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Economic Development Strategies Based on Food Self-Sufficiency in Indonesia: An Ends-Ways-Means Analysis

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Abstract: This study analyzes economic development strategies based on food self-sufficiency using the Ends-Ways-Means framework. A qualitative approach employing literature review and policy analysis was adopted, drawing on government publications, statistical data, and scientific literature. Findings indicate significant progress: rice production increased 13.29% to 60.21 million tons in 2025, rice imports declined 57.17%, and the Prevalence of Undernourishment decreased to 7.89%. Strategies include irrigation rehabilitation, government purchase price adjustments, fertilizer subsidies, agricultural modernization, and dual-track land policy. However, regional disparities, budget absorption constraints (72.41%), and human resource limitations persist. Food self-sufficiency can serve as an economic development strategy supporting national resilience when underpinned by integrated policies, equitable resource distribution, institutional strengthening, and sustainable financing. The findings recommend stronger agricultural governance, closer coordination among ministries, higher budget absorption, and smaller regional food security gaps through affirmative action and fiscal incentives. The study extends strategic studies into development economics. It also shows how food self-sufficiency can drive inclusive growth and national resilience, supporting the "Golden Indonesia 2045" vision.

Keywords: Economic Development; Economic Resilience; Ends–Ways–Means; Food Security; Food Self-Sufficiency

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A. Introduction

Economic development is a strategic agenda that is a top priority for nearly all developing countries in their efforts to improve the well-being of their people in a sustainable manner (Amalia et al., 2022). Conceptually, economic development is not

only oriented toward increasing GNP and GDP but also toward income equality, poverty alleviation, improving quality of life, and strengthening human resources (Simanjuntak & Widodo, 2025). Its success is influenced by the quality of human resources, natural resources, technology, capital, political stability, governance, and sociocultural conditions.

Economic development is closely linked to food security because an adequate supply of nutritious food improves health, the quality of human resources, and labor productivity. Food security also plays a role in reducing malnutrition, alleviating the burden on the healthcare system, maintaining social stability, and boosting income, employment, and economic growth through multiplier effects (Lestari et al., 2021). Therefore, food self-sufficiency is no longer viewed merely as an agricultural issue but has evolved into a vital component of national resilience and state sovereignty (Dwi Agustini Herawati et al., 2025).

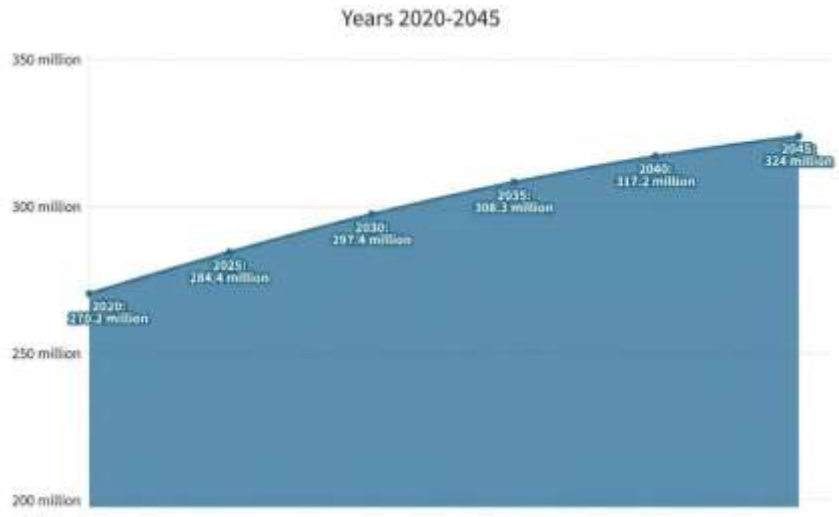


Figure 1. Projected Population of Indonesia, 2020–2045
Source: Central Bureau of Statistics (2023)

Based on the graph above, Indonesia's economic development toward the "Golden Indonesia 2045" vision faces both significant challenges and opportunities as the population is projected to reach 324 million by 2045, with an average annual population growth rate of 1.08% (Central Bureau of Statistics, 2023). This population increase will directly drive-up national food demand, making it difficult to meet food supply capacity because the rate of growth in food demand tends to outpace the increase in national production. As a result, a portion of the domestic food supply is still met through imports. The increasing reliance on food imports reflects the fact that national food self-sufficiency has not yet reached an optimal level, a situation influenced, among other factors, by low levels of investment and insufficient strengthening of the domestic food sector (van Berkum, 2021).

Food security is not only related to food availability but also encompasses the aspects of accessibility and affordability for the public. Over time, the FAO has expanded the concept of food security through six main pillars: availability, access, affordability,

stability, agency, and sustainability (Azhima et al., 2023). However, its implementation in Indonesia still faces challenges such as climate change, technological limitations, land-use conversion, and regional disparities in food distribution, all of which affect food production and public access to food.

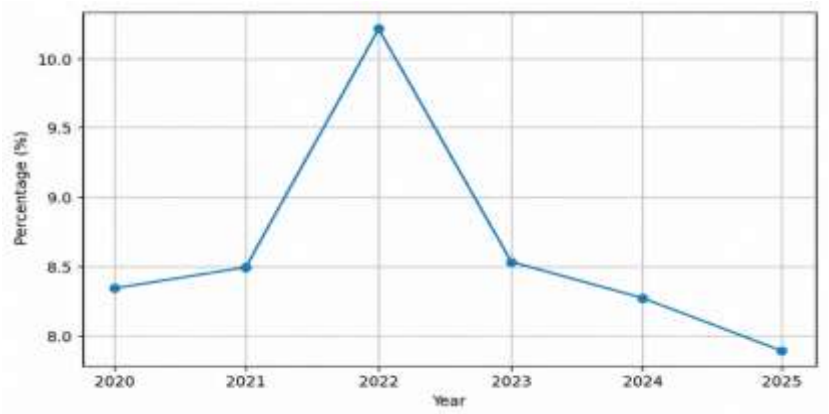


Figure 2. Prevalence of Undernourishment in Indonesia 2020-2025 Period
Source: Central Statistics Agency (2026a)

BPS data show that the prevalence of undernourishment (PoU) in Indonesia fluctuated between 2020 and 2025. The PoU rose from 8.34% in 2020 to 10.21% in 2022, then declined and is projected to reach 7.89% in 2025. Despite this decline, national food security still faces challenges, primarily due to regional disparities. In 2025, Central Papua will have the highest PoU at 32.30%, while West Nusa Tenggara will record the lowest at 2.67%. These conditions indicate that food security in Indonesia remains uneven and is still influenced by geographical factors, infrastructure, distribution, and the socioeconomic conditions of the population Bappenas & INDEF (2025).

Several previous studies on food self-sufficiency in Indonesia have primarily adopted sectoral and agricultural-technical approaches. S. Susanti et al. (2026) examined the implementation of sustainable food self-sufficiency policies in South Barito Regency using a qualitative-descriptive case study approach. They found that, although national policy instruments had been localized at the regional level, implementation remained constrained by inadequate infrastructure, limited human resources, and weak inter-institutional coordination. This study contributes to an understanding of policy implementation at the local level; however, it does not comprehensively integrate macroeconomic perspectives and national development strategies. Budiman & Santu (2024) analyzed government strategies and policies toward achieving the national rice self-sufficiency target through agricultural policy analysis. Their findings emphasized the effectiveness of the food estate program and agricultural intensification measures, yet their scope remained confined to the single commodity of rice without examining the broader strategic dimensions goals, methods, and resource allocationin an integrated manner.
Martani et al. (2025) found that the implementation of the Food Estate program continues to face gaps between policy objectives and field conditions, particularly regarding environmental sustainability and farmers' welfare. Therefore, achieving

food self-sufficiency demands strategies that transcend production-focused approaches and simultaneously strengthen the food system to support economic resilience and national autonomy. From a macro-policy perspective, Bappenas & INDEF (2025) analyzed the transformation of the food and agricultural sectors within the 2025–2045 National Long-Term Development Plan (RPJPN) and the 2025–2029 National Medium-Term Development Plan (RPJMN). This study provides an overview of national policy directions; however, it adopts a descriptive-normative approach and does not systematically analyze food self-sufficiency strategies using the Ends–Ways–Means framework. At the international level, Rusliyadi et al. (2019) identified gaps between food security policies and their implementation, particularly in terms of agricultural extension capacity and farmers' access to technology. Van Berkum (2021) highlighted the importance of trade in developing an inclusive and sustainable food system but did not examine strategies for increasing domestic food production in depth. Both studies do not comprehensively link food security with national economic development strategies.

Based on the previous literature, research on food self-sufficiency in Indonesia tends to examine production, food security, agricultural modernization, and government programs separately. Furthermore, relatively few studies have integrated food self-sufficiency strategies with national economic development through the Ends–Ways–Means framework proposed by Lykke (1997) Previous studies have also paid limited attention to recent food policy developments in 2025–2026, including irrigation rehabilitation, adjustments to grain prices, fertilizer subsidies, and the development of Food Estate programs.

Accordingly, this study addresses the research gap by analyzing economic development based on food self-sufficiency through the Ends–Ways–Means framework and the latest data from 2025–2026. This study examines how a national economic development strategy based on food self-sufficiency can be formulated through the establishment of strategic objectives (Ends), the formulation of strategies to achieve these objectives (Ways), and the optimization of available resources (Means). These strategic dimensions are directed toward strengthening economic resilience, achieving food self-reliance, and increasing the contribution of the agricultural sector to the national economy. The findings are expected to provide evidence-based recommendations for reducing dependence on food imports while contributing theoretically to the application of the Ends–Ways–Means framework in the context of national economic development.

B. Methods

This study employs a qualitative approach using desk research combined with policy analysis (Creswell & Poth, 2018). This approach was chosen because it provides in-depth understanding through the use of available secondary data, thereby offering a comprehensive description of the implementation of food self-sufficiency and its impact on economic development. Secondary data were obtained from: (1) official government publications (Central Statistics Agency, Ministry of Agriculture, National

Development Planning Agency); (2) policy documents (Presidential Instruction No. 2/2025 on accelerating irrigation rehabilitation; Regulation No. 2/2025 on the HPP GKP; the 2026 fertilizer subsidy ceiling); (3) institutional reports and official media; and (4) scientific literature published between 2023 and 2026 that is indexed in Scopus or the databases of leading publishers. Data analysis employed qualitative content analysis (Flick, 2004) in three stages: (1) data reduction, which involves selecting and focusing on information relevant to the Ends–Ways–Means problem formulation; (2) data organization, which involves classifying findings into the categories of Ends (goals), Ways (strategies/methods), and Means (resources); and (3) drawing conclusions, which involves interpreting the relationships among the three strategic components and formulating policy recommendations. The Ends–Ways–Means framework used here is based on Lykke (1997) definition: Ends are the strategic goals to be achieved; Ways are the courses of action to achieve those goals; and Means are the resources (human resources, budget, technology, land) required. The balance among these three factors determines the sustainability and effectiveness of the strategy.

C. Results and Discussion

Measurement of Ends Achievement (Strategic Objectives)

The analysis of the *Ends* indicates that the strategic direction of national economic development based on food self-sufficiency has made significant progress across three main dimensions: (1) economic stability, (2) food self-sufficiency, and (3) the agricultural sector 's contribution to Gross Domestic Product (GDP). Food self-sufficiency plays a crucial role in maintaining economic stability, national resilience, and increasing farmers' incomes (Arsyad et al., 2020). The successful implementation of this strategy generates a multiplier effect across various economic sectors, thereby supporting more inclusive and sustainable growth.

Table 1. Indicators of National Economic Stability and Food Self-Reliance, 2024–2025

Indicator	2024	2025	Change (%)
Rice production (million tons of milled dry grain)	53.14	60.21	+13.29
Rice harvested area (million ha)	10.05	11.32	+12.69
Rice productivity (quintals/ha)	52.90	53.18	+0.54
Rice imports (thousand tons)	~1,050	~450	−57.17
Prevalence of Undernourishment (PoU) (%)	8.27	7.89	−4.60

Source: Ministry of Agriculture (2026b)

The data in Table 1 show that national rice production reached 60.21 million tons of paddy, an increase of 13.29% compared to 2024. This increase was driven by a 12.69% expansion in harvested area to 11.32 million hectares and a rise in productivity from 52.90 to 53.18 quintals/ha. Rice import volume decreased from approximately 1,050 thousand metric tons (2024) to 450 thousand metric tons (2025), reflecting an increase in domestic food self-sufficiency (Ministry of Agriculture, 2026b). The PoU index decreased from 8.27% to 7.89% (Central Statistics Agency, 2026a). Nevertheless, disparities between regions remain striking: Central Papua recorded a PoU of 32.30%,

while West Nusa Tenggara recorded only 2.67%, indicating that food security stability is not yet geographically uniform (Bappenas & INDEF, 2025).

Table 2. Examines The Contribution of The Agricultural Sector to National GDP

Sector / Sub-sector	GDP Contrib 2024 (%)	GDP Contrib 2025 Q3 (%)	Change
Agriculture, forestry, and fisheries	12.61	13.10	+0.49
-- Food crop sub-sector	2.19	2.30	+0.11
-- Horticulture sub-sector	1.39	1.36	−0.03
-- Plantation sub-sector	4.17	4.51	+0.34

Sources: Central Statistics Agency (2024); Rahmatika (2026)

The agriculture, forestry, and fisheries sectors showed an increase in their contribution to GDP, from 12.61% (2024) to 13.10% (Q3 2025), up 0.49 percentage points. This increase was primarily driven by the plantation subsector (+0.34 percentage points) and the food crops subsector (+0.11 percentage points), while the horticulture subsector experienced a slight decline (-0.03 percentage points). These conditions indicate that the agricultural sector continues to play a strategic role in supporting the national economy, particularly through the strengthening of the plantation and food crops subsectors as part of food-self-sufficiency-based economic development (Central Statistics Agency, 2024; Rahmatika, 2026).

Geographically, three provinces on the island of Java account for the largest rice production: East Java (~6.02 million metric tons), West Java (~5.78 million metric tons), and Central Java (~5.32 million metric tons) (Rendanianti, 2026). Rice is a strategic commodity, accounting for 85.28% of total consumption. In 2025, national rice production increased to 60.37 million metric tons of paddy from 53.14 million metric tons in 2024, as the harvested area expanded to 11.36 million hectares. Rice production reached 34.34 million metric tons, exceeding national consumption of 30.81 million metric tons, resulting in a rice surplus for Indonesia (Rendanianti, 2026). However, regional disparities in production and consumption—such as the rice deficit in West Java indicate that ensuring equitable production and distribution remains a challenge. Bappenas & INDEF (2025) emphasizes that the transformation of the food and agricultural systems must be directed toward strengthening value chains, fostering innovation in the processing industry, and modernizing the agricultural sector to boost productivity and its contribution to national economic growth.

Measurement of Ways (Strategy Implementation)

Analysis of governmental policy documents reveals that, according to the Ministry of Agriculture (2026c), the strategic pursuit of food self-sufficiency can be organized around four principal pillars:

1. Strengthening agricultural infrastructure, particularly irrigation systems, farm access roads, storage facilities, and post-harvest equipment;
2. Reinforcing pricing policies and subsidies, ensuring guaranteed access to production inputs;

3. Modernizing and digitizing agriculture through mechanization, technological innovation, and data utilization;
4. Implementing dual-track land policy, combining productivity enhancement on existing farmland with agricultural land expansion through intensification and optimization of potential lands.

The urgency of this policy is reflected in Presidential Instruction No. 2 of 2025, issued to accelerate the construction, improvement, rehabilitation, and operation and maintenance of irrigation networks to support national food self Coordinating Ministry (2025) This instrument identifies infrastructure development, mechanization, the development of rain-fed land, post-harvest handling, warehousing, and market access as operational strategies for food self-sufficiency. More recent strategies emphasize deregulation, the transformation of traditional agriculture into modern agriculture, the optimization of peatland, and the strengthening of farmer pricing policies. These policies are driven by the fact that approximately 60% of the irrigation networks are not yet functioning optimally to meet agricultural water needs. According to Minister of Agriculture Amran, as quoted in a Ministry of Agriculture (2026c), there are two main steps that serve as the pillars for accelerating food self-sufficiency: deregulation and the transformation of agriculture from traditional to modern practices. The modernization of agriculture through the adoption of mechanization, increased labor efficiency, optimization of cropping patterns, strengthening agricultural commodity pricing policies, and utilizing potential land can increase productivity and reduce production costs, while simultaneously boosting farmers' income and welfare, strengthening national food reserves and availability, and establishing the agricultural sector as one of the main foundations for achieving sustainable economic stability and food self-sufficiency in Indonesia.

The latest scientific studies confirm that food self-sufficiency must be built on the principle of sustainability. According to W. I. Susanti et al. (2024), who outlines agroecological nutrient management strategies to achieve sustainable rice self-sufficiency in Indonesia, and Faoziyah et al. (2024), whose research predicts a more severe increase in food vulnerability by 2045 and emphasizes intensification rather than land expansion. These two findings underscore the importance of designing strategies that are responsive to environmental and land-use pressures.

Naufal Nur Mahdi (2025) achieving food self-reliance in Indonesia requires a strategy focused on sustainability, sovereignty, and enhanced competitiveness through policy transformations that are adaptive to climate change, land degradation, productivity stagnation, and supply chain vulnerabilities, by strengthening domestic production of strategic commodities such as rice and corn which already meet more than 90% of national demand while reducing import dependence on soybeans, granulated sugar, and beef.

Table 3. Implementation of Agricultural Irrigation Rehabilitation for the 2025 Period

Phase	Target (hectares)	Primary Implementation	Teriary Implementation	JIAT Implementation	Primary Achievement (%)
Phase 1	280.880	Not specified	Not specified	Not specified	99,93
Phase 2	225.775	83,46%	98,66%	92,25%	83,46

Source: Ministry of Agriculture (2026a)

Note: JIAT = Groundwater Irrigation Network. Achievement percentages are calculated based on the ratio of actual implementation to the target for each component.

The irrigation rehabilitation achievement was exceptionally high in the first phase (99.93%), while the second phase ranged from 83.46% to 98.66%. The urgency of irrigation rehabilitation stems from the fact that approximately 60% of the national irrigation network is not yet functioning optimally in meeting agricultural water needs (Ministry of Agriculture, 2026a). Presidential Instruction No. 2 of 2025 served as a catalyst for acceleration, demonstrating that top-level political commitment is a strategic prerequisite for addressing the long-standing agricultural infrastructure deficit (Martani et al., 2025). Evidence from West Java shows that rehabilitated tertiary irrigation networks, along with mechanization and retention ponds, help sustain rice production and mitigate the impacts of climate change (Jamil & Chairunnisya, 2023).

Table 4. Summarizes The Key Price and Subsidy Policies Implemented During 2025–2026

Policy Type	Value / Allocation	Period	Legal Basis
Government Purchase Price (HPP) for Wet-Paddy (GKP) at Farmer Level	Rp6,500/kg	15 Jan 2025-present	BAN Food National Board Regulation No. 2/2025
Previous HPP	Rp6,000/kg	2024	BAN Food National Board Regulation No. 4/2024
Subsidized fertilizer allocation (food crops)	9,550,000 tons	2026	Food National Body Regulation No. 2 of 2025
Subsidized fertilizer allocation (fisheries)	295,676 tons	2026	Minister of Agriculture Regulation No. 1397/Kpts/HK.130/M/12/2025
Subsidized fertilizer budget envelope 2026	Rp46.87 trillion	2026	DIPA BUN No. SP DIPA-999.07.1.984149/2026
Fishery sector subsidized fertilizer budget component	Rp941.47 billion	FY 2026	Fisheries economy budget policy

Source**:** Ministry of Agriculture (2026b)

The escalation of the government purchase price for wet paddy from Rp6,000 to Rp6,500 per kilogram represents a pivotal instrument for enhancing farmer production incentives. This policy rests on the premise that adequate government purchase prices can stabilize farmer incomes, reduce the motivation for land

conversion, and encourage productive intensification (Ali & Makhasin, 2025). Correspondingly, the allocation of 9.55 million tons of subsidized fertilizer with a budget envelope of Rp46.87 trillion in 2026 ensures sufficient availability of production inputs at the grassroots level to support optimal land productivity realization. The allocation of 9.55 million metric tons of subsidized fertilizer, with a budget ceiling of Rp46.87 trillion in 2026, ensures that production inputs are available at a sufficient level to support the optimization of land productivity (Central Statistics Agency, 2026b).

Regarding digitalization, smart farming implementations based on Internet of Things (IoT) technology have begun to be adopted progressively. Rachmawati (2021) noted that precision agriculture technologies including soil sensors, drones, big data analytics, and automation systems enable more precise cultivation management. Empirical research by Kusumaningsih (2023) confirmed that improved access to agricultural information through mobile phones significantly enhances the technical efficiency of rice farming enterprises, as farmers are able to make more informed decisions regarding planting timing, fertilization schedules, and pest control measures.

The dual-track land policy combines two complementary approaches: intensification on existing cultivated land (targeting 500,000 hectares) and extensification through new paddy field creation (realized 225,000 hectares in 2025, targeting 480,000 hectares in 2026) (Indonesian Ministry of Communication and Digital Affairs, 2025). This dual strategy is designed to curb the rate of land-use conversion while expanding productive cropland. This dual strategy is designed to curb the rate of land-use conversion while expanding productive cropland. However, studies of system dynamics suggest that the focus should be on intensification, not land expansion (Faoziyah et al., 2024).

Measurement of Means (Resource Availability)

The results of the mean analysis identified three main categories of resources that support the implementation of the food self-sufficiency strategy: (1) land and production, (2) financing, and (3) human resources.

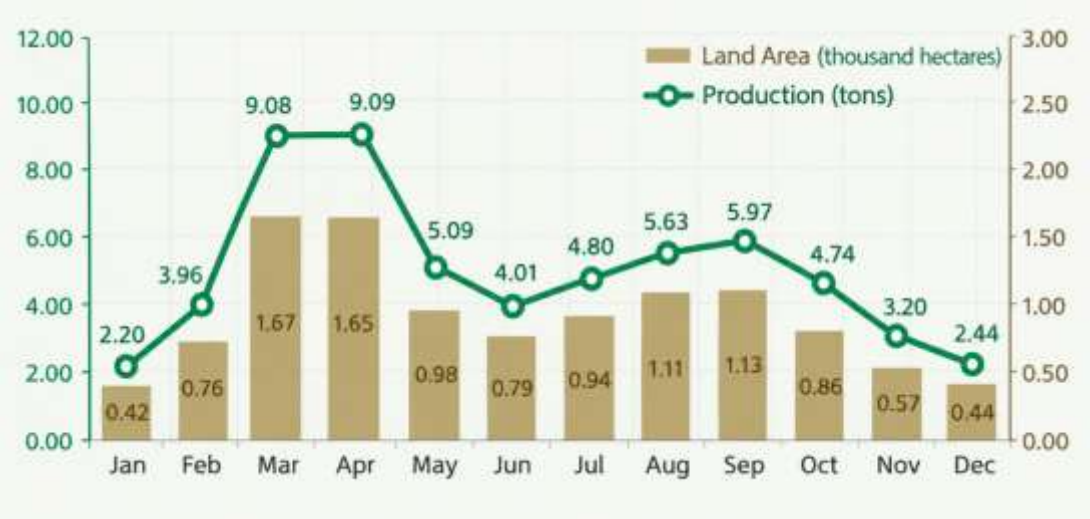


Figure 3. Rice Harvest Area and Production in Indonesia, 2025
Source: Central Statistics Agency (2026b)

By 2025, Indonesia will possess substantial agricultural resources, as evidenced by a rice harvested area of approximately 11.32 million hectares with a production of 60.21 million metric tons of paddy, support from 28.42 million farming households, the potential of 7.9 million hectares of state-owned land for land expansion outside protected and licensed areas, as well as a food security budget allocation of Rp155.5 trillion directed, among other things, toward developing 225,000 hectares of new rice fields and intensifying 80,000 hectares of land, with implementation as of October 2025 reaching approximately 160,500 hectares (Central Statistics Agency, 2026b).

For the 2025–2026 period, the government is strengthening funding for the agricultural sector and food security through budget increases and investments in various strategic subsectors. The Ministry of Agriculture has been allocated approximately Rp40–40.15 trillion in the 2026 Draft State Budget (RAPBN), while the 2025 budget execution is targeted to reach Rp29.93 trillion or 93.79% of the Rp31.91 trillion allocation with budget absorption through November 2025 totaling approximately Rp22–22.53 trillion, or 72.41%. The government is also strengthening the role of Perum Bulog through investments of Rp16.6 trillion for rice reserves and Rp5.5 trillion for corn reserves in 2025, as well as providing up to Rp5 trillion in post-harvest infrastructure support. In 2026, the government has allocated approximately Rp22.73 trillion in funding, with total OIP funding of around Rp39.1 trillion to support the procurement of strategic food commodities. Meanwhile, PTPN is expanding its investments through the food estate program, corn land optimization, and integrated downstream processing, with a national investment target of approximately US$7 billion or Rp117 trillion through Danantara. This strengthened financing is further complemented by a 2026 fertilizer subsidy allocation of Rp46.87 trillion (Emedia DPR RI, 2025).

Human resources are a strategic factor that determines the success of achieving food self-sufficiency. According to the 2023 Agricultural Census, the number of agricultural households in Indonesia reached 29,341,033 (Central Bureau of Statistics, 2023).

However, the large number of agricultural entrepreneurs must be balanced with improvements in the quality of human resources through extension services, training, technology demonstrations, and mentoring. The application of these technologies has been proven to increase land management efficiency, soil productivity, and optimize agricultural yields (Lusiana Dewi et al., 2026). The FAO emphasizes that enhancing farmers' capacity through extension services, technological innovation, and institutional strengthening is a key prerequisite for increasing agricultural productivity while achieving a sustainable food system (FAO, 2024). However, the large number of agricultural entrepreneurs must be balanced with improvements in human resource quality through extension services, training, technology demonstrations, and mentoring. Research in Ethiopia indicates that extension services tailored to farmers' needs are a key determinant of the successful adoption of digital technologies (Gizachew et al., 2024).

From a financing perspective, the Ministry of Agriculture's budget, which will reach Rp40.145 trillion in 2026 (a substantial increase from the 2025 actual expenditure of Rp22.5 trillion, or 72.41%), demonstrates a strong fiscal commitment (Lusiana Dewi et al., 2026). However, the 2025 budget realization rate, which reached only 72.41%, indicates an absorptive capacity gap that needs to be addressed by strengthening bureaucratic capacity at the regional level (Ministry of Agriculture, 2026c). This finding is consistent with S. Susanti et al. (2026), who noted that limited human resources and weak inter-agency coordination hinder the implementation of self-sufficiency policies at the local level.

Discussion

This research question examines how Indonesia's economic development strategy based on food self-sufficiency is structured through the establishment of goals (Ends), methods (Ways), and resources (Means). The results show that strategic objectives including economic stability, food self-sufficiency, and the agricultural sector's contribution to GDP are moving in the desired direction: rice production increased by 13.29%, rice imports decreased by approximately 57%, and the food-to-GDP ratio (PoU) fell from 8.27% to 7.89%. The approach adopted encompasses four pillars: infrastructure, pricing and subsidy policies, modernization, and a two-track land policy, while resources include land, the budget, and farming households. The Ends–Ways–Means framework is well-suited for application because it requires these three elements to be interrelated for a strategy to be considered robust (Moon, 2024). The analysis indicates alignment at the design level, but there are gaps in implementation, particularly regarding budget absorption, institutional coordination, and equity across regions.

Consistency with Previous Research Findings

The results of this study on the function of irrigation infrastructure are consistent with previous studies. Prayuginingsih et al. (2024) found that the development of irrigated areas, coupled with increased crop yields, is a key strategy for achieving rice self-

sufficiency in Indonesia. Jamil & Chairunnisya (2023) found that the rehabilitation of tertiary irrigation networks, mechanization, and the construction of retention ponds support increased rice production in West Java amid the pressures of climate change. In China, investment in irrigation substantially increased total factor productivity in the food agriculture sector (Zhou et al., 2025). Thus, the irrigation rehabilitation carried out in 2025 is on a path supported by empirical evidence both domestically and internationally.

The finding that productivity and intensification should be the focus is also consistent with the literature. According to Faoziyah et al. (2024), the importance of intensification over the expansion of agricultural land is emphasized, amidst growing pressure for land conversion in Java. An analysis of 65 countries along the New Silk Road indicates that crop yield per unit of land has the most significant positive impact on grain supply Qu et al. (2024), Furthermore, W. I. Susanti et al. (2024) incorporate sustainability aspects through agroecological nutrient management strategies to achieve rice self-sufficiency. All three support a dual-track land policy that emphasizes both intensification and the development of new rice paddies.

Regarding modernization and human resources, the findings of this study align with those of Kusumaningsih (2023), who found that access to information via cell phones can improve the technical efficiency of rice farming, as well as the study by Gizachew et al. (2024) which found that the adoption of digital devices increases the productivity and income of smallholder farmers. Ansari et al. (2023), emphasize that climate-hydrology-crop models are only reliable if improvements are made to the availability and quality of data, making the digitization of agricultural data a critical prerequisite for climate adaptation. S. Susanti et al. (2026), also indicate that inadequate infrastructure, labor shortages, and ineffective interagency coordination hinder policy implementation at the local level, and these findings align with the underutilization of the budget identified in this study.

The six-pillar framework for food security discussed by Azhima et al. (2023) helps illustrate that recent production gains have focused on the availability pillar, while the pillars of access, stability, agency, and sustainability still need to be strengthened. The experience of Guangdong Province shows a similar pattern: improving food security requires the protection of agricultural land, more advanced technology, a focus on reducing post-harvest losses through storage management, and interagency cooperation (Xiao et al., 2025). Finally, the government's purchase price policy in this study is consistent with evidence from India showing that net government purchases prevent extreme market price declines and mitigate price volatility (Tripathi, 2024).

Contradictory Findings and Counterbalancing Perspectives

There are a number of previous findings that do not fully support the results of this study. First, a study by Gnedeka & Wonyra (2023) found that open trade significantly increased food security in 37 countries in Sub-Saharan Africa, although the impact worsened in the presence of political instability. This finding challenges the belief that

import restrictions always strengthen food security and serves as a reminder that self-sufficiency must be supported by trade as a foundation. Second, Wassénius et al. (2023) indicate that only about one-third of the global population lives in countries with the potential for full self-sufficiency, and many production systems depend on a small number of commodities. This situation suggests that total self-sufficiency is not a universally applicable requirement and that an emphasis on rice risks sidelining food diversity.

Third, Zhou et al. (2025) show that investment in irrigation increases productivity, but its marginal benefits and rate of return tend to decline, suggesting potential allocative inefficiencies. Fourth, Tripathi (2024) finds that government procurement policies in India can keep prices low, but the release of stockpiles has not been able to control price increases. Fifth, Martani et al. (2025) and Juhandi et al. (2023) identified a gap between policy and implementation, as well as the still-moderate level of sustainability of food estates. These findings highlight the need to evaluate irrigation, pricing, and food estate policies in Indonesia based on allocative efficiency, price stability, and sustainability not merely on production increases.

Comparison with Findings from International Research

Compared to international studies, Indonesia exhibits a pattern very similar to China's, differing only in the nature of its constraints. China's policies prioritize self-sufficiency as a response to disruptions caused by disasters, pandemics, and conflicts, while also grappling with challenges such as land and water scarcity and the impacts of climate change. Meanwhile, Indonesia faces similar land and climate challenges, compounded by constraints in irrigation infrastructure and implementation capacity (Xiao et al., 2025). At the regional level, Qu et al. (2024) found that more than 58% of countries along the New Silk Road experience food insecurity, particularly in West Asia–the Middle East and Southeast Asia, with GDP growth exerting the greatest pressure on the balance between supply and demand. These findings indicate that economic growth must be accompanied by increased productivity to maintain food self-sufficiency, meaning Indonesia needs to strengthen sustainable investments in productivity.

In terms of food policy, Tripathi (2024) shows that price interventions have both benefits and consequences, while Gnedeka & Wonyra (2023) find that trade can strengthen food security under stable political conditions. From a technological perspective, Gizachew et al. (2024) show that digitalization boosts productivity and income when supported by adequate infrastructure and extension services. Globally, Wassénius et al. (2023) emphasize that food security depends on a balance between domestic production and trade; therefore, Indonesia's strategy must strengthen self-sufficiency in strategic commodities without restricting trade.

Mechanisms Through Which Food Self-Sufficiency Influences Economic Development

Theoretically, food self-sufficiency can contribute to economic development through four mechanisms: the income effect, the employment effect, the trade balance effect, and the fiscal multiplier effect. An increase in the purchase price of unhusked rice from Rp6,000 to Rp6,500 per kilogram has the potential to increase farmers' income. Assuming an average farm yield of 5.5 metric tons per hectare per season, a Rp500 per kilogram increase in the HPP generates an additional gross income of Rp2.75 million per hectare per season, which is significant in aggregate for 29.34 million farming households, while downstream processing and agroindustry can expand non-agricultural employment opportunities in rural areas (Bappenas & INDEF, 2025). A reduction in rice imports from approximately 1,050 thousand to 450 thousand metric tons has the potential to save foreign exchange and improve the trade balance, while the Ministry of Agriculture's spending of Rp40.145 trillion and fertilizer subsidies of Rp46.87 trillion can stimulate economic activity within the agribusiness ecosystem. These four mechanisms constitute an analytical framework that has not yet been quantitatively tested.

Critical Issues and Policy Implications

Integrating empirical findings with the theoretical framework identifies three critical issues. First, regional disparities in food security. Although the national PoU figure has declined, interprovincial disparities remain extremely pronounced, and Java as the only surplus region faces development pressures (Faoziyah et al., 2024). The policy recommendation is to strengthen regional support through proportional allocation of resources, particularly for Eastern Indonesia, and fiscal incentives for regions with a low Food Security Index. Second, the low budget absorption rate at the Ministry of Agriculture poses a challenge, as it indicates that the implementation of agricultural programs is not yet optimal. A budget realization rate of 72.41% as of November 2025 suggests that a portion of the allocation has not been effectively utilized, which could hinder the achievement of program targets and reduce the impact of agricultural spending on productivity. This situation needs to be addressed through the simplification of procurement procedures, real-time budget monitoring, and strengthened interagency coordination, as demonstrated by the experience in Guangdong (Xiao et al., 2025) and regional implementations in Indonesia (S. Susanti et al., 2026). Third, the transformation of agricultural human resources is necessary because the existence of 29.34 million farming households does not yet guarantee improvements in quality and productivity. Strengthening extension services, vocational education, competency certification, and incentives for the younger generation to adopt smart farming can enhance farmers' capacity and competitiveness. This is supported by Gizachew et al. (2024), who demonstrate that the relevance of extension services and the availability of digital infrastructure influence technology adoption.

Overall, the Ends–Ways–Means analysis indicates that Indonesia possesses the objectives and resources to support food self-sufficiency based economic development, but its effectiveness depends on improvements in governance and the implementation of inclusive and sustainable policies. Indonesia's food-self-sufficiency-based economic development strategy has a solid foundation in terms of both objectives and resources. The main challenge lies in shifting from policy formulation to effective, inclusive, and sustainable implementation a transition that requires fundamental reform of national agricultural governance.

This study has three theoretical implications. First, the Ends–Ways–Means framework can be applied to civil development policies because it connects objectives, instruments, and resources (Moon, 2024). Second, implementation gaps highlight the need to incorporate dimensions of implementation capacity and feedback so that the analysis does not merely assess the appropriateness of policy design. Third, "Ends" can be linked to the six pillars of food security (Azhima et al., 2023). Ameaning that self-sufficiency must be understood in a multidimensional way. Evidence of the benefits of trade for food security (Gnedeka & Wonyra, 2023); (Wassénius et al., 2023). Also suggests that self-sufficiency is better viewed as a continuum rather than a binary condition. The limitations of this study namely, reliance on secondary data and provisional figures for 2025–2026, as well as the lack of quantitative measurements of the impact of each policy instrument are outlined in the Limitations section below.

D. Conclusions

This study shows that economic development based on food self-sufficiency strengthens national economic resilience through three key findings. First, strategic objectives show progress: rice production in 2025 increased by 13.29% to 60.21 million metric tons of paddy, rice imports fell from approximately 1.05 million metric tons to approximately 0.45 million metric tons, the agricultural sector's contribution to GDP rose from 12.61% to 13.10%, and the PoU decreased to 7.89%. Second, the strategies pursued namely, irrigation rehabilitation, government purchase prices, fertilizer subsidies, agricultural modernization, and a dual track land policy are consistent with international empirical evidence, while budgetary resources, land, and the agricultural labor force are substantial. Third, challenges remain regarding interregional disparities (PoU in Central Papua at 32.30% compared to 2.67% in West Nusa Tenggara), the Ministry of Agriculture's budget absorption rate, which stood at only 72.41% as of November 2025, and human resource capacity. Theoretically, the Ends–Ways–Means framework has proven useful for assessing the alignment of food security strategies, but it needs to be supplemented with an implementation capacity dimension because the main gaps lie in execution, not in design. Comparative findings indicate that trade, the efficiency of irrigation investments, and price impacts need to be considered so that food self-sufficiency does not incur hidden costs. In terms of practical implications, the government needs to strengthen coordination across ministries and local governments, allocate budgetary support to food-insecure regions particularly in Eastern Indonesia accelerate budget disbursement through streamlined procurement and real-time monitoring, prioritize intensification over land expansion,

and enhance farmers' capabilities through extension services and the adoption of appropriate technologies. Policies that have successfully increased production must continue to be sustained through investments in productivity, land protection, and climate risk management. For future research, it is recommended to use quantitative or mixed-methods approaches to examine the impact of each policy instrument on farmers' income, productivity, poverty, food inflation, and economic growth, including field studies in areas with high food vulnerability and cross-commodity comparisons beyond rice.

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F. Author Contributions

Windy Widya Putri contributed to the design concept and implementation of the research, analysis of the results, and writing of the final manuscript. Sri Murtiana and Guntur Eko Saputro were involved in planning and supervising the work, processed the data, performed the analysis, drafted the manuscript, and designed the figures. Sri Murtiana developed the theory Guntur Eko Saputro verified this analytical method. Sri Murtiana investigates and supervises the findings of this study. All authors discussed the results and contributed to the final manuscript.

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H. Data availability

All data generated or analysed during this study are included in this published article.

I. Declarations

Ethics approval and consent to participate

The study was approved by the Ethics Committee of the Universitas Pertahanan, West Java, Indonesia. No participants in this study.

J. Competing Interests

The authors declare no competing interests

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