Strategic Innovation in Controlling Agricultural Land Conversion: Building Food Security and Sustainable Land Use Langkat Regency

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ABSTRACT
The conversion of agricultural land into non-agricultural uses—such as residential, industrial, and infrastructure areas—has been increasing in Langkat Regency due to population growth, urbanization, and suboptimal policy and regulatory frameworks. This study aims to analyze the key factors driving agricultural land conversion, evaluate its impacts on food security and spatial utilization, and formulate innovative control strategies. Using the SWOT analysis method, the research was conducted from April to December 2024, involving 200 respondents. The findings indicate that government policies and regulations have the greatest influence on land conversion, followed by population growth, urbanization, and low public awareness and participation. The impacts of land conversion include the reduction of productive agricultural land, increased economic pressure on farmers, and imbalances in sustainable land use planning. The SWOT analysis suggests that effective control strategies must prioritize the strengthening of spatial planning policies, provision of incentives for farmers, and enhanced education and community participation in preserving agricultural land. By implementing a more comprehensive strategy, it is expected that Langkat Regency can reduce the rate of land conversion and maintain food security in a more sustainable manner.

Keywords: *Land Conversion, Food Security, Spatial Planning Policy, SWOT, Langkat Regency.*

Introduction

Langkat Regency is one of the agrarian regions in North Sumatra with significant potential in the agricultural sector, particularly in the production of rice, oil palm, and horticultural crops. However, in recent years, rapid economic growth and urbanization in the region have driven major changes in land use (Nuraini, 2017, 2021). Productive agricultural land has increasingly been converted into residential areas, industrial zones, and infrastructure projects. This phenomenon not only results in a shrinking area of arable land but also poses a serious threat to food security and the sustainable use of space.

According to data from the Langkat Regency Agricultural Office, the area of paddy fields—which previously exceeded 50,000 hectares—has seen a significant decline over the past decade. Much of this land conversion has occurred in rapidly developing sub-districts such as Stabat, Hinai, and Wampu, where agricultural land faces mounting pressure due to growing demand for housing, industrial expansion, and public infrastructure development (Haloho & Sugiarto, 2024)t. Additionally, the phenomenon is exacerbated by rising land prices, leading many farmers to opt for selling their land rather than maintaining it for agricultural purposes. Socio-economic factors such as increasing living costs, the lack of financial incentives for farmers, and weak government regulations and oversight have further accelerated the conversion of agricultural land in Langkat.

Uncontrolled land conversion can have serious consequences for regional food security. As productive land continues to decline, local food production is at risk of falling, potentially disrupting food supply stability and driving up prices (Nasution Hasyim & Sugiarto, 2024; Nuraini et al., 2023). Moreover, agricultural land conversion can impact ecological balance, as the loss of green fields and paddy areas reduces water absorption capacity, increases flood risk, and contributes to environmental degradation. This is particularly concerning given that Langkat Regency's agricultural ecosystem plays a vital role in maintaining environmental balance and supporting the economic sustainability of local communities.

The local government has made several efforts to control agricultural land conversion, including the implementation of the Sustainable Food Agricultural Land (LP2B) policy, which aims to designate protected agricultural areas that cannot be converted. Additionally, the Langkat Regency Spatial Planning Regulation (RTRW) provides zoning guidelines to preserve productive farmland. However, the implementation of these policies continues to face challenges, such as weak enforcement, lack of coordination among stakeholders, and low public awareness of the importance of protecting agricultural land. Therefore, strategic innovations are needed in land conversion control—beyond regulatory approaches—to include economic and social mechanisms that are more effective in ensuring a balance between development growth and the sustainability of the agricultural sector in Langkat.

In light of these dynamics, this study aims to identify the main factors driving agricultural land conversion in Langkat Regency, analyze its impacts on food security and spatial utilization, and formulate innovative strategies that can be applied to control agricultural land conversion. By adopting more adaptive and sustainability-oriented strategies, Langkat Regency is expected to maintain its role as one of the key food-producing regions in North Sumatra while preserving a balance between development and environmental conservation.

Literature Review

A. Agricultural Land Conversion

Agricultural land conversion refers to the change in land use from agricultural to non-agricultural purposes, such as residential, industrial, or infrastructure development. This phenomenon is often driven by population growth, urbanization, and economic development, which increase the demand for non-agricultural land (Aini et al., 2023; Linda et al., 2024). A study by Purnama (2024) in Serang City shows that agricultural land conversion is primarily caused by the growing need for housing and public facilities, posing a threat to the sustainability of the agricultural sector.

B. Impact of Land Conversion on Food Security

The conversion of agricultural land has significant implications for food security. Research conducted in Sleman Regency by Astuti and Lukito (2020) identified that land conversion results in a decline in the area of agricultural land, negatively affecting food production, environmental quality, and biodiversity. Similarly, a study in Cianjur Regency by Hidayat et al. (2023) found that agricultural land conversion led to reduced rice production, potentially endangering regional food security.

C. Factors Driving Land Conversion

Several factors contribute to the conversion of agricultural land, including population growth, urbanization, and economic pressure. The study by Astuti and Lukito (2020) in Sleman showed that increasing population and economic development raised the demand for land for housing and industrial use, thereby accelerating agricultural land conversion. Additionally, research by Hidayat et al. (2023) in Cianjur identified economic factors, such as rising land values and farmers' financial needs, as key contributors to land conversion.

D. Strategies for Controlling Land Conversion

To address agricultural land conversion, various control strategies have been proposed. Ayunita et al. (2021) recommended implementing strict spatial planning regulations, protecting sustainable food agricultural land (LP2B), cross-sectoral collaboration, community participation, and regular monitoring and evaluation by relevant authorities. Moreover, research in Sidrap Regency by Nasir (2024) emphasized the importance of effective regulatory oversight and active community involvement in safeguarding agricultural land from uncontrolled conversion.

Conceptual Framework

The conceptual framework of this study illustrates the relationship between the driving factors of agricultural land conversion and their impacts on the sustainability of food security and land use, described as follows:

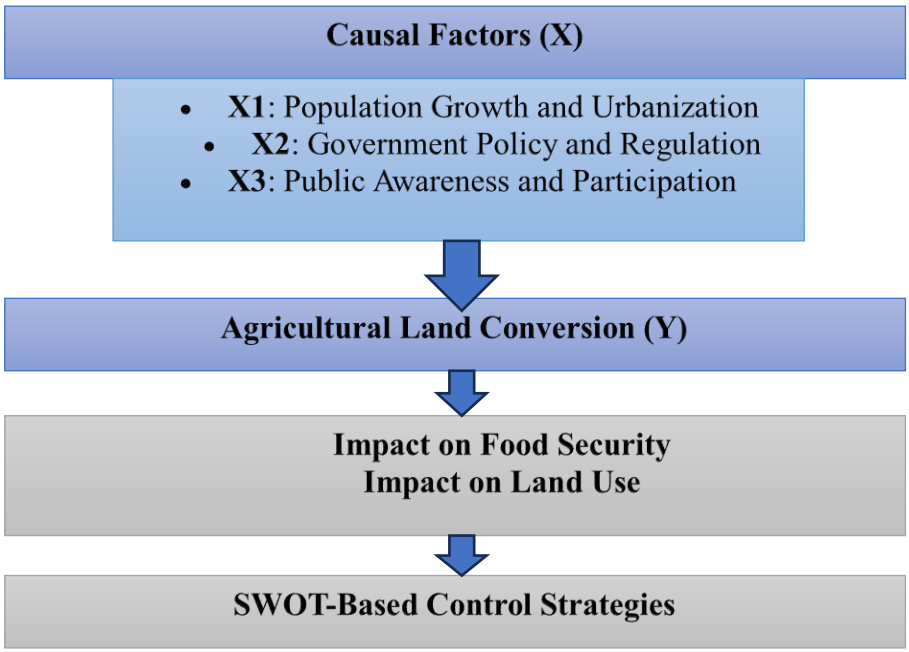

Figure 1. Conceptual Framework Diagram
Source: Author, 2025

The diagram above illustrates that variables X1, X2, and X3 serve as contributing factors to agricultural land conversion (Y), which ultimately impacts food security and land use planning in Langkat Regency. Therefore, control strategies must be designed based on the results of the SWOT analysis to maintain a balance between development and the sustainability of the agricultural sector.

Results and Discussion

A. Research Findings

Based on a survey conducted with 200 respondents in Langkat Regency, data were collected regarding the main factors contributing to agricultural land conversion. The survey results are presented in the following table:

Table 1. Influence Levels of Factors on Agricultural Land Conversion in Langkat Regency

Factor Category	Factor Category	Factor Category	Factor Category	Factor Category
Population Growth & Urbanization	45	30	15	10
Government Policy & Regulation	50	25	15	10

Public Awareness & Participation	35	40	20	5

Source: Researcher, 2025

The results show that government policy and regulation have the highest influence on agricultural land conversion, with 50% of respondents stating that this factor is highly influential. Population growth and urbanization are also major driving forces, as 45% of respondents identified these as significant causes of agricultural land being converted into residential and industrial areas. Meanwhile, public awareness and participation are also considered moderately influential, with 35% of respondents indicating that low community awareness contributes to the reduction of agricultural land.

Discussion

A. Relationship Between Research Findings and Theory

The findings of this study are consistent with land conversion theory, which states that population growth and urbanization are key drivers of land-use change (Astuti & Lukito, 2020). As the population increases, so does the demand for land for housing and public facilities, leading to uncontrolled agricultural land conversion.

In addition, government policy and regulation play a critical role in controlling agricultural land conversion. A study by Ayunita et al. (2021) showed that the effectiveness of policies such as Sustainable Food Agricultural Land (LP2B) and Regional Spatial Planning (RTRW) is crucial for successful land conversion control. However, this study finds that policies in Langkat Regency are still suboptimal in curbing land conversion due to weak enforcement and the lack of incentives for farmers to retain their farmland.

Besides policy and urbanization, public awareness and participation are also essential in maintaining agricultural land sustainability. Nasir (2024) found that regions with high levels of public participation tend to be more successful in preserving agricultural land. In contrast, many people in Langkat Regency still lack awareness of the importance of preserving farmland for food security.

B. Relationship Between Research Findings and Previous Studies

This study also aligns with several prior studies. For instance, Hidayat et al. (2023), in their research in Cianjur Regency, found that uncontrolled urbanization resulted in significant land conversion, similar to the conditions observed in Langkat. That study highlighted how rising population numbers increase the demand for non-agricultural land, thereby threatening local food production.

Furthermore, this study supports the findings of Purnama (2024), who investigated spatial planning policy in Serang City. Purnama's study concluded that existing regulations were insufficient in preventing land conversion and called for stronger, sustainability-based policies. This aligns with the present study, where respondents perceived government regulations to have weaknesses in their implementation.

C. Implications of the Research Findings

Based on the results, it can be concluded that controlling agricultural land conversion in Langkat Regency requires a more effective approach focusing on three main aspects:

1. **Strengthening Government Regulations and Policies**
   Local authorities need to enhance the effectiveness of spatial planning policies by enforcing stricter regulations on land conversion and providing incentives for farmers to retain agricultural land. Oversight and monitoring must be strengthened to ensure compliance among all stakeholders.
2. **Managing Sustainable Urbanization**
   Population growth and urbanization should be balanced with improved spatial planning. Authorities must ensure that residential and industrial developments occur within appropriate RTRW zoning areas, so as not to interfere with productive farmland.
3. **Improving Public Awareness and Participation**
   Communities—particularly farmers and landowners—need to be better educated on the importance of preserving agricultural land. Educational and training programs should be implemented to raise awareness of the long-term impacts of land conversion on food security and the environment.

D. SWOT-Based Control Strategies

Based on the research findings, land conversion control strategies in Langkat Regency can be formulated using a SWOT-based approach as follows:

Table 2. SWOT-Based Control Strategy

SWOT Aspect	Analysis
Strengths	Existence of land protection policies such as LP2B and RTRW, and the availability of vast agricultural potential.
Weaknesses	Weak enforcement of land conversion policies, low incentives for farmers, and limited public awareness.
Opportunities	Increasing attention to food security and environmental sustainability issues, as well as investment opportunities in sustainable agriculture.
Threats	Rapid population growth, high land price speculation, and economic pressures that drive farmers to sell their land.

Source: Researcher, 2025

Considering these SWOT aspects, the land conversion control strategy in Langkat Regency should focus on optimizing spatial planning policies, strengthening incentives for farmers, and enhancing public participation in agricultural land protection efforts.

Conclusion

Based on the research conducted on the conversion of agricultural land in Langkat Regency, it can be concluded that this phenomenon is driven by several key factors: population growth and urbanization, government policies and regulations, as well as public awareness and participation. Survey results indicate that government policy exerts the greatest influence in controlling land conversion; however, weak implementation and the lack of incentives for farmers have allowed the conversion to persist. Moreover, rising population levels have increased the demand for residential and infrastructure development, further reducing the area of productive farmland. Public awareness and participation also remain relatively low, with many landowners opting to sell their land for non-agricultural

purposes without considering the long-term impact on food security. The impact of land conversion is significant for both food security and sustainable spatial planning. The ongoing reduction of agricultural land in Langkat Regency threatens local food production, increases reliance on external food supplies, and contributes to environmental issues such as reduced water absorption capacity and heightened flood risk. Therefore, more effective control strategies are urgently needed—through stronger regulations, improved farmer incentives, and community empowerment to raise awareness of the importance of preserving agricultural land sustainability. For future research, it is recommended to conduct a more in-depth study on the effectiveness of existing policies and quantitatively assess their impact on food security and community well-being. Further studies should also explore specific models of economic incentives for farmers who maintain their land, to offer more practical solutions for reducing the rate of agricultural land conversion. Additionally, for local governments, the findings of this study can serve as a foundation for formulating stricter land conversion control policies, such as revising the Regional Spatial Planning (RTRW), providing subsidies for farmers who retain their farmland, and strengthening monitoring of developments that violate agricultural zoning regulations. The community should also be given further education about the negative consequences of land conversion and be encouraged to participate actively in protecting the sustainability of agriculture in their area. Through these measures, it is hoped that Langkat Regency will be able to effectively control the rate of agricultural land conversion while maintaining a balance between development needs and the sustainability of agricultural resources.

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