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Analysis of Leading Agricultural Commodities and Their Role in Regional Development in North Tapanuli Regency, Indonesia

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

This research explores the analysis of flagship agricultural commodities and their contribution to regional development in North Tapanuli Regency. Utilizing the Analytical Hierarchy Process and Location Quotient methodologies, the study identifies prominent crops including irrigated rice, upland rice, corn, and peanuts for food crops; chili, tomatoes, mustard greens, and shallots for vegetables; and coffee, rubber, coconut, and cocoa for perennial crops. The development strategy involves farmer education in conservation agriculture, strengthening cooperative groups, and managing agricultural land conversion. Recommendations suggest the implementation of research

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findings through programs led by the Department of Agriculture and Plantation, with resource allocation prioritized based on a location-specific priority scale, particularly in the agricultural sector, to support the regional development of North Tapanuli Regency. The study provides valuable insights for policymakers and stakeholders aiming to facilitate sustainable agricultural development in the region.

Keywords: Agricultural commodities; analytical hierarchy process; location quotient; strategic development; North Tapanuli Regency.

1. INTRODUCTION

The development of agricultural science involves a comprehensive understanding of biological, sociocultural, and business aspects related to the exploitation and production of biological natural resources [1]. The main goals of agricultural development include increasing farmer income, diversified resource-based food security, enhanced competitiveness of agricultural products, sustainable agribusiness system development, increased fair employment opportunities and entrepreneurship, and the development of flagship commodities

The agricultural sector plays a crucial role in providing food, raw materials, feed, and bioenergy, making its management a focal point in Indonesia's development processes. Development is a systematic and sustainable effort aimed at achieving goals to enhance the well-being of society. Among the essential aspects of development is the agricultural sector's progress (Ministry of Agriculture, 2021).

Determining flagship commodities in a region is imperative, as region-based development showcases the potential for more significant growth, fostering more optimal regional development. This approach aligns with sustainability concepts because the identification of flagship commodities is closely linked to land suitability, agroclimatic conditions, labor absorption, and alignment with the distinctive behavioral patterns of the local community [2,3,4].

North Sumatra is one of Indonesia's provinces where agriculture holds a strategic position in the economy. The agricultural sector serves as a key contributor to the Regional Gross Domestic Product (PDRB) and stands out as the largest employer compared to other sectors. In 2020, the agricultural sector employed 2,424,046 individuals, constituting 35.43% of the total workforce of 7,350,057. According to the Central Statistics Agency (BPS, 2022), agriculture remains the highest contributor to the PDRB in North Sumatra. In 2021, the agricultural sector contributed 22.04% (Desi et al., 2023).

According to Badan Pusat Statistik In 2022, the agricultural sector of North Tapanuli Regency contributed 43.91% to the Gross Regional Domestic Product (GRDP). This sector encompasses food crops, plantations, livestock, fisheries, and forestry. Out of the total population of 272,587 individuals or 61,256 households, approximately 88.67% or 54,316 households are engaged in the agricultural sector. The regional development vision, as outlined in the Regional Development Plan for 2023-2026, positions North Tapanuli Regency as a hub for quality food production (PERBUP Tapanuli Utara, 2023). Achieving this vision requires enhancing food security and farmer welfare through farmer protection, sustainable agricultural land, and the development of flagship commodities based on agriculture and local resources.

The importance of flagship commodities in supporting regional economic growth becomes evident. This concept is reinforced by the views of Taufik and Saleh (2002), as cited by Yulianita [5], stating that flagship commodities not only directly contribute to the increase in production factors and regional income but also stimulate local industrial growth through increased demand that supports local industrial development.

Ambardi & Prihawantoro [6] emphasize that flagship commodities must meet specific criteria, such as being a key driver of economic development, having strong forward and backward linkages, national and international competitiveness, links with other regions, increased technological status, optimal labor absorption, sustainability over a specific period, resilience to external and internal fluctuations, multifactor support, and maintaining resource and environmental sustainability (Sambodo in Soebagiyo, 2015).

Previous research has employed various analytical methods to determine flagship

commodities in the agricultural sector. Suryani et al. [7] and Widianingsih et al. [8] applied methods such as Location Quotient (LQ), shift share (SS), Trend, Dynamic Location Quotient (DLQ), Shift-Share, and Klassen Typology. Oktavia et al. (2016) used the Input-Output method, particularly in researching the role of the agricultural sector in East Java..

In the current landscape of agricultural research, particularly in the realm of identifying flagship commodities for regional development, a comprehensive examination of the specific application of the Analytical Hierarchy Process (AHP) remains conspicuously absent, particularly within the context of North Tapanuli Regency. The available literature, as exemplified by studies conducted by Suryani et al. [7], Widianingsih et al. [8], and Oktavia et al. [9], predominantly leans towards the utilization of methodologies such as Location Quotient (LQ), shift share (SS), Trend, Dynamic Location Quotient (DLQ), Shift-Share, Klassen Typology, and Input-Output analysis.

This research seeks to bridge this gap by introducing the AHP methodology as a robust tool for the identification and assessment of flagship agricultural commodities in North Tapanuli Regency. The uniqueness of the regency's agricultural landscape, coupled with its aspiration to become a hub for quality food production according to the Regional Development Plan for 2023-2026, necessitates a tailored analytical approach. The AHP methodology offers a structured and systematic framework for evaluating identified flagship commodities, considering multiple criteria and factors concurrently.

Boldly establishing the utility and significance of this study is paramount. By employing the AHP methodology, this research not only fills a critical gap in the existing literature but also provides a nuanced understanding of the role of flagship commodities in the specific context of North Tapanuli Regency. The systematic evaluation facilitated by AHP allows for a comprehensive analysis that goes beyond traditional methodologies, offering a more refined perspective on the selection and impact of flagship agricultural commodities.

Furthermore, this study contributes to the academic realm by enhancing regional development planning studies, specifically within the context of flagship commodity development. The findings aim to deepen our understanding of how agricultural commodities drive regional economic growth, providing valuable insights for future research endeavors in similar contexts.

Beyond academia, the research outcomes serve as a practical guide for local governments and businesses. The study's comprehensive analysis of flagship commodities in the agricultural sector equips decision-makers with essential information for formulating, evaluating, and adjusting regional development policies and strategies. Moreover, the research lays a foundation for planning programs and activities that align with the unique characteristics and potential of North Tapanuli Regency, facilitating sustainable agricultural development and contributing to the realization of its vision as a hub for quality food production.

2. METHODS

Our research unfolds in Indonesia, a vibrant Southeast Asian archipelago with a diverse economic landscape. As the largest economy in the region, Indonesia's dynamic growth spans various industries, including agriculture, manufacturing, services, and natural resource extraction. This study zooms into North Sumatra Province, a pivotal contributor to Indonesia's economic tapestry. With a balanced GDP reflecting diverse economic activities, North Sumatra Province becomes a focal point. Our attention then narrows to North Tapanuli Regency, characterized by its unique highland setting and the prominent Lake Toba. Agriculture takes center stage in the region's economic pursuits, leveraging its fertile land for a variety of crops and commodities.

2.1 Research Objectives and Methodology

The research, conducted in North Tapanuli Regency, aimed to analyze flagship commodities in the agricultural sector and gauge their impact on regional economic development. Employing the Analytical Hierarchy Process (AHP) and Location Quotient (LQ) methods, and also determine policy strategy through SWOT Analysis, the study considered inter-sectoral linkages, GRDP contribution, competitiveness, labor absorption, and environmental sustainability. The conversion of production data from weight to monetary units facilitated the evaluation of commodity values. The LQ analysis, calculated with precision using the formula:

$$LQ = \frac{\frac{V_{ij}}{V_j}}{\frac{V_{in}}{V_n}}$$

Keterangan:

LQ = Nilai *Location Quotient*
V_{ij} = Nilai *ouput* sektor i di wilayah studi j
V_j = *Ouput* total semua sektor di wilayah studi j
V_{in} = Nilai *ouput* sektor i di wilayah acuan n
V_n = *Ouput* total semua sektor di wilayah acuan n

2.2 Role of Flagship Commodities and Methodological Clarity

Determining the role of flagship commodities in economic development relied on the results of AHP and LQ analyses. The AHP analysis involved local and global priority assessments. The comprehensive methodology of this research lays a robust foundation for sustainable policy recommendations in North Tapanuli Regency's agricultural sector development.

2.3 Study Design and Data Sources

The study adopted a retrospective observational design, focusing on the agricultural sector, which consistently contributes over 50% to the Gross Regional Domestic Product (PDRB) structure of Tapanuli Utara Regency.

Utilizing PDRB data spanning from 2017 to 2022, the analysis included agricultural, forestry, and fisheries sectors. This extended period enabled a thorough exploration of trends. Further investigation identified pivotal sub-sectors—food crops, vegetables, and perennial crops—with contributions exceeding 10% to the PDRB. Data sources primarily involved meticulous analysis of PDRB records and harvest area variables, ensuring methodological clarity for robust and reliable study findings.

What is the study design of this study? Who are the data sources? How you sampled them? These are very critical issues you should clarify in the methods section.

3. RESULTS

Give introduction of the analysis procedure and present the objective one: analyze flagship commodities in the agricultural sector of North Tapanuli Regency as a first title.

The pivotal objective driving our investigation is the meticulous analysis of flagship commodities within the vibrant agricultural sector of North Tapanuli Regency. This analytical journey aims to unravel the intricacies and significance of select commodities that stand as pillars in shaping the region's economic landscape. The process involves a detailed examination of inter-sectoral linkages, contributions to the Gross Regional Domestic Product (GRDP), competitiveness, labor absorption, and environmental sustainability. As we embark on this exploration, the goal is to unearth valuable insights that shed light on the pivotal role of these flagship commodities in propelling regional economic development.

3.1 Flagship Food Crop Commodities

Determining flagship commodities provides several advantages, including lower production costs compared to other regions and vast development potential due to community support and accessible human resources (Sitorus et al., 2014). The focus of this research is on the agricultural sector, consistently contributing over 50% to the Gross Regional Domestic Product (PDRB) structure of Tapanuli Utara Regency. This insight is derived from a comprehensive examination of PDRB data spanning the years 2017 to 2022, covering the agricultural, forestry, and fisheries sectors. Further exploration within these sectors aimed to identify dominant sub-sectors contributing significantly to the PDRB of Tapanuli Utara Regency. The findings pinpoint three agricultural sub-sectors—food crop farming (22.88%), vegetable cultivation (11.77%), and perennial plantation (18.90%)—each making contributions exceeding 10% to the PDRB. The variable utilized to gauge the potential of flagship commodities in each sub-district is the harvest area for food crops, vegetables, and perennial plantations.

The agricultural sector remains the backbone of North Tapanuli Regency's economy, providing added value, foreign exchange, and employment opportunities for a significant portion of the population.

The analysis of Location Quotient (LQ) values in Table 2 reveals noteworthy patterns in the agricultural landscape across various sub-districts of North Tapanuli Regency. One key observation is the diverse range of LQ values, underscoring distinct levels of specialization in the cultivation of rice fields, upland rice, corn,

Table 1. Gross Regional Domestic Product (PDRB) of North Tapanuli Regency Based on Constant Prices in 2017-2022 by Field of Business (Billion Rupiah)

Field Of Business	2017	2018	2019	2020	2021	2022
Agriculture, Forestry, and Fisheries	2474.60	2533.96	2601.04	2660.74	2782.75	2916.34
Mining and Quarrying	4.00	4.21	4.41	4.67	4.95	5.17
Manufacturing Industry	108.31	114.61	122.24	124.81	128.94	134.04
Electricity and Gas Provision	5.88	6.30	6.87	7.54	7.98	8.17
Water Supply, Waste Management, Recycling	5.47	5.62	5.82	6.07	6.40	6.69
Construction	681.16	736.61	798.35	791.88	817.37	850.08
Wholesale and Retail Trade; Repair of Motor Vehicles	684.64	736.72	793.92	824.02	856.49	895.02
Transportation and Warehousing	252.57	268.42	285.44	274.44	282.05	303.28
Accommodation and Food Service Activities	119.98	127.08	134.99	135.38	138.63	148.52
Information and Communication	48.88	50.21	52.83	57.33	60.09	62.99
Financial and Insurance Services	82.77	85.63	88.33	91.33	93.63	96.60
Real Estate	114.91	118.39	121.76	123.00	123.47	129.46
Company Services	14.79	15.36	15.92	16.72	17.17	18.30
Government Administration, Defense, and Mandatory Social Security	540.83	562.26	585.17	580.30	581.96	576.85
Education	93.52	95.27	97.14	102.10	105.03	109.78
Health and Social Activities	41.33	42.18	43.04	43.46	43.63	46.06
Other Services	7.07	7.37	7.66	7.60	7.80	8.37
PDRB	5280.69	5510.19	5764.94	5851.40	6058.35	6315.72

Source: Badan Pusat Statistik Kabupaten Tapanuli Utara, 2023

and groundnuts. Notably, sub-districts like Pahae Julu, Pahae Jae, and Purbatua exhibit exceptionally high LQ values for rice fields, indicating a significant focus and specialization in rice cultivation. Conversely, Tarutung stands out for its remarkable specialization in groundnut cultivation [10-12]. Furthermore, some sub-districts, such as Simangumban and Pangaribuan, showcase diversified LQ values, suggesting a balanced focus on multiple crops. The implications of these findings are multifaceted. High LQ values signify economic specialization, potentially leading to increased efficiency and higher yields for specific crops. On the other hand, sub-districts with diversified LQ values present opportunities for further agricultural diversification, enhancing resilience and sustainability. Policymakers may consider tailoring strategies to support specialized sub-districts while encouraging balanced agricultural development in others. Overall, these insights from Table 1 pave the way for informed decision-making, community engagement, and the formulation of targeted policies to bolster the agricultural sector in North Tapanuli Regency.

Table 2. LQ Values of Food Crop Commodities in Each Sub-district of North Tapanuli Regency

Sub-district	Rice Fields	Upland Rice	Corn	Groundnuts
Parmonangan	0.32	1.08	1.61	0.85
Adiankoting	0.56	2.00	0.36	1.44
Sipoholon	0.63	0.87	1.47	1.49
Tarutung	0.81	1.16	0.67	5.82
Siatas Barita	0.45	1.61	0.91	0.96
Pahae Julu	2.84	0	0.05	3.14
Pahae Jae	3.10	0	0.02	0.05
Purbatua	3.09	0	0.02	0.10
Simangumban	2.30	0.27	0.44	1.52
Pangaribuan	0.55	1.26	1.24	0.09
Garoga	0.37	0.96	1.74	0.13
Sipahutar	0.75	1.20	1.07	0.47
Siborongborong	1.19	1.07	0.77	0.49
Pagaran	2.05	0.43	0.51	1.59
Muara	2.13	0.16	0.78	0.50

Source: Compiled Data, 2023

Table 3. Flagship Food Crop Commodities in Each Sub-district of North Tapanuli Regency

Sub-district	Flagship Commodities
Parmonangan	Upland rice, corn
Adiankoting	Upland rice, groundnuts
Sipoholon	Corn, groundnuts
Tarutung	Upland rice, groundnuts
Siatas Barita	Upland rice
Pahae Julu	Rice fields, groundnuts
Pahae Jae	Rice fields
Purbatua	Rice fields
Simangumban	Rice fields, groundnuts
Pangaribuan	Upland rice, corn
Garoga	Corn
Sipahutar	Upland rice, corn
Siborongborong	Rice fields, upland rice
Pagaran	Rice fields, groundnuts
Muara	Rice fields

Source: Compiled Data, 2023

Table 3 illuminates the distinct agricultural landscape of North Tapanuli Regency by outlining the flagship food crop commodities in each sub-district. A notable finding is the diverse array of flagship commodities, underscoring the unique agricultural priorities in each locality. For example, Parmonangan prioritizes upland rice and corn, while Adiankoting focuses on upland rice and groundnuts. This diversity signifies a nuanced approach to agricultural production tailored to the specific strengths and preferences of each sub-district. Furthermore, the table reveals variations in agricultural emphases, with sub-districts like Tarutung specializing in upland rice and groundnuts, showcasing distinct agricultural profiles. Interestingly, some sub-districts strategically combine flagship choices, such as Simangumban, which emphasizes both rice fields and groundnuts. Comparing these findings with similar studies in the field allows for a broader understanding of local agricultural practices [13,14]. While parallels may exist, the specific combinations and emphases on certain crops in each sub-district reflect the unique ecological, economic, and social factors shaping agricultural landscapes in North Tapanuli Regency. This localized insight not only informs tailored agricultural strategies but also contributes valuable perspectives to broader regional agricultural development initiatives.

3.2 Flagship Vegetable Crop Commodities

Based on the LQ analysis for vegetable crop commodities using 2022 harvested area data, all sub-districts have at least one comparatively superior commodity in terms of harvested area, indicated by an LQ value ≥ 1, as presented in Table 3.

Table 4 provides a comprehensive overview of the vegetable crop landscape in North Tapanuli Regency, showcasing Location Quotient (LQ) values for various crops in each sub-district. Notable findings emerge as each sub-district exhibits distinct levels of specialization and emphasis on specific vegetables. For instance, Pahae Julu emerges as a focal point for chili cultivation, demonstrating a high LQ value in this particular vegetable. Conversely, Siborongborong showcases a significant emphasis on tomatoes, with a notable LQ value for this crop. Additionally, some sub-districts, such as Pagaran and Muara, present diversified LQ values, indicating a multifaceted focus on multiple vegetables. Notably, certain sub-districts, including Pahae Julu, Pahae Jae, Purbatua, and Simangumban, register zero LQ values for specific vegetables, signaling a potential lack of specialization in those crops. This absence may suggest either a limited focus on these vegetables or a broader approach to vegetable cultivation in these areas [15,16]. Comparing these findings with similar studies in the field allows for a nuanced understanding of vegetable crop specialization trends unique to North Tapanuli Regency. These insights can serve as a valuable foundation for crafting tailored agricultural policies and strategies that align with the distinct agricultural profiles of each sub-district, thereby contributing to more targeted and effective regional development initiatives.

Table 4. LQ Values of Vegetable Crop Commodities in Each Sub-district of North Tapanuli Regency

Sub-district	Chili	Tomato	Chinese Cabbage	Spring Onion
Parmonangan	1,20	1,32	0,22	0
Adiankoting	1,10	0,32	0,06	1,35
Sipoholon	1,13	0,30	1,11	1,16
Tarutung	1,41	0,12	0,49	0,28
Siatas Barita	1,27	0,08	1,01	0,67
Pahae Julu	1,56	0	0	0
Pahae Jae	1,41	0,32	0	0,57
Purbatua	1,56	0	0	0
Simangumban	1,56	0	0	0
Pangaribuan	1,26	0,50	0	1,36
Garoga	1,51	0,22	0	0
Sipahutar	1,11	0,76	1,04	0,59
Siborongborong	0,72	1,96	1,13	1,20
Pagaran	0,39	0,97	3,18	2,60
Muara	0,79	0,98	1,16	2,31

Source: Compiled Data, 2023

Table 5. Flagship Vegetable Crop Commodities in Each Sub-district of North Tapanuli Regency

Sub-district	Flagship Commodities
Parmonangan	Chili, tomato
Adiankoting	Chili, spring onion
Sipoholon	Chili, Chinese cabbage, spring onion
Tarutung	Chili
Siatas Barita	Chili, Chinese cabbage
Pahae Julu	Chili
Pahae Jae	Chili
Purbatua	Chili
Simangumban	Chili
Pangaribuan	Chili, spring onion
Garoga	Chili
Sipahutar	Chili, Chinese cabbage, spring onion
Siborongborong	Tomato, Chinese cabbage, spring onion
Pagaran	Chinese cabbage, spring onion
Muara	Chinese cabbage, spring onion

Source: Compiled Data, 2023

Table 5 provides a concise yet meaningful insight into the agricultural landscape of North Tapanuli Regency by delineating the flagship vegetable crop commodities in each sub-district. The predominant emphasis on chili as a flagship vegetable is striking, with numerous sub-districts, including Parmonangan, Tarutung, and Garoga, demonstrating a clear focus on chili cultivation. This ubiquity suggests the economic and cultural significance of chili in the region. Additionally, some sub-districts strategically diversify their flagship choices, as seen in Sipoholon, Pangaribuan, Siborongborong, Pagaran, and Muara, indicating a deliberate effort to cultivate a variety of vegetables. This diversification aligns with a potential strategy to enhance food security and economic resilience through a varied agricultural portfolio. Importantly, the localization of flagship choices underscores the nuanced and context-specific decisions made by each sub-district, considering local agricultural strengths, market demands, and cultural practices. This localized approach is crucial for policymakers and agricultural planners seeking to formulate targeted strategies that align with the unique characteristics of each area, fostering sustainable agriculture, supporting local economies, and ensuring food security in North Tapanuli Regency.

3.3 Flagship Annual Plantation Crop Commodities

Based on the LQ analysis for annual plantation crop commodities using 2022 harvested area data, all sub-districts have at least one comparatively superior commodity in terms of harvested area, indicated by an LQ value ≥ 1, as presented in Table 5.

Table 6 presents the Local Quotient (LQ) values for annual plantation crop commodities in various sub-districts of North Tapanuli Regency. These values, indicating the comparative strength of each commodity within the region, unveil distinctive patterns and priorities in agricultural cultivation across different areas.

In Parmonangan, coffee stands out as the flagship annual plantation crop, boasting a notable LQ value of 1.37. This signals a specific focus on coffee cultivation in this sub-district, despite the presence of rubber and coconut with comparatively lower LQ values.

Adiankoting adopts a diversified strategy, with rubber taking the lead as the flagship commodity, highlighted by a substantial LQ value of 2.65. The cultivation of cocoa and coconut also contributes to the agricultural diversity of this sub-district.

Pahae Julu exhibits a clear emphasis on cocoa cultivation, marked by an exceptionally high LQ value of 3.17. While rubber and coconut play a role, cocoa dominates the agricultural landscape in this sub-district.

Purbatua stands out with a multifaceted approach, prioritizing the cultivation of rubber, coconut, and cocoa. Remarkably high LQ values of 7.07 for cocoa and 3.44 for coconut underscore their significant presence in the agricultural dynamics of Purbatua.

Table 6. LQ Values of Annual Plantation Crop Commodities in Each Sub-district of North Tapanuli Regency

Sub-district	Coffee	Rubber	Coconut	Cocoa
Parmonangan	1,37	0,55	0,42	0,69
Adiankoting	0,13	2,65	0,98	1,19
Sipoholon	1,68	0,17	1,18	0,05
Tarutung	1,67	0,14	2,01	0,09
Siatas Barita	1,78	0,01	0,83	0,02
Pahae Julu	0,02	2,16	0,70	3,17
Pahae Jae	0,01	2,68	3,38	1,49
Purbatua	0,03	0,64	3,44	7,07
Simangumban	0,24	0,69	1,33	6,07
Pangaribuan	1,73	0,04	0,10	0,26
Garoga	0,47	2,17	0,57	0,81
Sipahutar	1,80	0	0,32	0
Siborongborong	1,81	0	0	0
Pagaran	1,26	0	0	0
Muara	1,61	0	6,90	0,22

Source: Compiled Data, 2023

Simangumban adopts a diverse approach, with coffee, rubber, and cocoa sharing the spotlight. Cocoa, in particular, shines with a substantial LQ value of 6.07, emphasizing its vital contribution to the agricultural landscape of Simangumban.

Muara emerges as a key player in coconut cultivation, as evidenced by an exceptionally high LQ value of 6.90. This sub-district strategically leverages its agricultural landscape to prioritize and excel in coconut farming.

While these LQ values provide insights into comparative strengths, a more in-depth analysis is needed to explore the economic, social, and environmental implications of these flagship annual plantation crop commodities. Such an analysis would offer a comprehensive understanding of their roles, sustainability, and impact on local livelihoods in the agricultural tapestry of North Tapanuli Regency.

Table 7 delineates the flagship annual plantation crop commodities identified for each sub-district in North Tapanuli Regency. Notably, coffee emerges as a recurrent flagship commodity across several sub-districts, including Parmonangan, Siatas Barita, Pangaribuan, Sipahutar, Siborongborong, and Muara. This consistency suggests a regional emphasis on coffee cultivation, potentially influenced by factors such as climate, soil conditions, or market demand.

Table 7. Flagship Annual Plantation Crop Commodities in Each Sub-district of North Tapanuli Regency

Sub-district	Flagship Commodities
Parmonangan	Coffee
Adiankoting	Rubber and cocoa
Sipoholon	Coffee and coconut
Tarutung	Coffee and coconut
Siatas Barita	Coffee
Pahae Julu	Rubber and cocoa
Pahae Jae	Rubber, coconut, and cocoa
Purbatua	Coconut and cocoa
Simangumban	Coconut and cocoa
Pangaribuan	Coffee
Garoga	Rubber
Sipahutar	Coffee
Siborongborong	Coffee
Pagaran	Coffee and tobacco
Muara	Coffee and coconut

Source: Compiled Data, 2023

The combination of rubber and cocoa as flagship commodities in Adiankoting and Pahae Julu reflects a strategic diversification in these sub-districts, aligning with the economic and environmental characteristics of the respective areas. Similarly, Pahae Jae adopts a multifaceted approach, prioritizing rubber, coconut, and cocoa, showcasing a diverse agricultural landscape.

Simangumban and Purbatua both highlight the significance of coconut and cocoa in their flagship commodities, indicating a shared emphasis on these crops in distinct sub-districts. Meanwhile, Tarutung and Sipoholon prioritize coffee and coconut, showcasing a nuanced approach to agricultural development.

The inclusion of tobacco as a flagship commodity in Pagaran adds a unique dimension to the agricultural landscape, emphasizing the sub-district's specific cultivation practices and economic priorities.

While these findings provide valuable insights into the local priorities for annual plantation crops, a more extensive review of existing literature is needed to determine the consistency of these flagship commodities with previous studies. This comparative analysis would contribute to a more comprehensive understanding of the agricultural dynamics in North Tapanuli Regency and their alignment with broader agricultural trends and practices.

3.4 SWOT Strategies

1. Strategy SO (Quadrant I):

   a. Enhance marketing location potential by expanding the marketing network to densely populated areas.
   b. Optimize the socio-cultural aspects of the farming community in developing flagship commodities.

2. Strategy ST (Quadrant II):

   a. Optimize agricultural cultivation techniques in line with climate change and provide input assistance.
   b. Strengthen joint farmer group cooperatives to assist in product marketing.
   c. Control land conversion rates by optimizing agricultural land use.

3. Strategy WO (Quadrant III):

   a. Improve agricultural technology and waste management to overcome natural resource limitations.
   b. Coordinate government agencies to monitor prices and reduce fluctuations.
   c. Actively involve the population in improving farming skills and environmental conservation.
   d. Government and financial institution support for enhancing farmer skills and providing capital.

4. Strategy WT (Quadrant IV):

   a. Formulate land utilization policies supporting the development of flagship agricultural commodities.
   b. Central government involvement and support in balancing agricultural commodity prices.

Priority Strategy: The priority strategy to be implemented is Strategy ST (Quadrant II), with a focus on cultivating agricultural techniques, strengthening cooperatives, and controlling land conversion rates. The implementation of this strategy encompasses physical, economic, social, and institutional aspects to ensure the sustainability and success of developing flagship commodities in North Tapanuli Regency.

4. CONCLUSION

This study sheds light on the pivotal role of flagship agricultural commodities in steering regional development within North Tapanuli Regency. The analysis reveals that irrigated rice, upland rice, corn, and peanuts emerge as crucial food crops, while chili, tomatoes, mustard greens, and shallots stand out as key vegetables. Perennial crops such as coffee, rubber, coconut, and cocoa also play a significant role in shaping the region's economic landscape. The identified development strategy emphasizes the importance of farmer education in conservation agriculture, the strengthening of cooperative groups, and prudent management of agricultural land conversion.

Building on these insights, the recommendations put forth in this research carry actionable implications for stakeholders involved in regional development. Specifically, the Department of Agriculture and Plantation is positioned to spearhead targeted programs for the effective

implementation of these findings. Resource allocation, guided by a location-specific priority scale, is paramount, with a particular focus on the agricultural sector.

In essence, this study serves as a valuable resource for policymakers and stakeholders invested in fostering sustainable agricultural development in North Tapanuli Regency. By combining rigorous analytical methodologies with actionable recommendations, the research aims to contribute meaningfully to the realization of strategic and impactful initiatives in the region.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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