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Enhancing Regional Economy through the Development of a Coconut Sugar-Based Industry in Indragiri Hilir Regency, Indonesia

Ahmad Desrial[1♥], Yusman Syaukat[2], and Ma'mun Sarma[3]

[1] Department of Regional Development Management, Faculty of Economics and Management, IPB University, Bogor, Indonesia.

[2] Department of Resource and Environmental Economics, Faculty of Economics and Management, IPB University, Bogor, Indonesia

[3] Department of Management, Faculty of Economics and Management, IPB University, Bogor, Indonesia.

♥Corresponding author email: ahmaddesrial@apps.ipb.ac.id

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Abstract. The coconut sugar industry in Indragiri Hilir Regency shows good potential due to the high demand for coconut sugar products. However, this potential has not been optimally utilized and there is still low interest from farmers to be involved in this industry, even though the availability of raw materials is very abundant. This study aims to analyze the added value of coconut sugar production between tenant farmers and owner farmers using the Hayami method and formulate development strategies for the coconut sugar industry to improve the regional economy through SWOT and QSPM analysis. This research plays an important role in encouraging the development of the coconut sugar industry as a coconut-derived product that can increase community income and local economic growth. Increase community income and local economic growth. Data collection methods used include surveys, in-depth interviews, focus group discussions, and literature studies. The results show that with a scheme of 50 coconut trees, each liter of coconut sap generates an added value of IDR 2,794 (71.93%) in the leased coconut system and IDR 3,318 (85.44%) in the owned coconut system. Average monthly production is 462.69 kg, requiring 2,382.69 liters of nira, with profits reaching Rp 2,046 per kg (leased) and Rp 2,571 per kg (owned). The development of the coconut sugar industry is in the "Grow and Build" phase, and although it has high growth potential, there are still several challenges to be faced, including limitations in distribution, infrastructure, and capital. The findings of this study can be applied in local government policies through the preparation of coconut product regulations, integration of the One Village One Product (OVOP) concept in village programs, facilitation of business groups and training by relevant agencies, support for product diversification (liquid sugar and ant sugar) through MSMEs, and promotion of local product branding to increase competitiveness in national and export markets.

Keywords: coconut sugar industry; local economic development; sustainable economy; QSPM

INTRODUCTION

Agro-industry is one of the key sectors in economic development through local economic development because it plays an important role in increasing the added value of agricultural products, employment opportunities, exports, and farmer welfare (Radebe & Maphela, 2019). To achieve these goals efforts, are needed to optimize productive research resources, strengthen cooperatives and SMEs, diversify production types, develop sustainable partnerships and market networks, master modern technology, and improve the quality and productivity of production (Paulus et al., 2020).

Indragiri Hilir Regency has great potential in the development of coconut sugar agro-industry; this is supported by the productive coconut land area reaching 341,625 ha and 84.76% of the total coconut area of Riau Province with a productivity of 263,732 tons or equivalent to around 1.5 billion; coconut grains per year (RPD Indragiri Hilir Regency 2024-2026). The processing industry sector in Indragiri Hilir Regency occupies second place after the agricultural sector in PDRB. Its contribution was 23.63% in 2019, increasing to 24.06% in 2020, 24.63% in 2021, 25.06% in 2022, and 24.09% in 2023 (BPS Indragiri Hilir Regency 2024).

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The development of the coconut sugar industry in all sub-districts of Indragiri Hilir Regency is important for economic equality, increasing employment, and increasing PDRB. In 2022, the investment value was recorded at IDR 17.7 billion; coconut sugar has great prospects due to the high demand of local and export markets (Industry and Trade Office of Indragiri Hilir Regency 2024). However, the number of coconut sugar businesses in Indragiri Hilir is decreasing, and many have not reported their business, so it has not been recorded at the Indragiri Hilir District Government Office, with the following details, presented in **Figure 1**.

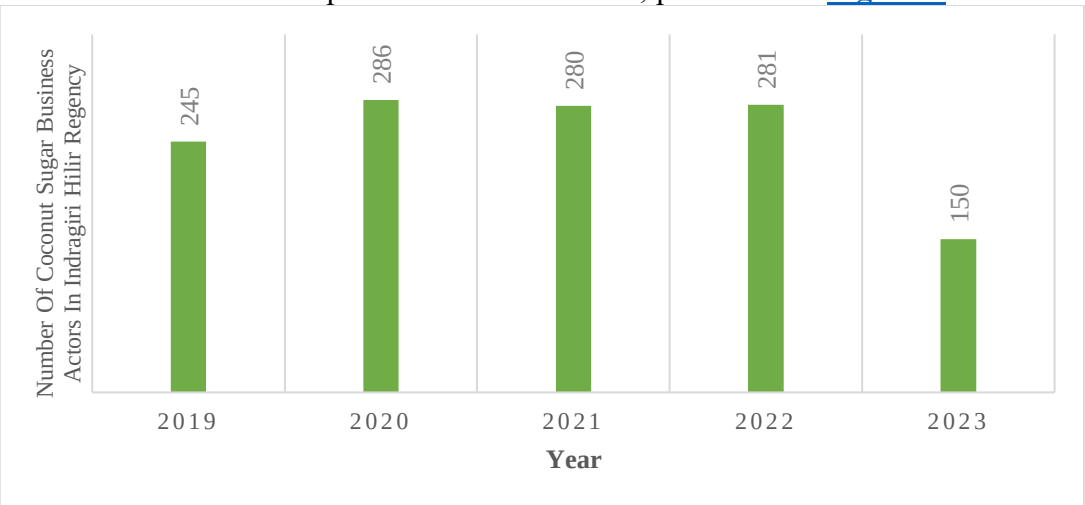

Figure 1. Diagram of coconut sugar business actors in Indragiri Hilir Regency (Department of Cooperatives and SMEs (Small and Medium Enterprises), Indragiri Hilir Regency, 2024)

Based on **Figure 1**, the number of coconut sugar business actors in Indragiri Hilir Regency continues to decline every year. After increasing from 245 to 286 craftsmen in 2019-2020, the number fell again until 150 craftsmen remained. This decrease in the number of craftsmen leads to reduced production and distribution of coconut sugar, and this is because agricultural products are not consumed immediately after harvest but through a series of complex logistical activities, such as material handling, storage, processing, packaging, sales, and marketing (Telukdarie & Dhamija, 2019) his long and complex process makes many farmers reluctant to do further processing, so they tend to choose to sell the harvest in the form of round coconuts. In fact, the coconut sugar agro-industry business opportunity is considered financially profitable, with an R/C ratio of 1.45, indicating that this sector is worth developing (Ekawati et al., 2022).

The coconut sugar industry plays an important role in the economy of coconut-producing regions. In Purbalingga Regency, this sector is a priority in the RPIP and RPIK, with 18,649 business units that absorb 37,570 workers (Fadilla, 2021). Research in Bangun Rejo Village, Tanggamus Regency, showed an added value of IDR 1,833/kg with a profit ratio of 45.84% (Ramadhan et al., 2023). Processing 1 kg of nira generates an added value of IDR 1,339.97 per kilogram (Kusuma et al., 2022), which shows the economic potential of processing this raw material. In addition, the crystallization process of coconut sap into crystal sugar not only increases this added value but also supports the economic sustainability of the agro-industry by creating many jobs (Tampubolon et al., 2024).

The challenges of the coconut sugar industry in Indragiri Hilir Regency include limited marketing channels, technology, infrastructure, and transportation (Kusuma et

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al., 2022). Coconut sugar businesses still use simple production equipment, such as wood-fired stoves with clay or red brick construction, and wooden and bamboo ladders. Dependence on firewood has the potential to cause scarcity of these raw materials. Packaging is still done using large, unbranded plastics. In addition, preservatives are added to make the juice last longer, whereas the export market requires the use of resak wood powder without other additives and the color of the sugar as requested. These limitations hamper production capacity and do not meet export market standards. Challenges in coconut sugar marketing include the dependence of artisans on middlemen, with no direct involvement in exports. Selling prices are determined by the market and middlemen, which occurs due to limited access to information, high dependence on middlemen, and lack of product development (Chatra & Rosi, 2024).

This research explores the differences in economic value-added analysis between coconut tenant farmers and coconut owner farmers so farmers need to establish partnerships with stakeholders to create added-value products (Latifa et al., 2021). A strategic approach and the formulation of strategies that are appropriate to local conditions are needed to support economic sustainability, and this must be supported by the active role of the government through the implementation of policies and regulations that support the development of the coconut sugar industry (Tangkudung & Kaseger, 2024). In addition, an effective marketing strategy can contribute to the improvement of the economy, both on a regional scale and in a broader scope (Luckyardi et al., 2022). Therefore, this research aims to analyze the added value and formulate local economic development strategies based on the coconut sugar industry to improve the economy in the Indragiri Hilir Regency.

METHODS

This research was conducted in the coconut sugar industry in the Kempas District and Tembilahan Hulu District, Indragiri Hilir Regency, Riau Province. The sample was selected using the purposive sampling method, which is a technique based on the selection of case studies with certain criteria (Sugiyono, 2021). The sample consisted of 26 coconut sugar business owners (13 tenant farmers and 13 owner farmers), 4 respondents representing middlemen, 1 respondent representing MSMEs, and 9 respondents from related agencies (Cooperative and MSME Agency, Plantation Agency, Industry and Trade Agency, and BAPPEDA) of Indragiri Hilir Regency. The total number of respondents was 40. This research data consists of primary data and secondary data, primary data obtained from surveys, In-depth interviews were conducted with relevant agencies and business actors to identify internal and external factors, then questionnaires were distributed to collect quantitative data, Focus Group Discussions were conducted with relevant agencies to formulate policies for developing the coconut sugar industry. While secondary data from BPS Indragiri Hilir Regency data and literature studies.

Data was analyzed by the Hayami value-added method (Ramadhan et al., 2023). This method can not only measure the added value of a product, but also determine the amount of output value, the level of production productivity, and the returns received by the owners of production factors such as capital, other input contributions, company profits, and labor (Aji et al., 2018), making it suitable for use in the context of household industries such as coconut sugar. One of the benefits of calculating value added is to measure the contribution of services to the owners of production factors (Julitasari et al.,

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2020) Furthermore, to formulate strategies and programs for local economic development based on the coconut sugar industry in Indragiri Hilir Regency, Riau, an analysis of internal and external factors with the IFE, EFE, and IE Matrices was conducted to identify factors that influence industrial development. SWOT analysis was used to match the data, and SWOT analysis is very useful in assisting the strategic planning of an organization (Abbasi et al., 2019) and the decision-making stage using the QSPM matrix resulted in strategies and programs that are ready to be implemented by the Indragiri Hilir District Government.

RESULTS AND DISCUSSION

Case Study Description

The coconut-derived products taken and sampled are the coconut sugar industry based on the household industry in Kempas District and Tembilahan Hulu District, Indragiri Hilir Regency, Riau Province. Kempas Sub-district is one of the largest coconut sugar producing areas after Tempuling Sub-district, while in Tembilahan Hulu Sub-district, there is UMKM Bekawan Agro Mandiri, which routinely exports coconut sugar to the export market to Malaysia and has been certified by the Regional Government of Indragiri Hilir Regency (Cooperative and MSME Office of Indragiri Hilir Regency 2024). The selection of coconut sugar products is based on previous research, which shows that one of the potential products to be developed can increase profits (Mardesci et al., 2021). As an exporter of coconut and its processed products to the EU market (Oktari et al., 2023). Indragiri Hilir Regency has an opportunity to strengthen its competitiveness in coconut sugar derivatives. Coconut sugar is also in demand due to its high nutritional content and low glycemic index, making it a healthier sweetening option compared to other types (Saraiva et al., 2023).

The coconut sugar industry in Indragiri Hilir Regency still faces a number of challenges. The processing process still uses traditional technology and equipment, and most of the production is done on a household scale. In addition, the lack of industrial development and low marketing efficiency (Pudyastuti et al., 2019) are constraints that must be overcome to improve productivity and product competitiveness. Opportunities for the development of the coconut sugar industry can be done through institutional strengthening (Fadilla, 2021), utilizing the role of a cooperative (Malik et al., 2018), and increasing yield and efficiency of crop production and coconut sugar business is very feasible to develop (Kusuma et al., 2022). With the right strategy, the coconut sugar industry in Indragiri Hilir Regency can provide significant added value to local products, while encouraging regional economic competitiveness in the local market and export.

Value-Added Analysis

The value-added analysis is a calculation method to measure the increase in the economic value of coconut processing into coconut sugar. According to Hayami (Sundari et al., 2021), the Value-added calculation method includes an analysis of outputs, inputs, prices, revenues, and profits (Ramadhan et al., 2023). **Table 1** shows the value-added analysis of coconut sugar products based on 50 coconut trees. The 50 coconut trees scheme is based on the average use of coconut trees by coconut sugar businesses in Indragiri Hilir District.

Coconut sugar production in Kempas Sub-district is higher in quantity than in the Tembilahan Hulu Sub-district, because the number of coconut trees used is greater. A total of 13 businesses in the Kempas Sub-district use a rental coconut system of around 752 trees, while 13 businesses in Tembilahan Hulu Sub-district only use around 541 of their own coconut trees. The scheme of using

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50 trees per business unit in the value-added analysis is based on the average use of coconut trees. The rental coconut system is more dominant in the Kempas Sub-district because many producers rent trees due to private plantations that are less productive or have been converted to oil palm. The results of the value-added analysis of coconut sugar production with rental and ownership systems are presented in **Table 1**.

Table 1. Analysis of value added in coconut sugar production by Hayami method

No	Variables		Value per Month	
			Leased coconut	Owned coconut
Output, Input, Price				
1	Output (kg/month)	a	462.69	462.69
2	Raw materials (liters/month)	b	2,382.69	2,382.69
3	Labour (HOK)	c	27	27
4	Conversion factor (2:1)	d = a/b	0.194	0.194
5	Labour coefficient (3:2)	e = c/b	0.011	0.011
6	Average product price (IDR/kg)	f	20,000	20,000
7	Average labor wage (IDR/HOK)	g	65,962	65,962
Revenue and Profit				
8	Raw material price (IDR/liters)	h	315	0.00
9	Contribution of other inputs (IDR/liters)	i	775	565
10	Output Value (IDR/kg)	j = d x f	3,884	3,884
11	a. Value added (IDR/liters)	k = j - i - h	2,794	3,318
	b. Value-added ratio (%)	l = (k/j) x 100%	71.93	85.44
12	a. Labour remuneration (IDR/kg)	m = e x g	747	747
	b. Labour share (%)	n = (m/k) x100%	26.76	22.53
13	a. Profit (IDR/kg)	o = k - m	2,046	2,571
	b. Profit level (%)	p = (o/k)x 100%	73.24	77.47
Factor of Production Owner's Remuneration				
14	Profit margin (IDR/kg)	q = j - h	3,569	3,884
	a. Labour income (%)	r = o/q x 100%	57.33	66.19
	b. Other input contribution (%)	s = m/q x 100%	20.94	19,25
	c. Other factors of production (%)	t = i/q x 100%	21.73	14.56

The results of the value-added analysis presented in **Table 1** show that coconut sugar production with a scheme of 50 coconut trees (rented and owned) produces as much as 2,382.69 liters of nira water per month, and from the nira water produces as much as 462.69 kg of coconut sugar per month. The conversion factor is 0.19 which means that 100 litres of coconut nira water will produce as much as 19 kg of coconut sugar. The number of man-days (HOK) is calculated from the multiplication result based on 2 people working 8 hours (0.5 working days) for 27 working days in a month, so the value is 27 HOK per month. The labor coefficient is calculated by dividing the amount of labor by the amount of raw materials used, the value of the labor coefficient in the coconut sugar production process is 0.011 HOK per kg and the average wage of labor is IDR 65,962.

This study shows that each liter of sap produces an added value of Rp 2,794 (71.93 percent) for the leased coconut system and Rp 3,318 (85.44 percent) for the owned coconut system. Based on the value-added assessment criteria, coconut sugar is said to have a positive value because the NT value is greater than 0. Labor rewards are obtained from the multiplication of the labor coefficient by the average wage of labor, which is Rp 747 kg. The percentage share of

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labor to value added is 26.76 percent (rented coconut) and 22.53 (owned coconut).

The price of coconut raw materials in the rental system is IDR 315 per liter, while farmers who do not rent coconut trees do not incur the cost of purchasing raw materials. The production of one kilogram of coconut sugar requires an average input contribution of IDR 775 per liter (leased coconuts) and IDR 565 per liter (owned coconuts), which can be derived from the per-liter division of the cost of auxiliary materials (preservatives and resak sawdust), fuel, packaging, transportation, depreciation of equipment and fertilizer. Another input contribution that differentiates the leased and owned coconut systems is the cost of firewood.

The profitability of coconut sugar processing reached Rp 2,046 on rented coconuts (73.24%) and Rp 2,571 on owned coconuts (77.47%) of the output value, meaning that 73.24 percent and 77.47 percent of the added value is net profit because it has taken into account the wages of workers. Each process of processing nira labor obtained a profit margin of Rp 3,569 (rented coconut) with a percentage of 57.33 percent and Rp 3,884 (owned coconut) with a percentage of 66.19 percent.

The profit margin in the agro-industry is higher than the value-added in leased coconuts, indicating that value-added calculations are appropriate to determine the amount of profit earned in the agro-industry. Meanwhile, the contribution of other inputs earned a profit of 20.94 percent (leased coconut) and 19.25 percent (owned coconut) and entrepreneurs earned a profit margin of 21.73 percent for leased coconut and 14.56 percent for owned coconut per kilogram of product produced.

Internal and External Factor Analysis

The internal and external strategic factors identified in the IFE Matrix (strengths and weaknesses) which are presented in **Table 2** and the EFE Matrix (opportunities and threats) which are presented in **Table 3** illustrate a weight and rating to produce a score from multiplying the weight by the rating. The process of grouping internal and external factors is based on the results of the In-depth Interview and Focus Group Discussion of the coconut sugar industry sector. Giving weights and ratings is done by respondents after mapping all strategic factors. The weight results reflect the weighted value of each internal and external factor.

Table 2. IFE Matrix (Internal Factor Evaluation)

No	Internal strategic factors	Weight	Rating	Score
Strengths				
1	Abundant and easily obtainable raw materials	0.09	4.00	0.37
2	Skill of the producer	0.08	4.00	0.34
3	Production location is very close to the raw materials	0.07	3.56	0.27
4	Nira water productivity is still relatively good	0.08	3.44	0.28
5	Profitable and value-added business	0.08	3.78	0.30
6	Labor absorption	0.09	4.00	0.36
Total Strengths		0.50	22.78	1.91
Weaknesses				
1	Declining community interest as coconut sugar crafters	0.09	2.00	0.17
2	Land conversion to oil palm plantations	0.09	1.78	0.15
3	Producers' behavior of copying with granulated sugar	0.07	1.78	0.12
4	The sugar craftsmen group is still weak	0.09	1.89	0.16
5	Limitations in production technology	0.09	1.67	0.15
6	Lack of capital	0.08	1.67	0.13
Total Weaknesses		0.50	10.78	0.96
Total IFE Score		1.00	33.56	2.81

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Based on Table 2, the results of calculations using the IFE matrix obtained a value of 2.81, which is the main strength of the development of the coconut sugar industry in Indragiri Hilir Regency, namely abundant and easily obtained raw materials with a value of 0.37. The main weakness is the decline in public interest as coconut sugar craftsmen with a value of 0.17.

Table 3. EFE Matrix (*External Factor Evaluation*)

No	External strategic factors	Weight	Rating	Score
Opportunities				
1	Government support and downstream policies	0.11	4.00	0.45
2	Collaboration with business partners	0.11	3.78	0.41
3	Market Potential	0.09	3.44	0.30
4	Product diversification	0.09	3.56	0.33
5	Infrastructure development	0.10	3.78	0.35
Total Opportunity		0.50	18.56	1.85
Threat				
1	Natural conditions and climate change	0.10	3.33	0.33
2	Absence of policies and regulations on coconut and its derivative products	0.11	4.00	0.44
3	Fluctuating prices	0.09	2.56	0.24
4	Limited distribution only to intermediary traders	0.10	3.33	0.33
5	Export quality standards in destination countries	0.10	2.78	0.28
Total Threats		0.50	16.00	1.63
Total EFE Score		1.00	34.56	3.47

Based on Table 3, the results of calculations using the EFE matrix obtained a value of 3.47. The total score is above the value of 3.0 which indicates that the development of coconut sugar in Indragiri Hilir Regency can take advantage of existing opportunities and avoid threats. The main opportunity in developing the coconut sugar industry in Indragiri Hilir Regency is government support and downstream policies, with a score of 0.45, while the main threat is the absence of policies and regulations on coconut and its derivative products, with a score of 0.44. The results of the analysis of internal and external strategic factors show that the IFE matrix value is 2.81, while the EFE matrix value reaches 3.47. Both values were then mapped into the IE matrix, as presented in Figure 2.

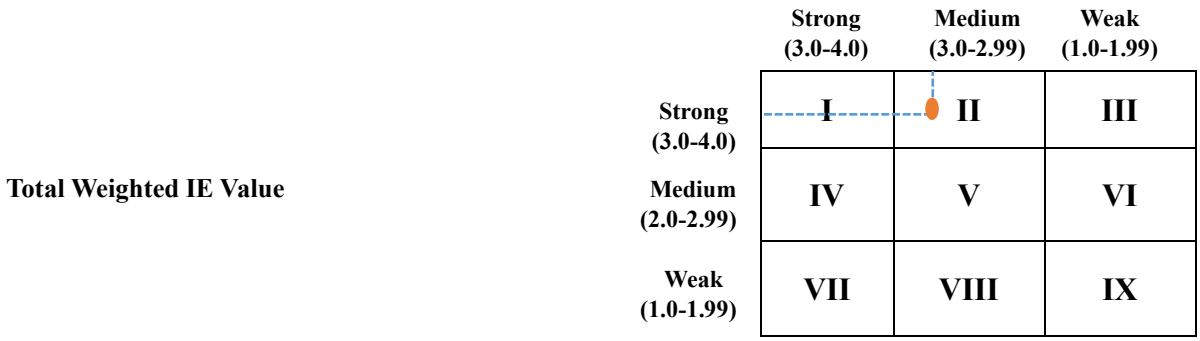

Figure 2. Results of internal-external matrix analysis

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Based on the results of the IE matrix, the development of the coconut sugar industry in Indragiri Hilir Regency is in quadrant II. According to David (2017), this strategy shows that the coconut sugar industry in Indragiri Hilir Regency is growing and developing. To accelerate growth, local governments can increase investment in production technology, expand market access, build supporting infrastructure, and provide training to producers to improve production quality and efficiency.

Strategy Identification Using SWOT Matrix

SWOT analysis is used to develop strategies by matching the strengths, weaknesses, opportunities, and threats of the internal and external conditions of the coconut sugar industry (Rangkuti, 2016). SWOT is effective for identifying initial strategic conditions but requires empirical data support to reduce bias. QSPM helps clarify strategic options, but the results are heavily influenced by the validity of the data. In addition, the assessments in SWOT and QSPM are heavily influenced by the subjective perceptions of the respondents.

Strengths, weaknesses, opportunities, threats in the coconut sugar industry were identified based on available documents and expert opinions. Internal and external factors were identified through an evaluation matrix of internal factors (IFE) and external factors (EFE). The SWOT matrix includes SO (Strengths-Opportunities), WO (Weaknesses-Opportunities), ST (Strengths-Threats), and WT (Weaknesses-Threats) strategies (Dzulquarnain, 2021) which are presented in **Table 4**. Development strategies for the coconut sugar industry were formulated by comparing the two factors. Next, a table of attractiveness was compiled and weighted using the QSPM method to determine the prioritized strategies.

The results of the SWOT analysis resulted in 11 prioritized strategies, namely:

Strategy S-O

1) Optimizing the supply chain from production to distribution

Optimizing the coconut sugar supply chain in Indragiri Hilir Regency can be done by utilizing the location close to raw materials and government support (Faza et al., 2021). Found that the amount of labor, tapped plants, and the amount of sap affect coconut sugar production. Strengthening the upstream sub-system is an important step (Dahliana & Tahir, 2021). This includes efficiency in raw material collection, distribution, use of appropriate technology, stock management, and transportation.

2) Develop a variety of coconut derivative products (liquid sugar and ant sugar) and other products.

The development of derivative products allows producers to produce various variants with higher economic value, so this diversification provides economic benefits for coconut and sugar agro-industry actors, reflected in an increase in the added value of IDR 2,086/kg and a margin of IDR 2,129/kg (Hidayat et al., 2023). District-level government officials need to provide regular assistance to control the quality of the products produced so that they meet the standards (Haris et al., 2023). The potential for downstream and diversification of processed products is an opportunity to develop the local economy by increasing added value (Ramdan et al., 2024).

3) Develop Product Branding

Branding serves to instill a positive image in the minds of consumers, it is important for MSME players to ensure their products are memorable in the long run (Saifulloh, 2021). The goal is to create a strong and attractive product identity through logos, packaging, and narratives that highlight the uniqueness and quality of Indragiri Hilir coconut sugar in order to increase competitiveness in the local and export markets.

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Strategy S-T

1) Make rules and regulations regarding coconut and its derivative products

The first step in this strategy is to establish a legal umbrella from the central government that forms the basis for the development of the coconut industry and its derivative products. With clear regulations, the government can set standard prices and provide protection for farmers and producers of coconut and its derivative products. RIA (Regulatory Impact Assessment) is an important instrument in modern regulation that plays a role in strengthening existing policies, not creating new policies, helps improve the quality of legislation and rule-making in the country (Sabohat, 2020).

Table 4. The results of the SWOT matrix analysis in the formulation of alternative strategies for the development of the coconut sugar industry in Indragiri Hilir Regency.

Internal / **External**	**Strengths (S)**	**Weaknesses (W)**
	S1 = Abundant and easily obtainable raw materials S2 = Producer skills S3 = Production location is very close to raw materials S4 = Nira water productivity is still relatively good S5 = There is no competition with other companies S6 = Labor absorption	W1 = Declining community interest as coconut sugar crafters W2 = Land conversion to oil palm plantations W3 = The behavior of producers who mix with granulated sugar W4 = The sugar craftsmen group is not yet strong W5 = Limited production technology W6 = Lack of capital
Opportunities (O)	**Strategy S-O**	**Strategy W-O**
O1 = Government support and downstream policies O2 = Collaboration with business partners O3 = Market Potential O4 = Development of diverse products (Product Diversification) O5 = Infrastructure development (facilities and infrastructure)	1. Optimize the supply chain from production to distribution (S1. S2. S3. S4. S5. O1. O4. O5) 2. Develop varied coconut derivative products (liquid sugar and ant sugar) and other products. (S1. S4. S6. O2. O3. O4) 3. Develop product branding (S1. S2. S5. O1. O4, O5)	1. Forming groups and empowering coconut sugar business actors (W1. W4. O2) 2. Replanting and management of coconut plantations (W2. O1. O5) 3. Establishing coconut sugar production centers with the OVOP (One Village One Product) concept (W1. W4. O1. O2. O3. O4. O5)
Threat (T)	**Strategy S-T**	**Strategy W-T**
T1 = Natural conditions and climate change T2 = Absence of policies and regulations on coconut and its derivative products T3 = Fluctuating prices T4 = Limited distribution only to intermediary traders T5 = Export quality standards in destination countries	1. Make rules and regulations regarding coconut and its derivative products (S1. S5. S6. T3. T5) 2. Encourage the application of modern production techniques (S2. T5)	1. Improve production quality standards (W3. T5) 2. Facilitate access to marketing and financing (W6. T3. T4) 3. Synergize with other local governments, the private sector, academics, and stakeholders for the development of supporting facilities (W2. W6. T1. T5)

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2) Encourage the application of modern production techniques.

Modernization of coconut sugar production techniques, such as the implementation of energy-efficient furnaces, the use of more durable ladders, and the utilization of innovative processing machinery, aims to speed up the production process, reduce operational costs, and improve product quality in a sustainable manner. This includes the utilization of integrated production devices, machines, and modules (Nugrowibowo & Muslimin, 2023). This is in line with the principle of sustainable development, which combines three main aspects: economic, environmental, and social (Rosyadi, 2023).

Strategy W-T

1) Improve production quality standards

Strategies to improve product quality in the supply chain include improving production skills, implementing quality standards, and government support for farmer and industry development. Strategic measures include training of farmers and producers, use of appropriate technology, and implementation of strict quality control. In addition, the focus on organic and environmentally friendly products is expected to attract global market interest. Regulatory support, training, and the implementation of PIRT also strengthen the competitiveness of the coconut sugar industry at the international level, making it more competitive and sustainable. Export market demand requires that the nira water not be mixed with preservatives other than natural preservatives, such as resak wood powder. However, this is still a consideration for businesses because the use of natural preservatives makes the shelf life of nira water shorter than other preservatives.

2) Facilitate access to marketing and financing.

Support from the coconut downstream road map can also be used to expand marketing networks through trade fairs, local bazaars, or government programs. With better access to financing and marketing, farmer groups can increase their independence, strengthen their bargaining position, and reduce their dependence on middlemen,

3) Synergize with other local governments, the private sector, academics, and stakeholders for the development of supporting facilities.

Local governments play an important role in service delivery, development, and community empowerment at the local level (Pinem et al., 2024). Synergies are carried out through the development of supporting facilities to face natural and climatic challenges in Indragiri Hilir, such as the provision of coconut sugar production facilities, joint marketing programs, development of distribution channels, and increased access to resources and market information.

Strategy W-O

1) Forming groups and empowering coconut sugar business actors

A government-supported coconut sugar farmer group strengthening program is needed to increase members' capacity, access to capital, and efficient production technology so that the coconut sugar business develops sustainably. The absence of farmer organizations and the lack of facilities and infrastructure make it difficult for farmers to develop their businesses. Improving the quality of human resources through joint group formation (Hurriati, 2020). The government also plays a role in increasing community participation through consultation and funding, with an integrated approach that strengthens partnerships, accelerates needs analysis, and promotes local self-reliance (Nitu & Cace, 2020). There are four strategic steps covering governance, financial support, business facilities, and marketing (Kaniawati & Saudi, 2019). In addition, partnerships with the private sector can strengthen support

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through funding, facilities, and experience for business development (Ginting et al., 2023).

2) Replanting and Management of Coconut Plantations

The strategy of replanting coconut plantations is to replace old trees with superior seedlings that are more productive and resistant to climate change to increase sap supply. Coconut trees play an important role in the supply of raw materials for making coconut sugar and other derivative products, this effort requires the application of proper tree maintenance techniques (Arwanda et al., 2021) to support the stability of the coconut sugar industry, meet market demand, and strengthen Indragiri Hilir's position as a leading coconut sugar producer.

3) Building a coconut sugar production center with the concept of OVOP (One Village One Product)

The One Village One Product (OVOP) strategy in Indragiri Hilir Regency aims to cluster coconut sugar production to strengthen branding, competitiveness, and recognition of regional specialty products while improving farmers' welfare and sustainable economic growth. Research (Indana & Sukidjo, 2020) An evaluation of the One Village One Product (OVOP) program in Petanahan Village, Kebumen, Central Java, using the CIPP model shows that the program is effective in empowering coconut processing SMEs.

Despite the positive impact, obstacles such as limited funding during high demand and price fluctuations, especially for Virgin Coconut Oil (VCO) products. Furthermore, research by Pramuditya et al. (2023) involved BUMDes in diversifying brown sugar products into liquid sugar to increase the economic value and income of coconut farmers. Activities are carried out through preparation, implementation, and evaluation stages. This innovation is still under development and not yet marketed, with ongoing assistance and recommendations.

Infrastructure support, as well as optimization of production factors, and integrated farming empowerment, also play a role in improving efficiency, coordination, and farmers' income (Nainggolan et al., 2024). Increasing productivity is one of the efforts to anticipate competition with other products (Dwijatenaya et al., 2021). During the establishment of OVOP Centers, key stakeholders highlighted four important aspects, namely government support, funding schemes, program sustainability, and stakeholder engagement (Erwan, 2023).

The MSME development model is carried out by providing market facilities and access to capital, empowering human resources, promotion, and increasing competitive and comparative advantages through the OVOP approach (Rauf et al., 2023).

Strategy prioritization analysis with QSPM

The next stage in strategy formulation is the decision-making stage using QSPM (Quantitative Strategic Planning Matrix) analysis. Alternative strategies obtained through SWOT analysis are entered into the QSPM matrix to be estimated using weights and attractiveness ratings (Abbasi et al., 2019), which are presented in **Table 5**.

The results of the analysis on the QSPM matrix in the formulation of strategic priorities to improve the regional economy through the development of coconut sugar-based industries in the downstream indragiri district in **Table 5** show that the strategies that have the highest value (TAS value) are 1) The strategy of making regulations regarding coconut and its derivative products with a value of 7.45 then 2) Building coconut sugar production centers with the concept of OVOP (One Village One Product), 3) Forming groups and empowering coconut sugar business actors 4) Developing varied coconut derivative products (liquid sugar and ant sugar) and other products, 5) Developing Product Branding, 6) Optimizing the supply chain from production to distribution, 7) Replanting and management of kelap plantations,8) Improve production quality standards, 9) Facilitate access to marketing and financing, 10) Synergize with other local

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governments, the private sector, academics, and stakeholders for the development of supporting facilities and the QSPM matrix which has the lowest TAS value of 5.75 is a strategy to encourage the application of modern production techniques.

Clear regulations from the central government are the basis for local governments to facilitate and protect farmers and business actors in the coconut sugar sector. With the formation of sugar organizations or groups in each sub-district and the existence of a legal umbrella, funding can be applied for farmers' capital, procurement of processing machines, socialization, and the formation of competent community assistants. This strategy will facilitate the implementation of other strategies to create synergy in the sustainable development of the coconut sugar sector.

Table 5. QSPM Analysis Results

No Strategy	Alternative Strategy	Score TAS	Priority Strategy
1	Make rules and regulations regarding coconut and its derivative products	**7.45**	**1**
2	Develop various coconut derivative products (liquid sugar and ant sugar) and other products.	6.63	4
3	Develop product branding	6.58	5
4	Optimizing the supply chain from production to distribution	6.45	6
5	Improve production quality standards	6.10	8
6	Encourage the application of modern production techniques	5.75	11
7	Forming groups and empowering coconut sugar business actors	6.96	3
8	Synergize with other local governments, the private sector, academics, and stakeholders for the development of supporting facilities	5.76	10
9	Facilitate access to marketing and financing	5.78	9
10	Replanting and Management of Coconut Plantations	6.16	7
11	Establishing coconut sugar production centers with the concept of OVOP (One Village One Product)	7.12	2

CONCLUSION

Coconut sugar processing provides added value to coconut sap water; each liter of raw material generates an added value of IDR 2,794 (71.93% ratio) for the leased coconut system and IDR 3,318 (85.44% ratio) for the owned coconut system. Coconut sugar production is 462.69 kg per month and requires 2,382.69 liter of nira water as raw material. Coconut sugar processing profits reached IDR 2,046 per kg for leased coconuts (73.24%) and IDR 2,571 per kg for owned coconuts (77.47%). The development of the coconut sugar industry in Indragiri Hilir Regency is in the “Grow and Build” stage, signaling positive growth. Great potential is supported by the availability of raw materials and stable market demand, although it faces challenges such as limited distribution, capital, and infrastructure. The development of the coconut sugar industry has social impacts in the form of increased community income and welfare, job creation, and encouraging village economic growth. The main strategy is to make regulations regarding coconut and its derivative products and build coconut sugar production centers with the concept of One Village One Product (OVOP), analysis of coconut sugar industry development policies, optimizing the use of raw materials, and strengthening distribution infrastructure to support the OVOP concept. To support the development of the coconut sugar industry, it is necessary to establish production centers and make regulations related to coconut products. This step will strengthen the industrial structure and increase the competitiveness of coconut sugar products in Indragiri Hilir Regency in the domestic and international markets.

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Future research can focus on further exploring the environmental and sustainability aspects of the coconut sugar industry, such as the impact on the coconut ecosystem, energy use efficiency in the production process, potential waste and its management, and the integration of sustainable agricultural practices to support the development of an environmentally friendly and sustainable industry.

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