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Sustainable Management of Sago (*Metroxylon Spp*) Agroindustry in East Indonesia

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Abstract

Utilization of the available potential of sago resources is one of the efforts that can be done in order to fulfil food needs which are increasingly in demand from time to time. Management of sago resources requires effective planning to reduce the risk of resource decline as a guarantee of sustainability. This research was carried out from December 2020 to February 2021 in East Indonesia, especially in the east Seram Regency. It involved 14 stakeholder representatives from the local government, Regional House of Representatives members, non-governmental organizations and sago farmers. By using participatory prospective analysis (PPA) this study had identified the seven most influential variables in governing the sago agroindustry which is reflected in the weighted global forces, that are: market guarantees, stakeholder participation, government policies, supporting infrastructure, *IKM* (Public Satisfaction Index/PSI) units, increasing farmer human resources and economic activities. As a follow-up, this study has also formulated strategic implications as an anticipatory effort in the form of an action plan, that is: encouraging regional policies to establish sago as a regional superior commodity and creating market guarantees, maximizing stakeholder participation in managing sago agroindustry to increase community economic activity, fulfilling supporting infrastructure for increasing production and processing of sago, growing PSI units and increasing farmers' human resources capacity in managing sustainable sago agroindustry. It is suggested for the local government to take advantage of the identified variables as an entry point to build an effective plan in maximizing the management of the available sago resource potential.

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1. Introduction

Meeting the public food needs which continues to increase from time to time has its own challenges. The high rate of population growth has caused faster food demands than the ability to supply food. One alternative in fulfilling food needs is to utilize local food resources. One of the potential natural resources owned by Indonesia is sago. The area of sago field in East Seram Regency is 34,723 Ha. This is 97% of the total area of sago field in Maluku Province (Badan Pusat Statistik, 2017). The potential for sago development to support food availability is quite large because sago contains starch as a carbohydrate source which reaches 20-40 tons per hectare per year (Bintoro et al., 2016). Sago has several advantages such as: able to grow on minimal lands such as peatlands and shallow swamps, resistant to drought and flood, able to adapt to slightly saline land, able to produce starch in large quantities, especially if maintained properly, cheaper starch production cost than other crops, potential to be used as food reserves, and contributive to reducing the threat of global warming because it has green clumps throughout the year (Djoefri et al., 2014). Beside being a source of food, sago has other benefits that can be used as a decent source of income for the small farmers and can open up job opportunities in the aspect of cultivation and processing of its derivative products and have a positive impact on the environment because it is an environmentally friendly plant.

On the other hand, the development of sago agroindustry management seems undeveloped which is indicated by the partiality of various government policies that do not accommodate the potential of this commodity as an alternative source of food for the community. The impact of the government's low attention to the utilization of sago causes the utilization of the available potential of sago to be very low. Various studies show the low utilization of sago, the Food Security Agency of Eastern Seram Regency (2016) reported that the utilization rate of sago was only 10% of the available potential Djoefri et al., (2014) in their study showed that in Papua and West Papua only there were only 3-4 sago trees harvested per year per family from the potential area of 5.2 million hectares of sago available in both provinces. Santoso, (2017) described the obstacles in developing sago agroindustry in Indonesia, among others: 1). Government policies that are not in favor of sago commodity development, 2). Limited market available for sago products and their processed products, 3). The technology used in the sago processing at the community level is very simple, 4). The low investment of the government and the private sector in the utilization of sago, 5). The sago forest area is difficult to access due to the lack of infrastructure.

Apart from the various problems and challenges faced, it is time for the utilization of local sago to be included as a major part of regional development plans through sago management policies with an agribusiness perspective. The benefits that can be obtained through the agribusiness approach include stimulating the growth of new industries in the sago agroindustry sector and being able to improve the income structure of the actors in the sago agroindustry. The context of sago agroindustry activities is related to the utilization of sago raw materials to produce marketable derivative products such as dry sago starch, sago noodles and others. This is an effort to increase product added value, extend shelf life and provide higher profits for sago producers

In line with the efforts, the utilization of the potential of sago resources needs to pay attention to the sustainability aspect so that it does not cause losses in the future. Agroindustry management always pays attention to aspects of management and conservation of natural resources through the use of technology and institutions that are adapted to the carrying capacity of the surrounding environment, economically profitable, socially acceptable to the surrounding community and not causing damage.

An effective management model needs to be developed objectively and rationally by taking into account local characteristics and problems. Rustiadi (2009), suggests the weak point in a plan is the availability of data that can be accessed completely and accurately. Stakeholders involvement related to the topic of consensus planning is an approach to solving these problems. Thus the need for complete and accurate data can be met. This study aims to build a sustainable sago agroindustry management model that is in accordance with the characteristics and problems in the East Seram Regency area.

2. Materials and Methods

This research was conducted from December 2020 to February 2021 in East Seram Regency, Maluku Province. Literature research and brainstorming with key informants were carried out as the first step to collect data and information as background information on the management of sago agroindustry. The data and information collected were then confirmed by using field confirmation in three sub-districts with the highest sago area, namely: Teluk Waru, Kilmuriy and Bula Barat. It involved 60 sago farmers who were determined proportionally based on the number of farmers in each sub-district. Other secondary data were also collected from government agencies as supporting research materials. All empirical data identified in the early stages were conceptualized as the focus of research studies. (Sugiyono, 2016).

Participatory prospective analysis (PPA) was used to achieve the research objectives. Focused discussions on the focus of the study involved 14 stakeholder respondents who view themselves as having an interest and being involved in the management of the sago agroindustry in the research location from elements of the local government, members of the DPRD, non-governmental organizations and sago farmers. The number of stakeholder respondents involved is considered sufficient as a reference to previous research conducted by CAPSA (The center for alleviation of poverty through secondary crops) in 2002 involving 13 stakeholder respondents (Bourgeois & Jesus, 2004).

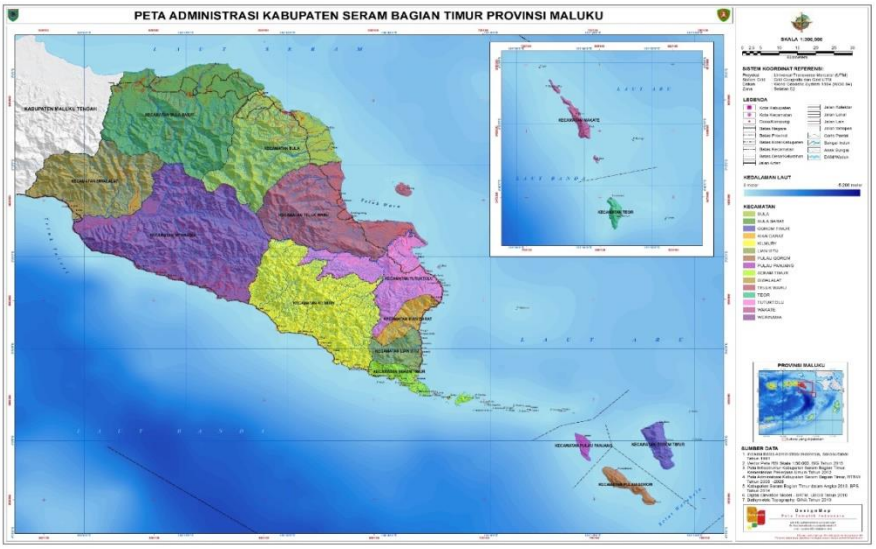


Figure 1.
Research Area Map

The participatory prospective analysis (PPA) stage began with defining the system that was the focus of the study. Stakeholder respondents were asked to identify variables that had an influence on the governance of the sago agroindustry within the research location. The identified variables were listed in a list to facilitate data input. The identified variables were then discussed again to produce a fixed variable as a result of consensus. The fixed variable was defined and stated in the matrix. Assessment of the relationship between variables was carried out reciprocally referring to the CIRAD/CAPSA scale consisting of 4 scales (0-3), (Bourgeois & Jesus, 2004). The results of the assessment of the relationship between variables were inputted into PPA software on Microsoft Excel which will produce output in the form of key variables based on quadrants and weighted global power values. Each quadrant reflects the influence and dependency which consists of: input quadrant (determinant variable), stake quadrant (linking variable), output quadrant (dependent variable) and unused quadrant (independent variable). The definition of conditions was done by compiling a matrix of key variables into four conditions that were potential to occur in the next 10 years. The four conditions are: increasing conditions, fixed conditions, declining conditions and volatile conditions. In addition, defining the existing condition was also carried out.

The formulation of scenarios for the management of sago agroindustry was carried out by combining variables that may occur in the future referring to existing conditions. The combination then became the scenario formulation, that were: optimistic, moderate, pessimistic and very pessimistic. The final stage of participatory prospective analysis was to formulate strategic implications as a form of action plan in order to prepare everything to face the situation in the future. Participatory prospective analysis was able to produce key variables that were reflected in the quadrant and weighted global power values, formulate scenarios and formulate strategic implications in the form of action plans as a form of anticipatory and responsive steps.

3. Results and Discussions

The focused discussion process was carried out by respondents from the stakeholder to identify the variables affecting the governance of the sago agroindustry in East Seram Regency. Each stakeholder respondent has the opportunity to express opinions. There were 30 identified variables as shown in table 1.

Table 1.
Variables Affecting the Management of Sago Agroindustry in East Seram Regency

No.	Variable	No.	Variable
1.	Availability of labor	16.	Product processing training program
2.	Farmers skills	17.	Research and development
3.	Farmer training program	18.	Economic value by-product development
4.	Availability of sago forest resources	19.	Waste management
5.	Sago forest arrangement	20.	Water availability
6.	Sago tree productivity	21.	Market
7.	Sago land ownership status	22.	Marketing training
8.	Environmental damage	23.	Marketing infrastructure support
9.	Social conflict	24.	Access to capital institutions
10.	Sago cultivation program	25.	Conseling institutions
11.	Economic activity	26.	Government policy

12. Access road	27. Sago processing center zoning
13. Sago production technology	28. The suitability of government assistance.
14. Sago *IKM* (PSI) unit	29. Involvement of non-governmental organizations/NGOs
15. Modernization of processing equipment	30 Licensing

Determining fixed variables is needed to see the possibility of similar ideas between one respondent and another so that it is possible to delete, merge or redefine the identified variables. After a structured discussion by the respondents, stakeholders have agreed to combine several variables that are seen to have the same operational meaning. In the process of combining similar variables, the basic principles of content analysis from the opinions of each stakeholder and their relevance must still be regarded, Bourgeois and Jesus (2004). By consensus, it is agreed that these variables are:

1. Variables number 3, 17, 22 and 25 16 were combined into Human Resources Quality Improvement.
2. Variables numbered 5, 6 and 10 were combined into a sago forest arrangement.
3. Variables number 7 and 27 were combined into area zoning.
4. Variables number 8 and 19 were combined into environmental damage.
5. Variables number 11 and 18 were combined into economic activity
6. Variables number 12, 20 and 23 were combined into supporting facilities and infrastructure
7. Variables number 13 and 15 were combined into production and processing technology
8. Variables number 26, 26 and 30 were combined into government policy.

Thus obtained 16 variables that were assumed to have an influence on sustainable sago agroindustry management as presented in table 2.

Table 2.
Fixed Variables Affecting the Management of Sago Agroindustry In East Seram Regency.

No.	Fixed Variable	Operational Definition
1.	Availability of labor	The Availability of labor in the potential sago area
2.	Farmers skills	The quality of the human resource (farmers) that can be measured by their educational background and their income.
3.	Sago forest resources	Accessible sago forest area to be utilized in sago production activities.
4.	Sago forest arrangement	efforts to obtain optimal yield productivity, growth and development of sago palms through the application of GAP principles.
5.	Economic activity	Sago forest exploitation activities to obtain economic benefits.
6.	Supporting facilities and infrastructure	Availability of supporting facilities for sago production and processing activities: road access for farming, water sources in terms of quantity and quality.
7.	*IKM* (PSI) unit	Number of small business actors involved in processing sago-based derivative products
8.	Access to capital	Availability of access sources to government/private capital
9.	Production and processing technology.	Input technology for sago production and processing and efforts to improve/modernize it.
10.	Environmental damage	Sago forest exploitation activities that have an impact on

	environmental damage and management of sago production waste
11. HR quality improvement	Training/assistance/counseling conducted to improve technical/management/marketing knowledge and skills.
12. Area zoning	Areas mapping based on the importance of sago resource management
13. Market guarantee	Guarantee of sago products market.
14. Government policy	Availability of government regulations that accommodate the interests of sago management.
15. Stakeholder participation	The suitability of the program in utilizing the potential in the various interests of each government/non-government sector
16. Social conflict	Potential social conflict due to land ownership status determination.

Source: Primary Data, 2021.

Reciprocal weighting of each variable to determine the direct influence and dependence between these variables. According to Bourgeois & Jesus, (2004), the results of reciprocal weighting between fixed variables describe the level of importance of each variable. Practically, the value of the weighting of the variables can be used as input in formulating an effective plan.

The assessment of the relationship between fixed variables was approached by giving weights according to the interests of the respondents using a scale of 0 = no effect to a scale of 3 = very influential. The results of the stakeholder respondents' assessments are presented in table 3 below.

Table 3
Direct Effect Score Between Variables.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
A		2	-	-	-	-	-	-	-	-	1	-	-	-	-	-
B	3		2	1	3	-	-	-	1	-	1	3	-	-	-	-
C	3	3		-	2	-	-	-	-	-	-	3	-	-	-	-
D	2	3	3		3	-	-	-	1	-	-	3	-	1	1	-
E	3	3	3	2		2	3	2	2	2	-	3	2	2	1	1
F	3	3	3	2	3		2	-	2	2	2	3	-	3	2	-
G	3	3	3	2	3	3		2	3	2	1	3	-	1	1	1
H	2	3	3	-	2	2	2		1	-	-	2	-	-	-	-
I	-	3	3	2	2	2	1	-		3	-	3	-	1	-	-
J	2	-	3	2	2	-	-	-	-		-	3	-	2	-	-
K	3	3	3	-	3	1	2	-	1	3		3	-	2	1	-
L	2	2	3	2	3	-	-	-		2	-		-	2	-	2
M	3	3	3	3	3	3	3	3	3	3	2	3		3	3	2
N	3	3	3	2	3	3	3	2	3	3	3	3	2		2	1
O	3	3	3	3	3	3	3	1	2	3	1	3	3	2		1
P	2	2	3	-	2	1	-	-	-	-	-	-	-	1	1	

Note:

A=Availability of labor
B=Farmers skills
H=Access to capital
I=Production and processing
O=Stakeholder participation
P=Social conflict

technology.

C=Sago forest resources	J=Environmental damage	3=Strong influence score
D=Sago forest arrangement	K=HR quality improvement	2=Moderate influence score
E=Economic activity	L=Area zoning	1=Weak influence score
F=Supporting Infrastructure	M=Market guarantee	0=No Influence Score
G=*IKM* (PSI) unit		
	N= Government policy	Moderate influence 2=score

Then, the score of the influence assessment between the fixed variables has been analyzed using the PPA software developed by CIRCAD/CAPSA which produces quadrant output and a weighted global power score as shown in Figure 2 and Table 4. According to Bourgeois & Jesus, (2004), the distribution of each variable in a quadrant space bounded by two axes has an interpretation in the form of variable position, variable distribution model and interpretation of direct and indirect relationships. Quadrant I space is the driving variable, quadrant II space is the leverage variable, quadrant III space is the output variable and quadrant IV space is the marginal variable. Variables spread in quadrants I and II are variables that have a strong influence on the system so that they can be used as a reference in preparing future plans.

The results of the analysis of direct and indirect effects show that there are seven variables that have a strong influence and seems to be key variables in the sustainable management system of sago agroindustry in East Seram Regency. This is shown by the distribution of the seven variables in quadrant I and quadrant II spaces and is supported by the weighted global power score. These key variables can be used as an entry point in the preparation of an effective management plan for sustainable sago agroindustry in East Seram Regency. The seven variables are: market guarantees, government policies, stakeholder participation, supporting infrastructure, *IKM* unit, improving the quality of human resources for sago farmers and economic activities.

The weighted global power scores of the variables mentioned above are: market guarantees (2.07), stakeholder participation (1.85), government policies (1.57), supporting infrastructure (1.35), *IKM* units (1.27), farmer human resource development (1.25), and activities economy (1.03). The weighted global power score tends to be higher when compared to other variables, this further confirms how big the influence of these variables are in the system. According to Yusuf et al., (2020), the dimension of the influence of each variable is indicated by the weighted global power score. The higher the weighted global power score, the higher the influence of these variables in the system.

Table 4.
Variable Weighted Global Strength Score

Variable	Weighted Global Power
Market Guarantee	2.07
Stakeholder participation	1.85
Government policy	1.57
Supporting Infrastructure	1.35
IKM (PSI) unit	1.27
HR (farmer) quality improvement	1.25
Economic activity	1.03
Access to capital	0.88
Production and processing technology	0.87

Sago forest arrangement	0.76
Environmental damage	0.73
Central Area Zoning	0.66
Social conflict	0.66
Farmers skills	0.53
Sago forest arrangement	0.46
Availability of labor	0.09

Source: Primary Data, 2021.

The seven selected variables in the previous stage were then explored by the respondents to project opportunities that could occur in the future under four states, including: increasing state, fixed state, declining state, and volatile state. The process of defining states through the preparation of a matrix by assigning codes to the selected variables and numbers in the projected conditions. Variables are coded with letters A-G while states are coded with numbers 1-4.

Table 5.
State Definition

Variable	Code	Condition in the nect 10 years				Existing Condition
		1	2	3	4	
Stakeholder participation	A	Increasing	Fixed	Decreasing	-	Moderate
Supporting Infrastructure	B	Increasing	Fixed	Decreasing	-	Moderate
Government policy	C	Increasing	Fixed	Decreasing	-	Low
HR (farmer) quality improvement	D	Increasing	Fixed	Decreasing	-	Low
IKM (PSI) unit	E	Increasing	Fixed	Decreasing	-	Low
Market Guarantee	F	Increasing	Fixed	Decreasing	Volatile	Low
Economic activity	G	Increasing	Fixed	Decreasing	Volatile	Moderate

Source: Primary Data, 2021.

The results of determining the state of sustainable sago agroindustry management in East Seram Regency that may occur in the future show that there are 5 variables that have the opportunity to have 3 conditions in the next 10 years, namely: stakeholder participation, supporting infrastructure, government policies, improving the quality of human resources (farmer) and *IKM* units. On the other hand, there are 2 variables that have the opportunity to have 4 states in the next 10 years, namely: market guarantees and economic activity.

The difference in the combination of possible states that may occur in each of these variables reflects the opinions and interests of respondents in the future and this is possible. (Godet dan Roubelat, 1998 ; Bourgeois dan Jesus, 2004 ; Gray dan Hatcard, 2008 ; Coates et al, 2010 ; Durance dan Godet, 2010). Scenarios are combinations of each variable under different states that have the potential to occur in the future according to stakeholder estimates. Projections of conditions that can occur in the future are a reflection of the interests of each stakeholder in the future (Godet and Roubelat, 1998; Bourgeois and Jesus, 2004; Gray and Hatcard, 2008; Coates et al, 2010; Durance and Godet, 2010).

The formulation of alternative scenarios for sustainable sago agroindustry management is carried out to project the combination of each variable that is likely to occur in the next 10 years consisting of scenarios: optimistic, moderate, pessimistic and very pessimistic. Each scenario will have implications for the action plans that need to be carried out. The optimistic scenario is a reflection of the best hope that is projected to occur, on the contrary the very pessimistic scenario reflects a change in existing states for the worse. Between the optimistic scenario and the very

pessimistic scenario, there is a moderate scenario and a pessimistic scenario which is a form of compromise of the two extreme scenarios mentioned above. The results of the focused discussion conducted by stakeholder respondents in projecting the combination of variables in the form of a sustainable sago agroindustry management scenario in East Seram Regency as presented in table 6 below illustrates four different states. These states have an influence on the anticipatory efforts that must be carried out.

Table 6.
Sustainable Sago Agroindustry Management Scenario

Scenario	Combination	Description
Optimistic	A1-B1-C1-D1-E1-F1-G1	Market Guarantee (Increased) Stakeholder Participation (Increased) Supporting Infrastructure (increased) Government Policy (increased) HR (farmer) quality improvement (increased) *IKM* (PSI) Unit (increased) Economic Activity (increased)
Moderate	A2-B2-C1-D1-E2-F2-G2	Market Guarantee (Fixed) Stakeholder Participation (fixed) Supporting Infrastructure (Fixed) Government Policy (increased) HR (farmer) quality improvement (increased) *IKM* (PSI) Unit (fixed) Economic Activity (Fixed)
Pessimistic	A3-B3-C2-D2-E3-F3-G3	Market demand (decreased) Stakeholder Participation (decreased) Supporting Infrastructure (decreased) Government Policy (Fixed) HR (farmer) quality improvement (fixed) *IKM* (PSI) Unit (decreased) Economic Activity (Decreased)
Very Pessimistic	A3-B3-C3-D3-E3-F4-G4	Market Guarantee (Volatile) Stakeholder Participation (decreased) Supporting Infrastructure (Fixed) Government Policy (decreased) HR (farmer) quality improvement (decreased) *IKM* (PSI) Unit (decreased) Economic Activity (volatile)

Source: Primary Data, 2021.

There were two scenarios that are considered as extreme models, namely the optimistic scenario which describes the respondents' maximum expectations and the very pessimistic scenario which describes the worst conditions that can occur in the sustainable management of the sago agroindustry in East Seram Regency. In the optimistic scenario, maximum and gradual improvement efforts need to be made to the variables of stakeholder participation, supporting infrastructure, government policies, improving the quality of human resources (farmer), *IKM* units, market guarantees and economic activities. On the other hand, in the very pessimistic scenario, the

respondents projected the worst situation that can occur where there is a decrease from the existing condition. It is caused by all the determinant variables experiencing a decrease and/or being unpredictable (fluctuating).

In addition to the two extreme scenarios mentioned above, there were also moderate scenarios and pessimistic scenarios that reflect alternative scenarios for compromising sago agroindustry management. These two scenarios are a connecting scenario between the upper extreme scenario (optimistic state) and the lower extreme scenario (very pessimistic state). These linking scenarios reflected the minimum effort that must be maintained for each variable to maintain the sustainability of the sago agroindustry management in East Seram Regency.

According to Yusuf et al., (2020), the differences in each scenario reflect the perceptions and interests of stakeholder respondents in assessing the ability to improve on each variable. This also has an impact on the strategic implications that will be formulated in the form of an action plan that will be carried out in the future. Preparing strategic implications is an anticipatory effort that needs to be done by stakeholder respondents in the form of action plans of strategic policies. The strategic policies in the management of the sago agroindustry in the East Seram Regency were prepared by first making a comparison between states. In addition, the ability to explore future states is also very helpful in preparing a reactive action plan.

To increase efforts to develop sustainable sago agroindustry in East Seram Regency, it is necessary to improve various sub-sectors supporting the management of sago agroindustry. These improvement efforts certainly need to pay attention to the order of priority based on the state of local agroindustry governance. The order of priority was obtained by calculating the weighted global power score of the variables which were concluded to have an important influence on the management of the sago agroindustry in East Seram Regency. These variables are: market guarantees, stakeholder participation, government policies, supporting infrastructure, *IKM* units, improving the quality of human resources (farmaers) and economic activities.

The formulation of the strategic implications generated in this study has set priorities for improving the governance of the sago agroindustry in East Seram Regency as follows:

1. Encouraging local government policies to establish sago as a leading commodity and create market guarantees in driving the agroindustry sector.

One of the results of government policies in increasing agricultural product processing activities in rural areas is agroindustry. The development of agroindustry both on a large and small scale is a reflection of the success of developing rural areas from economic, social and environmental perspective.

Government policies in supporting the management of sago resources in East Seram Regency will be maximized if they are supported by regulations in the form of Regional Regulations (*PERDA*). Until now, East Seram Regency does not yet have a regional regulation that regulates the management of sago areas. The management of the sago area in this region still refers to the Maluku Provincial Regulation number 10 of 2011 concerning the Management and Preservation of Sago.

The decision of making sago as a leading commodity is the authority of the regional government of East Seram Regency through a structured study. This authority is as regulated in the Minister of Home Affairs Regulation Number 09 of 2014 Regional governments have the authority to identify regional superior potential and determine regional superior products (PUD). However, determining regional superior potential and regional superior products must meet the 12 criteria required in the *PERMENDAGRI* (Minister of Home Affairs Regulation), including: 1). Labor recruitment, 2). Contribution to the economy, 3). Regional economic base sector, 4). Renewable, 5). Socio-cultural, 6). Market availability, 7). Raw materials, 8). Capital, 9). Production facilities/infrastructure, 10). Technology, 11). Business management and 12). Price. Various government policies to improve the

development of sago management recommended by (Bintoro et al., 2016) include: sago becomes a mainstay commodity, there is a need of making a clear spatial plan, there is no overlap between customary rights, regional regulations and central government regulations, facilitating licensing for investors, there is a need for fair pricing of sago starch.

2. Maximizing stakeholder participation in the management of sago agroindustry to increase community economic activity.

Stakeholders have an important role in managing sago agroindustry. The involvement of stakeholders, both in the form of institutions and individuals, can influence the success of developing a sustainable sago agroindustry.

Stakeholders are those who have their own interests and decisions. Stakeholders can be groups or individuals who can influence or be influenced in achieving the goals of a program. Stakeholders are part of the actors involved in the management of the sago agroindustry. Each stakeholder has a different level of role and interest. Reed et al., (2009) classify stakeholders based on their influence on a process into four groups: 1). Context setters: Stakeholders who have high influence and low level of interest, 2). Key Players: Stakeholders who have a high level of interest and influence, 3). Subject: Stakeholders who have a high level of interest but have low influence and 4). Crowd: Stakeholder groups that have a low level of interest and influence.

Bintoro et al., (2016) recommend an approach that can be taken in an effort to develop community empowerment by involving the role of stakeholders through the ABG+C formulation, namely Academics, Business, Government and Community. Each component in the formulation has different roles and responsibilities. Academics act as innovators, business as incubators, government as facilitators and community as implementers.

3. Supporting infrastructure in the management of sago agroindustry should be fulfilled to encourage increased production and processing.

The availability of supporting infrastructure to support the development of sago agroindustry includes transportation infrastructure, public infrastructure, production infrastructure and marketing infrastructure. Transportation infrastructure supports the movement of goods and people to the market which includes land/sea/air transportation facilities/infrastructure. General infrastructure includes basic infrastructure services such as electricity, telecommunications networks, and clean water. Production infrastructure includes the development of facilities/infrastructure in the areas of availability and continuity of raw materials, access to capital, modern machinery and appropriate technology. Marketing infrastructure is a development in the field of meeting local and national market needs, providing promotion space at local and national and international levels and utilizing information technology.

4. The growth of the sago *IKM* business unit and increasing the capacity of human resources in the management of the sago agroindustry.

The sago small business unit (*IKM*) will be sustainable if it is profitable. The partnership between *IKM* and other institutional units is one of the strategies in building a consolidated marketing of production products. The partnerships built need to be accompanied by efforts to improve technical and management skills for *IKM* units and other agroindustry actors.

The quality of human resources is one of the main problems in the development of sago management. Skill improvement can be done by utilizing existing institutions both from the government and private sectors. Bintoro et al., (2016), stated that improving the skills and knowledge of the community in the sago mining area can be achieved by maximizing the available institutional roles. Another option is to take advantage of community service programs that are periodically carried out by universities, such as *KKN* (Student Community Service) programs. Increased skills and knowledge are more related to the process of technology transfer to rural

communities and education about the use of sago in daily life through seminars, expos, workshops, cultural activities, learning curricula and others.

4. Conclusion

The current situation of managing sustainable sago agroindustry in East Seram Regency tends to be in a pessimistic to very pessimistic scenario. This study has formulated strategic implications that are implemented through regional plans as a form of action plan, including: regional government policies to establish sago as a leading commodity and create market guarantees for sago products, involving relevant stakeholders in the management of sago agroindustry to encourage community economic activity, fulfillment of production infrastructure. This study has identified and formulated strategic implications for the variables that most likely influence the sustainable sago agroindustry management system in East Seram Regency through participatory prospective analysis methods. These variables are: market guarantees, stakeholder participation, government policies, supporting infrastructure, improving the quality of human resources (farmers), *IKM* units, and economic activities.

Suggestion

The Regional Government of East Seram Regency is advised to prioritize policies for utilizing the available potential of sago to encourage economic growth and community income through a sustainable sago agroindustry management approach. In an effort to encourage improvement of the sago agroindustry management system in East Seram Regency, all relevant stakeholders (government , private sector, non-governmental organizations, entrepreneurs and farmers) need to develop effective planning. The plan can utilize seven variables that have been identified as having the most influence on sustainable sago agroindustry management as an entry point based on the order of priority that has been analyzed.

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