SAGO PALM 13: 1－8 (2005)

A Study on Sago Agribusiness in Riau Province, Indonesia

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Abstract Sago has long been considered to be a potential food crop in Indonesia, but the government and people have given most of their attention to rice, resulting in inadequate attention to the development and farming of sago in the province of Riau, Indonesia. A study to analyze the potential and prospects for the development of sago agribusiness was conducted at Tanjung village, one of the sago production centers in Riau. The results show that sago agribusiness has a strong regional potential as an alternative crop for food and as a base material for agro-industries. The development of sago agribusiness would support food diversification and agro-industries and, consequently, lead to increased economic activity of all of those involved.

Key words: Agribusiness, Agro-industry, Food diversification, Sago, *Tual*

インドネシア，リアウ州におけるサゴヤシのアグリビジネスに関する研究

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インドネシアにおいてサゴヤシは長い間潜在的な食料作物と考えられてきた．しかし，政府や人々は多くの関心をイネに寄せ，結果として，リアウ州ではサゴヤシの発展や農法については十分な関心が寄せられてこなかった．そこで，サゴヤシのアグリビジネスの発展に対する可能性と将来性を分析するための研究が，リアウ州におけるサゴヤシ生産の中心の１つであるTanjung村で行われた．その結果から，サゴヤシのアグリビジネスは食料に対する代替作物の１つとして，また，アグロインダストリーにおける１つの基盤的な作物として，地域的に強い可能性があることがわかった．サゴヤシのアグリビジネスの発展は食料の多様化およびアグロインダストリーを促進し，サゴヤシ関連産業従事者の経済的活動の発展をもたらすだろう．

キーワード：アグリビジネス，アグロインダストリー，食の多様化，サゴヤシ，*Tual*

Introduction

Sago palm is a plant that is usually cultivated traditionally and used as a source of food by people on the coast of Riau. However, the politics of rice, a staple in Indonesia, has fostered the perception among people in Indonesia that the consumption of substitute foods indicates poverty or a low quality of life. As a result people give little attention to sago as a food source

In 2001, the production of sago in Riau was 109,133 tons, which comes from 52,759 ha of sago stands. Traditional community farms, with 52,792 ha, dominate sago farming. This is made up of 16,173 ha farming families in Bengkalis (42,450), Indragiri Hilir (5,731), Kampar (1,409), Pelalawan (1,371), Riau Islands (958),

and Siak (425) and 415 ha of private plantations (Dinas Perkebunan Provinsi Riau, 2001). According to the P.T. National Timber and Forest Products Association, in these private plantations, sago is cultivated in an area of 9,000 ha from the 18,000 ha initially planned. Sago plantations in Riau are primarily managed by native farmers and not intensively cultivated. The sago plant grows naturally and produces starch; however, if it is cultivated and properly managed, it could have a high economic value. The potential for the area is still great because only 25% of it in Bengkalis has been used for sago. The steps that can be taken to increase the farmer's income increases in factory capacity and new plants would lead to increased economic activity for farmers and others.

As mentioned earlier, the sago commodity has the potential to be developed into a source of food in Riau as well as an agro-industry basic material. Therefore, the Riau government and community should further develop their strategy for increasing agro-business with sago. Satari and Haryanto (1992) reported that sago is potentially a core agribusiness and food source in Riau.

According to Saragih (2002), the implementation of an agribusiness system would industrialize agriculture in villages because such a system would connect with sub-systems, such as banking, transportation, trade, and education. Such industrial linkages would be good for the development of villages and rural communities. The above-mentioned agribusiness system would accelerate agricultural development.

The development of the sago commodity should be synchronized with human and natural resources on the basis of territorial ecology to create a friendly market mechanism. Sago development and agribusiness have generally been inefficient, and the productivity has been low in Riau. Sago cultivation has not been intensive because the production facilities and technologies are limited. Furthermore, there are problems associated with the marketing of sago. Sago farmers have not been fairly compensated for their product by starch processors.

Based on the points raised above there is need for research on sago production because there seems to be a lot of potentials, problems and opportunities for sago development that has not been exploited effectively. In view of all the issues raised above, an integrated approach to the development of sago is required.

This research is focused on analyzing the potentials, opportunities, and problems for the development of sago agribusiness in Riau. We believe the research will lead to an accelerated development of sago-related agribusiness in Riau.

Methods

This research has been conducted by surveying the Tanjung village of the Tebing Tinggi sub-district of the Bengkalis district, Riau Province, Indonesia. The area was selected because it is the main producer of sago in Riau. This research included samples from 79 sago farmers, 1 sago-starch plant owner, and 5 merchants, all selected by purposive sampling.

Primary and secondary data were used in this research. From the primary data, information on the ownership status, land utilization, uses and price for production factors, and marketing costs was obtained. From the information obtained, an analysis was conducted on the net income for sago cultivation, the added value of sago flour (starch) as an agro-industry commodity, and the costs and marketing margins of rice and rice flour.

To calculate the efficiency of sago agriculture and agro-industry, the formula used is (Hernanto, 1995):

$$RCR = \frac{TR}{TC}$$

Note: RCR = Return Cost Ratio, TR = Total Revenue (Rp./production process), TC = Total Cost (Rp/production process), Rp = Rupiah

Analysis of sago flour (starch) agro-industry added value uses the formula (Soeharjo, 1991):

$$NT = NPJ - (NBB + NBP)$$

Note: NT = Added value (Rp./kg); NPJ = Value of final product (Rp./kg); NBB = Value of base material (Rp./kg); NBP = Value of supporting material (Rp./kg)

The efficiency of sago starch with regard to product marketing is calculated using the formula (Soekartawi, 1993):

$$EP = \frac{TBP}{TNP} x100\%$$

Note: EP = Marketing efficiency (%); TBP = Total marketing cost (Rp./Kg); TNP = Total production value (Rp./kg)

Results and Discussion

1. Sago cultivation

The sago plant in Riau has been cultivated traditionally for a long time, but, until now, it has not been cultivated intensively, nor have modern cultivation techniques been used. The land for sago farming is mainly inherited from family members. Some of it is purchased from the last generation of the family, and the rest is obtained by developing new lands (conversion from forest) with an extensive pattern of sago plantations. This method is shown in Table 1.

Sago farms come from six sources. Most are inherited (45.5%), and some come from land development (27.8%). Land ownership is related to household income and the origin of the land. Sago farms vary from 1.87 to 44.64 ha with an average of 9.53 ha. Of that land, 75.8% (7.2%) is used for sago stands, and the rest for gardens and plantations. About 40.51% of farmers cultivate sago exclusively, while the rest diversify the crops. The diversification includes: sago, rubber, coconut and coffee.

Sago farmers own vast amounts of land compared to the average land ownership in Riau. According to the results of the 1983 and 1993 agriculture censuses, the average household farm was 2.633 ha and 2.163 ha, respectively. Family farm ownership is estimated to decline to 1.6 ha in 2003.

The average yearly income of Riau sago farmers is Rp. 11,464,728 (Table 2). From this amount, 83.11% comes from agriculture. From this, 69.16% is from sago (Table 2), and the rest, 16.89%, comes from non-farming activities, such as labor. This shows that sago farming is the backbone of the farmers' economy. From that income, sago farmers can save 27.79%, but the savings are usually used for activities and needs other than intensifying sago maintenance. The greatest expense for the average household is food (67.43%).

Most sago farmers usually engage in other economic activities to meet their daily needs. This is because the income from sago production is usually over a three-to-six-month period. The implementation of an agribusiness system would result in regular income for the farmers throughout the year.

Table 1. Average farmland ownership by farmer's sample and its source.

No	Source of farmland ownership	Type of source (%)[1]	Revenue (Rp/HH/year) [2]	Farmland (ha)	Land for sago (ha)	Other uses of land (ha)[3]
1	Purchasing and developing forest	7.6	34,481,864	25.1	17.9	7.2
2	Purchasing and inheriting	2.5	27,617,901	10.1	10.0	0.1
3	Purchasing	6.3	10,033,613	7.9	5.4	2.5
4	Developing forest	27.9	11,293,211	9.6	7.4	2.1
5	Developing forest and inheriting	10.1	7,547,040	9.3	7.2	2.2
6	Inheriting	45.6	6,918,246	6.1	4.5	1.6
Total		100.0	11,464,728[4]	9.5[5]	7.2[5]	2.3[5]

Source: Nafis, 2002, modified.

Note : [1] The total is 79 farmer responses.

[2] Average exchange rate for 2002, Rp 8,940.00/ 1 US$ (Bank Central of Indonesia)

[3] Other uses of land represent the difference between farmland and land for sago and use for garden, rubber, coconut, and coffee plantations.

[4] Average revenue by farmers

[5] Average land ownership by farmers

Table 2. Average of annual household revenue and expenditures of sago farmers in sub-district Tebing Tinggi

No	Source	Total (Rp)	share (%)
A	**REVENUE**	**11,464,728**	**100.00**
1	Agriculture (a+b+c+d+e)	9,528,642	83.11
	a. Sago	7,929,269	69.16
	b. Rubber	1,457,468	12.71
	c. Coconut	122,613	1.07
	d. Coffee	12,076	0.11
	e. Animal husbandry	7,216	0.06
2	Non-Agriculture (a+b+c+d+e+f+g)	1,936,086	16.89
	a. Labor	1,341,871	11.70
	b. Home industry	70,671	0.62
	c. Commerce	121,519	1.07
	d. Fishery	41,773	0.36
	e. Children allowance	27,848	0.24
	f. Salary at boarding school (*Madrasah*)	91,898	0.80
	g. Transportation (*Ojek*)	240,506	2.10
B	**EXPENDITURES AND SAVINGS**	**11,464,728**	**100.00**
1	Expenditures (a+b)	8,278,463	72.21
	a. Food [67.43]	5,582,399	
	b. Non-food [32.57]	2,696,064	
2	Savings	3,186,265	27.79

Source: Nafis, 2002, modified.

Note: The number in bracket [ ] represents the percentage with regard to the expenditure (100.00%).

The main reason for the cultivation of sago is the economic benefit received by the farmers. An analysis of sago cultivation income is shown in Table 3. The production cost of sago cultivation is relatively small and includes mainly plant maintenance. An analysis of the cultivation process is needed to estimate the total crop revenue The ratio between total revenue and production cost equals the sago cultivation efficiency. The return cost ratio of sago cultivation is Rp. 11.24, which means that every Rp. 1 invested in the cultivation of sago will produce a profit of Rp. 10.24. These figures indicate that sago cultivation is profitable and has the potential to increase.

Sago cultivation is not yet done intensively, this is because the use of cultivation technology such as the use of seedlings, land work, pest control and application of fertilizers is still limited. Other reasons for the low use of cultivation technology are the lack of production facilities. Other factors that may become obstacles to the development of an agribusiness sago plantation are funding, organization, marketing, and management. That is why efforts are needed to improve the use of cultivation technology with the support of production facilities, counseling, funding, organization, and quality sago seeds in large amounts that would be gained from tissue culture.

The conditions required for a viable sago cultivation are vast lands, suitable climates, and experience in working with limited management and economy. These conditions would serve as the foundation for sago production, and they would also lead to opportunities for investment in a more diversified market. Land is still available for sago development, which means that there are opportunities for farmers to earn more in the sago agribusiness.

2. Sago agro-industry

As a source of carbohydrates, sago starch is equal to other food crops, such as rice. Carbohydrates come from plant starch in foods. Sago starch is in the trunk and pith and obtained in a separation process.

Sago agro-industry involves the processing of sago into flour. This is done traditionall means, semi mechanically, or by using modern tools. Principally, the stage of sago processing includes harvesting,

rasping, filtering, sedimentation, drying, stirring, washing, sedimentation, drying, packaging, and storing.

To obtain starch from sago, a sago log, called *tual* in Indonesian, with an average length of 105 cm and 47 cm diameter, is used. From observation, 1,225 *tuals* would produce an average of 26,000 kg of clean sago starch. Each sago stand can produce an average of 10 *tuals*, so those logs come from about 123 sago plants, which requires 5 ha of farmland.

One of the problems of sago agro-industry is the selection of ready-harvest plants. It is not easy to search for and select a ready-harvest plant traditionally because of irregular planting times, planting distance, and poor maintenance. A ready-harvest plant with a considerable amount of starch would normally be 10 − 12 years of age, and harvesting should be done just before flowering. When harvesting is done after a plant flowers, the plant's starch contents decline, and the plant dies. That is why the timing of harvest will greatly influence starch production.

? **Sago trunk**

To retrieve fine quality sago starch, the harvested trunk has to be immediately transported to the processing plant. Transportation is still an obstacle in moving sago logs from the farmland to the processing plant. The *tuals* are usually transported through rivers by joining them together, forming rafts, and pulling them with powerboats.

? **Supply of raw materials (*tual*)**

The base material for the small-scale sago-starch industry usually comes irregularly from stands that are not well kept and grow wildly on farmlands. Sago-starch agro-industry that owns their own plantation has a better-organized farm; as a result, the *tuals* needed for production can be predicted and obtained on a continuous basis.

? **Process for the extraction of starch**

The first process of the sago-starch agro-industry is the peeling of the skin, which is done manually. The inside of the log is then rasped and grinded. Squeezing and filtering are the subsequent processes. The water is then run into sedimentation tubs. The process is usually done twice to obtain a clean sediment before the product is ready for consumption.

? **Quality of starch**

The quality of sago starch is one of the main obstacles in the processing of Riau sago. The low quality of sago starch is related to the water quality used in the process. The processing site in Riau is located on peat land, where the water is brownish. That is why the quality of sago starch produced at these plants cannot fulfill the needs of large-scale downstream industries.

? **Waste problem**

The waste from starch production also needs serious attention because it has resulted in complaints from the community, especially, in the reduction of fish caught in the rivers. For large-scale sago-starch plants, there are ways to use the waste as feed for starch-drying boilers; however, for small-scale starch processing, the unprocessed waste is typically thrown into the river.

3. Sago marketing

Choosing a marketing line is based on the ease of entering the market or profitability, so producers can determine to whom their products should be sold. Good marketing practices are important, especially distribution. An efficient marketing line with a wider market reach would give consumers an alternative product. The sago product market structure from producers to consumers is shown in Figure 1. The picture shows that sago trees are sold to plant owners directly or through collectors. These business activities are implemented on the basis of a social-traditional relationship. The output of a plant, i.e., sago starch, is sold to the food industry through wholesalers in Cirebon (Java Island), which is the only market center. The starch is used to produce noodles in the food industry, and the noodles are sold to consumers directly or through retailers.

There is the strong socio-economic imbalance

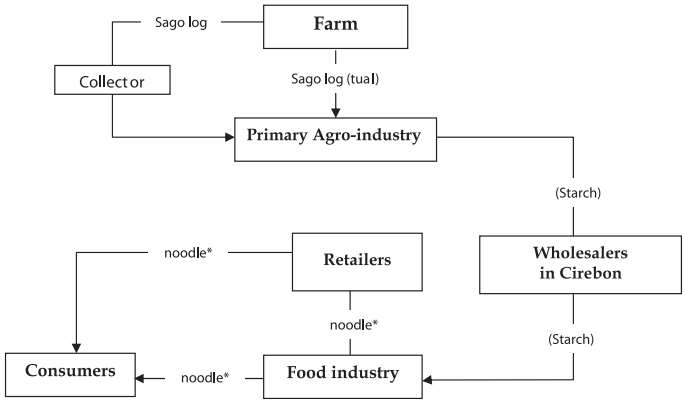

Figure 1. Market chain of sago log (tual) and starch of sago in Riau noodles;* noodles and other products, such as chips, sago pearl, and biscuits.

between farmers with low income and plant owners. The farmers need to fulfill their immediate household needs and this affects their bargaining power in determining the selling price of their products. Many farmers depend on these well-funded plant owners.

Principally, there are two methods for payment. One is cash, in which a number of harvest-ready trunks with a height of 9 − 11 m (10 *tuals*/logs) are paid for directly. The other is a low-price advance payment, called "*ijon*" or "*pajak*," in which the harvest takes place 1 to 2 years later. When farmers invest in their stands in these manners, the harvest is done by the buyer or plant owner and then reported to the farmer. The second method has disadvantages since the selling price is lower than the selling price at harvest time.

Farmers with sago trunks harvest ready to be sold by cash payment is only 11.4% with selling price Rp. 70,000/trunks, 31.6% farmer sells with unripe sago trunks according to *ijon* method with harvest in 1-2 years later has the selling price Rp. 50,000 while 57% sago farmer sells their unripe sago trunks by *ijon* method with a price Rp. 30,000 and harvest in 2-4 years later.

The pricing of trunks and sago starch is done by estimating the purchase price that traders in Cirebon will pay. Fluctuations in the price of sago starch would determine the price paid for a log. The sago starch traders in Cirebon have more bargaining power than plant owners and farmers in Riau. This is because the profit is not distributed fairly and evenly. The weak bargaining power in the monopsony market resulted in a small percentage paid to sago owners. That is the reason why a stable, dynamic, and responsive market is needed to create a fair marketing system.

Sago-starch traders are generally Chinese and are members of the Harmonis Cooperative (strong elite sago entrepreneurs); the market is influenced by a cartel. This results in an insular trade with small profits. That is the reason why a wider sago-starch market is needed to increase the share of the income that goes to the farmer.

In the marketing of sago, market information is needed to control the price so that the disadvantages reported above can be overcome. The large difference in the profit margin among farmers, plant owners, and starch traders is caused by the lack of access that farmers have to market information, which weakens their bargaining power (Nainggolan, 2000).

Small boats (called "*pompong*") are used to transport sago starch from the plant to the harbor; however, these boats can only travel over short distances. Dock crews at Selat Panjang harbor load the ships that transport the starch to Cirebon. During the loading, some weight is lost. This is caused by improper handling, the reduction of moisture content from the sago starch, and the difference between weighing tools used. The losses amount to 294 kg (1.14%) or Rp. 367,500.

Other costs in the marketing of sago include administration fees and a marketing commission of 4% of the price of the starch. Payment occurs seven days from the day the starches are received in Cirebon. In the marketing of the sago commodity, there is a need for an equal compensation to every party related in the activity (Mubyarto, 1995). The efficiency of sago starch marketing is 9.54% with the selling price of Rp. 1,250, as shown in Table 3. It means that for every 100 rupiah of sago (starch) sold

Table 3. Farming, agro-industry, and marketing analysis of starch to Cirebon based on 26,000 kg per production period

No	Description	Total	Prive (Rp/unit)	Cost/revenue (Rp)	Share (%)
I. FARMING					
A	Production costs			**779,559**	
	1. Production (tree)	122.5			
	2. Price (Rp/tree)		71,500		
B	Revenue, gross revenue (Rp)			**8,758,750**	
C	Net revenue (Rp)			**7,979,191**	[91.10]
D	Return cost ratio	**11.24**			
II. AGRO-INDUSTRY OF STRACH					
A	**Production and marketing cost (1+2)**			**18,155,960**	**100.00**
	1. Production costs			15,090,660	83.12
	a. Purchasing/*tual*	122.5	91,000.00	11,147,500	61.40
	b. Labor cost			2,082,890	11.47
	c. Processing cost of starch/*tual*	122.5	15,185.00	1,860,270	10.25
	2. Marketing/transportation costs			3,065,300	16.88
	a. Transport cost to port (kg)	26,000	6.54	170,000	0.94
	b. Cost at original port (kg)			350,000	1.93
	i) Labor/handling cost (kg)	26,000	8.83	229,580	1.26
	ii) Enterprise fee	26,000	3.75	97,500	0.54
	iii) Storage fee	26,000	0.77	20,020	0.11
	iv) Other fees			2,900	0.02
	c. Transport cost to Cirebon			1,260,000	6.94
	i) Shipping cost (kg)	26,000	25.00	650,000	3.58
	ii) Money transfer fee			10,000	0.06
	iii) Handling cost at port (kg)	26,000	23.08	600,000	3.30
	d. Purchasing fee (4%)			1,285,300	7.08
B	**Sale**				
	1. Gross weight (kg)	26,000			
	2. Losses (kg)	294			
	3. Net weight (kg)	25,706			
C	**Sale price (Rp/kg) at Cirebon**		1,250.00		
D	**Revenue**				
	1. Gross revenue (Rp)			**32,132,500**	
	2. Net revenue (E-A) [F:E]			**13,976,540**	[43.50]
E	**Return cost ratio TR/TC**	**1.77**			
F	**Added value (Rp/kg sago) NPJ-(NBB+NBP)**	**147.14**			
G	**Marketing efficiency (%)**	**9.54**			

Note: 1 tree of sago = 10 *tual*; 1,225 *tual* = 26,000 kg starch; productivity = 21.22 kg starch/*tual*; Price of starch at Cirebon Rp. 1,250/kg; Value of sago per *tual* = Rp. 1,250 *x* 21.2 kg = Rp. 151,723; The number in brackets [ ] represents the percentage in regard to the gross revenue of starch.

to Cirebon, there is an Rp. 9.54 marketing cost. On the other side, the agro-industry of sago starch earned a 1.77 RCR (Return Cost Ratio). Sago starch product is marketed to Cirebon because it has higher market demand continuity compared to other areas or countries that have promising market prospects and potential. From the value of 26,000 kg sago starch, farmers can earn a profit of 91.10%, while the industry earns 43.50% with an added value of Rp. 147.14/kg sago [NPJ-(NBB-NBP)].

Conclusion

The cultivation of sago has not been managed intensively, and the implementation of technology, such as the use of selected plant materials, crop cultivation technology, and maintenance, is still poor. The sago starch industry is still operated semi mechanically and on a small scale; therefore, the production potential has not been fully realized.

The marketing of sago pith is predominantly done

by taxes (called "*ijon*"), and the market of sago pith and starch, which is a monopsony, has resulted in a disadvantageous situation for the farmers. The starch traders receive more than sago farmers and also more than plant owners. The increase in the demand for the sago commodity is an opportunity that needs to be reached by implementing an agro-business system.

The development of the sago as a commodity with the agribusiness system is the best solution to increase the amount and quality of production by involving up- and downstream industries with farms and increase the income of those involved.

The increase in the quality and quantity of sago starch with a higher price requires support in the form of increase of access to information, technology, and funding. On the other hand, market information concerning the quantity, quality, and price of sago starch could motivate farmers and sago starch entrepreneurs to increase their productivity.

For the long run, there is a need to create a farming strategy for the crop, starting with the seedlings and continuing with plant tissue culture, pest control, fertilizer application, harvest and post-harvest technology, and marketing and distribution of the product.

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