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Condition of Plantation and Development Strategy of Sago Garden

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ABSTRACT

Sago plants in Indonesia have great potential, such as a very large area, a high source of carbohydrates, high productivity, and can be used as various kinds of derivative products. Sago is a local specific food ingredient in Maluku. Especially people in rural areas consume sago as a staple food. This study aims to determine plantations' condition and sago gardens' development strategy in Sumber Agung Village, East Seram Regency, Maluku Province. The research sample is determined by purposive sampling because farmers desire and are willing to organize sago forests into sago gardens. The number of samples is 80 respondents. The results show that the sago garden is located in an area with Alluvial Plain physiography with choppy microrelief so that there are sporadic spreading basins that cause puddles. The height of this garden's location ranges between 25-35 m above sea level, with a slope varying between 0-3%. This microrelief condition results in a puddle of water, but this puddle is temporal, where the pool occurs during the rainy season and sometime after the rainy season. The people of Sumber Agung Village, who are very, welcoming friendly, and open to developing innovations in the management of sago gardens, are important to preserve Sago in the future. The transmigration community in Sumber Agung Village supports the structuring of sago gardens. This is evidence of ethnic diversity, but concern for Sago is grave. This is good because Maluku is famous for local sago food, so sago forests need to be organized into representative and sustainable sago gardens. The community's perception of factors towards the development of sago plantations shows that the convenience construct does not significantly affect the needs construct. While the aesthetics construct, the benefit significantly influences the needs to construct.

1. INTRODUCTION

Sago palm (*Metroxylon sagu* Rottb.), grown mostly in the tropics, is one of the most productive carbohydrate-producing crops. However, it is still underutilized. Tissue culture of sago through somatic embryogenesis has been developed [1]. Sago is one of the superior national crops but has not been used properly. Sago plants have not been well cultivated by the community and are still hereditary as a family inheritance. Sago has been used extensively, but cultivation is not intensive and is still traditional. The variation of morphologic characters for each sago variety is influenced by environmental, genetic, collecting, and morphological characterization factors [2]. Using seeds, propagation of sago palm will result in large variations due to segregation resulting in genetic diversity. Morphological diversities of sago palm seedlings showed high variations, with the similarity coefficient ranging from 10% to 69%. Growth patterns of sago palm seedlings were divided into three categories, i.e., slow, medium, and fast growth [3].

Based on environmental factors, the conditions for growing sago palms are in the geographical location of 100 LS - 150 LU and 90-180 BT. Topographic conditions 0-1000 m above sea level; Optimum: 5-400 m above sea level and a slope less than 35%. Rainfall conditions of 2,000-4,000 mm/year are evenly distributed throughout the year, solar radiation is 900 J/cm^2/day, irradiation time is 1,600 with an average of 5-6 h/day, humidity (RH) is 80-90%, and daily temperature 25°C-29°C. The best growth occurs in soils with high organic matter content and a slightly acidic reaction with a pH of 5.5-6.5 [4].

Indonesia is the largest owner of the sago area, with about 1,128 million hectares or 51.3% of the 2,201 million hectares of sago area. It has a fairly high productivity potential of ± 30 t/ha/y, exceeding other food sources such as rice 10 to 16 tons/ha/year and corn from 8 to 10 t/ha/y [5]. Indonesia has many areas that have the potential to be planted with Sago. There are around 183 districts spread across 27 provinces considered the potential for the development of sago plantations. The total potential of sago starch produced in Indonesia can reach 6.84 million t/y [6]. The biggest ingredient in sago is carbohydrates. In 100 g of dried sago, 94 to 96 g of carbohydrates are higher than 80.4 g of rice, 71.7 g of corn, and 16.3 g of potatoes [7]. Sago pith reaches a weight of 270-360 kg and produces 90-180 kg of sago starch or 40% weight. The starch content in sago stems reaches a maximum before flowering, which is at the age of 8-11 years, depending on sago's botanical source. In the flowering phase, the starch content decreases very rapidly. Sago starch contains water 12-21%, protein 0.1-1.0%, fat 0.1-0.3%, crude fiber 0.08-0.5% and ash 0.1-1.6%, with amylose 24-27%.

Processing sago stems at this time focuses on producing sago starch, although in rural areas, other parts of the sago plant are used, such as leaves (pinnae) for roofs fronds (rachis)

for walls and ceilings, and others. Sago pith processing, commonly called sago processing, consists of sago tree felling, sago stem division/sago stem cutting, sago core destruction, extraction, sedimentation, and packaging of starch [8, 9]. Sago palm forests and sago palm semi-cultivation are generally spread in swampy areas, seasonally inundated areas, and non-inundated areas [10]. Public interest in processing sago as a food source is getting lower because sago is already considered an inferior food and no longer an excellent food even though the potential for sago starch production in Maluku can reach 465,480 t of dry starch/y. Its utilization is only 10% or approximately 46,500 tons of dried starch/y [8]. Sago produced 200 to 400 kg of starch/tree; some even produced 800 kg of starch/tree. If intensive sago planting is carried out with a population of around 100-200 trees/ha, it is assumed to produce 300 kg of starch from each tree, then in one hectare of sago plant will be obtained 30-60 tons of starch. Meet the calories of 200 million people in Indonesia, only one hectare of the sago plant is needed [4, 10]. Research showed that the highest yield of dry pith stem was in the type of short spines (511 kg/stem), followed by the type without spines (417 kg/stem) and the type of long spines (329 kg/stem) [11].

Sago plants in Indonesia have great potential, such as a very large area, a high source of carbohydrates, high productivity, and can be used as various kinds of derivative products. Sago plants in Indonesia are the largest global because more than 85% of the total world sago area is in Indonesia, especially in Papua and West Papua. Papua and West Papua have the most potential because they only need to harvest and organize into sago plantations. Another potential that supports the superiority of sago is that it contains high carbohydrates with dry starch content of 200-400 kg/tree, and if harvested in 1 ha, it will produce 20-40 tons of starch/ha/y. Sago is superior to rice to feed the world. Sago in one hectare can produce 20-40 t of starch, if added to the sago area of 5 million hectares, will produce 100-200 million tons. Rice requires 12 million hectares to produce 30 million tons, while sago produces 30 million tons of starch in just 1 million ha. Sago gardens with an area of 1 million hectares feed 200 million people; if in 5 million hectares, sago can feed 1 billion people. Sago can meet the needs of the world's starving 868 million people reported by the FAO [4].

The development of sago innovation is an absolute thing that must be done to increase competitiveness and add value to sago-based commodity products. In addition to the term innovation that has been previously stated, another term for innovation is "the first" application of science and technology in a new way, with commercial success." Innovation of various processed sago products in Maluku. Various types of processed sago products are available in markets and souvenir centers typical of Maluku such as sago cheese, sago brownies, brown sago, sago steak, sago noodles, sago bagea, sago shaved, plate sago, sago flour and others.

The advantage in processing Sago both as food and as alternative energy of raw material compared to other foods is because (1) the potential is immense, (2) the carbohydrate content is quite high, (3) the production of starch per hectare is quite high and (4) the condition of sago in the form of forest, take the starch directly without having to be planted/cultivated first. However, it must be considered to change/organize the sago forest into sago gardens in the future development of sago. The development of sago plantations will be better because it can restore the people of Maluku's passion for loving sago. The arrangement of sago forests into sago gardens will look beautiful, and the results will be enjoyed continuously by all the people in Maluku. Through sago plantations, sago productivity will be higher than only managed in the condition of sago forests. This study aims to determine the status of estates and development strategies of the sago garden in Sumber Agung Village, East Seram Regency, Maluku Province.

2. MATERIALS AND METHODS

The research takes place in Sumber Agung Village, West Bula District, East Seram District, Maluku Province. Determining the location using purposive sampling because the sago forest area in Sumber Agung Village covering an area of 50 ha is directed to the arrangement of sago gardens. The research location is a swampy and flat area so it is very suitable for the development of sago gardens. The study was conducted in March-April 2019. The research sample is determined by purposive sampling because farmers desire and are willing to organize sago forests into sago gardens. The number of samples is 80 respondents. The data collection method is conducted through observation, interviews, and recording. Researchers conduct observations before the study and when doing research. Interviews are conducted by meeting with respondents, then conducting questions and answers using a list of items (questionnaire). Then, the record of obtaining primary and secondary data from relevant agencies and institutions [12]. Field data analysis is conducted qualitatively and quantitatively—qualitative data analysis using SWOT analysis to measure the development of sago plantations. The SWOT matrix is a tool used to develop farming strategy factors. This matrix can clearly describe how the external opportunities and threats are adjusted to their strengths and weaknesses. This matrix can produce four sets of possible alternative strategies. SWOT analysis is a systematic way to identify factors and strategies the best. This analysis is based on the assumption that an effective strategy will maximize strengths and opportunities and minimize weaknesses and threats. When applied accurately, this simple assumption has a huge impact on the design of a successful strategy. This analysis can logically help in the process decision-making. The decision-making process regarding with the vision and mission and goals of farming. So that SWOT analysis can be used as an effective tool for analyze the factors that affect the business, as a decision-making process to determine the strategy. Quantitative data analysis to measure respondents' perceptions of the development of sago plantations. In this study, the structural causal model built made the usability aspect an exogenous latent variable, which was linked to the exogenous-endogenous latent variables of convenience and aesthetic aspects, as well as endogenous aspects of needs as the final estuary to see public perceptions in general—collecting data on latent variables and indicators using a simplified questionnaire using a Likert scale of 1 to 5 where the scores are 1 (Strongly Disagree), 2 (Disagree), 3 (disagree), 4 (agree), and 5 (Strongly agree).

$$\text{Index Number Formula \%} = \text{Total Score} / Y \times 100 \quad (1)$$

$$\text{Interval number formula } (I = 100 / \text{Total Score (Likert)}) \quad (2)$$

Result = 100/5 = 20 (This is the interval from the lowest 0%

to the highest 100%) the criteria for interpretation of the score are based on intervals: Score 0%-19.99% = Strongly (disagree); Number 20%-39.99% = Disagree); Figures 40%-59.99% = Fair/Neutral; Number 60%-79.99% = (Agree); Number 80%-100% = Strongly (agree).

For the structural model analysis with path diagrams, the SmartPLS version 3.0 software was used. The indicators of benefit aspect (exogenous) consist of effective in allocating the resources owned by farmers as well as possible (x_{11}) and efficient allocation of inputs and production facilities (x_{12}); indicators of convenience aspect (exogenous-endogenous) consist of ease of obtaining assistance (x_{21}), ease of area arrangement (x_{22}), ease of garden maintenance (x_{23}); indicators of aesthetic aspects (exogenous-endogenous) consist of interest as a sago garden (x_{31}) and beauty in scenery and arrangement (x_{32}); Needs aspect indicators (Endogenous) consist of the need to increase productivity (y_1), the need to increase people's income (y_2) and the need to increase welfare (y_3).

3. RESULTS AND DISCUSSION

3.1 Physical condition of the garden

3.1.1 Location of the survey area

Sago plants are found in swampy soils and are located at least in riverside soil [13]. Sago grows at an altitude between 0-100 m above sea level, but Sago also grows up to 0-700 m above sea level. Sago growth and production will be good at altitude < 400 m above sea level, while at height > 400 m above sea level, sago growth is inhibited, and production decreases. At an elevation of > 600 m above sea level, sago trees only reach 6 m with a small circumference, like those found in Manusela, Seram. The topography where Sago grows is generally concave - flat (slope 0-3%). Sago also grows on slopes > 3% (wavy) but in a narrow area, in a stream. Sago trees can reach 25 m in height and produce sago starch at 6-18 m in height.

3.1.2 Physiography

The sago garden's location is in an area with Alluvial Plain physiography with choppy microrelief so that there are sporadic spreading basins that cause puddles. The height of this garden location ranges from 25-35 m above sea level, with slope varies between 0-3%.

3.1.3 Hydrology

The meaning of hydrology is related to the condition of drainage flow and inundation in the garden. Several drainage lines were found in the garden, namely on the West Side and East Side of the garden. As noted above, the garden is in the Alluvial Plain's physiography with choppy microrelief so that there are sporadic spreading basins. This microrelief condition causes a puddle of water, but this puddle is temporal, where the puddle occurs during the rainy season and sometime after the rainy season.

3.1.4 Distribution of sago clumps

This study is prioritized in arranging a new sago garden, a continuation stage (second stage, 2019) from structuring the first stage (in 2016) of the sago forest to become sago gardens in Sumber Agung Village West Bula District, East Seram District. In this study, structuring is prioritized only in the new sago garden. Some activities are needed in structuring sago forests to become sago gardens. The event intended to close the thinning of sago groves, nurseries, and planting. They are thinning conducted in the area by closing the Sago Forest land, while the cover of the Shrubland of Mixed Forest-1 and Mixed-2 Forest is done by planting Sago.

Covering land with grass and water, hyacinth is found in inundated areas. This study was conducted during the rainy season, with the puddle being more than 30 cm. This inundation is permanently based on local farmers (local helpers), although the inundation level is reduced in the dry season. In connection with this, it can be stated that the area by covering the land with water hyacinth can be planted if the stagnant drainage improvement is taken. Structuring sago forests into sago groves was conducted at a clump distance and a spacing of 10 × 10 m.

3.2 Condition of plantation and development of sago garden

Indonesia has remarkable potential for the center of sago production because of its sago forests. There is no doubt that Indonesian Sago palm diversity should have great future value for the world's food. Therefore, sago is one of the tropical forest biodiversity that needs to be conserved and preserved to maintain more food production, food security, healthy diet, and food sustainability for the future of human diet in the world [14]. Sago plant is quite potential as a local food source in Maluku. As a staple food source, sago has been known since ancient times but has increasingly been marginalized because people prefer to switch to rice because rice is fast in serving and easily obtained [15]. Sago contains high carbohydrates (79.51%) can overcome the problem of food insecurity if it can appropriately be developed as a staple food source for the family [16]. Domestic and world demand for sago starch continues to increase, both for food and non-food resource. To respond to the opportunity, farmer empowerment needs to be encouraged to increase current low productivity (less than 15 t/ha/y). Through farmer empowerment, traditional sago farming will change to managed farming, enabling farmers to implement and apply recommended technology called Best Management Practices and fulfill other related support to uplift their sago farming productivity [17].

Sago plants can be developed and utilized in Indonesia to support food security. Sago plants have potential based on the extensive planting area, high productivity, and nutritional value that is not inferior to other food crops. The average productivity per tree (wet weight) is 147.8 ± 33.6 kg [18]. In line with Jong's research [19], the average productivity of sago starch in South Sorong reached 152 kg/tree. The results are one-quarter when compared between sago productivity in South Sorong and Maluku. Sago in Maluku, according to Louhenapessy et al. [20], has productivity of 640 kg (wet weight) per tree. Yamamoto et al. [21] found that sago productivity in Maluku reached 700 kg/tree. Sago palm (M. sagu Rottb.) is a potential starch crop suited to this purpose; prefer the control of groundwater level and fertilizer application should be done to maintain the high starch productivity. It is also important to estimate the impact of sago palm cultivation on the environment from the sustainability viewpoint [22].

Sago plants are essential to support food diversification and stability, which can be used as raw materials for industrial businesses [23]. As a food of the Maluku people, Sago has

long been known, and its processing comes from habits transmitted orally from generation to generation. Therefore, substantially, sago is the people's food because of its simplicity or presentation as it is, and papeda as a traditional sago food needs to be increased in value by a more prestigious processing process with the addition of protein, namely yellow fish soup, which is of higher quality [24-26]. The development of sago flour research is still minimal. So far, the flouring technology or sago fermentation process is always juxtaposed with the extraction process as conducted [27], who developed a method of traditional sago processing in the Philippines mechanically, resulting in simplifying the process of 22 stages by 50%. Likewise, what is conducted by Kamal et al. [28] regarding the development of the sago flour process with squeezing technique and the results can increase yield. The results of interviews with farmers working in sago plantations showed that the percentage of farmers who agreed to the development of sago forests into sago plantations was 97.09%, and only 2.91% did not agree. This means that farmers and village officials agree if the sago forest is turned into a sago plantation. So far, sago palms have not been cared for, ignored, not touched by farmers, there is no sense of belonging to sago trees by local farmers, and sago is always neglected. Therefore, if the sago forest is managed properly, farmers and the entire community in East Seram Regency will preserve the sago. Meanwhile, farmers who do not agree think that managing a sago garden is very difficult and takes a long time.

Figure 1 shows that respondents' assessment of the condition of sago plantations and development showed that the 11 descriptions displayed showed good to very good results. It can be seen that the index value of 95% in the sago plantation area is preserved. This means that farmers are very concerned about the sustainability of sago gardens. While the smallest index value is 61% on the community, who have a high concern for managing sago gardens properly. This needs to be socialized continuously so that people are more aware and care about the arrangement of sago gardens.

The acquisition of sago plantations with maximum productivity and sustainability, the sago business pattern, which is categorized as "natural sago forest," should be directed to become a sago estate pattern. The initial steps taken include improving the number, distribution, and age composition of the sago plant population through community sago garden management activities. Efforts to conserve sago habitat in Padang Island need to be recommended to preserve sago diversity and maintain the source of income of local people who depend on the sago plantation and processing industry. Efforts to increase national sago production need to be expanded to plant Sago in potential areas [29].

The results showed that farmers approved the development of sago forests into sago gardens with an index value of 83.91%, a relatively high value. This means that farmers and village officials agree that sago forests are used as sago gardens. So far, sago trees are not cared for, and farmers do not care about them; local farmers have no sense of ownership of sago trees, and Sago is always ignored.

Structuring of the sago garden must be conducted without destroying the existing sago habitat. This habitat must be preserved because it is a buffer zone and because Sago is a plant inherited from its predecessors. On the other hand, the community wants to raise sago management's culture as a source of income. Therefore, involvement in a group of sago farmers intends to improve the family economy. Sago gardens will be fascinating and unique because they exist in Maluku.

3.2.1 The spirit of work of sago farmers

The agricultural sector remains a potential source of income and employment opportunities. Efforts to improve the productivity and welfare of farmers as farming business actors must continue to utilize the bioenergy and diversity innovation and develop agro-industry of processed products as well as agro-industry products for crops and work opportunities outside the agricultural sector [30]. The experiences of local people in consuming sago have proven that sago has wider utilization. It can allow the home industry to grow, and of course, indirectly can give economic impact to the farmers. Sago has become an important raw material for the food industry and it is predicted that the demand for sago in the future will increase. Sago-based food products, with a total of 63 various products that are spread in 21 of 33 provinces in Indonesia, have provided a lot of benefits and surely has a high potency to be developed further for wider acceptance purpose, especially in processing efforts in the food industry sector [31].

Farmers in Sumber Agung village are mostly transmigrant farmers whose daily work is farming in paddy fields. They have a high enthusiasm to work because they have the intention, willingness, and confidence to work optimally to produce something useful, in this case, high yields. Interest is the primary key to starting an activity. If the farmer does not have enthusiasm, he will not do his activities. The spirit of rice farmers is different from indigenous farmers. Indigenous farmers carry out farming activities of tubers, sago, and vegetables. Indigenous farmers are not as detailed as transmigration farmers. They tend to go to the garden if there is a passion for work.

The working spirit of sago plantation workers shows that the six components displayed show good to very good results. It can be seen that the index value is 83.33% in determining the ideals or desires. This means that farmers want to be successful in their harvests, to take care of their crops. While the smallest index value is 44.67% in the part of carrying out work according to plan. Before starting work, a plan must be drawn up. A good plan makes the job easier. The work was completed on time. A good plan fosters morale.

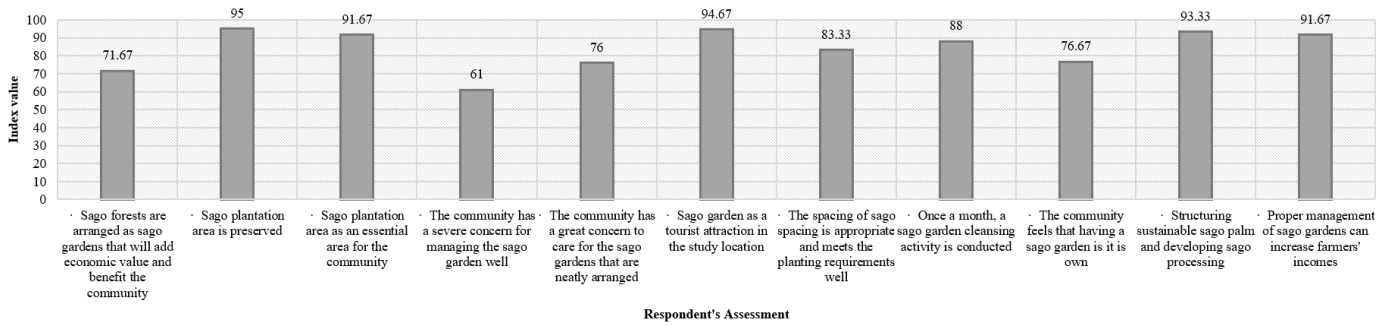

Figure 1. Community responses and assessments of sago plantation and development garden conditions

Structuring a sago forest into a sago orchard is needed for high moral for all the farmers involved. The work of structuring sago forests is different from other farm work. Sago palms are in swampy areas with many thorns; they are hard and long. This situation causes most farmers not to want to manage and manage sago orchards. However, sago farmers engaged in activities with the Provincial Agriculture Office of Maluku showed good loyalty to work. The spirit that will continue to be fostered so that the structure of the sago plantation can run smoothly has not been seen. Farmers are still being reminded and have not taken the initiative to work continuously in sago fields. If a suitable time division is done, all the work can be done well. Work spirit includes the spirit of activeness and care and the enthusiasm to help and prioritize others' interests as a form of social satisfaction.

Figure 2 shows that the moral growth of sago farmers is with an index value of 69.39%; this value is relatively low. It can be seen that farmers have not created a good spirit. Farmers do not yet have high enthusiasm for work because their hopes will not be seen at all sago production that will be received when the structuring process optimally. Work in the sago garden is not optimal because the lazy culture is still high. Farmers have not managed themselves well to work continuously. Therefore, continuous assistance is needed from the Provincial Agriculture Office of Maluku and the District Agriculture Office so that farmers' enthusiasm will get better day by day.

3.2.2 Work discipline of sago farmers

The work discipline of sago farmers is related to the ability to control themselves, the ability to manage work, and the ability to use work time. Sago farmers in Sumber Agung Village have not shown good work discipline. Work discipline is formed because farmers are aware that smooth work requires discipline, both written and unwritten, such as time discipline, the discipline of responsibilities and duties, and the willingness to accept sanctions if they violate the rules, duties, and responsibilities.

The work discipline of sago plantation workers shows that the four components displayed show good to very good results. It can be seen that the index value of 70% in the part of receiving sanctions if violating the rules, duties, and responsibilities. This means that farmers are willing to accept sanctions if they are not disciplined in their work. In contrast, the smallest index value is 60% in the discipline section against the rules. Farmers have not fully complied with the rules agreed upon with village, district, and provincial government officials. There needs to be assistance and guidance to farmers to be more disciplined. Figure 3 shows the response of farmers to aspects of the regulatory discipline, time discipline, duty, and responsibility discipline, and acceptance of sanctions if they violate provisions, duties, and responsibilities with an index value of 65.50%, which is relatively low. This is because all aspects of work discipline have not been thoroughly carried out correctly. Farmers still think that structuring sago gardens are not very important. Farmers always leave sago fields filled with weeds and not be cleaned continuously. Work discipline has not yet been fully implemented in the sago garden. Farmers are formed in groups of farmers; therefore, group members must follow the group leader's direction to work according to the provisions and work items that have been determined. However, in the field, group members did not hear the group leader's course, and even the group leader did not know the functions and duties to direct the group members to work. The group leader is not disciplined, causing group members to become lazy to work.

3.2.3 Skills of sago farmers

A skilled farmer can apply new ideas to achieve something useful. First, in skills, it takes several aspects, such as communication skills. This is a soft skill that farmers must learn to communicate well with the group leader, fellow group members, village community, village government, district government, and provincial government related to the development and structuring of sago gardens. If the farmer can communicate well, he will convey ideas well and even carry out persuasion that benefits himself and others.

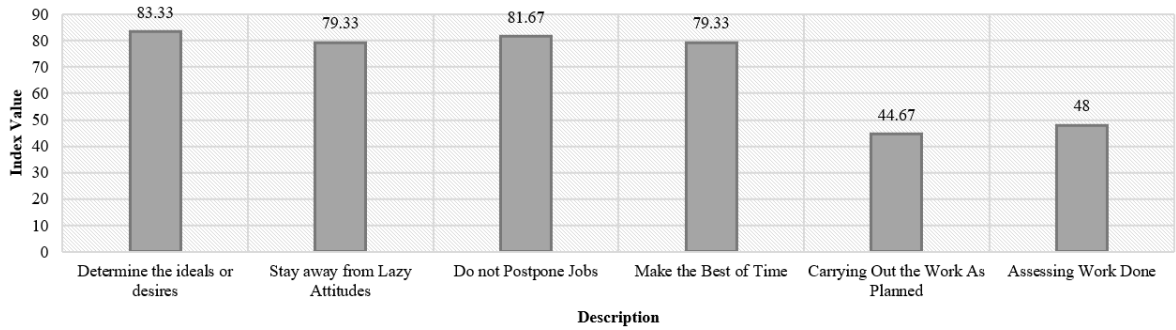

Figure 2. The enthusiasm of sago farmers

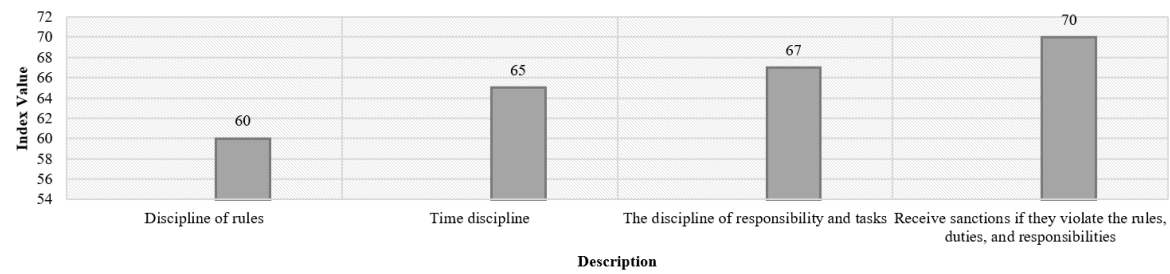

Figure 3. Work discipline of sago farmers

Second, flexible attitude. This is what many people want. The skills to be able to adapt to technological developments, be open-minded, and do multitasking work. To keep abreast of the fast-paced knowledge economy, a farmer must have a strong desire to learn and accept criticism and advice from others. Sago farmers must take criticism and input from others to develop themselves and develop agriculture—the desire to learn from others so that changes occur in themselves and the activities they do. Structuring sago gardens is not an easy job. This requires preliminary cleaning, area clearing, main thinning, tillering, tending, and controlling weeds in sago gardens. Respondents' opinions on work skills to manage initial cleaning, area clearing, main thinning, tillering, tending, and weed control in sago gardens are shown in Figure 4.

The skills of sago plantation workers showed that the four components displayed good to very good results. It can be seen that the index value of 88.33% on farmers' skill on cleaning sago land area. That farmers have excellent skills to clear sago forest areas into sago gardens. In comparison, the smallest index value is 76.33% in farmers' skills on the maintenance of sago gardens. Farmers have good skills to carry out the process of maintaining sago gardens.

Figure 4 shows that the index value of the four activity items in the sago plantation is 81.83%. This value is relatively high and very good. This means that farmers still need assistance from specialized agencies to give orders so that they are righter. Farmers' skills in thinning sago trees show that most farmers only work according to their knowledge but do not know clearly why thinning is done. Therefore, this knowledge must be shared with farmers to understand the aims and objectives better. Farmers' skills in controlling weeds show that farmers very rarely do this. Farmers rarely do weed clearing in sago fields, so weed populations increase. Communication and information are needed to regulate farmers' work and stimulate their skills to improve their structuring of sago gardens.

3.2.4 The motivation of sago farmers

Motivation is encouragement from within individuals to do something. Farmers' motivation consists of encouraging relatedness, namely the desire to always interact with people in their environment, the urge to grow and develop, the urge to get things that can make someone achieve achievements, and the urge to get knowledge and information technology, and communication networks.

Motivation is related to two factors, namely, internal and external factors. Farmers' internal factors include attitude, education, age, and several family members. Meanwhile, external factors come from outside individual farmers, namely counseling. Internal factors such as attitude are part of the behavior that is still in the affective domain. Affective is a tendency to act based on knowledge (cognitive). This fact is by Haryadi [32] opinion that a person's attitude will give color and style to people's behavior or actions. If you know someone's attitude, you will be able to guess how that person will take the response or behavior. Sago farmers have a variety of attitudes. Farmers can respond quickly to all activities that the technical service has determined. However, some farmers are slow to respond to all activities. This causes farmers to need assistance and coaching continuously to change their lazy attitude with work. Farmers are rewarded with payment of wages means they have to change their attitudes and work according to regulations. Education levels include elementary, middle, and high school. Education does not affect motivation because sago farmers' education levels for all levels of education have the same motivation to work. Managing a sago garden does not require a high level of education, but the most important is work skills, high motivation, discipline, and enthusiasm.

Farmers of productive age and unproductive have the same motivation at work. Productive age is classified as young, while non-productive age is the old age group. Farmers with young and old age have almost no difficulty in working. Most sago farmers are productive and are very active at work. Having good physical ability can survive in the sago forest to work. Sharing work among group members and communicating in groups is relatively high.

The number of dependents of the family does not affect the motivation because the family members of the farmer, the wife and children, generally do not work as laborers in the structuring of sago gardens. As head of the family, the farmer has full responsibility for working for his family. In addition to working as a sago plantation worker, the farmer has another main job cultivated in the farm business location.

Counseling does not affect motivation because farmers generally attend extension activities rarely provide material about the benefits of sago garden structuring. However, extension activities that are held are always followed by farmers. Most farmers obtain information about sago garden arrangements from the technical office. The information collected is more than complete and meets the needs compared with extension activities carried out by field counselors.

The motivation of sago plantation workers shows that the four components displayed show very good results. It can be seen that the index value is 91.33% on the part of the drive for relatedness, namely wanting to always interact with people in their environment. This means that farmers are interested in interacting with the environment to manage sago gardens. At the same time, the smallest index value is 86.33% for the encouragement to grow and develop. Farmers have a high drive to continue growing and developing in managing sago gardens.

Figure 4. Skills of sago farmers

Figure 5 shows that the index value of 88.08% has a good response to the urge to be relatedness namely the desire to always interact with people in their environment, the urge to grow and develop, the call to get things that can make someone achieve achievements and the drive to acquire knowledge, information, technology and communication networks. This means that farmers have the motivation to work well in sago groves. However, the technical service needs to be accompanied and continuously fostered so that the initial clearing activities, area clearing, primary thinning, thinning of tillers, maintenance, and control of weeds in sago can occur properly. During this time, farmers did not care about Sago to be arranged. Farmers only prioritize traditional sago processing to produce wet sago for consumption and sale. They assume that the sago harvest time is too long to work on the land requires extra time and energy. Farmers became lazy, and there was no encouragement to work in the sago gardens.

3.3 Factors of community perception on the development of sago gardens

Analysis of the variance-based SEM-PLS model was carried out to assess the outer model or measurement model that links all manifest or indicator variables with latent variables; assessing the inner model or structural model, where all latent variables are related to each other based on the path diagram model. The measurement model was assessed using reliability and validity for reliability using Cronbach's Alpha. The minimum value is 0.7, while ideally, it is 0.8 or 0.9. In addition to Cronbach's Alpha, the value of *c* (composite reliability) is also used, interpreted the same as the value of Cronbach's Alpha. Each latent variable must explain the indicator variance at least 50%. Therefore, the absolute correlation between the latent variables and their indicators must be > 0.7 (the absolute value of the outer standard loadings).

Based on the estimated value of the model, it is known that the loading factor value shows a value of > 0.7, meaning that this value is valid and can be used as data in the overall model. The value of outer loading = 0.5 can still be tolerated in a model that is still under development, and below the value of 0.50 can be omitted from the analysis. An indicator is said to have good validity if the outer loading value is above 0.70. Table 2 shows that all construct correlations (latent variables) with their indicators are higher than those of other construct indicators (latent variables). This means that each latent construct created (Aesthetics, Needs, Benefit, and Convenience) can predict indicators in each construct better than indicators in other constructs.

The Fornell-Larcker criterion value shows each constructs correlated with one construct and another in the model. The value of the Fornell-Larcker criteria can be seen in Table 1. The measurement of the discriminant validity value with the AVE value according to Table 3 looks greater than 0.5 as a determinant of the suggested convergent validity. Based on the Fornell-Larcker criteria, the value is greater than the correlation value with other constructs. Likewise, the internal consistency based on the composite reliability value shows greater than 0.6. In general, the measurement test of the outer model (measurement model) between the constructs (Aesthetics, Needs, Benefit and Convenience) with each indicator value has met the standard values of the recommended criteria, the correlation between the constructs made with the indicators can be used in the previously designed modeling.

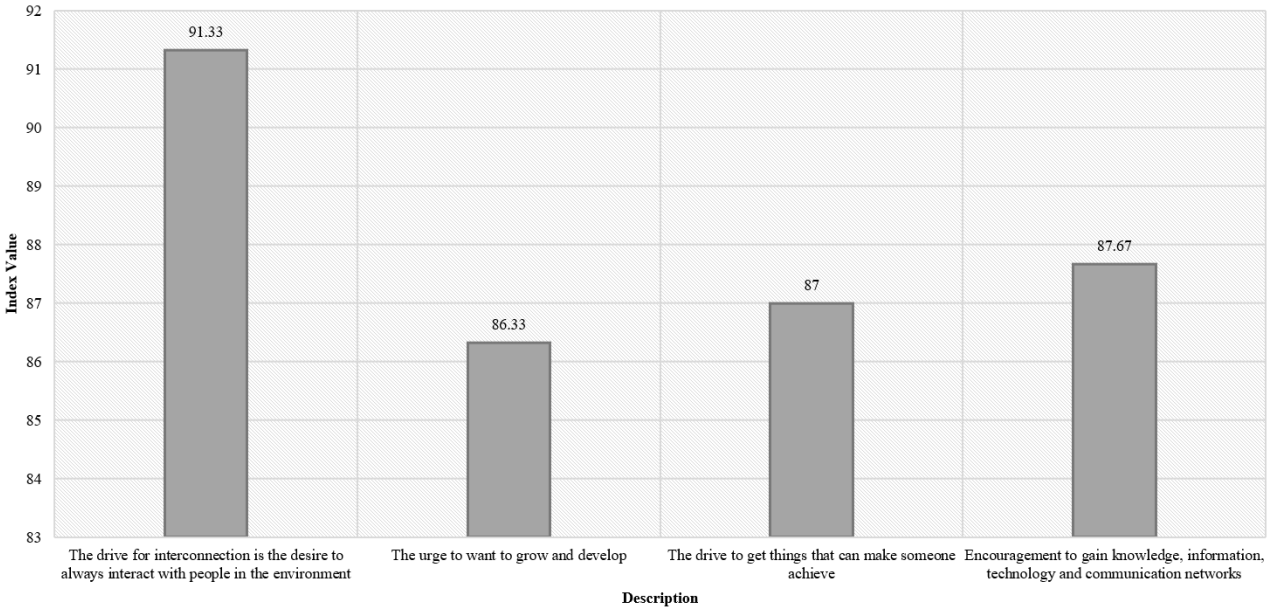

Figure 5. The motivation of sago farmers

Table 1. Displays the construct reliability and validity values

Variable Laten	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Aesthetics	0.835	0.931	0.921	0.854
Needs	0.808	0.855	0.881	0.712
Benefit	0.736	0.753	0.883	0.790
Convenience	0.769	0.775	0.867	0.686

Table 2. Cross-loading value

Indicator	Aesthetics	Needs	Benefit	Convenience
X11	0.253	0.842	0.910	0.516
X12	0.176	0.383	0.438	0.819
X21	0.346	0.462	0.507	0.899
X22	0.420	0.405	0.501	0.762
X23	0.953	0.486	0.366	0.392
X31	0.893	0.324	0.249	0.307
X32	0.462	0.809	0.438	0.285
Y1	0.503	0.880	0.552	0.417
Y2	0.253	0.842	0.910	0.516
Y3	0.368	0.566	0.867	0.525

Table 3. Fornell-larger criteria values

	Aesthetics	Needs	Benefit	Convenience
Aesthetics	0.924			
Needs	0.453	0.844		
Benefit	0.343	0.805	0.889	
Convenience	0.385	0.505	0.584	0.829

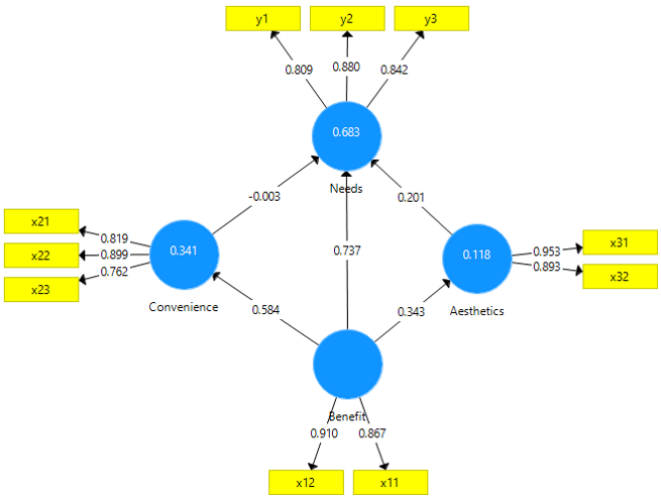

Figure 6. The value of loading factor (outer path), path coefficients (inner path), and R^2 as standard values in the model

The test value for the structural model (inner model) or the model that connects the constructs (latent variables) requires an advanced model using bootstrapping facilities. The structural bootstrapping model (inner model) results can be seen in Figure 7. The structural model based on the t-value in Figure 6, the convenience construct does not significantly affect the needs construct because its t-value (t-convenience-needs=0.04 is smaller than the recommended value (t-value < 1.96). In the Aesthetics construct, benefit significantly affects the needs construct. This can be seen from the t value > 1.96 (t-Aesthetics-Needs = 2.788; Benefit Needs = 14.159). Meanwhile, the Benefit construct has an influence that is significant for both the Aesthetics construct and the Convenience construct, where each t value (t-Benefit-Aesthetics = 4.176 and t-Benefit-Convenience = 8.841) is greater than the recommended t value (t > 1.96). Positive and negative between constructs can be seen based on the path coefficient values, as shown in Table 4.

Structural model testing can be done by looking at the R^2 value, a goodness-fit-model test, as shown in Table 3. Based on the R^2 value, the Aesthetics construct, Convenience construct, and Needs construct are 0.198, respectively, 0.335 and 0.611. It can be explained that each benefit increase can affect Aesthetics, Convenience, and Needs aspects, respectively, by 19.8%, 33.5%, and 61.1%. While the remaining 80.2%, 66.5%, and 38.9% respectively were influenced by other factors.

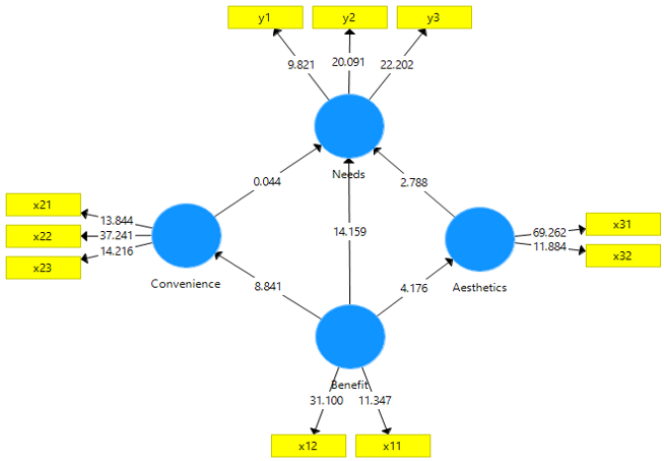

Figure 7. The t-Value value from bootstrapping between constructs (Inner model)

3.4 Development strategy of sago garden using SWOT analysis

Analysis of the sago gardens' development strategy is assessed from internal and external conditions presented in Table 5.

3.4.1 Analysis of internal conditions

(1) Strength

The condition of sago forests in Sumber Agung Village can be arranged as sago gardens because the location is in front of the production road. This condition is possible because sago land's most significant potential is in the Eastern District of Seram. The choice of Sumber Agung Village as the location for sago orchards will be better and is expected to become the largest sago orchard center in East Seram District. The expansion of 50 ha of land is a condition of development from 2016-2019 in Sumber Agung Village declared the Center for sago gardens.

Table 4. Path coefficient value of bootstrapping results

	Original Sample (O)	Sample Mean (M)	(STDEV)	t- Statistics	p-Values
Aesthetics → Needs	0.201	0.195	0.072	2.788	0.006
Benefit → Aesthetics	0.343	0.354	0.082	4.176	0.000
Benefit → Convenience	0.584	0.590	0.066	8.841	0.000
Benefit → Needs	0.737	0.748	0.052	14.159	0.000
Convenience → Needs	-0.003	-0.004	0.062	0.044	0.965

Table 5. Development strategies of sago farms

Internal (IFAS)	Strength (S)	Weakness (W)
	1. sago forests' condition is suitable for being arranged as sago gardens. Potensi saga di Kabupaten Seram Bagian Timur very large. 2. The sago forest area of 25 ha functions as a protected, buffer, and cultivation area. 3. Local Regulation of the Province of Maluku No. 10 of 2011 concerns Management and Conservation of Sago (Chapter III, Article 6, paragraphs 1 & 2). 4. The community consumption of Sago is high. 5. The community and village government support the development and structuring of sago orchards by 97.09%. 6. The community preserves the process of sago processing sustainably. 7. The transmigration community supports the process of structuring sago gardens.	1. Community concern for the structuring of low Sago 2. Environmental awareness is still low. 3. The mindset of the community towards the development of Sago is limited 4. Flooded land conditions make it difficult for the community to work. 5. Potential logging of Sago without land rehabilitation efforts. 6. The human resources of Sumber Agung village communities are low. 7. Lack of supporting facilities and infrastructure, especially transportation systems and accessibility. 8. The processing of Sago is still simple 9. Sago fields are still natural stands 10. The interest of the younger generation to process sago is getting lower
Eksternal (EFAS)		
Opportunity (O)	**Strategy "SO"**	**Strategy "WO"**
1. As a village tourism area. 2. A buffer of regional food. 3. Increase community income Reducing dependence on rice. 4. The development and structuring of the sago plantation support various parties, both the village government and the community. 5. The people of Sumber Agung Village are very welcoming and friendly, so they are expected to help the development and structuring of sago gardens sustainably.	1. Utilize all the potential of the existing Sago. 2. Utilizing forest areas as sustainable sago gardens 3. Regional food buffer both in the district and province Regional food buffer both in district and province ce. 4. Empower the community to be involved in developing and structuring sago gardens and their preservation for their children and grandchildren's future. 5. Efficient land use by utilizing land use by the land's ability to develop and arrange sago gardens. 6. Utilizing sago gardens as educational areas, such as collection gardens and research areas. 7. We utilize sago gardens as educational areas, such as collection gardens and research areas.	1. Improve sago forests' condition by rehabilitating sago fields into sago gardens. 2. Improve the sago processing system while paying attention to the quality of starch according to the sago starch's quality standard. 3. Building cooperation with relevant agencies to develop and organize sago gardens sustainably. 4. Conduct training, courses, etc., for farmers to develop local food in the area.
Threat (T)	**Strategy "ST"**	**Strategy "WT"**
1. Efforts to develop Sago are ignored 2. The rice program for the poor is still maintained 3. Future generations will come to know and love Sago 4. Sumber Agung village community is a mixed society that can cause culture shock to eliminate the cultural values of the sago tradition. 5. Some habits are a less healthy community and cause environmental degradation.	1. Reinforce regional regulations on Sago, especially the prohibition on converting sago land and legal sanctions. 2. Review the rice program for the poor through government policy so that it does not always depend on it and needs to be combined with local sago food. 3. It increases the utilization of local sago food for future food needs. 4. Increase the level of education and skills of farmers about Sago. 5. Increase the knowledge of indigenous farmers and transmigration to preserve sago as a local food region	1. Prohibition of conversion of Sago the forest functions for other uses. 2. They were moving all people in Maluku to return to eating local sago food as their staple food. 3. Application of local content lessons about Sago at the school curriculum. 4. Community dependence on rice for the poor is very high, so a balance between rice and local sago food is needed (50:50).

Local Regulation on Sago No. 10 of 2011 concerning the management and conservation of Sago becomes a legal force so that Sago is protected. Sago consumption is still high because farmers consume Sago every day, even once. Community support for sago gardens is excellent for village governments and communities because it is directed towards sustainable sago management. The availability of land can function as an area of agriculture, forest, settlement, industry, mining, and open space. With sufficient land available, it can develop sago gardens to increase sago production [33]. This Sago has been hailed as the next viable commodity in Sarawak, Malaysia, given its potential as a versatile crop. Realizing its potential, the Sarawak state government has started initiatives to stimulate sago plantations, from subsistence farming to estate plantations. Introducing sago estate plantation is a bold one considering that Malaysia is the first country to introduce such plantation design. This is a reflection on sago estate plantation in the state of Sarawak. It is observed that to ensure the success of the plantation scheme, factors such as rigorous land consolidation program aiming to maximize sago

production; introduction of a modern planting method that integrates well with the traditional planting method; rigorous scientific research in finding the best sago variety that produces high yield; effective communication between related agencies and smallholders; and concentrated involvement of all actors, governmental agencies, mills, and smallholders, have to be addressed accordingly.

To conclude, it is hoped that this writing can be utilized as a contribution to accelerating the commercialization of sago as the next viable commodity crop not only in Sarawak but also in Southeast Asia as a whole [34]. Sago palm plantations need to be developed by planting elite varieties in other areas [35].

(2) Weakness

The sago field in Sumber Agung Village is in the form of natural stands so that the number of low-cutting mature trees causes low sago starch production. Therefore, it is necessary to rehabilitate the sago land by structuring it into a sago garden. The community is less concerned with Sago's arrangement and low environmental awareness so that the sago tree in the sago family is left without thinning. Farmers' knowledge about sago gardens is low because they never get information from any party related to sago gardens. Human resources in Sumber Agung Village are low, so learning about sago cultivation is not well understood. Sago starch processing activity is still pure, and there is no modern touch in sago processing. The native youth of the area is that the younger generation has no interest in developing Sago. The low survival rate of sago palm in the nursery once have been experienced in the Philippines, and then they developed a propagation technique to overcome the problem [36]. As sago becomes a potential commodity, improving sago farmers' capability [17].

3.4.2 Analysis of external conditions

(1) Opportunity

Sago gardens, if structured correctly, will become a strategic location for the development of local tourism. Introducing a sago garden for schoolchildren from kindergarten through high school will be increasingly important because it will foster a soul to protect and preserve sago. As a local food buffer, sago is a native Maluku food that must be removed and maintained to not disappear over time. Because now sago is being ignored, young people do not consume sago because they consume more than rice. If sago is appropriately managed, it will become the most significant food buffer for the regions in Maluku. Proper management of sago will increase income for the community. In line with the research of Timisela [37], the sago processing business is feasible to be developed. If every rupiah is invested in the sago processing business, it will provide excellent benefits and optimal results. Sago has added value and high selling value if processed properly. Consumers will be interested in buying sago because it can satisfy their needs and wants, the consumers will have a deep impression of the product. If the consumers are satisfied by a product, they will buy it continuously, use it, and inform others about the product's strengths based on their experiences [38].

If intensive thinning is carried out and properly maintained, the production of sago starch will increase. High production will increase farmers' income. If Sago is developed and structured, there will be an increase in production. High production the availability of sago starch will be fulfilled. Sago flour and its processed products are classified as a functional food because they have a carbohydrate content of 84.7% and food fiber 3.69 to 5.96%, which is quite high, a low glycemic index of 28. However, farmers' skills are still limited to processing sago starch into various value-added products [5]. It is hoped that rice dependence will be reduced, especially in rural areas, so that local people can consume local food. It needs to be accustomed to children from kindergarten to high school to consume local food, especially Sago, so Sago is preserved as a legacy of future generations. The development and structuring of sago plantations support all parties, including the provincial government, district government, village government, and the community. The people of Sumber Agung Village, who are very welcoming and friendly and open to developing innovations in structuring sago gardens, are essential in preserving sago. The transmigration community in Sumber Agung Village supports the structuring of sago gardens, so this is evidence of ethnic diversity, but concern for sago is very significant. Domestic and world demand for sago starch continues to increase, both for food and non-food resource. To respond to the opportunity, farmer empowerment needs to be encouraged to increase current low productivity (less than 15 t/ha/y). Through farmer empowerment, traditional sago farming will change to managed farming, enabling farmers to implement and apply recommended technology called Best Management Practices and fulfill other related support to uplift their sago farming productivity [17].

(2) Threat

So far, efforts to develop and organize sago have been neglected because land acquisition II has constrained them as a transmigration site. Indigenous people do not pay attention to sago continuously, so there is a tendency that sago land is not considered. The government program on rice assistance for the poor continues to roll to the village community. The villagers feel the government's attention about rice for the poor has made the community more indifferent to local sago food. Local content about local sago food is not included in school education, causing future generations not to know and love Sago.

The development of sago forests into the sago garden needs the support of all parties. This is undoubtedly good because Maluku is famous for local sago food. Still, all of them are in the form of sago forests that have not yet been converted into representative sago gardens. The Eastern District of Seram, with relatively large sago forests, must continue to be promoted to create representative sago gardens. Riau Islands is the province with the largest sago area until processed products can be exported abroad because the arrangement of sago gardens is very representative. The harvesting of sago trees and sago production can be well predicted because it is included in the sago export scale.

4. CONCLUSIONS

The results showed that 97.09% of the farmers approved the development of sago forest into sago plantations, and 2.91% did not agree. This means that farmers and village officials agree if the sago forest is turned into a sago plantation. The working spirit of farmers to manage sago gardens is quite good, with an index value of 69.39%. It can be seen that farmers have not created a good spirit. The response of farmers to aspects of the regulatory discipline, time discipline, duty, and responsibility discipline, and acceptance of sanctions if they violate provisions, duties, and responsibilities with an index value of 65.50% this value is relatively low. This is because

all aspects of work discipline have not been thoroughly carried out correctly. Skills of sago farmers index value are 81.83%; this value is relatively high and very good. This means that farmers still need assistance from specialized agencies always to give orders so that they are righter. The index value of motivation of sago farmers of 88.08% has a good response to the urge to be relatedness namely the desire to always interact with people in their environment, the urge to grow and develop, the call to get things that can make someone achieve achievements and the drive to acquire knowledge, information, technology and communication networks.

The R^2 value for the Aesthetics constructs, Convenience construct, and Needs construct are 0.198, respectively, 0.335 and 0.611. It can be explained that each benefit increase can affect Aesthetics, Convenience, and Needs aspects, respectively, by 19.8%, 33.5%, and 61.1%. While the remaining 80.2%, 66.5%, and 38.9% respectively were influenced by other factors. The results of the analysis of the community's perception of factors towards the development of sago plantations show that the convenience construct does not have a significant effect on the needs construct. While the aesthetics construct, the benefit significantly influences the needs to construct.

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