***Original Research Article***

# ANALYSIS OF LEADING AGRICULTURAL COMMODITIES AND THEIR ROLE IN REGIONAL DEVELOPMENT IN NORTH TAPANULI REGENCY


## 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 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.




## I. INTRODUCTION

The analysis of flagship commodities in the agricultural sector of North Tapanuli Regency highlights its crucial role in economic development. Situated in the highlands of North Sumatra, the regency covers a land area of approximately 3,793.71 km², with Lake Toba spanning 6.60 km². With a population of around 315,222 in 2021 and a low density of 83 people per square kilometer, North Tapanuli Regency places a primary focus on the agricultural sector.

According to Badan Pusat StatistikIn 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. 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 (2009), 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.

In economic development, basic requirements identified by Jhingan (1983) include Economic Independence, Capital Formation, Appropriate Investment Criteria, Socio-Cultural Aspects, and Administrative Quality. The key to successful development is accurate planning, which should be based on the region's issues, needs, and potential. This aims to ensure that development is efficient and targeted, thereby enhancing the regional economy (Permatasari, 2016). Coordination in development planning involves macro planning, sectoral planning, regional planning, and micro planning (Nursini, 2010).

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 (Nurmala et al., 2012). 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.

Ambardi&Prihawantoro (2002) 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. (2015) and Widianingsih et al. (2015) 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.

This recent study, focused on North Tapanuli Regency, utilizes the Analytical Hierarchy Process (AHP) to identify flagship commodities. Input-output analysis is conducted using the 2015 East Java Provincial input-output table, the most recent data available.

The objectives of this research involve two main aspects. First, the study aims to comprehensively analyze flagship commodities in the agricultural sector of North

Tapanuli Regency. Second, the research evaluates the impact of these flagship commodities on regional development in the regency.

The results of this research have significant benefits not only in the academic realm but also for local governments and businesses. Academically, the study is expected to make a valuable contribution to regional development planning studies, especially in the context of flagship commodity development. The benefits include a deeper understanding of the role of agricultural commodities in driving regional economic growth.

For local governments, the research results can serve as a guide for formulating, evaluating, and adjusting regional development policies and strategies. Comprehensive analysis of flagship commodities in the agricultural sector provides essential information for making more effective and efficient decisions. Moreover, this research can serve as a foundation for planning programs and activities for the development of agricultural commodities that align with the characteristics and potential of the region.

## II. METHOD

This research will be conducted in North Tapanuli Regency, North Sumatra Province, with the primary objective of analyzing flagship commodities in the agricultural sector and measuring their impact on regional economic development. The study will utilize the Analytical Hierarchy Process (AHP) method to determine flagship commodities, considering aspects such as inter-sectoral linkages, contribution to Gross Regional Domestic Product (GRDP), competitiveness, labor absorption, and environmental sustainability. Data sources will include primary data from interviews with experts and secondary data through documentation methods, including data on agricultural commodity production and prices. The analysis will also involve the use of Location Quotient (LQ) to assess the competitiveness of agricultural commodities.

The prices of commodities determine the value of production. Therefore, it is necessary to convert production data from weight units to monetary units by multiplying the production value in weight units by the commodity price per weight unit. Subsequently, the data on the value of agricultural commodity production (in monetary units) will be used as input in the LQ analysis. The formula for the Location Quotient (LQ) analysis used is as follows:

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

Where:

$LQ$ = Location Quotient Value
$V_{ij}$ = Output value of sector *i* in study area *j*
$V_j$ = Total output of all sectors in study area *j*
$V_{in}$ = Output value of sector *i* in reference area *n*
$V_n$ = Total output of all sectors in reference area *n*

The determination of the role of flagship commodities in economic development will consider the results of AHP and LQ. AHP analysis requires local and global priority assessments and the use of excellence indices with the Rasmussen/Hirschman method. The overall methodology of this research is expected to provide a robust foundation for sustainable policy recommendations in the development of the agricultural sector in North Tapanuli Regency.

## III. RESULT

North Tapanuli Regency, located in North Sumatra Province, Indonesia, has a population of 320,542 people in 2023 with a density of 85 people/km², primarily consisting of the Batak Toba ethnic group. The Labor Force Participation Rate (TPAK) in North Tapanuli Regency reaches 81.07%, with male TPAK at 82.68% and female TPAK at 79.54%.

### 3.1 Flagship Food Crop Commodities

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.

Table 1 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

Based on the LQ analysis of food crops as shown in Table 1, flagship commodities in food crops are identified for each sub-district. The compilation of flagship commodities in each sub-district is presented in Table 2.

Table 2 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

The selection of primary flagship commodities aims to concentrate regional development on the most comparatively and competitively superior commodity, which is also the most dominant preference of the community. The flagship commodity for food crops is rice fields in the Pahae Jae sub-district.

**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 3 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

Based on the LQ analysis of vegetable crops as shown in Table 3, flagship vegetable crop commodities are identified for each sub-district. The compilation of flagship commodities in each sub-district is presented in Table 4.

Table 4 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

Chili is the most prevalent flagship commodity in North Tapanuli Regency, found in 13 out of 15 sub-districts with flagship commodities. Sipoholon and Siborongborong sub-districts have the highest number of flagship vegetable crop commodities, with three each.

### 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 5 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

Based on the LQ analysis of annual plantation crop commodities as shown in Table 5, flagship annual plantation crop commodities are identified for each sub-district. The compilation of flagship commodities in each sub-district is presented in Table 6.

Table 6 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

Coffee is the dominant plantation crop commodity in each sub-district in North Tapanuli Regency. The LQ calculation results show that out of the 15 sub-districts in North Tapanuli Regency, 9 sub-districts serve as the base for coffee commodities. These coffee base areas include Parmonangan, Sipoholon, Tarutung, Siatas Barita, Pangaribuan, Sipahutar, Siborongborong, Pagaran, and Muara.

### 3.4 Development Strategy for Flagship Commodities in North Tapanuli Regency

The development strategy for flagship commodities in North Tapanuli Regency is carried out using the A'WOT method, which combines AHP (Analytical Hierarchy Process) and SWOT (Strengths, Weaknesses, Opportunities, Threats). In this study, various factors of strengths, weaknesses, opportunities, and threats were obtained through perceptions and interviews with various experts during the

preliminary research, which were then combined with various relevant references. Some of these factors can be seen in Table 7.

Table 7 Factors of Strengths, Weaknesses, Opportunities, and Threats

| Internal Factors | External Factors |
|---|---|
| **Strengths** | **Opportunities** |
| - Potential marketing locations<br>- Sociocultural support from the community<br>- Potential underutilized agricultural land<br>- Local Government Support | - Sociocultural support for regional development based on flagship commodities<br>- Potential underutilized agricultural land<br>- Government support<br>- Central government programs supporting agricultural sector development<br>- Demographic bonus in terms of labor force |
| **Weaknesses** | **Threats** |
| - Fluctuations in agricultural commodity prices<br>- Environmental issues (pollution and damage)<br>- Low human resources in terms of agricultural technology, education level, and management skills<br>- Relatively small scale of operations | - Global Climate Change<br>- Conversion of agricultural land to built-up land<br>- Low productivity<br>- Domestic market competition |

### 3.5 Analysis of Internal Strategy Factors

Table 8 Results of Internal Strategic Factors Analysis Summary (IFAS)

| Internal Strategic Factors | Weight | Rating | Score |
|---|---|---|---|
| **Strengths** | | | |
| 1. Potential marketing locations | 0.136 | 3 | 0.402 |
| 2. Sociocultural support from the community | 0.134 | 3 | 0.363 |
| 3. Potential underutilized agricultural land | 0.161 | 3 | 0.094 |
| 4. Local Government Support | 0.067 | 3 | 0.591 |
| **Weaknesses** | | | |
| 1 Fluctuations in agricultural commodity prices | 0,136 | 3 | 0,514 |
| 2 Environmental issues | 0,038 | 1 | 0,198 |
| 3 Low human resources | 0,225 | 4 | 0,489 |
| 4 Small-scale operations | 0,100 | 3 | 0,132 |
| Total | 1 | | 2,974 |

Source: Compiled Data, 2023

Based on Table 8, the total score obtained by multiplying the weight and rating for all strengths and weaknesses is 2.9745. This value is derived from the score of strength factors, which is 1.4527, and the score of weakness factors with a value of 1.3345.

In the Rating column, it can be observed that all strength factors have a Rating of 3 (moderately strong). For weakness factors, there are 2 factors that receive a Rating of 3 (moderately strong), namely fluctuations in agricultural commodity prices and small-scale operations. Meanwhile, the role of environmental pollution and damage issues has a Rating of 1 (very weak), and the role of human resources has a Rating of 4 (very strong).

### 3.6 Analysis of External Strategy Factors

Table 9 Results of External Strategic Factors Analysis Summary (EFAS)

| External Strategic Factors | | Weight | Rating | Score |
|---|---|---|---|---|
| **Opportunities** | | | | |
| 1 | Increasing selling prices | 0,156 | 2 | 0,564 |
| 2 | Improving market demand | 0,180 | 2 | 0,299 |
| 3 | Central government support | 0,032 | 3 | 0,118 |
| 4 | Demographic bonus | 0,130 | 3 | 0,457 |
| **Threats** | | | | |
| 1 | Global climate change | 0,066 | 2 | 0,317 |
| 2 | Land conversion | 0,045 | 2 | 0,332 |
| 3 | Low productivity | 0,175 | 3 | 0,645 |
| 4 | Domestic market competition | 0,213 | 3 | 0,205 |
| **Total** | | 1 | | 2,569 |

Source: Compiled Data, 2023

The EFAS matrix presented in Table 9 shows that the total score obtained by multiplying the weight and rating for all opportunities and threats is 2.5699. This value is derived from the score of opportunity factors, which is 1.2013, and the score of threat factors with a value of 1.3687.

In the weight column, the weight of each factor, obtained from questionnaire data processing using the AHP method, is multiplied by 0.5 so that the total weight of opportunity and threat factors is 1.0000 (Rangkuti, 2009). In the Rating column, it can be observed that two opportunity factors have a Rating of 3 (moderately strong), and the other two have a Rating of 2 (moderately weak). The threat factors also show a similar pattern, with two factors having a Rating of 3 (moderately strong) and the other two having a Rating of 2 (moderately weak).

The analysis of internal and external matrices is carried out for detailed planning based on IFAS and EFAS matrices. The total score for internal factors is 2.9745, and for external factors, it is 2.5699, indicating that the development of commodities in North Tapanuli Regency is at an average level. In the Internal-

External matrix, the position of developing flagship commodities is in cell 5, indicating an average level.

From the IFAS and EFAS analysis, the difference between the strength and weakness scores is 0.0176, and the difference between the opportunity and threat scores is -0.0595. This places North Tapanuli Regency in quadrant II, indicating the need for diversification strategies to address threats while leveraging long-term strengths.

The SWOT analysis, referring to the IFAS and EFAS matrices, establishes the position in cell 5 and quadrant II. The main strategy is ST (Strengths-Threats), with a focus on leveraging strengths to overcome threats. The success of this strategy requires support from local government agencies, local marketing efforts, and adaptation to commodity price fluctuations. Efforts to develop human resources are also identified to turn threats into opportunities.

| Internal Factors / External factors | STRENGTH (S)<br>1. Potential marketing locations.<br>2. Socio-cultural community support.<br>3. Unused agricultural land.<br>4. Local government support. | WEAKNESS (W)<br>1. Fluctuations in agricultural commodity prices.<br>2. Environmental issues.<br>3. Low human resource capacity.<br>4. Small-scale farming operations. |
|---|---|---|
| OPPORTUNITIES (O)<br>1. Increasing selling prices.<br>2. Improving market demand.<br>3. Central government support.<br>4. Demographic bonus. | SO Strategy | WO Strategy |
| THREATHS (T)<br>1. Global climate change.<br>2. Land conversion.<br>3. Low productivity.<br>4. Domestic market competition. | ST Strategy | WT Strategy |

Figure 1 SWOT Analysis

### 3.7 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.

## IV. CONCLUSION

Based on the study on the Analysis of Leading Agricultural Commodities in North Tapanuli Regency, it can be concluded that irrigated rice, upland rice, corn, and peanuts emerge as the prominent food crops in various districts. Meanwhile, chili, tomatoes, mustard greens, and shallots stand out as the preferred vegetables, and coffee, rubber, coconut, and cocoa take precedence as the favored perennial crops. Development strategies involve farmer training in conservation agriculture, bolstering cooperative groups, and regulating agricultural land conversion. Recommendations include implementing research findings through programs led by the Department of Agriculture and Plantation, utilizing a priority scale for the allocation of resources, especially in the agricultural sector, to support regional development in North Tapanuli Regency.

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