SAGO PALM 30-1: 1 – 10 (2022)

The financial feasibility of the sago drying business in Sago Technopark of Palopo City, South Sulawesi, Indonesia

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Abstract: The sago industry still gives benefit to local people in Palopo City, South Sulawesi, Indonesia. However, sago starch is mostly produced by local farmers in the form of wet due to limited access to drying machines. This study aims to determine the feasibility of the sago drying business, both with and without government subsidy. The results show that the sago drying business with government subsidy is feasible in undiscounted criterion and discounted criterion. Meanwhile, the financial analysis showed that the sago dry business without subsidy is feasible in undiscounted criterion but not feasible in the discounted criterion. In order to make drying sago business without subsidy feasible in the discounted criterion, the selling price of dried sago starch should be increased by 10% from the price of Rp 13,000/kg to Rp 14,300/kg.

Keywords: Financial analysis, government subsidy, sago industry, sago starch

1. Introduction

Sago palm (*Metroxylon sagu* Rottb.) is a highly efficient starch-producing plant that grows well in Southeast Asia's tropical rain forests between latitudes 10° N and 10° S (Mathur et al., 1998). Sago is still considered a staple food plant in Indonesia, especially in Sumatra and the eastern part of Indonesia (Ehara, 2009). Total sago area in South Sulawesi Province is about 3,844 ha, of which 92.2% is mostly distributed in the northern part of South Sulawesi known as Tana Luwu (Statistics Agency, 2019). Palopo city has sago area of 320 ha or 8.3% from the total area in Tana Luwu, where sago is considered as the second staple after rice (Metaragakusuma et al., 2017).

Sago business, especially the dried sago business, is an important business that can improve the economy of farmers (Jong, 2018; Trisia et al., 2018). Unlike wet sago with a short shelf life (Wijandi, 1980), dried sago is considered to have a long shelf life and easier to handle both in transportation and utilization. Thus, the sago drying business is believed to be profitable and creates a new job for the community. In fact, Indonesia's dried sago exports to foreign countries in 2012 was 3,617 ton with a value of US $ 703,054 and increased to 12,908 ton with a value of US $ 3,216,099 in 2018

(Ministry of Agriculture, 2018). However, the dried sago business in Tana Luwu is quite limited. In Palopo city for example, there is only one businessman who does dry sago processing with simple equipment (Metaragakusuma et al., 2017; Trisia et al., 2018).

In Palopo City, the Research and Development Agency has a new sago drying machine, placed in the Sago Technopark[1]. The machine is developed by the Indonesian Center for Agricultural Postharvest Research and Development (ICAPRD), Ministry of Agriculture. The same machine was also given to the Agricultural Research and Development Agency of Central Maluku to produce not only dried sago but also sago noodle and rice analog (BPTP Maluku, 2019). It is expected that the Research and Development Agency of Palopo City will support the development of the dried sago starch industry and educate sago farmers and the local community in Tana Luwu.

In order to determine whether the company is profitable or not, a feasibility study is commonly used before starting a business to avoid loss (Djamin, 1984; Silva et al., 2007; Swastika, 2012; Svatonova et al., 2015; Sumatri et al. 2019). In general, sago farmers in Palopo City do not know whether the sago drying business is financially profitable for them or not. Therefore, this study aims to analyze the feasibility of the sago drying business. In addition, the production process and final product of dried sago are explained. As our limitation, this study does not include an analytical evaluation of the quality of the final product. However, it advocates future research to promote sago drying business with better quality. Finally, the results of this study are expected to be taken into consideration by small-scale producers and provide an important recommendation to policymakers on sago drying business development in Tana Luwu.

Materials and Methods

1. Data

This research was conducted at the Department of Industry of Palopo city from July-August 2019 (Figure 1). The data in this study consisted of primary data and secondary data. Primary data were obtained from the experimental production while secondary data collected from the literature. The data were then analyzed to evaluate the feasibility of sago drying business.

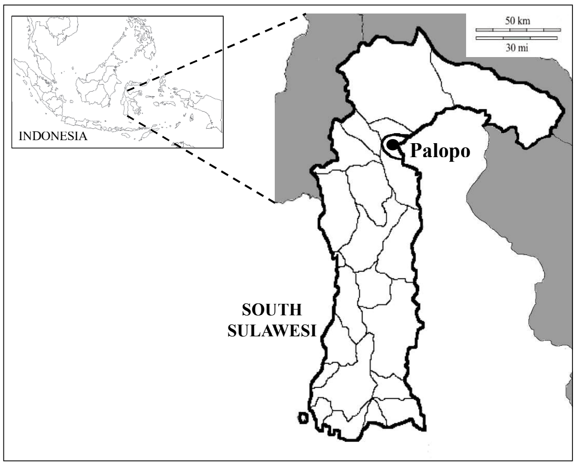

Fig 1. Map of research location

2. Methodology

Estimates of the cost of operating and expected income are essential in determining whether the project is financially viable (Bjornsdottir, 2010). Break Even Point (BEP), Return On Investment (ROI), Pay Back Period (PBP), Net Present Value (NPV), Revenue Cost Ratio (RCR), Internal Rate of Return (IRR) are calculated to determine the feasibility of the business (Djamin, 1984; Suratiyah, 2015 ; Shruthi et al., 2017, Ntaribi and Paul, 2019). The BEP, ROI, PBP, NPV, RCR, and IRR formulas are formulated below with an economic lifetime of the drying machine is assumed to be 10 years.

[1] Sago Technopark is an area of 10 ha (currently 5.8 ha) in Salubattang Village, Palopo City, which aims to be an educational center for disseminating research and technology for developing sago products and sago ecotourism.

a. Break Even Point (BEP)

$AVC = \frac{TVC}{Q}$ ………………………………………………………………………… (8)

$BEPQ = \frac{TFC}{P-AVC}$ ……………………………………………………………………… (5)

$BEPR = \frac{TFC}{1-AVC/P}$ ………………………………………………………………….. (6)

$BEPp = \frac{TC}{Q}$ ……………………………………………………………………….. (7)

Where:

$AVC = Avarage\ variable\ cost\ \ (variable\ cost\ per\ unit)$

$TVC = Total\ variable\ cost$

$Q = Quantity\ of\ production$

$P = Selling\ Price$

$TFC = Total\ fix\ cost$

$BEPQ = Break\ even\ point\ quantity\ of\ production$

$BEPR = Break\ even\ point\ revenue$

$BEPp = Break\ even\ point\ price$

b. Return on Investment (ROI)

$ROI = \frac{\pi}{Ko}\ X\ 100\%$ ……………………………………………………………… (9)

c. Pay Back Period (PBP)

$PBP = 1/ROI$ …………………………………………………………….…. (10)

d. Net Present Value (NPV)

Positive result (+) means project is worth doing, meanwhile negative result (-) means project is not worth doing. The formula of NPV is following:

$NPV = \left(\sum_{y=1}^{y=n} \frac{\mathrm{ry-}}{(1+i)^y}\right) - K_o$…..…………………………………………………… (11)

Where:

$ry = Revenue\ over\ the\ year$

$cy = Cost\ over\ the\ year$

$(1+i)^y = Discount\ factor\ (DF)$

$Ko = Investment$

$y =\ n\ shows\ the\ economic\ life\ of\ the\ project$

$y =\ 1\ shows\ the\ first\ year\ of\ the\ project$

e. Revenue Cost Ratio (RCR)

$\frac{R}{C} = \frac{\sum_{y=1}^{y=n}\left(\frac{ry}{(1+i)^y}\right)}{\sum_{y=1}^{y=n}\left(\frac{cy}{(1+i)^y}\right)+K_o}$ ……………………..…………………………………… (12)

The result can be interpreted as following: $\frac{R}{C} > 1$ (Project is worth doing); $\frac{R}{C} = 1$ (Break Even Point, depends on the investor); $\frac{R}{C} < 1$ (Project is not worth doing)

f. Internal Rate of Return (IRR)

$$IRR = \text{DFP} + \left[\frac{PVP}{PVP-PVN} \times (DFN - DFP)\right] \ldots \quad (13)$$

Where:

$DFP = \textit{Discount factor positive}$

$DFN = \textit{Discount factor negative}$

$PVP = \textit{Present value positive}$

$PVN = \textit{Present value negative}$

Information regarding the production process and the final product are then added to complete the study. For the production process, we compared the drying sago machine from ICAPRD with the conventional method (drying under the sun). We also conducted a trial experiment to calculate full capacity of sago production. Finally, we compared the final product with sago from PT ANJ Agri Papua (Sapapua) and another local product produced in Tana Luwu (Tiga Permata) following the sago starch sensory condition from Indonesian National Standard (SNI).

Results and Discussion

1. Production and final product

1.1 *Sago drying machine*

The sago drying machine from ICAPRD in the Sago Technopark, Palopo City, consists of machinery lines from digital scale, wet shifter machine (100 mesh), deposited container, hydraulic press machine, starch grinding machine, drying machine, and starch shifter machine (100 mesh) (Figure 2). The generator was not utilized because the electricity is available at the location. In addition, the noodle maker machine was

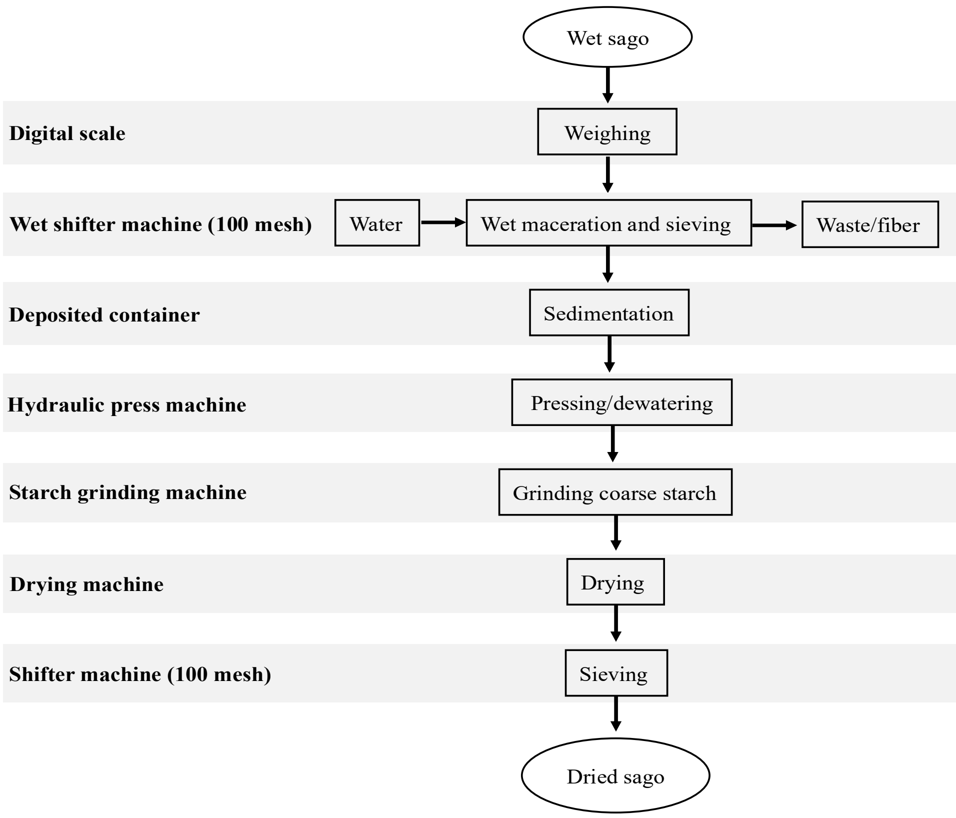

Fig 2. Diagram of dried sago production process

not used since this study was only focused on dried sago. The process to make dry sago from wet sago consists of seven stages, starting with weighing, wet maceration and sieving, sedimentation, pressing/dewatering, grinding, drying, and sieving. The sago drying process is considered a semi-mechanical process because it still requires human labor.

The index of the drying process in the drying machine is the water content. The drying process is about 12 hours at a temperature of 60-70^{0}C and stops after the water content reaches 12%. The drying machine works automatically and is equipped with a solenoid while the temperature remains stable during the drying process. It also has a window to check the condition of the sago starch. If the sago starch is not lumpy and dusty, it means that the sago starch is already dry.

To understand the dried sago production, we compared the drying sago machine with the conventional method, which is drying sago starch under the sun (Table 1). The price of the machine is higher compared to the conventional method. The price of the machine is about IDR 162 million, with the shipping price of IDR 31 million from Bogor to Palopo City. However, the drying machine has a big capacity to process wet sago up to 350 kg at one cycle production and is considered much simple, faster, and does not depend on the weather. The number of workers for the drying machine is relatively many compared to the conventional method. However, the working time (21 hours) and day of work (2) is relatively low compared to the conventional method. The drying machine was funded by the government. However, there is a possibility that the support will end in the future as the government is considering the commercialization of the machine.

The dried sago production was estimated through an experimental study. Through our trial production, 71 kg of wet sago produced 43 kg of dried sago with total production costs of Rp 352,620. Based on that calculation, we estimated that the drying machine with full capacity produced 212 kg of dried sago with a production cost of Rp 1,738,355. These variable costs of production consist of material input costs, labor costs, electricity costs, packaging costs, as detailed in Table 2.

Table 1. Comparison of conventional method to drying machine (per 100 kg of wet sago)

Criteria	Conventional method	Drying machine
Price	Cheap	Expensive
Flexibility	Depends on the weather	Does not depend on the weather
Labor	5 people	11 people
Working time	78 hours	21 hours
Day of work	2	2

Source: Authors' data collection

Table 2. Comparison of quantity and cost production of drying machine between trial experiment and full capacity

No	Item	Trial			Full capacity		
		Quantity	Unit price	Total	Quantity	Unit price	Total
1.	Production (kg)	43	13,000	559,000	211.99	13,000	2,755,870
2.	Variable cost			352,620			1,738,354.60
	a. Material input cost (kg)	71	2,112	150,000	350	2,112.68	739,438
	b. Water (liter)	355	4	1,420	1,750.15	4	7,000.6
	c. Electricity (hour)	27	1,300	35,100	133.11	1,300	173,043
	d. Sack	1	2,000	2,000	4.93	2,000	9,860
	e. Labor (man day)	1.03	100,000	103,000	5.08	100,000	507,790
	f. Packaging	43	700	30,100	211.99	700	148,393
	g. Labor for packaging (man day)	0.31	100,000	31,000	1.53	100,000	152,830

1.2 Dried sago product

The Indonesian government has issued the Indonesian National Standard (SNI 3729: 2008) for dried sago. However, many producers do not have any knowledge of this standard (Trisia et al, 2018). Meanwhile, a food product produced by the home industry must also have a Home Industry Product (PIRT) license. Before the permit is given, the local government through the Department of Health will check the quality and safety of the product. After the product is marketed, the government then monitors the product through the Food and Drug Supervisory Agency (BPOM). Since we could not check the product in the laboratory due to COVID pandemic, we decided to check the sensory condition of sago products based on the Indonesian National Standard (SNI) for final product from ICAPRD, Tiga Permata and Sapapua (Table 3). Dried sago from ICAPRD has not yet been commercialized. Since it is in the preliminary stage, the local government has not carried out quality control or release a product name. Meanwhile, the packaging is made by the Department of Industry as an example. Tiga Permata is a dried sago product that is found in the local market and Sapapua is a dried sago product from PT. ANJ Agri Papua.

The final product of the machine from ICAPRD is a fine powder with a distinctive taste of sago. Dried sago is produced with clean water from the state water company without using hazardous chemicals, preservatives, and bleach. We compared the form, color, smell, and taste of the final product from ICAPRD with those of Sapapua and Tiga Permata. The color of dried sago from the ICAPRD is not as white as Sapapua. However, it is whiter than Tiga Permata, which is from Tana Luwu. Furthermore, for smell, Sapapua has normal with mild distinctive sago smell, followed by ICAPRD product with normal with moderate distinctive sago smell, and the last Tiga Permata with strong distinctive sago smell.

Table 3. Sensory condition of sago products based on the Indonesian National Standard (SNI) and prices

Parameter	Requirement	ICAPRD 	Tiga Permata 	Sapapua 
Form	Fine powder	Fine powder	Medium	Fine powder
Smell	Normal (free from foreign smell)	Normal with moderate distinctive sago smell	Normal with strong distinctive sago smell	Normal with mild distinctive sago smell
Color	White, typical sago starch	 White	 Less white	 Very white
Taste	Normal	Normal	Normal	Normal
Price		Expected price: Rp 13,000/kg ~ Rp 14,300/kg	Rp 8,500/500 g	Rp 20,000/kg

Table 4. Cost and revenue of sago drying business with subsidy (Rp in millions, 1US $ = Rp 14,581)

No	Item	Year											Total (Rp)	Average (Rp)
		y0	y1*	y2**	y3***	y4***	y5*** (Rp)	y6***	y7***	y8***	y9***	y10***		
A	**Cost (I+II)**	**146.22**	**157.76**	**191.40**	**208.22**	**208.22**	**208.22**	**208.22**	**208.22**	**208.22**	**208.22**	**208.60**	**2,161.56**	**216.16**
I	Fixed cost													
	a. Capital/investment	146.22											146.22	
	b. Management Cost													
	- Management fee		36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	360.00	
	- Administration cost		1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	18.00	
	- Maintenance cost		2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	22.20	
	Subtotal b		40.02	40.02	40.02	40.02	40.02	40.02	40.02	40.02	40.02	40.02	400.20	
	Total I (a + b)	**146.22**	**40.02**	**40.02**	**40.02**	**40.02**	**40.02**	**40.02**	**40.02**	**40.02**	**40.02**	**40.02**	**546.42**	**54.64**
II	Variable cost													
	a. Production cost		116.82	150.19	166.88	166.88	166.88	166.88	166.88	166.88	166.88	166.88	1.602.07	
	b. Tax 0.5%		0.93	1.19	1.32	1.32	1.32	1.32	1.32	1.32	1.32	170	13.07	
	Total II (a + b)		117.74	151.38	168.20	168.20	168.20	168.20	168.20	168.20	168.20	168.58	1,615.14	161.51
B	**Return/Revenue (II+III)**		**185.19**	**238.11**	**264.56**	**264.56**	**264.56**	**264.56**	**264.56**	**264.56**	**264.56**	**339.32**	**2,614.57**	**261.46**
I	Production (g)		14.25	18.32	20.35	20.35	20.35	20.35	20.35	20.35	20.35	20.35	195.37	19.54
II	Revenue		185.19	238.11	264.56	264.56	264.56	264.56	264.56	264.56	264.56	264.56	2,539.81	
III	Salvage value (25%)											74.76	74.76	
C	**Net profit (B-A)**	**(146.22)**	**27.43**	**46.70**	**56.34**	**56.34**	**56.34**	**56.34**	**56.34**	**56.34**	**56.34**	**130.72**	**453.01**	**45.30**
D	**Profit rate (%)**												20.96%	**20.96%**

*Year 1= 70% of production capacity, **Year 2= 90% of production capacity, ***Year 3-10= 100% of production capacity

2. Financial analysis

2.1 Cost and Revenue of production with subsidy

There are two main components in the financial analysis of the sago drying business, which are cost and revenue (Table 4). The total cost of production was calculated from fixed cost (capital/investment and management cost) and variable cost (production cost and business tax) with 10 years of economic life. Since the machine is subsidized by the government, there is no need to pay a bank loan. Meanwhile, the revenue was calculated from the annual selling dried sago product, which is Rp.13,000/kg. We also calculated the salvage value (25%) at the end of economic life, which is IDR 74.7 million.

Our estimation divided the production capacity into three stages; 1st year for 70% of production capacity, 2nd year for 90% of production capacity, and 100% of production capacity afterward (3rd-10th year). The results show that drying business is profitable. The profit during the economic life (10 years) is IDR 453 million or an average of IDR 45.3 million. However, Djamin (1984) stated that the total profit is not enough to indicate business feasibility due to the inflation rate. By comparing the profit rate with the average inflation in Indonesia, we found out that the calculation of the sago drying business's profit rate is 20.96%, bigger than the average inflation rate in 2019, which is 3.58%. Therefore, we conclude that the sago drying business is feasible.

2.2 Cost and Revenue of production without subsidy

This financial analysis is calculated, assuming that the machine will be bought by the sago farmer/businessman (Table 5). Since the drying machine is quite expensive, we expect to seek the loan/credit of IDR 194.5 million from the bank with an interest rate of 7 % per year. The repayment period for the loan is five years with fixed installment, and its interest rate is paid monthly. The fixed cost, such as management fee, administration cost, and maintenance cost is then calculated. Meanwhile, the revenue is estimated from the total of the dried sago selling price. In addition, we also assumed the salvage value at the end of economic life (10th year) is 25% from total investment and drying machine price, which is IDR 74.7 million.

The results show that the sago drying business starts making a profit after the 3rd year. It is because the company focuses on repaying loans from the 1st until the 5th year. The total cost for 10 years is IDR 2.3 billion or an average of IDR 239 million per year. Meanwhile, the total revenue for 10 years is IDR 2.6 billion or an average of IDR 261 million per year, with a profit of IDR 223 million or an average of IDR 22 million per year. The profit rate is also considered higher than the inflation rate in 2019.

Table 5. Cost and revenue of sago drying business without subsidy (Rp in millions, 1US $ = Rp 14,581)

No	Item	Year											Total (Rp)	Average (Rp)
		y0	y1*	y2**	y3***	y4***	y5*** (Rp)	y6***	y7***	y8***	y9***	y10***		
A	**Cost (I+II)**	146.22	**209.04**	**239.96**	**254.05**	**251.33**	**248.61**	**208.22**	**208.22**	**208.22**	**208.22**	**208.60**	**2.390.71**	**239.07**
I	Fixed cost													
	a. Capital/investment	146.22											146.22	
	b. Management Cost													
	- Management fee		36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	360.00	
	- Administration cost		1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	18.00	
	- Maintenance cost		2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	22.20	
	Sub-total b		40.02	40.02	40.02	40.02	40.02	40.02	40.02	40.02	40.02	40.02	400.20	
	c. Loan payment													
	- Fixed installment		38.91	38.91	38.91	38.91	38.91						194.54	
	- Interest		12.37	9.65	6.92	4.20	1.48						34.61	
	Sub-total c		51.28	48.55	45.83	43.11	40.38						229.15	
	Total I (a + b + c)	**146.22**	**91.30**	**88.57**	**85.85**	**83.13**	**80.40**	**40.02**	**40.02**	**40.02**	**40.02**	**40.02**	**775.57**	**77.56**
II	Variable cost													
	a. Production cost		116.82	150.19	166.88	166.88	166.88	166.88	166.88	166.88	166.88	166.88	1.602.07	
	b. Tax 0.5%		0.93	1.19	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.70	13.07	
	Total II (a + b)		**117.74**	**151.38**	**168.20**	**168.20**	**168.20**	**168.20**	**168.20**	**168.20**	**168.20**	**168.58**	**1615.14**	**161.51**
B	**Return/Revenue (II+III)**		**185.19**	**238.11**	**264.56**	**264.56**	**264.56**	**264.56**	**264.56**	**264.56**	**264.56**	**339.32**	**2,614.57**	**261.46**
I	Production (g)		14.25	18.32	20.35	20.35	20.35	20.35	20.35	20.35	20.35	20.35	195.37	19.54
II	Revenue		185.19	238.11	264.56	264.56	264.56	264.56	264.56	264.56	264.56	264.56	2,539.81	
III	Salvage value (25%)											74.76	74.76	
C	**Net profit (B-A)**	**(146.22)**	**(23.85)**	**(1.85)**	**10.51**	**13.23**	**15.96**	**56.34**	**56.34**	**56.34**	**56.34**	**130.72**	**223.86**	**22.39**
D	**Profit rate (%)**												9.36%	**9.36%**

*Year 1= 70% of production capacity, **Year 2= 90% of production capacity, ***Year 3-10= 100% of production capacity

Table 6. Comparative feasibility of sago drying business with subsidy and without subsidy (per year)

Feasibility indicator	Value	
	Subsidy	Without subsidy
Profit/year	Rp 45,300,809	Rp 22,385,971
Profit Rate	20.96%	9,36%
Break Even Point Quantity of Production (BEPQ)	11,545 kg	16,387 kg
Break Even Point Revenue (BEPR)	Rp 150,086,533	Rp 213,027,225
Break Even Point Price (BEPp)	Rp.11,064	Rp.12,237
Return on Investment (ROI)	31%	15.3%
Pay Back Period (PBP)	3,2 year	6.5 year
Net Present Value (NPV)	Rp 122,493,998 (positive)	Rp 33,664,784 (negative)
Revenue Cost Ratio (RCR)	1.11, ($\frac{R}{C}$ > 1)	0.97, ($\frac{R}{C}$ < 1)
Internal Rate of Return (IRR)	32.66% (> DF15%)	12.82% (< DF15%)

2.3 The comparative feasibility of sago drying business with subsidy and without subsidy

Based on table 6, the sago drying business with subsidy has a Break-Even Point Quantity (BEPQ) of 11,545 kg per year. Meanwhile, Break-Even Point Revenue (BEPR) is IDR 150 million per year, and Break-Even Point price (BEPp) is Rp 11,064/kg. In addition, the Return on investment (ROI) is 31% per year with the Pay Back Period (PBP) of 3 years 2 months. Analysis of the discounting factor (DF) of 15% obtained a positive NPV of Rp. 122,493,998, RCR 1.11> 1 and IRR 32.66% > DF15%, meaning that the sago drying business was feasible to implement.

The sago drying business without subsidy from the government has BEPQ of 16,387 kg, BEPR of IDR 213 million, a BEPp of IDR 12,237/ kg. It means that not to lose profit, the company needs to produce more than 16,387 kg per year and revenue of IDR. 213 million every year. Furthermore, the ROI is 15.3% per year, and the PBP of investment is 6 years 6 months. The NPV result is negative with the value of IDR 33.7 million, RCR of 0.97, which is less than 1, and IRR (12.82%) less than DF 15%. It indicates that the sago drying business without subsidy is not feasible.

Based on the Table 7, we can assume that the sago drying business with a government subsidy is feasible both in undiscounted criterion and discounted criterion. Meanwhile, the financial analysis of the sago drying business without a subsidy is feasible in undiscounted criterion but not feasible in the

Table 7. Financial feasibility measures of sago drying business without subsidy by increasing price 10%

Economic feasibility indicator	Value
Net Present Value (NPV)	Rp 92,059,322 (positive)
Revenue Cost Ratio (RCR)	1.07, ($\frac{R}{C} > 1$)
Internal Rate of Return (IRR)	24.43 % (> DF15%)

discounted criterion. In order to make drying sago business without subsidy is feasible in the discounted criterion, sensitivity analysis is then carried out.

Djamin (1984) stated that sensitivity analysis is done to determine the possible impact of key variables such as low selling prices of raw material or high rising price. In this study, sensitivity analysis is used to calculate NPV, RCR, and IRR if the revenue increases. The sensitivity test result by increasing the revenue to 10% showed a positive NPV of Rp. 92,059,322; RCR 1.07> 1; and IRR 24.43% (Table 7). This result also indicated that the sago drying business without subsidy is still feasible if the selling price of dried sago starch is increased by 10% from Rp 13,000/kg to Rp 14,300/kg.

In our opinion, the selling price of Rp 14,300/kg for dried sago is still acceptable for modern market or local/souvenir shops in South Sulawesi. For example, the price of TIGA PERMATA found in Makassar is Rp 17,000/kg (sold Rp 8,500/500 g) and SAPAPUA Rp 20,000/kg. A study from Trisia et al (2018) also mentioned that the selling price of dried sago (ENGKA) is Rp 14,500/pack (1 pack is 750 g) at modern markets and Rp 15,000/pack at souvenir shops. In addition, the online prices of dried sago in several online platforms such as TOKOPEDIA, BLIBLI and BUKALAPAK are variated between Rp 21,000/kg ~ Rp 30,000/kg. Therefore, we believe the sale price of 14,300/kg for dried sago is not considered high for market inside and outside of South Sulawesi.

Conclusion

Based on our study, the sago drying business using the drying machine from ICAPRD in the Sago Technopark of Palopo City is relatively expensive but feasible with support from government. It has a big capacity, it is faster, and does not depend on the weather like the conventional sun-drying method. In addition, the final product is relatively good with a fine powder, white color, taste normal with moderate distinctive sago smell. On the other hand, the sago drying business without government subsidy will be feasible only on the condition that the selling price of dried sago is increased by 10%. However, the increased price still can compete in the national market (offline or online). We agree that the price of the machine will greatly influence the continuity of the dry sago business, thus, affordable technology for drying machines is recommended for smallholders.

It is also important for the sago industry in Tana Luwu to produce sago with higher quality than Sumatra and Papua. It is also necessary for the local government to create a system to grade and guarantee the sago quality of Tana Luwu. Furthermore, promoting an integrated business from upstream to downstream can be another strategy to make the sago drying business more efficient and ensure its sustainability, for example, establishing contracts with sago farmers to ensure the supply of raw materials at stable prices. Regarding market development, it is important to emphasize the characteristics of sago production. For example; sago starch from Tana Luwu is healthy and safe because it does not use poisons (such as chemical fertilizers and pesticides) and chemical bleach in the production process.

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