

Improving Food Security through Local Food Development in Bulungan District: A Short Food Supply Chain (SFSC) Perspective

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Abstract. This study examines efforts to improve food security in Bulungan Regency, North Kalimantan, through the development of local food using the Short Food Supply Chain (SFSC) approach. Food security, regulated by Law Number 18 of 2012 and Government Regulation Number 17 of 2015, has become a critical issue due to the decline in food availability indicators in the Food Security Index (IKP) of Bulungan Regency from 2019 to 2022. Local food development aims to reduce dependence on imports and enhance access to diverse and nutritious food. The SFSC approach shortens distribution chains, strengthens producer-consumer relationships, and empowers local farmers. This research employs qualitative methods and a literature review to identify SFSC strategies and their relevance in Bulungan Regency. This promising approach is expected to improve food security while supporting community welfare and environmental sustainability

Keywords: food security, local food, Short Food Supply Chain (SFSC)

1. Introduction

Food is a fundamental human necessity, and its fulfillment is enshrined as a human right in the 1945 Constitution of the Republic of Indonesia, serving as a crucial element for fostering quality human resources. According to Law No. 18/2012 on food, the management of food is implemented to meet basic human needs in a manner that is fair, equitable, and sustainable, rooted in the principles of food sovereignty, food independence, and food security.

Achieving food requirements that are affordable for the entire population has become a vital objective of national development. Food security is a central concern within the national development framework and is a key focus of agricultural operational policies. To effectively develop national food security amidst globalization and decentralization, it is essential to consider the various developmental changes that have taken place thus far.

As defined by Government Regulation of the Republic of Indonesia Number 17 of 2015 [1] concerning Food Security and Nutrition, food security is characterized as a state where individuals have access to sufficient, safe, diverse, nutritious food that aligns with their cultural beliefs and practices, allowing them to lead healthy, active, and productive lives sustainably. The Food and Agriculture Organization (FAO) (2014) [2] states that food security exists when all individuals have physical, social, and economic access to sufficient, safe, and nutritious food that fulfills their dietary needs and preferences for a healthy and active lifestyle. To achieve this

ideal, four essential pillars of food security must be addressed: availability, access, utilization, and stability.

To assess the level of food security within a specific area and its contributing factors, a Food Security Index (FSI) has been developed. This index is based on the definition of food security and the subsystems that constitute the food security framework. The nine indicators employed in the formulation of the FSI are derived from three fundamental aspects of food security: food availability, affordability, and utilization. The selection of indicators is based on several criteria, including:

- a. A review of the global food security index;
- b. The sensitivity level of measuring the food security and nutrition situation;
- c. Representation of the three pillars of food security; and
- d. The consistent availability of data over a specified period (annually) across all districts/municipalities and provinces [3].

In order to realize food security and food independence as well as the utilization of natural resources to improve the welfare of the community, various efforts are needed in a systematic and integrated manner. The potential of local foodstuffs scattered in the Bulungan Regency area of North Kalimantan Province needs to be managed and developed intensively and extensively as well as possible to meet the food needs of the community as well as to develop awareness in the utilization and consumption of local food in accordance with the North Kalimantan Governor Regulation Number 25 of 2021 concerning Local Food Development in North Kalimantan Province [4].

Future research will be conducted related to local food development in the context of improving food security located in Bulungan Regency, North Kalimantan Province. Based on the Bulungan District Food Security Index (IKP) data, there is one indicator, namely the Food Availability Indicator, which is highlighted because there is a decrease every year. The following is the data on the Food Security Index (IKP) of Bulungan District for the last 5 years [3]:

Table 1. Bulungan District Food Security Index 2019-2023

No.	Indicator	Year				
		2019	2020	2021	2022	2023
1	Availability Index	84.11	69.09	70.35	65.52	59.18
2	Affordability Index	88.26	88.76	87.10	88.12	88.08
3	Utilization Index	71.42	75.68	74.88	77.26	82.33
4	Food Security Indeks (IKP)	80.28	77.63	77.19	77.00	77.11
5	National IKP Average	66.84	72.11	72.43	71.97	70.84

Data Source: BAPANAS Year 2024 [23]

Based on the data on the Food Security Index (IKP) of Bulungan Regency, North Kalimantan Province above, in general, the IKP value of Bulungan Regency is still in good condition when compared to the average National IKP value, but when looking at the trend from year to year it tends to decrease, seen from 2019 of 80.28%, it continues to decline to 77.00% in 2022 and then begins to increase again in 2023 which is 77.84%. For this reason, intensive efforts are needed from the Government, especially in overcoming this problem, by maximizing programs that can boost the value of the Food Security Index, one of which is by developing local-based food.

According to BPS data, Bulungan Regency of North Kalimantan Province has an area of 13,181.92 km² with a population of 136,831 people (BPS, 2023-2025). Based on the results of the Area Sample Framework Survey (ASF), rice production in North Kalimantan in 2023

amounted to 10,348 tons of GKG with a harvest area of 3,341 hectares. This causes the food consumption of the population of Bulungan Regency to still be dominated by grains, especially rice, while food groups such as tubers, oily fruits/seeds, nuts, and vegetables and fruits are far below [5].

Table 2. Rice Production in Bulungan Regency

District	Rice Production in Bulungan Regency				
	2019	2020	2021	2022	2023
Bulungan	12,610	15,395	13,011	11,626	10,348

Source: BPS, Area Sample Frame Survei (ASF)

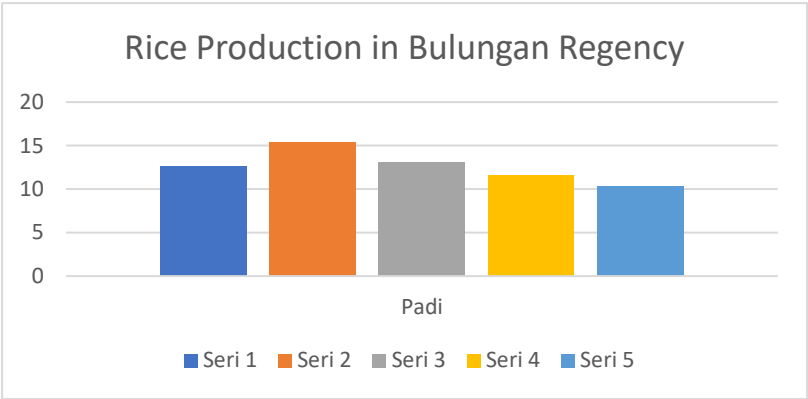


Figure 1.1. Chart of Rice Production in Bulungan Regency
Source: BPS, Area Sample Frame Survei (ASF)

See the chart of rice production in Bulungan Regency in figure 1.1. In 2020, there was an increase from 2019, which was around 2,785 tons of GKG, but experienced a decrease in production in the following year, where in 2020 rice production was 15,395 tons of GKG and then decreased in the following year, namely 13,011 tons of GKG and continued to decline until 2023, which was around 10,348 tons of GKG. It can be concluded that there are several factors that have resulted in a decrease in rice production in the Bulungan Regency area, this also affects the amount of community consumption which still depends on food sourced from grains.

Table 3. Production of Secondary Crops by Crop Type in 2019-2023

Type of secondary crops	Production of secondary crops by crop type in Bulungan Regency (tons)				
	2019	2020	2021	2022	2023
Corn	1,591	1,993	2,278	2,868	3,298
Peanuts	69	48	68	33	34
Cassava	3,521	2,644	2,803	2,489	2,489
Sweet Potato	542	607	1560	728	692

Source: BPS, Agricultural Statistics Report (SP) Food Crops

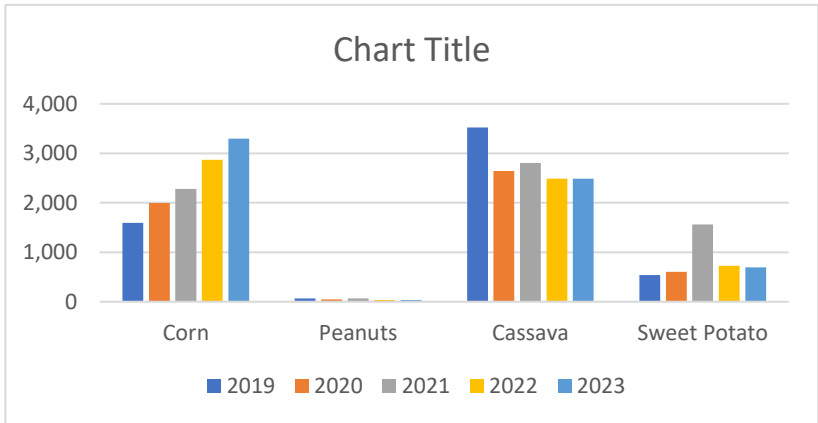


Figure 2. Production chart of secondary crops by type
Source: BPS, Agricultural Statistics Report (SP) Food Crops

The figure above also supports the problem of food sources in Bulungan Regency. Where it can be seen that the amount of production is decreasing from year to year. Corn production fluctuates slightly in production, namely from 2018 producing 2,030 tons, in 2019 experiencing a decrease in production, which is around 1,591 tons, and in 2020 to 2022 experiencing an increase in production at up to 2,868 tons. Peanuts continued to experience a decline in production from 2018 of around 80 tons, in 2019 around 69 tons, and continued to decline in 2020, namely 48 tons. Although quite large in production, cassava continues to experience a decline in production from 2018 around 5,759 tons, up to 2022 at 2,489 tons. Then for sweet potato production is slightly stable like corn production where in 2018 it produced 663 tons of production, then in 2019 it fell to 542 tons of production, but then rose around until 2022 at 728 tons [6].

Local food development is a key priority to accelerate food diversification and strengthen community food security by utilizing home gardens to meet family food and nutritional needs. There are various methods for developing local food, one of which is through the implementation of food diversification, as outlined in Law No. 18 of 2021 [7] concerning food and Government Regulation (PP) No. 17 of 2015 concerning Food Security and Nutrition. This regulation serves as a reference to encourage efforts for rapid diversification of food consumption, emphasizing local wisdom and integrated cooperation between the government and the community. Food innovations must be globally competitive while remaining rooted in local potential. This means that consumers should be able to choose and select local foods that positively impact health as their primary choice. Thus, it is essential to prioritize local potential-based food in our own country (Nugraheni, 2020) [8].

In efforts to enhance food security, local food development plays a significant role by employing the right approaches to optimize its effectiveness. One approach that should be considered is the Short Food Supply Chain, which offers a strategic framework for improving the process from production to accelerating responses to basic needs. This model is designed to facilitate access to healthy food, informally known as local food systems. According to the vision of the food value chain, this model is defined as “a business model in which producers and buyers of agricultural products form strategic alliances with partners along the supply chain to increase financial returns through product differentiation that advances social or environmental values and embodies the values of transparency, strategic collaboration, and dedication to authenticity” (Garrity, 2024) [9].

Seeing the above problems provides room for further research, to see whether the regulations from the government are appropriate in order to meet the needs and welfare of people's lives, for this reason this research will examine "Increasing Food Security through Local Food Development: A Short Food Supply Chain (SFSC) Perspective (Study in Bulungan District, North Kalimantan Province)".

2. Literature Review

2.1. Food Security

The concept and paradigm of food security have undergone significant development since the Food and Agriculture Conference in 1943, which introduced the idea of "safe, adequate, and appropriate food supply for all." The definition of food security itself varies widely but generally refers to the understanding put forth by the World Bank (1986) and Maxwell and Frankenderger (1992), which states that food security means "secure access at all times to sufficient food for a healthy life."

A literature review conducted by IFPRI in 1999 estimated that there are approximately 200 definitions and 450 indicators related to food security (Weingartner, 2000). Below are some definitions of food security according to experts that are often referenced [10]:

1. The United Nations Committee on World Food Security (1992) defines food security as a condition in which all individuals at all times have physical, social, and economic access to sufficient, safe, and nutritious food that meets their preferences and dietary needs.
2. According to the Food and Agriculture Organization (FAO) in 1997, food security is a state in which all households have physical and economic access to food for all family members, and are not at risk of losing that access.
3. Based on Law Number 18 of 2012, food security is defined as a condition of food fulfillment from the state to individuals, which is reflected in the availability of sufficient food, both in quantity and quality, safe, diverse, nutritious, equitable, and affordable, and not contrary to the religion, beliefs, and culture of the community, allowing individuals to live healthy, active, and productive lives sustainably.

2.2. Local Food Development

According to Omayani & Ariani (2023) [11], there is a need to restore the national food culture based on local food to strengthen food security in a sustainable manner in anticipation of climate change. Therefore, it requires the commitment of the government and legislative institutions at the central and regional levels to develop local food from upstream to downstream in a sustainable manner. There are several strategies that can be done to improve the development of competitive local food as follows:

1. Improve product availability and quality;
2. Improve brand and promotion;
3. Improve marketing network;
4. Community socialization and education;
5. Local food subsidies. (Omayani & Ariani, 2023) [11]

Law of the Republic of Indonesia No. 18/2012 on Food article 1 paragraph 16 states "diversification is an effort to increase the availability and consumption of food that is diverse, nutritionally balanced, and based on the potential of local resources". Furthermore, paragraph 17 states "local food is food consumed by local communities in accordance with local potential and wisdom".

Food diversification is an effort to increase the availability of diverse food and based on the potential of local resources to:

- a. fulfill diverse, nutritionally balanced and safe food consumption patterns;
- b. developing food businesses; and
- c. to improve the welfare of the community. (Law No. 18/2012, Article 41)

2.3. Short Food Supply Chains (SFSC)

According to Garrity et al. (2024), the Short Food Supply Chain (SFSC) [9], which is commonly referred to as the local food system, is designed to enhance access to healthy food and aligns with the vision of the food value chain. This model is defined as “a business framework where agricultural producers and consumers establish strategic partnerships with various stakeholders along the supply chain to boost financial gains through product differentiation, which also promotes social and environmental values, while embodying principles of transparency, strategic collaboration, and commitment to authenticity.”

The Short Supply Chain Knowledge and Innovation Network (SKIN) (2020) [12] indicates that the SFSC concept is rooted in sustainability, which comprises three foundational pillars: environmental, social, and economic. In the analysis of SFSC, four key topics have been identified for the classification of best practices:

1. Products;
2. Organization/Institution/System;
3. Governance;
4. Sales.

The topics pertaining to Products within the first category encompass several areas, including:

1. Branding and labeling (which refers to innovations that communicate the features of a product or a range of products to consumers);
2. Valorization (which involves innovations in products, product ranges, or new approaches to product development, such as multi-actor design and co-design);
3. Value (which relates to health benefits, nutritional content, freshness, and taste);
4. Values (which articulate the three sustainability pillars: social, economic, and environmental aspects).

In the realm of Organization/Institution/System, two main dimensions have been highlighted: Learning and Empowerment (which encompasses networking and cross-learning) and Process Innovation, linked to logistics and distribution collaboration. The Governance topic addresses both Internal and External elements. The Internal aspect pertains to agreements among supply chain partners and decision-making frameworks, while the External aspect encompasses supportive governmental policies and regulatory structures, in addition to public procurement tenders that incorporate social and environmental criteria. In the Sales category, Efficiency pertains to effective ordering systems, the proximity of consumers, and dependable distribution; Variety involves aggregating supplies from numerous small producers through collaborative hubs; and Connection includes activities like consumer engagement events, such as “meet the farmer,” and leveraging social media for interaction.

3. Research Methods

The method used in writing this scientific article is a qualitative approach combined with a literature study or library research [13]. The author reviews theories and literature relevant to the topic being discussed, particularly regarding food security, local food

development, and the Short Food Supply Chain (SFSC). In addition, both reputable and non-reputable scientific articles and journals are analyzed.

In qualitative research, the literature review must align with the methodological assumptions. This means that the review should be conducted inductively, ensuring it does not guide the research questions. One of the primary reasons for conducting qualitative research is its exploratory nature (Ali & Limakrisna, 2013). In the next phase, this will be further elaborated in the “Related Literature” or “Literature Review” section, which serves as the foundation for formulating hypotheses. In the final stage, both literatures will be used as a reference for comparison with the research results and findings (H. Ali & Limakrisna, 2013).

4. Result and Discussion

4.1. Research Review Results

Improving food security is a major challenge in Indonesia, especially in the face of various issues such as climate change, urbanization, and rapid socio-economic dynamics. Local food development is one of the solutions to improve food security in a sustainable manner. Various studies have been conducted to explore various innovations and approaches in local food development. In this analysis, the research results related to food security are compared, similarities and differences among the various studies are drawn, and policy implications are formulated:

1. Local Food Innovation by Burhanudin Mukhamad Faturahman (2017) [14]
Faturahman examined tuber development innovations in Pacitan District, where the results showed that socialization and direct assistance could Increase community Income. This research highlights the importance of utilizing local potential as a first step in improving food security. The similarity with other studies lies in the concept of innovation in local food development. However, differences arise in the theoretical perspective, where this study focuses more on specific products (tubers) and their impact on community Income.
2. Income and Food Security by Susanti Amerta Nutr (2019) [15]
Nutr identified that low education and household income have an impact on daily eating habits. This research shows that it is not only the amount of food available that matters, but also the nutritional value of the food. The similarity with other studies is the emphasis on nutritional value in food development. However, the differences are in the more limited scope, focusing on coastal areas and the influence of education on consumption patterns.
3. Local Food Diversification by Irmalia Fitri Siregar and Syamsir Harahap (2020) [16]
Siregar and Harahap explained that local food diversification, especially non- rice products, can help improve food security in Padangsidempuan City. A partnership with the Women Farmers Group (KWT) became one of the main strategies in this study. This collaborative approach creates an opportunity to Increase education on diverse and nutritious local food consumption. Similarities with other studies lie in the development of partnerships, while differences exist in the focus on the local food industry.
4. Collaborative Governance by Zahran Mabrukah Tomimi (2022) [17]
Tomimi examines the importance of collaboration in addressing food issues during the COVID-19 pandemic. The research emphasizes that food issues are shared issues that require collaboration between actors. Efficiency in the use of local resources is recognized as key in overcoming food security challenges. The similarity with other studies lies in the importance of collaboration, but the difference is seen in the specific context of the pandemic and its impact on food security.
5. Policy Support by Ifall et al. (2023)[18]

- Ifall et al. highlighted the need for comprehensive policy interventions to support local agriculture and community development. The study recommends policies that encourage consumer awareness and strong partnerships between farmers and communities. While there are similarities in exploring local potential, the difference lies in the broader scope, focusing not only on food security but also on environmental and social sustainability.
6. The SFSC approach by Bowski et al. (2020) [12]
Bowski and colleagues discuss the concept of sustainability-oriented Short Food Supply Chains (SFSC). The research shows that SFSC can reduce the carbon footprint of food distribution, as well as improve the connection between producers and consumers. The similarity with other research lies in the focus on sustainability, but the difference arises from the specific approach to short supply chains.
 7. SFSC Business Strategy by Cirone et al. (2023) [19]
Cirone et al. examined business strategy pathways for ancient grain products in local markets. The research shows that a good understanding of consumer preferences can improve farmers' welfare. While there are similarities in the emphasis on local potential, differences exist in the context of a more focused business strategy, which includes marketing and value-added elements of the product.
 8. Local Food Systems by Garrity et al. (2024) [9]
Garrity et al. conducted a systematic review of knowledge gaps related to food safety among low-income populations. The study emphasized the need for supply chain optimization in ensuring food accessibility. The similarity with other studies lies in the focus on supply chains, but the approach is more analytical and policy-oriented.
 9. Global Nutrition Research by Cuenca et al. (2024) [20]
Cuenca et al. highlighted that food security and nutrition are global issues that require special attention. This study identifies gaps in research and emphasizes the Important role of nutrition practitioners in developing policy. Similarities with other studies lie in the emphasis on food security, while differences lie in the global context and focus on innovation in policy.
 10. Factors Causing Food Security by Mota et al. (2024) [21]
Mota et al. Investigated the influence of socio-economic variables on food security in Mexico. This research offers an innovative approach to understanding the interactions between factors affecting food security. Similarities lie in the focus on food security, while differences exist in the theoretical approaches used.

4.2. Discussion

From the analysis, it appears that while there are similarities in the themes of food security and local food development, each study has a unique approach and focus. This reflects the complexity of food security issues involving various factors, including economic, social and environmental. In addition to collaboration and innovation, Short Food Supply Chain (SFSC) is a keyword that appears in various studies. Food security requires not only food availability, but also food access, utilization and stability.

a. Challenges and Opportunities

In an effort to improve food security through local food development, several significant challenges are faced. First, there is limited knowledge among farmers and consumers about the importance of local food and its nutritional value. Many individuals are not yet fully

aware of the health and sustainability benefits offered by local products, so better education and socialization are needed to raise public awareness.

Furthermore, inconsistent policies are another obstacle to local food development. Government policies often do not support initiatives that focus on strengthening the local agriculture sector. Therefore, more cohesive and integrated policies are needed to encourage the development and support of local agriculture, so as to create an ecosystem that is more conducive to sustainable agriculture. Socio-economic variability also affects food access and consumption behavior. Different conditions between urban and rural areas create challenges in understanding food consumption behavior and accessibility. Research should consider the specific local context to make the proposed solutions more relevant and effective.

In addition, a weak distribution system is an inhibiting factor. Long and inefficient distribution chains lead to increased food prices, reducing people's purchasing power. In this case, the Short Food Supply Chains (SFSC) approach can be an effective solution to overcome this distribution problem, by creating a more direct link between producers and consumers.

b. Policy Implications

The results of this study have significant implications for policy development related to food security. First, the government needs to provide support for local innovation in food product development. This can be in the form of incentives such as subsidies, training and technical assistance to encourage farmers and local entrepreneurs to innovate in their products.

Furthermore, education and counseling should be a major focus. Educational programs that increase understanding of nutrition and local food need to be expanded, especially in rural areas, to make people more aware of the importance of choosing and consuming local products.

Sustainable food policies must also be prioritized. Policies that encourage environmentally friendly agricultural practices and support local food development will be crucial in creating sustainable food security.

Strengthening supply chains is also an important aspect. Facilitating SFSC approaches to improve distribution efficiency and reduce food costs will contribute to better accessibility for communities. Finally, community empowerment should be strengthened. Programs that empower farmer groups and local communities to take an active role in local food development and distribution will contribute significantly to improving food security. By involving communities in the process, a more resilient and sustainable food system is expected.

4.3. Short Food Supply Chains (SFSC) Perspective

Short Food Supply Chains (SFSC) offer an innovative approach to the food system by emphasizing direct links between producers and consumers. By shortening the distribution chain, SFSC not only improves efficiency but also supports food security through local food development. In this context, the discussion will link existing research results with SFSC principles, exploring how this approach can facilitate improved food security in Bulungan District, North Kalimantan.

One of the basic principles of SFSC is to create a closer relationship between producers and consumers. Research by Bowski et al. (2020) shows that SFSC can reduce carbon footprints and strengthen local economies. By connecting local farmers directly with consumers, the food produced can be consumed fresher, which has positive implications on nutritional value. In Bulungan district, this approach can be implemented through local or community markets, where farmers can sell their produce directly to consumers. This not only increases fresh food

accessibility but also empowers local farmers, giving them more control over their prices and income.

The SFSC concept also includes the three pillars of sustainability: social, economic, and environmental. Research by If'all et al. (2023) emphasizes the importance of policies that support sustainability in local food systems. In the context of SFSC, social sustainability can be achieved through the development of stronger communities, where people are actively involved in the process of food production and distribution. Economically, SFSC can support sustainability by increasing farmers' income through better market access. In addition, the environmental aspect of SFSC includes environmentally friendly agricultural practices, which can be promoted through education and training for farmers in Bulungan. This approach is in line with efforts to improve food security by preserving natural resources.

One of the main challenges in the conventional food system is the long and inefficient supply chain. Research by Garrity et al. (2024) shows that supply chain optimization is critical to improving food accessibility, especially among low-income populations. By applying SFSC principles, distribution can be shortened and simplified, reducing costs and increasing the speed of product delivery. In Bulungan district, the implementation of an efficient distribution system could include the use of information technology to speed up the ordering and delivery process. In addition, collaboration between farmers and local retailers can create a better distribution model, reducing the risk of losses due to spoilage or unsold products.

The value of local food, both in terms of nutrition and freshness, is an important aspect of SFSC. Research by Mota et al. (2024) shows that understanding the interaction between socio-economic and demographic factors can affect the level of food security. In the context of SFSC, It is important to educate consumers about the nutritional value of local food and its health benefits. In Rulunnan district awareness camnaions highlighting the benefits of consuming local food can increase demand. In addition, by guaranteeing product quality through clear labeling, consumers can have more confidence to buy local products, which in turn supports the sustainability of farmers.

Community empowerment is an integral part of SFSC. Research by Cirone et al. (2023) shows that collaboration between producers and consumers can help create shared value. In Bulungan district, building networks between farmers, retailers and consumers can create communities that are more resilient to food crises. Initiatives such as “meet the farmer or community markets where consumers can interact directly with producers can increase community engagement and strengthen ownership of their food sources. This contributes to food security as people become more aware and engaged in food issues.

From the above analysis, it can be concluded that the implementation of Short Food Supply Chains (SFSC) has great potential to improve food security in Bulungan District, North Kalimantan. By creating closer links between producers and consumers, promoting social, economic and environmental sustainability, and Increasing efficiency in distribution, SFSC can address the challenges faced by the current food system.

SFSC implementation must involve all parties, from the government to the community, to create a more resilient and sustainable food system. By utilizing local food potential and applying SFSC principles, it is expected that food security in this area can be significantly improved, while supporting the economic welfare of local communities.

5. Conclusion

Research on Improving Food Security through Local Food Development in Bulungan District, North Kalimantan Province, shows that food security is a central issue that must be

considered in national development, in accordance with the mandate of the Constitution of the Republic of Indonesia and related regulations. From the data analysis of the Food Security Index (IKP) in Bulungan District, North Kalimantan Province, there is a decline in food availability indicators that must be addressed immediately through strategic measures.

Local food development is key to strengthening community food security. Through food diversification and utilization of local resources, it is expected to reduce dependence on imported food and improve food accessibility and quality for the community. Regulations such as Law No. 18/2012 and Government Regulation No. 17/2015 serve as references to encourage local-based food diversification.

The implementation of the Short Food Supply Chain (SFSC) model provides a new approach that can shorten the distribution channel between producers and consumers, so that more economic benefits are felt by local farmers. Collaboration between the government, local communities and the private sector is essential in facing food security challenges, especially in crisis situations.

Thus, this research emphasizes the importance of local food development and the application of the SFSC approach as a strategic solution to improve food security in Bulungan District. These efforts not only have the potential strengthen access to safe and nutritious food, but also contribute to community welfare through increased farmer income and sustainable utilization of local resources.

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