Agribusiness Design of Local Sago Food in Southeast Sulawesi

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Abstract: - Sago is a local food ingredient for the people of Southeast Sulawesi, which has good prospects for large-scale development. This research aims to determine the income level of sago processors, the priority types of sago processed products to be cultivated, the potential of sago agro-industry, and the design of local sago food agro-industry in Southeast Sulawesi. The research respondents included local sago processors and local governments. The data analysis technique in this research uses income analysis, exponential comparison matrix (EPM), and analytic hierarchy process (AHP). The research results show that the average income generated by sago processors is higher than that of other sago-processed products, namely IDR 192,826,000 per month. However, sago biscuit is a processed sago product with a higher income per unit of production than other processed sago products. Sago biscuit processed product is a priority processed product with a value of 8.545532 with the priority criterion being business development with a value of 0.558. The priority alternative for local sago processing in Southeast Sulawesi is capital strengthening with a value of 0.205. The results of this research also confirm that the development of the local sago agribusiness industry needs to be supported by capital strengthening.

Key-Words: - income, priority, design, agribusiness, sago, local food.

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1 Introduction

Southeast Sulawesi is one of the regions that has quite a large potential for sago, with many residents using sago as a staple food or as a supplemental food ingredient, [1]. However, the potential of sago at the farmer level is currently not being optimally utilized, [2]. Southeast Sulawesi's sago plantations cover an area of 4,567 hectares, producing 3,001 tons of sago starch, [3]. In Southeast Sulawesi, sago is dispersed in ten districts and cities: Konawe Regency, Kolaka, South Konawe, Bombana, Wakatobi, North Kolaka, North Konawe, East Kolaka, Konawe Islands, and Kendari City. Given the increasing pattern, sago production in Southeast Sulawesi appears to be stagnant. This suggests that sago production in Southeast Sulawesi is still highly stable. This condition could enable the people of Southeast Sulawesi to make Indigenous food sago a commercial product, which can be exploited in the downstream sector, [4].

Sago from Southeast Sulawesi is not only an alternative food product for the community, but also part of the community's lifestyle, particularly among the Tolaki tribe, [5]. Every household cooks sago every day in accordance with the *Masonggi* or *Sinonggi* custom, which involves processing the sago into food and covering it with rice. Apart from that, sago has completed the life path of their forefathers. The Tolaki people make use of practically every part of the sago plant, including sago leaves for roofing, fronds for fencing, and sago worms and shoots for food. All of this continues today, [2].

The prospect of controlling sago plants through an agro-industrial system holds tremendous promise for commodity development and company development, [6]. A number of factors indicate this, including the following: 1) sago plants grow in some areas without any locals' involvement in their cultivation; 2) sago is a very promising alternative food source for the populace and for industrial needs; 3) in some areas, sago production far outpaces local consumption needs; and 4) in general, the local populace only uses sago as a local (traditional) food ingredient, such as *sinonggi*, *kapurung*, sago biscuits, and others, [7], [8], [9].

Public awareness of different food crops is clashing with the growth of sago, a local food product, [10], [11], [12]. Due to changes in people's consumption patterns and their reliance on rice as a food source, sago plants, one of the natural resources for creating a variety of products to suit the needs of the people, are becoming scarce, [2], [13], [14], [15]. Sago forests are significantly shrinking because of the conversion of sago lands into plantations and residential areas, which exacerbates the situation, [16], [17]. Additionally, the balance of production is neglected in the exploitation of sago by medium-sized companies, which results in a deterioration of sago growth that takes a long time to recover-roughly five to seven years, [8]. Communities living close to the sago palm harvesting area will see a direct disruption in their access to food sources high in carbohydrates if this harm persists, [18].

The challenge faced by local sago food processing stakeholders is to determine the priority sago by-products to be cultivated. This results in processors not focusing on the production process and incurring high production costs, unrelated to the revenue generated, [5], [18]. Determining the priority local sago processed food products will make the use of production costs more efficient, and processors will become more specialized in the production process, [19]. The purpose of this study is to ascertain the amount of revenue of sago processors, the most important sago-processed product categories to be planted, the potential of the sago agro-industry, and the layout of the local sago food agro-industry. This study is the first to look at Southeast Sulawesi Province's traditional sago food design model.

2 Material and Methods

This research was conducted in Southeast Sulawesi Province, specifically in East Kolaka Regency, Konawe Regency, South Konawe Regency, and North Konawe Regency. The choice of the research site was made with the knowledge that these regions in Southeast Sulawesi Province are the main producers of sago locally. In July 2024, this research was carried out. Both primary and secondary data were used in this study. Through questionnaire-based interviews with local sago food processing enterprises totaling 85 processors. Primary data were acquired; secondary data were gathered from relevant research journals and government agencies or institutions. The research employed various data analysis approaches, such as revenue analysis, the Analytic Hierarchy Process (AHP), and Exponential Comparison Matrix (ECM). Revenue analysis is used to determine the revenue of local sago processors in Southeast Sulawesi. The revenue analysis equation used is:

$$Pd = TR-TC \quad (1)$$

Information:
Pd = Income of local sago food processors
TR = Total Revenue of local sago food processors

TC = Total Cost of local sago food processors

The equation for the exponential comparison matrix (ECM) is as follows, [20].

$$TV_i = \sum_{j=1}^{m} (RK_{ij}) TKK_j \quad (2)$$

Information:

TV_i = Total value of the i_{-th} alternative
RK_{ij} = The relative importance of the j_{-th} criterion in the i_{-th} decision choice
TKK_j = Degree of importance of the j_{-th} decision criterion. $TKK_j > 0$; round
n = Number of decision choices/alternatives
m = Number of decision criteria

The decision-making criteria using the ECM model is the sago product with the highest-ranking value.

Analytical Hierarchy Process (AHP) is a method used to evaluate and make multi-criteria decisions. It evaluates various alternatives based on different criteria and assigns a relative score to each alternative. AHP allows users to incorporate subjectivity and objectivity into the decision-making process and helps identify the most important factors in complex situations. The steps to perform AHP are as follows:

1. Problem Definition
2. Identify Criteria
3. Hierarchy Formation
4. Pairwise Comparative Analysis
5. Determining Relative Weights
6. Determination of alternative scores
7. Decision making
8. Verify and interpret the results

3 Result and Discussion

3.1 Potential Development of Local Sago Food

Sago is a type of plantation product used as a local food by the people of Southeast Sulawesi. The sago whose pith is processed into a local food for the people of Southeast Sulawesi is called *sinonggi*. In addition to being a local food, sago is for the people of Southeast Sulawesi not only a food ingredient but also a cultural identity for the community, especially the *Tolaki* tribe. The *Tolaki* people use almost all parts of the sago plant, such as sago leaves that are woven into roofs, fronds made into fences, and sago worms and shoots used as food. All these activities persist today, [2].

Fig. 1: Documentation of potential development of sago processing in Southeast Sulawesi

According to data from the Central Statistics Agency of Southeast Sulawesi Province (2024) and result and observation (Figure 1), the current area planted with sago is 4,567 hectares, with a total production reaching 3,001 tons per year. Meanwhile, according to the Konawe Regency Agriculture Service (2024), there is potential land for sago development in Southeast Sulawesi, with an area of 1,717,709.51 hectares. The potential of this land will ensure the availability of local sago food raw materials and can ensure the sustainability of existing sago processing businesses in the community. The demand for sago in the Southeast Sulawesi region and outside the island also shows a significant increase, where based on data from the Southeast Sulawesi Industry and Trade Service (2024), the inter-island trade of sago through Kendari Port amounts to 2,400 tons and is sent to the islands of Java, Nusa Tenggara, and Papua. This picture shows the excellent potential for local food development and can increase the income of processors.

3.2 Income of Local Sago Food Processor

Income is the difference between revenue and total production costs. Total cost is the total of all costs incurred to produce processed sago products, while revenue is the price multiplied by the production volume of each processed sago product. Income data for local sago processors were obtained directly from these business actors. Data collection on production, production costs and production prices were carried out through direct interviews with local sago food processors (Figure 2).

Fig. 2: Documentation of data collection from sago processors in Southeast Sulawesi

Based on the research results, the income of Aci Sago processors, sago flour processors, and sago biscuits processors can be seen in Table 1.

The average income generated by sago processors from sago starch is higher than that of other sago-processed products with an average income of IDR 192,826,000. This is because most of the sago processors in the research site process sago until the product is manufactured and then sell it to consumers. Apart from this, the market demand for sago starch products is higher than that of other sago processed products, which also contributes to the high average production volume and income of processors who produce sago starch. However, judging from the income per unit of output produced, the sago biscuit product type offers a higher income than other product types. The production quantity of sago starch in a production season is 94,870 kg, sago flour production is 1,200 kg, and 245 packs of sago biscuits. The results of this research are consistent with the research conducted by [21], who claim that local sago food processing activities can increase the source of income of the authors' households.

Table 1. Average income of sago product processors in Southeast Sulawesi province, 2024

Kind of Product	Production Cost (IDR)	Revenue (IDR)	Income (IDR)
Sago Starch	34,862,000	227,688,000	192,826,000
Sago Flour	9,250,000	18,000,000	8,750,000
Sago Biscuits	2,134,000	6,615,000	4,481,000

Source: Result of data analysis, 2024

3.3 Priority Types of Processed Sago Products

The determination of the priority processed sago product type was done by examining several indicators used in this research. The indicators used in this research are technological mastery, product-added value, market potential, capital requirements, competition for similar products, and labour absorption capacity. These indicators will serve as a reference for determining alternative processed sago products that can become priority products for development. The type of processed sago product that has the highest alternative value indicates that this product can be a priority factor for development. The results of the analysis to determine the priority types of processed sago products using an exponential comparison matrix (ECM) are presented in the following graph.

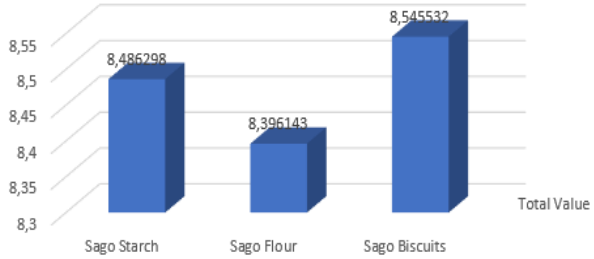

Fig. 3: Results of the analysis to determine priority types of sago-processed products

Figure 3 shows that sago biscuit products have the highest alternative value compared to sago starch and sago flour products. Based on the results of this analysis using exponential comparison matrix (ECM), processed sago products in the form of sago biscuits are the priority (P.1) for cultivation with the total ranking value 8.545532, while processed sago products in the form of sago starch are the second priority (P.2) with the total ranking value are 8.486298 and processed sago products in the form of sago flour are the third priority (P.3) with total ranking value are 8.396143. Sago biscuit in Southeast Sulawesi Province is a newly developed product, so the amount produced by producers is still on a small scale. However, sago biscuit products in this region have good potential to be developed as a diverse food source for the community. Sago biscuit products are currently marketed in modern markets in the provincial capital, namely Kendari City, and have attracted very high interest from the public or consumers.

3.4 Agribusiness Design of Local Sago Food

The analysis of the local agribusiness design of sago was carried out by establishing three criteria to support the management of sago products. This part is used using Analytical Hierarchy Process (AHP). The support criteria are continuity of production, development of marketing, and improvement of the quality of production. Based on these three criteria, several alternative indicators for evaluating the sago agribusiness will be measured, namely strengthening capital (Capital), developing

technology (Technology), increasing the skills of economic actors (Skill), forming business groups (Group), developing partnerships (Partnerships), facilitating and assisting (Facilitation), and preparing facilities and infrastructure (Infrastructure).

The priority support criteria in the management of sago-based processed products, consisting of production continuity, marketing development, and improvement of production quality, are very important factors in the management of local sago-based foods. However, for management to be more effective and efficient, economic actors must be able to determine priority criteria. The results of the analysis of priority criteria are presented in the following graph.

Fig. 4: Evaluation of criteria for local sago agribusiness design companies in Southeast Sulawesi

Figure 4 shows that in the development of the agro-industry of processed sago products (sago biscuits) in Southeast Sulawesi, the supporting factor that should be prioritized is the development of marketing with the value are 0,430. Processed sago products in the form of sago biscuits are one of the innovations in the diversification of local sago foods that aim to increase the added value of the local sago food itself. This product is a new product that has been produced and currently, its marketing is still limited to the area where the product is produced. Marketing development is necessary so that the product can reach potential markets, including markets outside Southeast Sulawesi so that the profits received by producers can increase.

Seen from a combination of opinions of all criteria, the design of the sago agro-industry in Southeast Sulawesi province shows that the indicator that is the main priority factor of agribusiness in Southeast Sulawesi province is capital strengthening (0.205). The capital factor remains the main obstacle faced by most local sago processors in Southeast Sulawesi province. This condition is reflected in the ability of processors of each local sago food product to provide production facilities that are still very limited and generally simple. Most of the local sago-processed products in Southeast Sulawesi use simple equipment or machines, even self-assembled ones with low production capacity. This condition impacts low production capacities and impacts on low-income levels. If these conditions do not change, it will be difficult for local sago-based processed food products, especially sago biscuits, which have good prospects, to develop. The results of the opinion-based analysis of the development of the local sago agro-industry in Southeast Sulawesi are shown in Figure 5.

For sago biscuit processors to increase their capital, the policy to follow is to increase the capital of the processing groups. This policy will have a multiplier effect, as the increase in capital from sago biscuit processing will have an impact on increasing production and raw material requirements. This condition will have a positive impact on sago starch producers, which is the main raw material for sago biscuit processing. Apart from this, capital strengthening will also have an impact on strengthening the institutions of sago processing groups. This research is in line with the research. [22] which states that capital strengthening aims to strengthen the capital of economic actors in the development of agro-industry and food security; increase the production, productivity, and income of actors in the agricultural sector; develop agricultural and agro-industrial enterprises in development areas; increase the independence and cooperation of the group; and encourage the development of microfinance institutions.

Capital strengthening of sago processing groups can be established in the form of cooperatives. Cooperatives are the ideal agribusiness activity hub for each business unit in rural areas, especially for processing and marketing. The activities of this business unit will have an economic multiplier effect on people's lives. Agro-industry can create business opportunities in rural economic activities, thereby increasing people's income as an indicator of their well-being. Agro-industrial cooperatives should be able to support the development of the agro-industrial subsystem (trade in agricultural production facilities, agricultural activities, processing of agricultural products, support services), provide market information to their members, be able to apply agricultural technology and be the main actor in agro-industrial activities, [23].

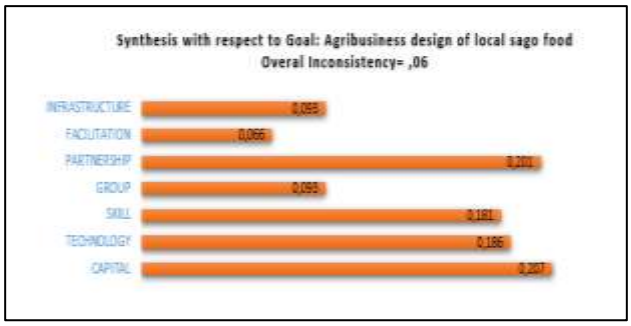

Fig. 5: Evaluation of agribusiness for alternative local sago food processing according to a combination of criteria

Capital building of local sago food processing groups can be done in the form of cooperatives. Cooperatives are agribusiness hubs that are suitable for rural businesses, especially for processing and marketing activities. These activities will have an economic multiplier effect on people's lives. Agro-industrial activities can increase business opportunities in rural economic activities so that they will have an impact on increasing people's incomes, which are an indicator of their well-being. Agro-industrial cooperatives must be able to support the development of the agro-industrial subsystem (trade in agricultural production facilities, agricultural activities, processing of agricultural products, support services), provide market information to their members, be able to apply agricultural technology and be the main actor in agro-industrial activities, [24].

4 Conclusion

The average income generated by sago processors is higher than other sago-processed products, namely IDR 192,826,000 per month. However, sago biscuit is a sago-processed product with a higher income per unit of production than other sago-processed products. Sago biscuit processed product is a priority processed product with a value of 8.545532 with the priority criterion being marketing development with a value of 0.669. The priority alternative for local sago processing in Southeast Sulawesi is capital strengthening with a value of 0.207. Based on the results obtained, the researcher recommends that there is a need for a study of the development strategy for processed sago products that provide the greatest benefits for those involved, namely sago biscuits.

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Contribution of Individual Authors to the Creation of a Scientific Article (Ghostwriting Policy)

- Nursalam, Muh. Obi Kasmin, Kartomo has implemented the agribusiness design of local sago food.
- Muhtar Amin, Musadia Afa, Aan Wilhan Juliatmaja, Suparman and La Mpia carried out the data of this research.
- Helviani, Abdul Rizal and Andi Mariani Ramlan has implemented the income of local sago food processor.

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Conflict of Interest

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