of investment costs and profits that

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will produce estimates of the payback period from the people's sago plant business per hectare unit.

Table 1
Cost Analysis of the Benefits of the People's Sago Plants

No	Sago /ha Description	Year 0	1	2	3	4	5	6	7	8	9
1	Land Price	15.000.000	-	-	-	-	-	-	-	-	-
2	Land Clearance Cost	5.000.000	-	-	-	-	-	-	-	-	-
3	Seed Price (10thousand)	1.430.000	-	-	-	-	-	-	-	-	-
4	Planting Wages	2.860.000	-	-	-	-	-	-	-	-	-
5	Land Maintenance	-	1.500.000	1.575.000	1.653.750	1.736.438	1.823.259	1.914.422	2.010.143	2.110.651	2.216.183
7	Urea Fertilizer	-	512.500	787.969	1.076.891	1.379.766	1.697.112	2.319.387	2.971.714	3.046.007	3.122.157
8	Organic Phosphate Fertilizer	525.000	-	-	-	482.918	-	811.785	-	1.066.103	-
9	TSP Fertilizer	-	574.000	882.525	1.206.118	-	1.900.766	-	3.328.320	-	3.496.816
10	KCl Fertilizer	-	281.875	577.844	888.435	1.517.743	1.555.686	2.551.326	3.268.886	4.020.730	4.808.122
11	KIES Fertilizer	-	-	-	45.229	61.814	79.199	129.886	166.416	204.692	244.777
12	Harvesting Wages	-	-	-	-	-	-	-	-	14.195.542	10.185.301
13	Transportation Cost to the Factory	-	-	-	-	-	-	-	-	9.722.974	6.976.234
A	Total Cost	24.815.000	2.868.375	3.823.338	4.870.422	5.178.678	7.056.022	7.726.806	11.745.480	34.366.698	31.049.592
	Sago Price (11 tual /tree)	-	-	-	-	-	-	-	-	76.661.910	55.004.921
B	Total Benefits	-	-	-	-	-	-	-	-	76.661.910	55.004.921
C	Net Profit	(24.815.000)	(2.868.375)	(3.823.338)	(4.870.422)	(5.178.678)	(7.056.022)	(7.726.806)	(11.745.480)	42.295.213	23.955.329
D	Net Profit (Cumulative)	(24.815.000)	(27.683.375)	(31.506.713)	(36.377.135)	(41.555.813)	(48.611.835)	(56.338.641)	(68.084.121)	(25.788.908)	(1.833.579)
	Payback Period (Year)	-	-	-	-	-	-	-	-	-	-

Source: Analysis of researchers, 2017

(Continued analysis of the costs of the benefits of sago plants)

No	Sago /ha Description	Year 10	11	12	13	14	15	16	17	18	19	20
1	Land Price	-	-	-	-	-	-	-	-	-	-	-
2	Land Clearance Cost	-	-	-	-	-	-	-	-	-	-	-
3	Seed Price (10thousand)	-	-	-	-	-	-	-	-	-	-	-
4	Planting Wages	-	-	-	-	-	-	-	-	-	-	-
5	Land Maintenance	2.443.342	2.565.509	2.693.784	2.828.474	2.969.897	3.118.392	3.274.312	3.438.027	3.609.929	3.790.425	2.443.342
7	Urea Fertilizer	3.280.217	3.362.222	3.446.278	3.532.435	3.620.745	3.711.264	3.804.046	3.899.147	3.996.625	4.096.541	3.280.217
8	Organic Phosphate Fertilizer	-	-	-	-	-	-	-	-	-	-	-
9	TSP Fertilizer	3.673.843	3.765.689	3.859.831	3.956.327	4.055.235	4.156.616	4.260.531	4.367.044	4.476.221	4.588.126	3.673.843
10	KCl Fertilizer	5.051.534	5.177.822	5.307.268	5.439.949	5.575.948	5.715.347	5.858.230	6.004.686	6.154.803	6.308.673	5.051.534

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1 1	KIES Fertilizer	257.169	263.598	270.188	276.943	283.866	290.963	298.237	305.693	313.335	321.169	257.169
1 2	Harvesting Wages	10.700.932	15.669.222	11.242.667	16.462.477	11.811.827	17.295.890	12.409.801	18.171.494	13.038.047	19.091.426	10.700.932
1 3	Transportation Cost to the Factory	7.329.406	10.732.344	7.700.457	11.275.669	8.090.292	11.846.500	8.499.864	12.446.229	8.930.169	13.076.319	7.329.406
A	Total Cost	32.736.442	41.536.406	34.520.473	43.772.273	36.407.812	46.134.971	38.405.020	48.632.321	40.519.130	51.272.679	32.736.442
	Sago Price (11 tual /tree)	57.789.545	84.620.405	60.715.140	88.904.313	63.788.844	93.405.094	67.018.155	98.133.727	70.410.949	103.101.746	57.789.545
B	Total Benefits	57.789.545	84.620.405	60.715.140	88.904.313	63.788.844	93.405.094	67.018.155	98.133.727	70.410.949	103.101.746	57.789.545
C	Net Profit	25.053.103	43.083.999	26.194.668	45.132.040	27.381.033	47.270.123	28.613.134	49.501.406	29.891.819	51.829.067	25.053.103
D	Net Profit (Cumulative)	64.342.390	107.426.388	133.621.056	178.753.097	206.134.130	253.404.252	282.017.386	331.518.792	361.410.612	413.239.679	64.342.390
	Payback Period (Year)	10 years										

Source: Analysis of researchers, 2017

From the results of the cost benefit analysis above, it can be obtained that the Sago Plant Business is able to repay the investment because the net profit (cumulative) in the 10th year has reached a value (positive) of Rp 39,289,287.00. Therefore, **the Payback Period occurs in the 10th year** of the planting of the people's sago.

b. Return on investment

Return on investment is the amount of profit that can be obtained (in%) over a predetermined period of time to run the project (Rangkuti, 2014). To calculate, the following formula is used:

$$ROI = \frac{\text{Total Benefit} - \text{Total Cost}}{\text{Total Cost}}\ x\ 100\%$$

$$ROI = \frac{(1.000.097.688) - (586.857.989)}{(586.857.989)}\ x\ 100\%$$

$$ROI = 69{,}71\%$$

The ROI from the analysis of sago cultivation is **71.42%** positive, so ROI is considered **feasible**.

c. Net present value

There are several terminologies that need to be addressed, including:

1. Present Value: The present value of the acquisition (money) that will be obtained in the coming year.
2. Net Present Value: Deviation between income and expenditure per year.
3. Discount Rate: Numbers used to discount the revenue that will be obtained in the coming year are the present value. To calculate this discount rate, the following formula can be used:

$$d = 1/(1+i)^t$$

where :

d = discount rate
i = Interest rate
t = year

NPV can be calculated by using the following formula:

$$NPV = \sum \frac{(B_t - C_t)}{(1+i)^t} - K_0$$

Where :
Bt = Benefit in the year of-t
Ct = Cost in the year of -t
i = Specified interest rate
t = year
K_0=Initial investment of year 0 (before project starts)

Criteria :
NPV > 0 Feasible
NPV = 0 Indifferent

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NPV < 0 Unfeasible

Table 2
NPV Analysis of Sago Plant

No	Sago /ha Description	Year 0	1	2	3	4	5	6	7	8	9
A	Total Cost	24.815.000	2.868.375	3.823.338	4.870.422	5.178.678	7.056.022	7.726.806	11.745.480	34.366.698	31.049.592
B	Total Benefit	-	-	-	-	-	-	-	-	76.661.910	55.004.921
C	Net Profit	(24.815.000)	(2.868.375)	(3.823.338)	(4.870.422)	(5.178.678)	(7.056.022)	(7.726.806)	(11.745.480)	42.295.213	23.955.329
D	Net Profit (Cumulative)	(24.815.000)	(27.683.375)	(31.506.713)	(36.377.135)	(41.555.813)	(48.611.835)	(56.338.641)	(68.084.121)	(25.788.908)	(1.833.579)
	Discount Rate 15%	1	0,870	0,756	0,658	0,572	0,497	0,432	0,376	0,327	0,284
	NPV on Disc. Rate 20%	(24.815.000)	(2.494.239)	(2.890.992)	(3.202.382)	(2.960.926)	(3.508.090)	(3.340.511)	(4.415.561)	13.826.380	6.809.600

Continued NPV Analysis of Sago Plant

No	Sago / ha Description	Year 10	11	12	13	14	15	16	17	18	19	20
A	Total Cost	39.420.053	32.736.442	41.536.406	34.520.473	43.772.273	36.407.812	46.134.971	38.405.020	48.632.321	40.519.130	51.272.679
B	Total Benefit	80.542.920	57.789.545	84.620.405	60.715.140	88.904.313	63.788.844	93.405.094	67.018.155	98.133.727	70.410.949	103.101.746
C	Net Profit	41.122.866	25.053.103	43.083.999	26.194.668	45.132.040	27.381.033	47.270.123	28.613.134	49.501.406	29.891.819	51.829.067
D	Net Profit (Cumulative)	39.289.287	64.342.390	107.426.388	133.621.056	178.753.097	206.134.130	253.404.252	282.017.386	331.518.792	361.410.612	413.239.679
	Discount Rate 15%	0,247	0,215	0,187	0,163	0,141	0,123	0,107	0,093	0,081	0,070	0,061
	NPV on Disc. Rate 20%	10.164.944	5.384.995	8.052.707	4.257.366	6.378.451	3.364.978	5.051.511	2.658.901	3.999.967	2.100.358	3.166.770

Source: Analysis of researchers, 2017

$NPV = NPV_1 + NPV_2 + NPV_3 + NPV_4 + NPV_4 + NPV_5 + NPV_6 + NPV_7 + NPV_8 + NPV_9 + NPV_{10} + NPV_{11} + NPV_{12} + NPV_{13} + NPV_{14} + NPV_{15}$

NPV = 27.589.225

NPV > 0, so the sago plant business is considered feasible

d. Internal rate of return

It is a method that considers the time value of money. In the NPV method, the desired interest rate has been set before, while the IRR method actually calculates the interest rate (Rangkuti,2014). The interest rate that will be calculated is the interest rate which will make the present value of each proceeds discounted at the interest rate equal to the present value of the initial cash outflow (project value). In other words, this interest rate is the exact interest rate of the investment worth break-even, which is not profitable and also not detrimental. This breakeven interest rate is referred to as the Internal Rate of Return (IRR), if the ratio between IRR and the rate of return (rate return), if the IRR is greater than the rate of return then the investment is concluded to be profitable. The calculation of IRR can be formulated as follows:

$$IRR = i_1 + \frac{(i_2 - i_1)\,NPV_1}{NPV_1 - NPV_2}$$

where,

i1 = The first interest rate that causes a positive value of NPV

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i2 = The second interest rate that causes a positive value of NPV

NPV1 = Positive NPV with interest rate i_1

NPV2 = Positive NPV with interest rate i_2

Tabel 3
Analisa Internal Rate Ratio Usaha Tanaman Sagu

Analysis of Internal Rate of Sago Plant Business Ratio

Sago /ha		Year									
No	Description	0	1	2	3	4	5	6	7	8	9
A	Total Cost	24.815.000	2.868.375	3.823.338	4.870.422	5.178.678	7.056.022	7.726.806	11.745.480	34.366.698	31.049.592
B	Total Benefit	-	-	-	-	-	-	-	-	76.661.910	55.004.921
C	Net Profit	(24.815.000)	(2.868.375)	(3.823.338)	(4.870.422)	(5.178.678)	(7.056.022)	(7.726.806)	(11.745.480)	42.295.213	23.955.329
D	Net Profit (Cumulative)	(24.815.000)	(27.683.375)	(31.506.713)	(36.377.135)	(41.555.813)	(48.611.835)	(56.338.641)	(68.084.121)	(25.788.908)	(1.833.579)
	Discount Rate 15%	1,000	0,826	0,683	0,564	0,467	0,386	0,319	0,263	0,218	0,180
	NPV on Disc. Rate 20%	(24.815.000)	(2.370.558)	(2.611.391)	(2.749.226)	(2.415.892)	(2.720.402)	(2.461.998)	(3.092.952)	9.204.671	4.308.576

(Continued analysis of Internal Rate of Sago Plant Business Ratio)

Sago /ha		Year									
No	Description	10	11	12	13	14	15	16	17	18	19	20
A	Total Cost	39.420.053	32.736.442	41.536.406	34.520.473	43.772.273	36.407.812	46.134.971	38.405.020	48.632.321	40.519.130	51.272.679
B	Total Benefit	80.542.920	57.789.545	84.620.405	60.715.140	88.904.313	63.788.844	93.405.094	67.018.155	98.133.727	70.410.949	103.101.746
C	Net Profit	41.122.866	25.053.103	43.083.999	26.194.668	45.132.040	27.381.033	47.270.123	28.613.134	49.501.406	29.891.819	51.829.067
D	Net Profit (Cumulative)	39.289.287	64.342.390	107.426.388	133.621.056	178.753.097	206.134.130	253.404.252	282.017.386	331.518.792	361.410.612	413.239.679
	Discount Rate 15%	0,149	0,123	0,102	0,084	0,069	0,057	0,047	0,039	0,032	0,027	0,022
	NPV on Disc. Rate 20%	6.112.652	3.077.673	4.374.129	2.197.875	3.129.607	1.569.167	2.238.828	1.119.990	1.601.330	799.154	1.145.160

Source: Analysis of researchers, 2017

NPV 1 (+) = 24..589.225
NPV 2 (-) = - 2.358.607

So, it is obtained that IRR = 10.53%, IRR> 15%.
This means that this project will generate profits at an interest rate of 10.53% per year. If the desired return rate is 15% per year, then the IRR is> 15%, so the project can be accepted.

Table 4
Economic Feasibility Analysis Results

No	Analysis Component	Results	Description
1	Payback Period	10 years	
2	Return On Investment	71,42 %	ROI > 0, stated feasible
3	Net Present Value	27.589.225	NPV > 0, stated feasible
4	Internal Rate Ratio	10,53 %	IRR > 15%, stated feasible

Source: Analysis of researchers, 2017

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CONCLUSIONS

In general, the cultivation and utilization of sago provide more benefits, both at the level of economic improvement, social welfare, the supply of national food commodities, to the provision of employment and business. And more importantly, if these efforts are carried out consistently, we can contribute significantly to the fulfillment of world food. For national food, certainly the use of sago as a carbohydrate food commodity also contributes to reducing dependence on rice which is currently absorbed by almost 80% by the Indonesian people, so that food diversification programs can be implemented by utilizing local food resources.

In addition to the nature and nutritional content it has, sago can be relied upon as a food diversification commodity considering the price that is still affordable by the wider community. The price of sago is easier and cheaper to access by the lower class of society compared to rice. In this context a policy can be consolidated, that the sago commodity is very promising as a future national food source.

It is important to keep in mind that there is no single food that contains all the nutrients that the body needs in sufficient quantities. If you want to fulfill all the nutrients you need, there is no way except to increase the diversity of food that is eaten every day. With a combination of diverse consumption, the nutritional elements of food will complement each other. One nutrient deficiency from food ingredients will be covered by other food ingredients. Diverse food consumption will be better for the health of the body, compared to consumption patterns that rely solely on certain single foods. According to some experts, sago starch is even known to contain long-lasting starch resistant intestines and is beneficial for microbes in the intestine.

Indeed, it is time for us to use local resources to support national food policies. By utilizing local raw materials, we should have followed the mandate of Presidential Regulation No. 22 of 2009 concerning the policy of accelerating the diversification of food consumption based on local resources. Hopefully our tireless efforts in cultivating food diversification, especially sago commodities, provide a meaningful legacy for future generations of Indonesia in creating food security and independent food sovereignty.

To improve the management system for the empowerment of sago farmers / processors in the future, it should be noted that the development of sago natural resources must be planned properly and integrated by the central and regional governments through the implementation of policies in the food sector (diversification of non-rice food sources) and supported by allocating funds for the development through APBN and APBD, involving other stakeholders including the community as the subject of the program. The sago natural resource management system must pay attention to aspects of economic, social and ecological sustainability as well as various local wisdoms in order to protect and prevent over-exploitation which results in environmental degradation.

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