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Optimizing Adaptive Governance as a Solution for Food Self-Sufficiency and Family Resilience in Makassar City

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Abstract: The urgency of this study lies in the decline of agricultural land area in Makassar City by 600 hectares over the past decade, and the city's Food Security Index (FSI) ranking of 54th nationally with a score of 87.95, indicating significant challenges to food self-sufficiency. Consequently, an adaptive governance strategy is needed to enhance local food production, improve distribution systems, and ensure stable food access for the population. This study aims to explore the role of adaptive governance in enhancing the effectiveness of food self-sufficiency policy and in strengthening family resilience in Makassar City. A qualitative research approach was employed, with data collected through interviews, observation, documentation, and focus group discussions (FGDs). Data were analyzed using NVivo 12 Plus. The findings confirm that food self-sufficiency efforts in Makassar City continue to be constrained by agricultural land depletion, weak distribution infrastructure, high logistical costs, low community participation, and institutional fragmentation, compounded by external factors such as climate change and global price fluctuations. To address these challenges, an adaptive governance approach is required through data-driven institutional capacity building, multi-stakeholder collaboration, utilization of social capital, agricultural technology innovation, and policy flexibility. Through these strategies, Makassar has the potential to develop a resilient, inclusive, and sustainable food system, while serving as a model for adaptive food governance in Indonesia.

INTRODUCTION

This study departs from the challenges confronted by Makassar City in achieving food self-sufficiency and family resilience amid rapid urbanization, climate change, and complex socio-economic dynamics. These conditions also adversely affect access to nutritious food and engender family health risks (Irwansyah & Ismayanti, 2024). According to the District/City Food Security Index (FSI) released by the National Food Agency, Makassar City obtained an FSI score of 87.95 and ranked 54th nationally (Badan Pangan Nasional, 2024). As the primary growth center of Eastern Indonesia, Makassar City faces rising food demand, while the availability of agricultural land is increasingly constrained by urban expansion. Agricultural land in Makassar has contracted by 600 hectares over the past ten years (Hasanuddin, 2022). In this context, adaptive governance represents an essential approach for developing a more flexible, innovative, and sustainable food system (Smith & Lawrence, 2018). The urgency of this research lies in the need to identify optimal strategies within an adaptive governance framework to enhance local food production, strengthen efficient distribution, and ensure stable food access for the population, thereby supporting family resilience and overall social welfare.

Several countries have implemented food self-sufficiency policies through different approaches tailored to their respective conditions and challenges (Tleuberdinov et al., 2025). Japan adopted the Basic Plan for Food, Agriculture, and Rural Areas, emphasizing food source diversification, incentives for young farmers, and the rehabilitation of agricultural land through modern technology (Shoyama et al., 2021). The Philippines developed the National Disaster Risk Reduction and Management Plan, which incorporates agricultural policy reform through crop diversification for disaster resilience and financial assistance programs for affected communities (Wen et al., 2023). In the United States, the federal government, through the Farm Service Agency

(FSA), provides subsidies while promoting the strengthening of agricultural infrastructure and food storage systems (Atkinson et al., 2024). Bangladesh adopted Climate-Smart Agriculture (CSA), which integrates adaptive agricultural technology and crop insurance to mitigate the risk of harvest failure caused by natural disasters (Akter et al., 2022).

Food self-sufficiency and family resilience are closely interrelated in ensuring the sustainable well-being of communities. Food self-sufficiency refers to the capacity of a region or country to meet its food needs independently, without reliance on imports (Traore et al., 2021), and directly contributes to economic and social stability (Brink et al., 2023). Family resilience depends on the availability and accessibility of adequate (Kertati, 2021), nutritious (Joshi et al., 2025), and sustainable food supplies to safeguard the health and welfare of household members (Alwi et al., 2024). Without robust food self-sufficiency, family resilience may be undermined by food price volatility (Marrero et al., 2022), supply instability, and low levels of balanced nutritional consumption (Inzana et al., 2024). Strengthening adaptive governance-based policies that support local food production (Lida Teneva et al., 2023), efficient distribution (Davila et al., 2021), and food accessibility for all segments of society therefore constitutes a strategic imperative in achieving sustainable resilience (Olubukunmi & Aderemi, 2024). This underscores that the integration of policies promoting sustainable agricultural development is indispensable (Wicaksono & Ismayanti, 2023).

Although 52 documents in the Scopus database as of March 2025 address policies related to food self-sufficiency and family resilience, the majority of existing studies remain focused on the technical dimensions of food production and sector-specific food security policy.

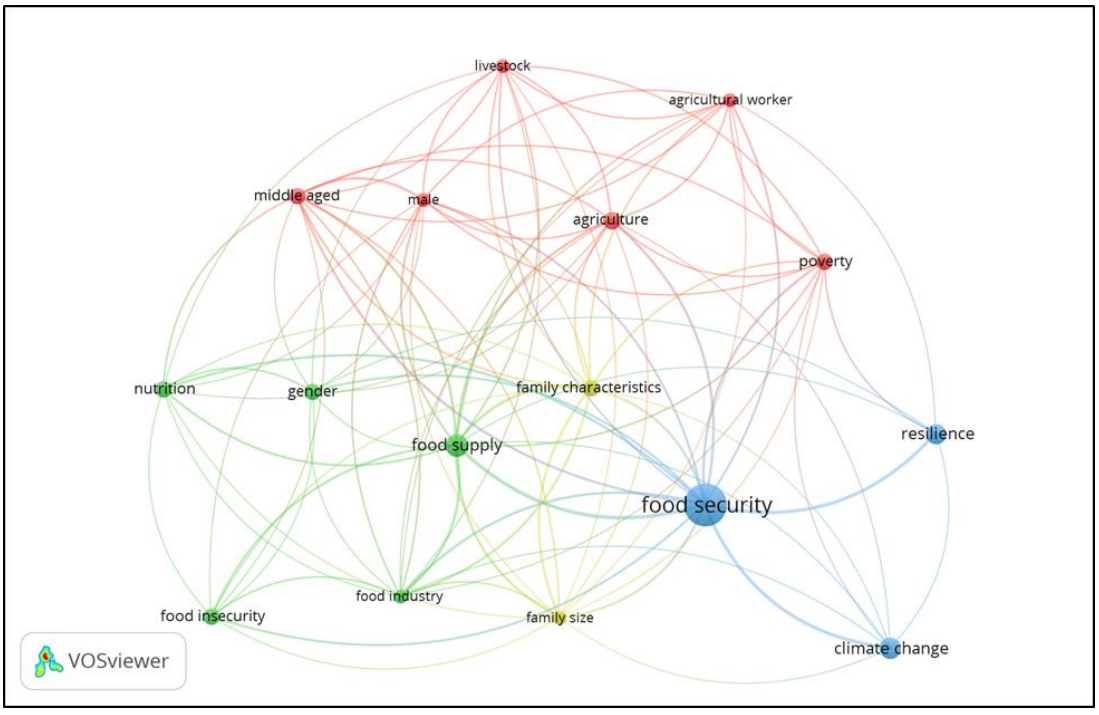

Figure 1. Research Gap
Source: Processed by the researcher using VOSviewer, 2025

However, studies that specifically link adaptive governance as an approach to strengthening food self-sufficiency and family resilience remain limited, particularly in the context of regions characterized by geographical and socio-economic challenges such as Makassar City. The novelty of this research lies in its analysis of how adaptive governance can function as a more flexible and participatory policy strategy to address constraints in food access and to enhance family resilience by strengthening the role of local actors, fostering multi-stakeholder collaboration, and promoting responsiveness to the dynamics of social change. Accordingly, this study fills a gap in the existing literature by proposing an adaptive governance

approach capable of supporting food self-sufficiency policy in a more inclusive and sustainable manner.

The problem-solving approach adopted in this study is grounded in the concept of adaptive governance, which emphasizes policy flexibility, multi-stakeholder collaboration, and the capacity to adapt to changing social, economic, and environmental conditions (Kekulandala et al., 2023). Adaptive governance enables coordination among government, communities, and the private sector in addressing societal challenges (Correia et al., 2025). The problem-solving strategies formulated in this study encompass four principal dimensions: (a) strengthening institutional capacity to manage food systems that are responsive to change; (b) optimizing social capital-based policies that encourage active community participation in local food production and distribution; (c) leveraging agricultural technology and food innovation to enhance the productivity and efficiency of the food system; and (d) developing adaptive policy mechanisms through periodic evaluation of food self-sufficiency program effectiveness to ensure the long-term maintenance of family resilience. These strategies are expected to foster a more inclusive, resilient, and responsive food governance system capable of addressing the dynamic challenges of food self-sufficiency in Makassar City.

The research questions are grounded in the principal challenges confronting food self-sufficiency and family resilience in Makassar City, as evidenced by persistently high rates of food inadequacy and limited access to sustainable food sources. This study therefore seeks to address two core questions: (a) What factors constitute barriers to the implementation of food self-sufficiency policy in Makassar City? (b) How can adaptive governance enhance the effectiveness of food self-sufficiency policy in promoting family resilience in Makassar City? The urgency of this research lies in the pressing need to formulate policies capable not only of ensuring food security, but also of strengthening family resilience as the fundamental social unit that determines the overall welfare of society. By adopting an adaptive governance approach, this study aims to provide evidence-based recommendations for local government in building a more resilient and sustainable food system.

RESEARCH METHODS

This study employed a qualitative research approach, with data collected through interviews, observation, documentation, and focus group discussions (FGDs). Key informants included the Makassar City Department of Fisheries and Agriculture, the Makassar City Department of Food Security, the Makassar City Department of Health, local farmer groups, and community self-reliance organizations. Interviews were conducted to obtain an in-depth understanding of food self-sufficiency and family resilience policy implementation from the perspectives of relevant stakeholders, while observation facilitated direct insights into policy implementation in the field. Documentation was employed to collect pertinent secondary data, including annual reports from relevant municipal agencies, Food Security Index (FSI) data, and Prevalence of Undernourishment (PoU) statistics from the Central Statistics Agency (BPS). Additionally, policy documents, regional regulations, and prior research on adaptive governance and food security were incorporated to enrich the analysis. Focus group discussions provided a platform for deliberating on key issues and eliciting perspectives from multiple stakeholders.

The data analysis procedure using NVivo 12 Plus commenced with data importation, whereby interview transcripts, documentation, observation notes, and FGD results were uploaded into the software for systematic management. This was followed by data coding, a process of categorizing information according to predefined themes or categories, which facilitated the identification of patterns and conceptual relationships emerging from the data. The final stage was data visualization, in which the analytical outcomes were presented in the form of diagrams, word clouds, or network models to facilitate interpretation and the systematic organization of research findings. The analytical process incorporated data triangulation—the comparison and cross-verification of data from multiple sources—to ensure the validity and reliability of the results. This approach ensured that the findings were dependable and representative of a comprehensive account of the phenomenon under investigation.

RESULTS AND DISCUSSION

Barriers to the Implementation of Food Self-Sufficiency Policy in Makassar City

Efforts to achieve food self-sufficiency in Makassar City confront a range of structural and non-structural barriers (Risnawati et al., 2025). First, the scarcity of agricultural land due to large-scale urban expansion has diminished local food production capacity. Second, weak food distribution infrastructure results in inequitable access across sub-districts, with attendant implications for high logistical costs. Third, low levels of community and local actor participation in food production and distribution further compromise the sustainability of the food system.

Additional constraints are evident at the institutional and policy levels, including inter-agency fragmentation within government, insufficient ongoing evaluation, and limited integration of community social capital. External factors such as climate change, global food price fluctuations, and the socio-economic dynamics of urban areas further compound these conditions. By identifying these barriers, this study is able to delineate the root causes impeding the effective realization of food self-sufficiency.

Table 1. Barriers to the Implementation of Food Self-Sufficiency Policy in Makassar City

Barrier Category	Description of Barrier	Implications for Food Self-Sufficiency
Structural	Depletion of agricultural land due to urban expansion (600 ha over 10 years).	Declining local food production capacity.
	Weak and unevenly distributed food distribution infrastructure.	Inequitable food access across sub-districts.
	High logistical costs.	Rising food prices and increased household burden.
Social	Low community participation in food production and distribution.	Weak sustainability of community-based food systems.
	Limited role of local actors (community organizations/farmer groups).	Restricted innovation and food production independence.
Institutional & Policy	Inter-agency fragmentation within government.	Weak coordination in the implementation of self-sufficiency programs.
	Insufficient ongoing evaluation of food policies.	Programs are non-adaptive to changing conditions.
	Limited integration with community social capital.	Policies are unresponsive to local needs.
External	Climate change (extreme weather, flooding, drought).	Risk of crop failure and production fluctuations.
	Global food price fluctuations.	Instability in domestic food supply and prices.
	Urban socio-economic dynamics.	Disparities in food access among population groups.

Source: Researcher documentation, 2025

Structural barriers represent the most tangible challenge to realizing food self-sufficiency in Makassar City. The contraction of agricultural land by 600 hectares over ten years reflects the significant pressures exerted by unregulated urbanization. Land previously productive for agriculture has increasingly been converted to residential, industrial, and urban infrastructure uses. The consequence is a decline in local food production capacity, resulting in increasing dependence on food supplies from other regions. This situation risks diminishing Makassar City's

food autonomy while heightening community vulnerability to distribution disruptions and food price increases.

In addition to land constraints, uneven distribution infrastructure has further destabilized the food system in Makassar. Inefficient distribution channels generate price disparities between sub-districts, particularly between the urban core and peripheral areas. High logistical costs exacerbate this condition by directly affecting the food prices paid by consumers. Ultimately, the burden on households increases, most acutely for low-income families. This underscores that food self-sufficiency is not solely a matter of production, but also of the sustainability of a just and efficient distribution system.

Social factors also weaken food self-sufficiency efforts in Makassar City. The low level of community participation in food production and distribution activities reflects a limited degree of public engagement in supporting local food security. Many urban residents prefer the service sector over agriculture, perceiving it as economically more promising. At the same time, local actors such as farmer groups face constraints related to capital, access to technology, and market networks. As a result, the sustainability of community-based food systems is difficult to develop, and grassroots innovation is unable to adequately address the continuously growing food demands of the urban population.

At the institutional and policy level, inter-agency fragmentation constitutes a significant barrier. Program overlaps, weak coordination, and insufficient cross-sectoral integration are common occurrences. Consequently, food self-sufficiency policies operate in a fragmented manner and fail to produce optimal outcomes. Furthermore, the absence of sustained evaluation leaves implemented policies unresponsive to emerging dynamics, such as climate change or shifting consumption patterns. Limited integration with community social capital further diminishes policy effectiveness, as programs misaligned with local needs tend to garner insufficient public support.

External constraints compound these challenges through the emergence of factors that are difficult to control at the local level. Climate change presents serious challenges through extreme weather events, flooding, and drought that directly affect agricultural productivity (Dahliana, 2025; Mahyudin et al., 2025). Global food price fluctuations add further uncertainty, as domestic commodity prices are subject to international market influences. Meanwhile, urban socio-economic dynamics create disparities in food access between higher-income groups and vulnerable populations. If left unaddressed, these conditions will widen social inequality while threatening family resilience as the fundamental unit of society.

The foregoing analysis demonstrates that the barriers to food self-sufficiency in Makassar City are multidimensional in nature, encompassing structural, social, institutional, and external factors. The complexity of these challenges necessitates an adaptive governance approach capable of responding flexibly and engaging multi-actor collaboration. By strengthening inter-agency coordination, promoting community participation, and integrating social capital with technological innovation, food self-sufficiency policy can be rendered more effective in enhancing family resilience. Without a transition to an adaptive policy approach, food self-sufficiency efforts will remain transient and incapable of addressing the dynamic challenges of the long term.

The Role of Adaptive Governance in Enhancing the Effectiveness of Food Self-Sufficiency Policy

Adaptive governance offers a more flexible and participatory framework for the formulation and implementation of food self-sufficiency policy (L Teneva et al., 2023). This approach enables local governments to establish stronger coordination with local actors, including farming communities, the private sector, and civil society organizations. Through multi-stakeholder collaboration, decision-making processes can be rendered more responsive to the genuine needs of communities and to changing environmental conditions.

The implementation of adaptive governance can be realized through several key strategies. First, strengthening institutional capacity to manage food systems through data-driven approaches and periodic evaluation. Second, promoting social capital-based policies that facilitate active community engagement in food production and distribution. Third, leveraging

agricultural technology innovation to enhance productivity and efficiency. Fourth, developing adaptive policy mechanisms that enable rapid adjustment in response to climate change, market dynamics, and social transformation. By implementing adaptive governance, food self-sufficiency policy in Makassar City can extend beyond a focus on production enhancement to the creation of a more resilient, inclusive, and sustainable food system, thereby directly reinforcing family resilience as the foundation of social welfare.

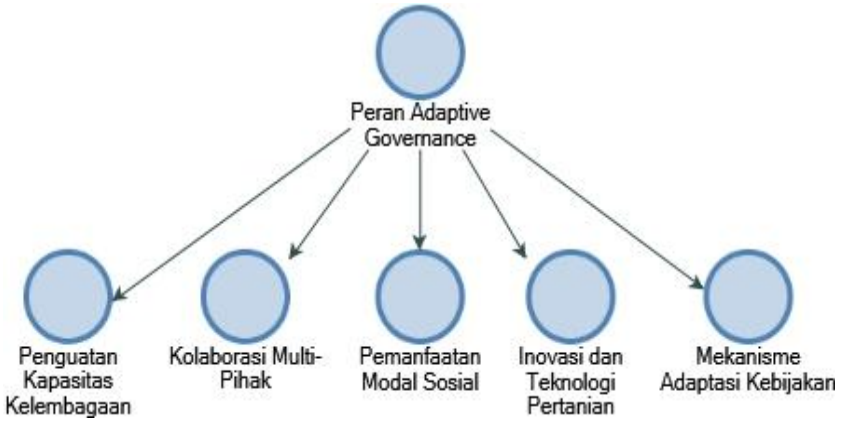

Figure 2. The Role of Adaptive Governance in Enhancing the Effectiveness of Food Self-Sufficiency Policy

Source: Processed by the researcher using NVivo 12 Plus, 2025

The role of adaptive governance in food self-sufficiency policy is of growing importance in the face of complex challenges confronted by large cities such as Makassar. This approach offers a flexible, participatory, and responsive framework attuned to environmental, social, and economic dynamics. With robust adaptive principles, food policy extends beyond production enhancement to ensure the long-term sustainability of the food system. Adaptive governance may therefore be understood as a corrective to the weaknesses of conventional governance models, which tend to be rigid and insufficiently responsive.

The first prominent step is the strengthening of institutional capacity. Local governments require data-driven systems and periodic evaluations to ensure that food policies remain continuously aligned with field realities. For instance, the implementation of a Food Security Information System in Central Java has demonstrated how digital data can predict food surpluses and deficits, enabling more efficient distribution management (Naja, 2024). If this model were adopted in Makassar, food policy could be more precisely calibrated to anticipate potential food insecurity.

Multi-stakeholder collaboration constitutes a further key instrument in adaptive governance. Food policy cannot be managed by government alone; it requires the support of farming communities, academics, the private sector, and civil society organizations. This collaborative approach renders decision-making more participatory and accountable. The example of One Village One Product (OVOP) in Japan illustrates the effectiveness of synergy between communities and government in developing superior local products (Anh, 2013). Makassar could emulate this approach to strengthen the competitiveness of local food products such as seaweed and processed fish.

A subsequent role is the utilization of social capital, encompassing the trust, norms, and social networks of communities. When social capital is effectively managed, community participation in maintaining food security increases significantly. The practice of the Village Granary (Lumbung Desa) in Yogyakarta provides a concrete example of how community solidarity can collectively guarantee food availability (Danugroho et al., 2025). For Makassar, strengthening farmer groups or fishing cooperatives through the spirit of mutual cooperation (gotong royong) could serve as an important instrument for equitable food distribution.

Adaptive governance also emphasizes the importance of agricultural innovation and technology. Urban conditions characterized by limited land necessitate creative solutions such as

urban farming, hydroponics, and vertical agriculture. The example of an aquaponics village (Kampung Akuaponik) in Karanganyar demonstrates that such innovations not only provide healthy food but also strengthen community self-reliance (Negara et al., 2024). By adopting comparable technologies, Makassar can utilize the limited spaces of its urban environment to sustainably enhance food productivity.

Adaptive governance thereby promotes the establishment of flexible policy adaptation mechanisms responsive to climate change, market dynamics, and social conditions. Vietnam's experience with Climate-Smart Agriculture (CSA) shows that agricultural policies can be designed to be more resistant to extreme weather and environmental change (Kodama et al., 2025). If implemented in Makassar, this approach would assist in managing the risks of tidal flooding and extreme weather events that have the potential to disrupt food production, particularly in coastal areas. Through these five strategies, adaptive governance can strengthen the effectiveness of food self-sufficiency policy while creating a resilient, inclusive, and sustainable food system.

The implications of implementing adaptive governance in food self-sufficiency policy in Makassar City include the establishment of a more resilient and inclusive food system. With data-driven institutional coordination, multi-actor participation, utilization of social capital, and adoption of agricultural innovations, food policy can extend beyond production enhancement to address the resilience of distribution and long-term sustainability. This will strengthen community resilience against food crises, reduce inter-regional access disparities, and encourage the active engagement of communities in safeguarding food availability. Furthermore, adaptive policy enables the government to respond more swiftly and effectively to climate change, market dynamics, and socio-economic disruptions.

Going forward, the Makassar City Government needs to follow up by establishing an integrated food information system, strengthening partnerships with farming and fishing communities and the private sector, and providing regulatory support and incentives for the adoption of innovative agricultural technologies. Academics can play a role as providers of evidence-based research, while civil society organizations can assist in ensuring transparency and public participation. Through this synergy, Makassar has the potential to become a city that is not only self-sufficient in food supply, but also a model for adaptive food governance in urban Indonesia.

CONCLUSSION

The findings of this study indicate that food self-sufficiency efforts in Makassar City continue to confront multidimensional challenges spanning structural, social, institutional, and external dimensions. Land depletion attributable to urbanization, weak distribution infrastructure, and high logistical costs have been demonstrated to reduce production capacity and widen inequities in food access. Additionally, low levels of community participation and the limited role of local actors compromise the sustainability of community-based food systems. At the institutional level, inter-agency fragmentation, insufficient ongoing evaluation, and limited integration with social capital cause food policies to operate in a fragmented and unresponsive manner. These challenges are further compounded by external factors including climate change, global food price fluctuations, and urban socio-economic inequalities.

To address this complexity, adaptive governance emerges as an alternative approach capable of strengthening the effectiveness of food self-sufficiency policy in Makassar. Through data-driven institutional capacity building, multi-stakeholder collaboration, utilization of social capital, adoption of agricultural technology innovation, and flexible policy adaptation mechanisms, Makassar City can build a more resilient, inclusive, and sustainable food system. The implementation of this model extends beyond a focus on production enhancement to ensuring equitable distribution, broad community participation, and stronger family resilience. With these strategic measures, Makassar has the potential to serve as a model city for adaptive food governance in Indonesia.

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