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Food Commodity Development Strategy Towards Food Security in North Sumatra

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Abstract: Until now, North Sumatra's food security is still unstable. This condition gives a clear picture that North Sumatra Province experiences problems in the field of food security. Because of the position of the North Sumatra region's very strategic position, this province should be prosperous and independent in terms of food sources. This research aims to develop a policy strategy for the development of food commodities towards national food security. In supporting this research, SWOT, Interpretative Structural Modeling (ISM), and Balanced Score Card (BSC) methods are used. The SWOT method was used to formulate a strategy based on the identification of internal factors and external factors that had a significant influence based on the Mckinsey 7S and PEST models. Furthermore, the ISM method is used to determine strategy priorities. The BSC method is used to determine the implementation plan and mapping of the strategies formulated. The development of food commodity development policy strategies towards food security in North Sumatra based on the results of the research consists of 11 (eleven) main strategies consisting of Strategy SO-1,2,3, Strategy ST-1,2,3, Strategy WO-1,2,3 and Strategy WT-1,2. It is hoped that the eleven strategies resulting from this research can increase the development of food commodities in North Sumatra towards stable and sustainable food security.

Keyword: Food Commodities, SWOT, Interpretative Structural Modeling (ISM), Balanced Scorecard (BSC), PEST Analysis

INTRODUCTION

Food security is a strategic issue for every country, including Indonesia. This is based on the fact that food is a basic human need that must be met sustainably. Food security is also one of the important indicators in achieving the Sustainable Development Goals (SDGs) proclaimed by the United Nations (UN). (Wardhana, 2021) Food security refers to the ability of a country or region to ensure sufficient food availability for all its population. This involves the production, distribution, and public access to safe, nutritious, and affordable food in a sustainable manner.

According to data from the Central Statistics Agency (BPS) in 2023, the number of Indonesia's population will reach 280.73 million people, showing a growth of 0.69% compared to the previous year. The increasing population growth indicates a major challenge in meeting the food needs of the community. Therefore, food needs are one of the main priorities in national development, with efforts to increase food production sustainably and increase people's access to quality food.

Not only that, Indonesia is also faced with other challenges in terms of food security, such as climate change and natural disasters that often occur. Climate change results in unstable weather patterns, causing disruptions to food production. Meanwhile, natural disasters such as floods, landslides, and droughts can also disrupt food security by damaging agricultural land and food distribution infrastructure. Therefore, the government and various related parties need to work together in overcoming this challenge to maintain national food security.

The limitation of agricultural land is a problem in food security, with the population growth rate continuing to increase, there will be less agricultural land that is transformed into residential areas. According to the Minister of Agriculture, the total area of agricultural land in Indonesia in 2023 is 70 million hectares, while the effective production is only 45 million hectares. Land area tends to decrease due to the conversion of agricultural land to non-agricultural land which reaches an average of 50-70 thousand hectares per year. The limited land results in limited food production which can hinder a country from producing food to meet the needs of its population.

In Indonesia, efforts to achieve food security are carried out nationally and at the regional level, including in North Sumatra Province. In addition to the main food commodities such as rice, corn, and soybeans, horticultural commodities such as garlic, onions, and red chili peppers also play an important role in ensuring the availability of diverse foods for the community. (Sabrina et al., 2021)

Based on data from the Central Statistics Agency (BPS) of North Sumatra Province, in 2023, the population in this province will reach 15.47 million people. This figure shows a growth of 0.92% compared to the previous year. With a large population, food needs are one of the main priorities in regional development. In terms of food production, North Sumatra is known as one of the centers of rice production in Indonesia. In 2022, rice production in this province reached 3.78 million tons of dry-milled grain (GKG), an increase of 2.71% compared to 2021 which reached 3.68 million tons of GKG. However, rice production in North Sumatra is still not enough to meet the consumption needs in the province which reaches around 2.4 million tons of rice per year. (BPS, 2022)

One of the challenges faced in achieving food security in North Sumatra is the conversion of agricultural land to non-agricultural land. Based on data from the Central Statistics Agency (BPS) of North Sumatra Province, the area of rice fields in this province has decreased from 707,698 hectares in 2016 to 699,852 hectares in 2023. This is due to the conversion of land for the development of settlements, industries, and other infrastructure. In addition, climate change and natural disasters such as floods and droughts are also threats to food security in North Sumatra. In 2022, several areas in the province experienced a drought that resulted in crop failure and a decrease in food production. (Yani & Restiatun, 2022)

In terms of horticultural commodity production, North Sumatra has considerable potential. However, the production of garlic, shallots, and red chili peppers in this province is still insufficient to meet the consumption needs of the community. In 2022, garlic production in North Sumatra will only reach 1,674 tons, far below the consumption needs of around 84 thousand tons per year. Meanwhile, the production of shallots in the same year only reached 19,857 tons, while the consumption needs reached around 120 thousand tons per year. For

red chili, production in North Sumatra reached 98,674 tons in 2022, but it is still not enough to meet the consumption needs of around 150 thousand tons per year. (Hakim et al., 2022)

The decline in the rate of increase in production along with the continued increase in consumption due to the increase in population and income has caused the availability of garlic for household purposes and the food industry to become scarce. The supply of shallots and red peppers is also often depleted, causing problems that trigger the increase in the price of the commodity.

To achieve the target of food security in North Sumatra, a comprehensive strategy is needed in the development of horticultural commodities such as garlic, shallots, and red chilies. This strategy includes increasing productivity through the application of modern agricultural technology, improving distribution and logistics systems, and strengthening supporting infrastructure such as irrigation and farming roads. One of the efforts that can be made is to increase land productivity through the application of appropriate cultivation technology, the use of superior seeds, and integrated management of pests and plant diseases. In addition, improving the distribution and logistics system is also important to ensure the availability and accessibility of horticultural commodities throughout North Sumatra. (Sabrina et al., 2021)

METHOD

This study uses a descriptive qualitative approach. This approach is defined as an approach that describes an objective situation/event based on facts that are seen or should be, followed by a general conclusion based on these historical facts.

This research was conducted online and offline with agricultural experts in Indonesia and/or in person in North Sumatra. The research period starts from April 2024 to May 2024.

As for the data analysis technique before reaching the ISM stage, there is an important analysis that is selected and carried out first in order to get the best strategy to be included in the ISM, namely: SWOT analysis.

RESULTS AND DISCUSSION

In the context of national food security, internal factor analysis helps the government and other stakeholders to design more effective policies and programs. By understanding the strengths they have, strategies can be directed to optimize existing potential, such as developing superior varieties, increasing production efficiency, or strengthening the food distribution system. Meanwhile, understanding weaknesses allows for a more appropriate allocation of resources to overcome existing constraints, for example through farmer capacity-building programs, investment in agricultural infrastructure, or the development of technology that is suitable for local conditions.

Here is a Compilation of Strategies from the SWOT Matrix Analysis

Table 1. Matrix Analysis

Code	Compilation of Strategies
SO-1	Optimizing the diversity of topography and the potential of vast agricultural land to develop various types of food commodities, in line with the national food diversification policy.
SO-2	Utilizing collaboration between research institutions (such as BPTP North Sumatra) and universities to develop modern agricultural technology and superior varieties that are adaptive to local conditions.
SO-3	Develop a food estate program by integrating modern agricultural technology and local wisdom to increase productivity and food security.
ST-1	Leveraging ethnic diversity and local knowledge to develop agricultural practices that are climate change adaptive and sustainable.

ST-2	Optimizing the institutional role of farmers (such as farmer groups and cooperatives) to improve the bargaining position of farmers in the face of price fluctuations and competition with imported products.
ST-3	Develop research and development programs that focus on the creation of pest and disease resistant plant varieties, as well as adaptive to climate change.
WO-1	Leverage national policy support to strengthen agricultural infrastructure, especially irrigation systems and crop storage facilities, to increase productivity and reduce dependence on imports.
WO-2	Develop technology-based farmer training and empowerment programs, with a focus on the younger generation, to increase the adoption of modern technologies and attract interest to the agricultural sector.
WO-3	Build an integrated agricultural information system that connects farmers, markets, and other stakeholders to improve the efficiency of food supply chains and distribution.
WT-1	Develop strict farmland protection policies and economic incentives to prevent the conversion of farmland to non-farm.
WT-2	Increasing the capacity of farmers in agricultural risk management, including training on climate change impact mitigation and diversification of farming businesses.
WT-3	Develop an attractive agricultural revitalization program, with a focus on modern technology and entrepreneurship, to increase the interest of the younger generation in the agricultural sector.

According to the results of the SWOT matrix analysis, the SO Strategy, the WO Strategy, the ST, and the ST each have three sub-strategies. Furthermore, all the steps of the strategy will be compiled into one so that twelve sub-strategies for the development of food commodities are obtained.

The process of prioritizing and mapping strategies begins by forming a hierarchical system between aspects that have been identified previously. The approach used in the formation of this hierarchical system is the Interpretative Structural Modeling (ISM) method. The main purpose of this method is to plan the selected strategy so that it can be outlined in the implementation plan based on the hierarchical structure that has been formed.

Table 2. SSIM in Research

No	Kode	12	11	10	9	8	7	6	5	4	3	2	1
1.	SO-1	V	V	V	V	V	V	X	X	X	A	A	-
2.	SO-2	V	V	V	V	V	V	X	X	X	A	-	
3.	SO-3	V	V	V	V	V	V	X	X	X	-		
4.	ST-1	V	V	V	X	X	X	A	A	-			
5.	ST-2	V	V	V	X	X	X	A	-				
6.	ST-3	V	V	V	X	X	X	-					
7.	WO-1	A	A	A	A	A	-						
8.	WO-2	A	A	A	A	-							
9.	WO-3	A	A	A	-								
10.	WT-1	O	O	-									
11.	WT-2	O	-										
12.	WT-3	-											

Table 3. Reachability Matrix in Research

No	Kode	1	2	3	4	5	6	7	8	9	10	11	12	DP	Level
1.	SO-1	1	1	1	1	1	1	1	1	1	1	1	1	12	1
2.	SO-2	0	1	1	1	1	1	1	1	1	1	1	1	11	2

3.	SO-3	0	0	1	1	1	1	1	1	1	1	1	1	10	3
4.	ST-1	0	0	0	1	1	1	0	0	0	1	1	1	6	7
5.	ST-2	0	0	0	0	1	1	0	0	0	1	1	1	5	8
6.	ST-3	0	0	0	0	0	1	0	0	0	1	1	1	4	9
7.	WO-1	0	0	0	1	1	1	1	1	1	1	1	1	9	4
8.	WO-2	0	0	0	1	1	1	0	1	1	1	1	1	8	5
9.	WO-3	0	0	0	1	1	1	0	0	1	1	1	1	7	6
10.	WT-1	0	0	0	0	0	0	0	0	0	1	1	1	3	10
11.	WT-2	0	0	0	0	0	0	0	0	0	1	1	1	3	10
12.	WT-3	0	0	0	0	0	0	0	0	0	1	1	1	3	10

Based on the results of the synthesis of research that has been carried out, it can be analyzed that the strategy of developing food commodities towards food security in North Sumatra requires a comprehensive and integrated approach. The SWOT analysis conducted revealed various strengths, weaknesses, opportunities, and threats faced in efforts to realize food security in the region.

In terms of strength, North Sumatra has several advantages that can be used for the development of food commodities. The region's topographic diversity supports the cultivation of various types of food commodities, providing flexibility in agricultural development. North Sumatra's status as one of the national food barns, with rice production reaching 3.78 million tons of GKG in 2022, shows great potential in its contribution to national food security. The existence of research institutions such as BPTP North Sumatra and its collaboration with universities is also an important force in the development of adaptive and innovative agricultural technology.

However, some weaknesses have also been identified that need to be addressed. The decline in the area of rice fields due to land conversion is a serious challenge for the sustainability of food production. In addition, the production of main food commodities that are not enough for the province's consumption needs shows that there is a gap between production and demand. High dependence on imports for several commodities, especially garlic, is also a weakness that needs to be overcome to increase food independence.

The SO-1 strategy, which focuses on optimizing topographic diversity and the potential of agricultural land to develop various types of food commodities, is the strategy with the highest level of influence (level 1). This shows that the optimal utilization of natural potential is an important foundation in the development of food commodities in North Sumatra.

The SO-2 and SO-3 strategies, which involve collaboration between research institutions and universities as well as the development of food estate programs, are at levels 2 and 3. This shows the importance of integration between research, technology, and implementation in the field in an effort to improve productivity and food security. These strategies emphasize the importance of a knowledge-based approach and innovation in the development of the agricultural sector.

The WO-1, WO-2, and WO-3 strategies, which focus on strengthening agricultural infrastructure, developing technology-based training programs, and building integrated agricultural information systems, are at the middle level in the ISM hierarchy. This shows that infrastructure improvement and human resource capacity building are important supporting factors in the implementation of key strategies.

The ST-1, ST-2, and ST-3 strategies, which involve the utilization of ethnic diversity and local knowledge, optimization of the institutional role of farmers, and the development of research programs for pest and disease resistant crop varieties, are at a lower level. Nevertheless, these strategies still have an important role in building the resilience and adaptability of agricultural systems to various challenges.

The WT-1, WT-2, and WT-3 strategies, which focus on protecting farmland, building farmers' risk management capacity, and agricultural revitalization programs to attract younger generations, are at the lowest level in the ISM hierarchy. However, these strategies remain crucial as mitigation measures against identified threats and weaknesses.

CONCLUSION

The strategy for developing food commodities towards food security in North Sumatra requires a comprehensive and integrated approach, based on SWOT analysis, and Interpretative Structural Modeling (ISM). The main priorities include optimizing topographic diversity, collaboration between research institutions and universities, and the development of food estate programs. This strategy is supported by strengthening agricultural infrastructure, developing human resources, and utilizing modern technology. Focus is given on food diversification, local commodity development, and the development of integrated agricultural information systems. The implementation of this strategy also considers aspects of local wisdom, environmental sustainability, and adaptation to climate change. With this holistic approach, it is hoped that North Sumatra can significantly and sustainably increase its food security.

The development of food commodities towards food security in North Sumatra faces a variety of complex and interrelated challenges. The main challenges include the conversion of agricultural land, the impact of climate change, the institutional limitations of farmers, inadequate infrastructure, and the need to optimize biodiversity and local wisdom. Efforts to overcome this challenge require a holistic and integrated approach, involving synergy between stakeholders, adaptation of modern technology, strengthening farmers' capacity, development of efficient value chains, and policies that are responsive to local conditions and global changes. The strategy developed must pay attention to aspects of environmental sustainability, social justice, and economic competitiveness. With a comprehensive and adaptive approach, it is hoped that North Sumatra can realize a resilient, sustainable food security system and contribute significantly to national food security.

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