

Sustainable Food Security in New Kalimantan in the Context of IKN Development

Verry Albert Jekson Mardame Silalahi^{1*}, Violetta Hosiana Christella Silalahi²
SMA Kristen 7 PENABUR Jakarta

Corresponding Author: Verry Albert Jekson Mardame Silalahi
verry.jekson@bpkpenaburjakarta.or.id

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ABSTRACT

Food security is a crucial issue for Indonesia, especially in the face of increasing population and urbanization. This research examines sustainable food security in East Kalimantan in the context of the development of the nation's capital. The purpose of this research is to identify agricultural strategies and innovations, logistics solutions, economic policies, and nutrition education programs that can improve food security in East Kalimantan. The research method used is a literature study with content analysis of various related literature. The results show that the application of modern agricultural technology, digital platforms for food distribution, social assistance programs, and nutrition education can significantly improve food security. The development of IKN also provides an opportunity to integrate food security policies with sustainable development strategies. The conclusion of this study emphasizes the importance of collaboration between the government, private sector and communities to implement these strategies to achieve sustainable food security in East Kalimantan.

INTRODUCTION

Food security is a critical issue in Indonesia, an archipelagic country with a growing population and rapid urbanization. Food security refers to a condition where food availability is ensured for the nation down to the individual level, reflected in the sufficient quantity and quality of food that is safe, diverse, nutritious, evenly distributed, and affordable, without conflicting with the religion, beliefs, and culture of the community, allowing for a healthy, active, and productive life in a sustainable manner (Republik Indonesia, 2012).

Food security involves three main components: food availability, access and utilization.

1. Food availability

- a. Indonesia has a diversity of agricultural, fishery and livestock products. However, food production is still not optimal in some regions due to problems such as limited technology, low land productivity, and lack of agricultural infrastructure support (Wicaksono et al., 2022).
- b. Unequal food distribution is often a problem. Remote or hard-to-reach areas experience difficulties in obtaining adequate food supplies (Mulyani et al., 2020).
- c. Indonesia does not yet have a strong food reserve system. Dependence on uncertain harvest seasons often leads to fluctuations in food prices and availability (Anwar, 2024)

2. Food access

- a. Economic access to food relates to people's ability to purchase food. Many Indonesians, especially in rural and remote areas, have low incomes, making it difficult for them to afford adequate and nutritious food (Putri & Ikomatussuniah, 2023).
- b. Physical access relates to the ability of individuals or households to obtain food from markets or other sources. In many remote areas of Indonesia, poor road infrastructure and difficult geographical conditions make food distribution a challenge (Mulyani et al., 2020).
- c. Social factors such as gender inequality and social status also affect food access. For example, women often have lower access to productive resources and economic opportunities than men (Sirojuddin et al., 2020).

3. Food utilization

- a. Food utilization relates to the way food is consumed and processed to meet nutritional needs. Many Indonesians do not have sufficient knowledge about balanced nutrition, which contributes to malnutrition problems such as stunting and obesity (Puspa, 2022).
- b. Poor sanitation conditions and limited access to health services affect people's ability to make good use of food. Diseases caused by unsafe water and food can reduce the body's ability to absorb nutrients.

Problem formulation

1. How can agricultural strategies and innovations increase local food production in Kalimantan?

2. What are the logistics and technology solutions that can be applied to improve food distribution in remote areas of Kalimantan?
3. How can economic policies and aid programs improve more equitable food access in Kalimantan?
4. How can nutrition education programs and improved health services improve food utilization and nutritional status of communities in Kalimantan?
5. How can IKN development strategies be integrated with food security policies to meet the food needs of the population without compromising the sustainability of local production?
6. What agricultural technology innovations are suitable to be implemented in Kalimantan and what is the implementation strategy?
7. How can sustainable agriculture models be adapted and applied in Kalimantan to ensure long-term food security?

Research objectives

1. Identify agricultural strategies and innovations: aim to increase local food production in Kalimantan to support sustainable food security.
2. Finding logistics and technology solutions: aiming to improve food distribution in remote areas of Kalimantan, ensuring stable and affordable food availability.
3. Improving economic access to food: aims to develop economic policies and assistance programs that can ensure more equitable access to food in Kalimantan.
4. Improving food utilization and nutritional status: aims to design and implement nutrition education programs and improved health services that can improve food utilization and nutritional status of communities in Kalimantan.
5. Integrating NI development strategies with food security policies: aims to ensure that NI development can meet the food needs of the population without compromising the sustainability of local food production.
6. Identifying and implementing agricultural technology innovations: aims to find suitable agricultural technologies and design implementation strategies to improve food security in Kalimantan.
7. Developing sustainable agriculture models: aims to adapt and implement sustainable agriculture models in Kalimantan that can ensure long-term food security.

THEORITICAL REVIEW

Food security challenges in Indonesia

1. Climate change

- Climate change is causing erratic changes in weather patterns, including an increase in the frequency and intensity of natural disasters such as floods and droughts. This affect agricultural production and food availability.

- Rising global temperatures and sea levels negatively impact agricultural and fisheries ecosystems, threatening the sustainability of food production.
2. *Land degradation*
 - Unsustainable land use, such as deforestation and intensive agriculture, leads to soil erosion and soil fertility loss, which reduces agricultural productivity.
 - The conversion of agricultural land into residential and industrial land also reduces the area of land available for food production.
 3. *Dependence on food imports*
 - Dependence on food imports makes Indonesia vulnerable to global food price fluctuations and international food crises. This dependence also affects national food sovereignty.
 - Policies that do not support local food production and inefficient food distribution management exacerbate food security problems in Indonesia.

The food security situation in Kalimantan reflects the general challenges faced across Indonesia, but with some specific local characteristics. Kalimantan, with great potential in the agriculture and fisheries sectors, still faces challenges in producing enough food to meet local needs. Rice production, for example, is still often insufficient, requiring supplies from outside the island. Many areas in Kalimantan are remote, making access to food difficult, especially in the rainy season when some areas are isolated due to poor road conditions. This results in higher food prices in remote areas compared to urban areas. Inadequate nutrition knowledge and practices are also a problem, resulting in high rates of stunting and malnutrition in some parts of Kalimantan.

Introduction to the IKN development project and its impact on food security

The Indonesian government has planned to relocate the country's capital from Jakarta to East Kalimantan, a major project known as the National Capital City (IKN) of the Archipelago. The policy of relocating the national capital (IKN) has been officially established as one of the national strategic priority project agendas. This project aims to reduce the burden on Jakarta and encourage equitable development outside Java (Nugrohosudin, 2022). In its implementation, specifically the development of the National Capital City (IKN) turned out to have an impact on food security specifically on the East Kalimantan province, namely :

1. With the development of IKN, the population in East Kalimantan is expected to increase significantly. This will lead to an increase in food demand in the area. If not properly anticipated, this could exacerbate existing food security issues.
2. The development of IKN requires large tracts of land, which may result in the conversion of agricultural land to residential land and infrastructure. This may reduce the land available for food production, which in turn may affect food availability in the area (Wijaya & Rahayu, 2024).
3. On the other hand, the development of IKN also opens up opportunities to implement strategies and innovations in food security (Sucipto, 2023). For

example, modern agricultural technologies, more efficient food distribution systems, and nutrition improvement programs can be introduced to ensure food security in the area.

4. The development of IKN is expected to boost local economic growth, which may lead to increased purchasing power and better access to food (Hairunnisa & Syaka, 2022). However, this must also be accompanied by improved food production and distribution to avoid food price inflation.

Overall, the development of IKN in East Kalimantan brings opportunities and challenges for food security in Kalimantan. This research will focus on how strategies and innovations can be used to ensure sustainable food security in the context of IKN development.

METHODOLOGY

Research approach

The approach used in this research is qualitative with a library research method, which is a method of collecting data by understanding and studying theories from various literatures related to the research (Nina Adlini et al., 2022). This method was chosen to gain an in-depth understanding of sustainable food security in Kalimantan in the context of IKN development through analyzing existing literature.

Data collection technique

1. Literature collection : collect relevant literature from academic journals, books, government reports, articles, and other sources that address food security, NI development, and sustainable agricultural practices and technologies.
2. Secondary data sources : secondary data to be collected include official policies and reports from relevant government agencies, published academic studies, and reports from international organizations related to food security and sustainable development.

Research sample

1. The literature selected must meet the following criteria :
 - Relevance to the topics of food security, NI development, and sustainable agricultural practices.
 - Publications within the last 10 years to ensure up-to-date data and information.
 - Quality and credibility of sources, including articles published in indexed journals and reports from trusted organizations.
2. The primary sources to be analyzed include :
 - An academic journal that discusses food security and sustainable development.
 - Government reports on IKN development policies and food security strategies.
 - Case studies from other regions that can provide insights into the application of innovative technologies and strategies.

Data Analysis Procedure

1. Content analysis technique : the data collected from the literature will be analyzed using the content analysis technique. This process involves coding important information, identifying key themes, and connecting findings from different sources to gain a comprehensive understanding of the topic under study.
2. Synthesis and integration of findings : findings from various literatures will be synthesized and integrated to provide a broader and deeper picture of sustainable food security in Kalimantan in the context of IKN development. This process involves combining different research results to find consistent patterns and identify gaps in the existing literature.
3. Validation by source triangulation : data validation is done through source triangulation, by comparing findings from various literatures to ensure consistency and reliability of information. This will help increase the credibility and validity of the research results.

Using the literature study method, this research is expected to provide a comprehensive and in-depth insight into sustainable food security in Kalimantan and its implications in the context of IKN development.

RESULT

Description of Findings

Data presentation and key findings :

1. Agricultural strategies and innovations to increase local food production
 - Literature studies show that the use of modern agricultural technologies such as drip irrigation, soil sensors, and vertical farming techniques can significantly increase agricultural productivity in areas with different climatic and soil challenges, such as Kalimantan (Susmawati, SP, 2023).
 - Implementation of this technology in Kalimantan can increase crop yields and land use efficiency, thus helping to achieve better local food security (Indonesia, 2024).
2. Logistics and technology solutions for food distribution
 - Analysis from various studies indicates that the use of digital platforms for food supply chain management can optimize distribution and reduce food waste.
 - The adoption of an information technology-based food distribution system in Kalimantan can improve food access to remote areas, reduce price disparities, and ensure more stable food availability (Kuspraningrum et al., 2023).
3. Economic policies and aid programs to improve food access
 - Case studies from other regions show that social assistance programs and food subsidies can improve people's economic access to food (Ridha & Rumayya, 2024).
 - The implementation of similar policies in Kalimantan, such as subsidies for staple foods and direct cash transfers to low-income families, could help address the issue of unequal food access.

4. Nutrition education program and health services for food utilization
 - Previous research has highlighted the success of nutrition education programs and improved health services in reducing stunting and malnutrition in various regions (Soumena, 2024).
 - Implementation of structured nutrition education programs and improved access to health services in Kalimantan can improve food utilization and nutritional status of the community.
5. Integration of IKN development strategy with food security policy
 - The literature shows that large infrastructure developments such as IKN can impact food security if not managed properly.
 - The integration of food security policies in the planning and development of IKN, such as maintaining productive agricultural land and developing urban agriculture, can ensure that the food needs of the population are met without compromising local production (Saragih & Mulawarman, 2023).
6. Agricultural technology innovations suitable for Kalimantan:
 - The use of technologies such as smart farming and the Internet of Things (IoT) has successfully increased agricultural efficiency in various regions (Rachmawati, 2020).
 - The adoption of smart farming technology in Kalimantan can help farmers manage their land more efficiently, increase crop yields, and reduce environmental impacts (Prov Kalteng, 2024).
7. Sustainable agriculture model for long-term food security
 - Sustainable agriculture models that integrate environmentally friendly practices and wise management of natural resources have proven effective in various contexts.
 - The implementation of sustainable agriculture models in Kalimantan can ensure long-term food security by maintaining soil fertility, reducing pesticide use, and increasing biodiversity (Djibran et al., 2023).

Analysis of findings

Interpretation of data in the context of theory and literature

1. Agricultural strategies and innovations to increase local food production
 - Interpretation : the use of modern agricultural technologies such as drip irrigation, soil sensors, and vertical farming has been shown to increase agricultural productivity in various regions.
 - This finding is in line with the theory of agricultural intensification, which proposes the use of technology to optimize yields per unit area of land.
 - Context of the literature : The Food Security Council of East Kalimantan Province analyzes strategies to improve East Kalimantan's food security as a buffer for IKN, challenges of food production in East Kalimantan and how agricultural technology can overcome these limitations. The application of modern strategies and technologies in East Kalimantan is expected to reduce dependence on food imports and increase local food self-sufficiency (Suryadi, 2021).

2. Logistics and technology solutions for food distribution
 - Interpretation : digital platforms and information technology can improve food supply chain efficiency, ensure more equitable distribution and reduce waste. This is consistent with supply chain management theory, which emphasizes the importance of technology in optimizing distribution and logistics.
 - Literature contex : analysis of various studies shows that information technology in supply chain management has successfully improved food availability and access in remote areas. The implementation of similar solutions in Kalimantan could help address the food distribution challenges faced by the region (Gumilang et al., 2018).
2. Economic policies and aid programs to improve food access
 - Interpretation : social assistance programs and food subsidies can increase people's purchasing power, which in turn increases access to adequate food and food security.
 - nutrition. Socio-economic development theory supports these policy interventions as a way to reduce inequality and improve people's well-being.
 - Literature context : the study by Salasa shows that effective policy interventions can significantly improve food access in poor areas (Salasa, 2021). At Kalimantan, a well-targeted social assistance program can help address inequality in food access.
4. Nutrition education program and health services for food utilization
 - Interpretation : nutrition education and access to good health services are key to improving food utilization and nutritional status. Nutrition and public health theory emphasizes the importance of nutrition knowledge and access to health services in reducing malnutrition.
 - Literature context : previous studies have shown that comprehensive nutrition education programs can reduce the prevalence of stunting and malnutrition. Implementing a similar program in Kalimantan could improve the nutritional status of the community and support sustainable food security (Fitri J et al., 2022).
5. Integration of IKN development strategy with food security policy
 - Interpretation : the integration of food security policies in the development of IKN is important to ensure that the food needs of the population are met without the need for food. At the expense of the sustainability of local production. Sustainable urban planning theory supports this approach, which emphasizes the importance of a balance between infrastructure development and environmental sustainability.
 - Literature context : the literature shows that large development projects often have significant impacts on food security if they are not properly managed (Mulyani et al., 2020). By integrating food security policies in IKN development plans, Kalimantan can avoid these negative impacts and support long-term food security.

6. Agricultural technology innovations suitable for Kalimantan
 - Interpretation : adoption of smart farming technology can improve agricultural efficiency and productivity in Kalimantan. Technological innovation theory supports the use of advanced technologies to overcome the challenges of traditional agriculture.
 - Literature context : studies show that smart farming technologies have successfully improved crop yields and agricultural efficiency in various contexts. The implementation of this technology in Kalimantan can help farmers manage their land more effectively and sustainably (Rachmawati, 2020).
7. Sustainable agriculture model for long-term food security
 - Interpretation : a sustainable agriculture model that integrates environmentally friendly practices and wise natural resource management is key for long-term food security. The theory of sustainable agriculture emphasizes the importance of maintaining soil fertility, reducing the use of harmful chemicals, and increasing biodiversity.
 - Literature context : the implementation of sustainable agriculture models in various regions has proven effective in maintaining land productivity and food security. Adapting this model in Kalimantan can ensure that food production remains sustainable and the environment is preserved (Djibran et al., 2023).

DISCUSSION

Discussion of the implications of the findings

1. Agricultural strategies and innovations to increase local food production

The findings suggest that the application of modern agricultural technologies in Kalimantan can significantly increase food production. This is important because it can reduce dependence on imports and increase local food self-sufficiency. The implementation of these technologies can also create new jobs and boost local economic growth.

The government and the private sector need to collaborate to provide training and financial support for farmers to enable them to adopt modern agricultural technologies. In addition, research and development should continue to be encouraged to find technologies that best suit local conditions.

2. Logistics and technology solutions for food distribution

Improving the efficiency of the food supply chain through digital platforms can address distribution issues in remote areas of Kalimantan. This will help reduce price disparities and ensure more stable food availability. Investment in digital and transportation infrastructure should be a priority. The government should also facilitate the development of digital applications and platforms that can be used by farmers and food distributors.

3. Economic policies and assistance programs to improve food access:

Social assistance programs and food subsidies can improve food access for low-income people in Kalimantan. This will help reduce inequality and improve people's welfare. Policies supporting food assistance programs need to be strengthened, with proper targeting to ensure that assistance reaches those

most in need. Periodic evaluations are also important to assess the effectiveness of the program.

4. Nutrition education program and health services for food utilization

Better nutrition education and health services can reduce stunting and malnutrition in Kalimantan. This will have a positive impact on community health and productivity. Nutrition education programs should be integrated into school curricula and public health campaigns. In addition, access to health services needs to be improved, especially in rural and remote areas.

5. Integration of IKN development strategy with food security policy

The integration of food security policies in the development of IKN can ensure that the food needs of the population are met without compromising the sustainability of local production. This is important to maintain a balance between economic and environmental development. IKN development planning should include strategies to maintain productive agricultural land and develop urban agriculture. Collaboration between government, academia and local communities is essential to develop sustainable solutions.

6. Agricultural technology innovations suitable for Kalimantan

The adoption of smart farming technologies can improve agricultural efficiency and productivity in Kalimantan, which is important to face climatic and geographical challenges. The government should support research and development of agricultural technologies that are appropriate to local conditions. Training programs for farmers in the use of these technologies also need to be widely organized.

7. Sustainable agriculture model for long-term food security

The adoption of sustainable agriculture models can ensure that food production remains sustainable and the environment is preserved. This is essential for long-term food security. Sustainable agriculture policies should be promoted and supported with incentives for farmers who implement environmentally friendly practices. In addition, education and awareness on the importance of sustainability need to be increased among communities and farmers.

The implications of the findings of this study suggest that with the right strategies and the application of technological innovations, food security in Kalimantan can be significantly improved in the context of IKN development. Collaboration between the government, communities and the private sector is essential to achieve this goal. Holistic and sustainable policies should be prioritized to ensure that the development of IKN not only improves the economy but also safeguards the welfare of the people and the environment.

CONCLUSIONS AND RECOMMENDATIONS

Summary of key findings :

1. Agricultural strategies and innovations can increase agricultural productivity in Kalimantan.

2. Digital platforms and information technology can improve food supply chain efficiency and ensure more equitable distribution in remote areas of Kalimantan.
3. Economic policies and aid programs can improve people's purchasing power and access to adequate and nutritious food.
4. Education programs and access to good health services can reduce stunting and malnutrition in Kalimantan.
5. The integration of food security policies in the development of IKN can ensure that the food needs of the population are met without compromising the sustainability of local production.
6. Agricultural technology innovation and the adoption of smart farming technology can improve agricultural efficiency and productivity in Kalimantan.
7. Sustainable agriculture models that integrate environmentally friendly practices and wise natural resource management are key to long-term food security.

Final conclusion based on research results

This research shows that improving food security in Kalimantan requires a multifaceted approach that includes technological innovation, improved logistics, supportive economic policies, nutrition education, and the integration of NIC development strategies with food security policies. By implementing the right strategies and innovations, Kalimantan can overcome food security challenges and ensure sustainable food self-sufficiency in the context of ICT development.

Practical suggestions for stakeholders

I. Government

1. Promote the adoption of modern agricultural technologies through training, financial support and supportive policies.
2. Invest in digital and transportation infrastructure to improve food distribution in remote areas.
3. Develop and strengthen targeted social assistance programs to improve food access for low-income communities.
4. Integrate food security policies in IKN development planning to ensure a balance between development and food sustainability.

II. Private sector

1. Collaborate with government and farmers to develop locally appropriate technology solutions.
2. Invest in digital platforms that can help optimize the food supply chain.
3. Support nutrition and health education programs through corporate social responsibility (CSR) initiatives.

III. *Communities and Non-Governmental Organizations (NGOs)*

1. Conduct nutrition and health education programs in local communities.
2. Encourage sustainable agricultural practices and provide training to farmers on environmentally friendly techniques.

FUTURE STUDY

- a. Further research is needed to evaluate the effectiveness of modern agricultural technology implementation in Kalimantan, including its impact on farmers' productivity and welfare.
- b. In-depth studies on the impact of social assistance policies on food access and community welfare in Kalimantan need to be conducted to ensure the effectiveness of these programs.
- c. Further research on the adaptation and application of sustainable agriculture models in different local contexts in Kalimantan can help identify best practices for long-term food security.
- d. Research that examines how IKN development policies can be effectively integrated with food security policies will be very useful to ensure sustainability and community welfare.

By following these recommendations, stakeholders can take concrete steps to improve food security in Kalimantan in the context of IKN development, ensuring that food needs are met sustainably and equitably.

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