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Strategic Priorities of Poverty Alleviation and Reducing the Prevalence of Undernourishment in Central Java

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Abstract

In the Draft Regional Regulation of the Central Java Province RPJPD 2025-2045, Central Java Province has a vision as a national food support. However, Central Java as a national food provider has a handful of food problems. According to data from the Central Statistics Agency (BPS), the PoU value of Central Java has tended to increase since 2018. This means that the population of Central Java who consume substandard food is increasing every year. The increase in the PoU value in Central Java could be due to the high poverty rate in Central Java, which makes it unable to access food. This study aims to further analyze Central Java's strategy to maintain food security in order to reduce the poverty rate and PoU value. The analysis method uses Analytic Hierarchy Process (AHP) analysis with food security measurements from the Food and Agriculture Organization (FAO), namely access, stability, utilization and availability. The results showed that Improving the quality of food crops (Rank 1; GW 0.145), Developing weather modification technology (Rank 2; GW 0.085) and On-farm and off-farm expansion (Rank 3; GW 0.085) are the top priority policy strategies that Central Java can do in reducing the PoU value and reducing poverty. Market guarantee (Rank 15; GW 0.023), Ease of distribution of food crops (Rank 14; GW 0.034), and Improving food market information and transparency (Rank 13; GW 0.034) can be used as supporting strategies to reduce the value of PoU and alleviate poverty in Central Java in the long term.

Keywords: *Access, Availability, Food Security, Stability, Utilization.*

Introduction

Food security is a key issue in the fulfillment of community welfare because it will determine the economic, social and political stability of a country [1,2,3]. The concept of *food security* began to develop in the 1970s along with the food crisis and world hunger, especially in Asia and Africa [4, 5, 12, 17, 20, 23]. Initially, food security only focused on the provision of food at the national and international levels, especially grains [9,10,11]. Thus, at the beginning of the New Order era, Indonesia's resilience policy was based on food provision [12]. According to the Food and Agriculture Organization (2009) in establishing food security is based on three main aspects, namely (1) Food *availability*, the physical availability of food in the area obtained from domestic production, import/trade or food aid. Food availability is more determined by domestic production. (2) food *access*, the ability of households to obtain sufficient food, whether it comes from their own production, purchase, barter, gifts, loans, and assistance or from all five. While (3) food *utilization* can be seen from the use of food by households and the ability of individuals to absorb and metabolize nutrients and (4) food stability [6,7,8,31].

In the Draft Regional Regulation of the Central Java Province RPJPD 2025-2045, Central Java Province has a vision as a national food support. This is because Central Java Province has characteristics as a strategic area for the development of the food sector. Central Java Province has the contribution of GRDP in the agricultural sector ranked first nationally in 2023 and is the third largest rice producer in Indonesia with a production value of 9,084,107.53 tons.

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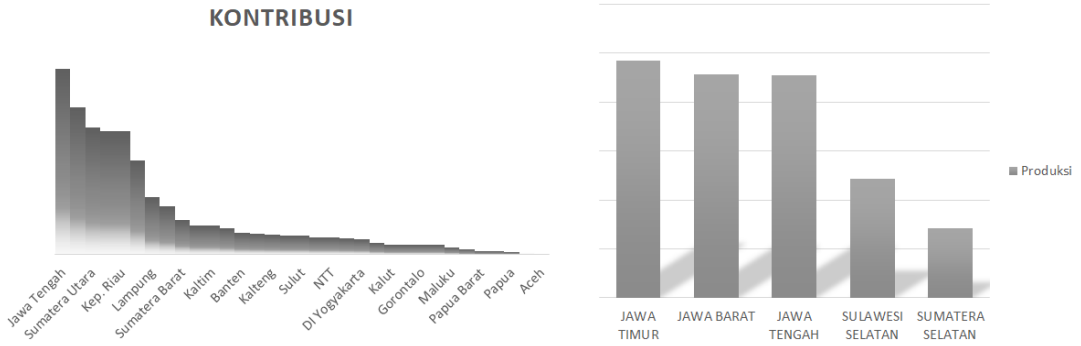

Figure 1. Contribution of National Agricultural GRDP in 2023 (Billions) and Largest Rice Production in Five Provinces in 2023 (Tons)

Sources: Central Statistics Agency, 2024

A key indicator of food development is reflected by the *Prevalence of Undernourishments* (PoU) indicator which identifies how much of the population consumes food below the recommended energy adequacy standard [13,14,18,19]. The higher the PoU value, the more the population consumes food below the adequacy standard [21]. However, Central Java as a national food supplier has a handful of food problems. According to data from the Central Statistics Agency (BPS), the PoU value of Central Java has tended to increase since 2018. This means that the population of Central Java who consume substandard food is increasing every year. The increase in the PoU value in Central Java could be due to the high poverty rate in Central Java, which makes it unable to access food.

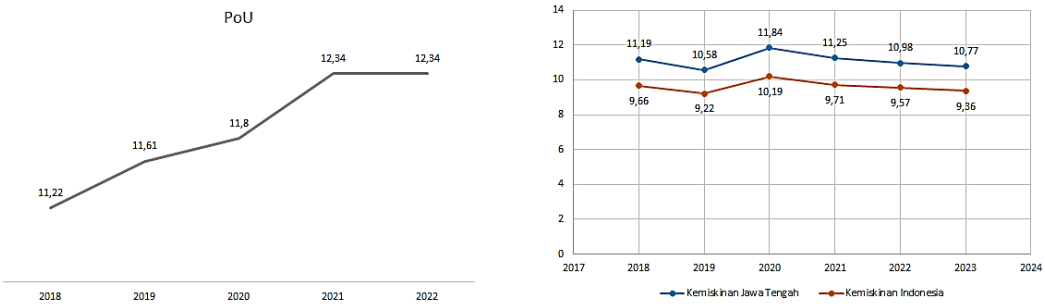

Figure 2. Percentage of PoU in Central Java (Percent) and Poverty Rate in Central Java and Indonesia (Percent)

Sources: Central Statistics Agency, 2024

Central Java's inability to access food is closely related to its poverty. The poor generally spend about three-quarters of their income on staple foods, making them vulnerable to high food prices [1,4,9,21,24,29]. In addition, the poor rely on the agricultural sector, making them vulnerable to volatility in production [15, 16, 31]. When food prices rise or incomes fall, the poor will tend to choose lower-priced foods, failing to adequately meet their nutritional needs [2, 8]. Maintaining food security can be an alternative strategy to reduce poverty and PoU impairment [5]. If food productivity increases, it will increase income, especially for farmers. This increased income will encourage farmers to spend their income to consume various consumer goods and non-agricultural services [10]. Cumulatively, there will be an improvement in the economy, thereby reducing poverty. In addition, an increase in productivity will make food prices affordable, enabling all poor people to consume a diet that is high in nutrients and will ultimately reduce the PoU [3, 5, 11].

Seeing the urgency of the problems faced by Central Java as a food supplier, namely the increasing population consuming substandard food due to the high poverty rate even though Central Java has the characteristics of a strategic area for the development of the food sector, specifically the purpose of this study is to conduct further analysis of Central Java's strategy to maintain food security in order to reduce poverty levels and PoU values. The novelty of this research is to use the four dimensions of food security from the *Food and Agriculture Organization* (FAO), namely *access*, stability, *utilization* and *availability* using *Analytic Hierarchy Process* (AHP) analysis to develop priority strategies that can be carried out by the Central Java government in maintaining food security.

Research Methods

This research uses quantitative research using the *Analytical Hierarchy Process* (AHP) analysis tool. From a theoretical perspective, several studies have also utilized the AHP approach to develop PoU values for factors causing poverty, as in the following table:

Table 1. Relationship between PoU and Poverty Causal Factors

	Food Availability	Food Access	Food Utilization	Food Stability
Economic	(Abbade, 2017; Adeyeye, 2017; Carson and Boege, 2020)			
Social		(Battersby and Watson, 2018; Ben and El, 2022)	(Calloway et al., 2023; Caroline et al., 2020; Fajobi et al., 2023)	
Environmental and Infrastructural				(Gassner et al., 2019; Mulyo et al., 2023; Tushar et al., 2023)

Data collection in the AHP analysis was carried out using a questionnaire filled out by experts. The questionnaire consists of two parts:

a. The first is a pairwise comparison between indicators to determine which of them has a greater influence or is more important through a numerical scale of 1-9.

b. The second is a pairwise comparison between attributes or sub-indicators to determine which of them has a greater influence or is more important through a numerical scale of 1-9.

Then the data that has been collected is input into the Expert Choice software for further analysis. AHP analysis is divided into three parts:

a. Pairwise comparison analysis between indicators to compare which indicators are most prioritized.

b. Pairwise comparison analysis between attributes to compare which attributes or sub-indicators are most prioritized.

c. Sensitivity analysis to be able to see the feasibility of respondents' opinions to be used as a basis for decision making with AHP. Sensitivity analysis can be carried out for both criteria and sub-criteria. Sensitivity analysis relates to the question of whether the final result will always be stable if there is a change in input, either assessment or priority.

Results and Discussion

Statistical Results of Respondent Data

The respondents in this study consisted of 42.86% women and 57.14% men, which shows a relatively balanced proportion although dominated by men. The majority of respondents in this study, 57.14%, are farmers who process rice as one of the staple foods in Indonesia. Followed by academics at 28.57% and government practitioners at 14.29%. Respondents in this study mostly have more than five years of work experience.

Table 2. Statistical Results of Respondents

Indicator	Percentage	Indicator	Percentage
Gender		Work Experience	
a. Women	42,86%	a. 1-2 years	14,29%
b. Men	57,14%	b. 2-5 years	28,57%
Experts		c. >5 years	57,14%
a. Farmer	57,14%		
b. Academic	28,57%		
c. Regulator	14,29%		

Source: Data Processed, 2025

Identification of PoU indicators related to poverty

The factors that shape the value of PoU related to poverty were identified through a literature study and interviews with relevant experts, as described in the following figure:

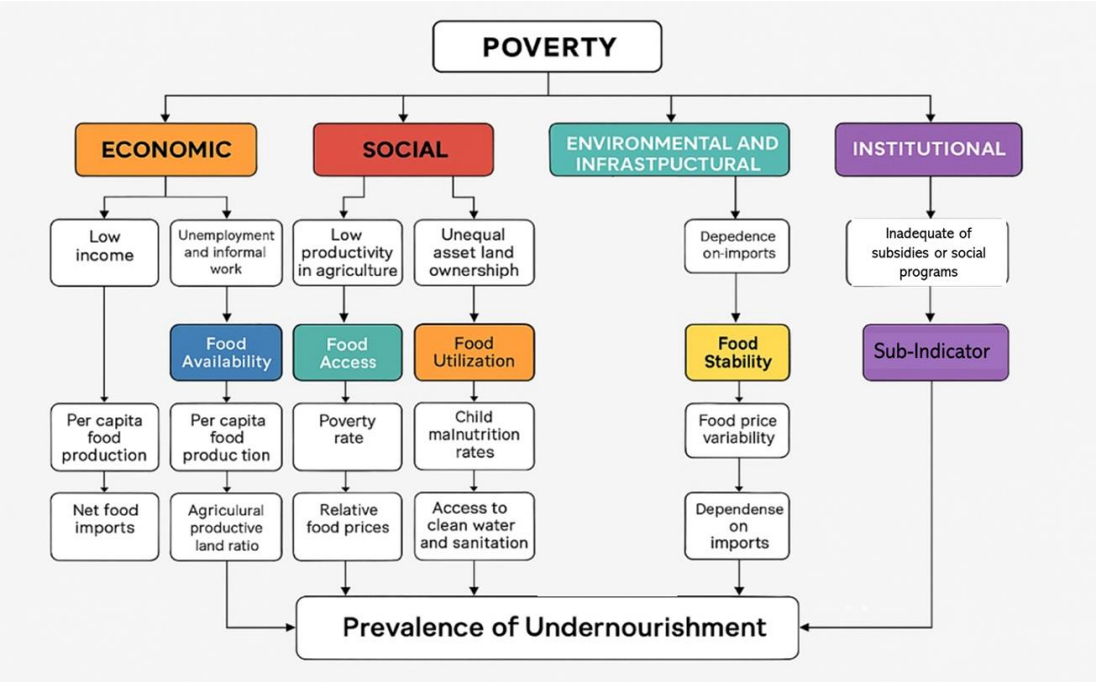

Figure 3: PoU Indicators Related to Poverty

The PoU value, which reflects the prevalence of undernutrition, is a complex indicator of food availability. It is rooted in and closely related to poverty. There are four main factors that cause poverty: economic, social, environmental and infrastructure, and institutions. In terms of economic factors, the causes of poverty are low income, unemployment and the dominance of informal workers. This has limited people's purchasing power to fulfill their food needs. This has an impact on low per capita food production and dependence on imports, which in turn reduces *food availability*.

On social factors, there are two concerns: weak agricultural productivity, which will affect *food access*, and unequal ownership of land assets, which will lead to limited *food utilization*. Limitations on food access and food utilization will lead to various problems such as high relative food prices, rampant child malnutrition, and limited access to clean water and sanitation. In terms of environment and infrastructure, low transportation infrastructure and high dependence on imports will lead to rising food prices, which will destabilize the food system (*Food Stability*). Inadequate government subsidies in maintaining food security will also contribute to poverty, which is the cause of the institutional factor.

The strategies in the AHP analysis used in the research are useful to answer the strategies that are prioritized to reduce the PoU value and alleviate poverty. The structure of the AHP analysis is as follows:

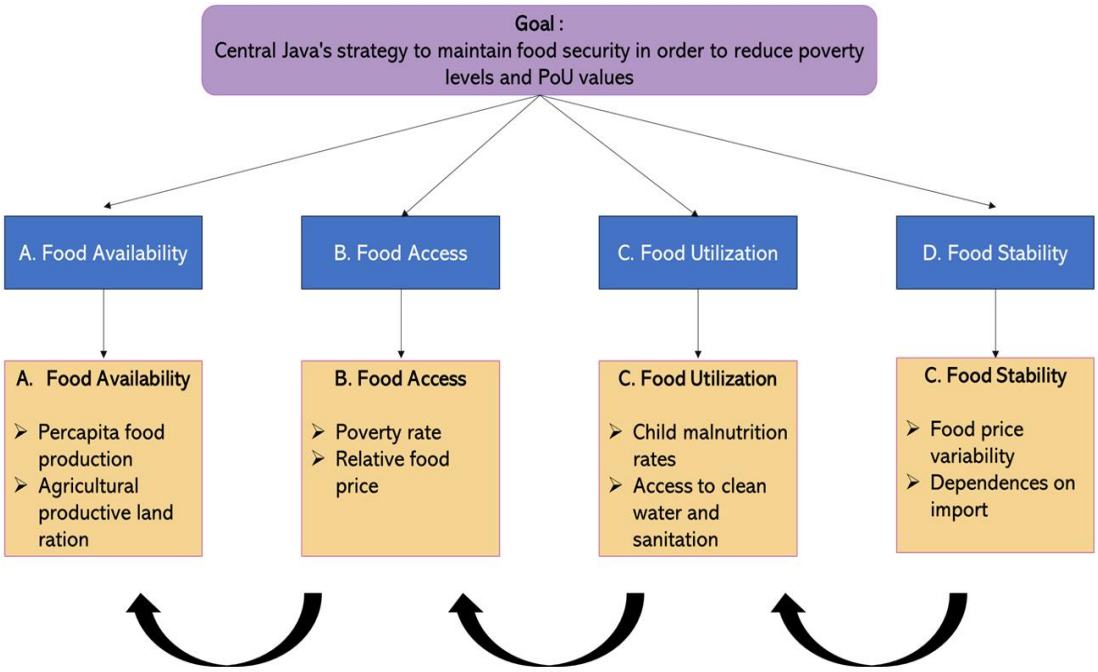

Figure 4: PoU Indicators and Sub-indicators

Food availability is measured by food production per capita and agricultural land productivity ratio. *Food access is* measured by poverty rate and relative food prices. *Food Utilization* is measured by child malnutrition rates and access to clean water and sanitation. *Food Stability* is measured by variable food prices and dependence on imports. All these indicators and sub-indicators resulted in the following strategic priorities:

Table 3. AHP Analysis Results

PoU Indicator	Local Weights (LW)	Global Weights (GW)	Attributes	Local Weights (LW)	Global Weights (GW)	Rank
Availability	0,308	0,308	On-farm and off-farm expansion	0,323	0,100	2
			Conducting technology transfer to increase domestic production	0,258	0,080	5
			Conducting expansion of agricultural research and development	0,230	0,071	6
			Increasing public and private investment	0,188	0,058	9
Utilization	0,300	0,300	Improving the quality of food crops	0,483	0,145	1
			Increase the number of households with access to adequate sanitation	0,284	0,085	4
			Increase the number of households using clean drinking water sources	0,233	0,070	7
Stability	0,202	0,202	Developing weather modification technology	0,422	0,085	3

			Maintaining price stability	0,237	0,048	10
			Improving food market information and transparency	0,225	0,045	13
			Market guarantee	0,116	0,023	15
Access	0,190	0,190	Access to clean water	0,323	0,061	8
			Affordable food prices	0,250	0,048	11
			Infrastructure improvements	0,247	0,047	12
			Ease of distribution of food crops	0,180	0,034	14

Notes: All calculated Consistency Ratios (CR values) are below 0.1. This means that the matrix assessment passes the consistency test, ensuring the calculated weights maintain coherence.

Source: Data Processed, 2025

Based on the results of the AHP analysis, the PoU indicator that needs to be prioritized first in reducing the PoU value and alleviating poverty is *food availability*. Food availability has a *global weights* value of 0.308 which means it has a contribution to reducing the inability to consume nutritious food by 30.8% compared to other indicators. The second indicator that is prioritized in reducing the PoU value and reducing poverty is *food utilization* with an influence of 30%. These two indicators are the dominant aspects that together have an effect of 61% on reducing the PoU value so that it can reduce poverty. The other two indicators, namely *food stability* and *food access,* have the lowest *global weight* of 0.202 and 0.190 respectively. This means that these two indicators only contribute to a 39.2% reduction in the PoU value. Although *food stability* and *food access* are also important indicators, their strategic role in the short term is relatively smaller than *food availability* and *food utilization*.

In terms of attributes that can be seen in Figure 5, the *Improving the quality of food crops* strategy ranks first with a global weight of 0.145, indicating that improving food quality is the most crucial factor in reducing malnutrition. This strategy falls under the *Utilization* criterion, which emphasizes the importance of the quality aspect of food consumption in supporting people's nutritional status. High-quality food crops not only have better nutritional profiles, but also generate higher market value, thus providing greater income and economic stability for farmers. By investing in research and development to create nutrient-dense varieties and implementing sustainable agricultural practices, Central Java can improve the resilience and productivity of the food system [2,3,25]. Quality improvement efforts can also focus on reducing post-harvest losses through better storage and handling techniques, ensuring more food reaches consumers in good condition [4,26].

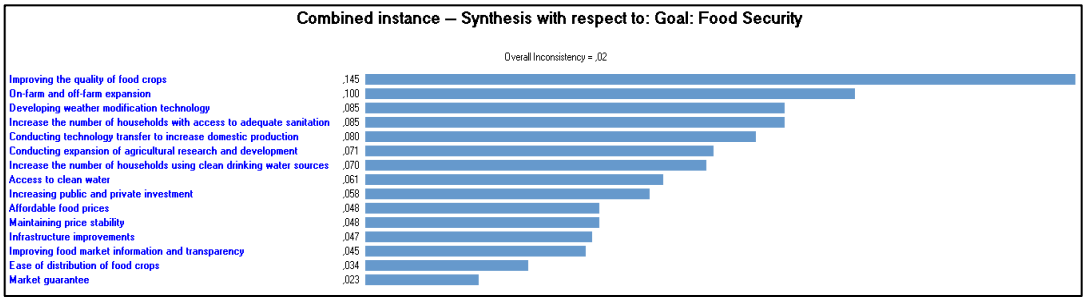

Figure 5. AHP Analysis Results on Attributes

Source: Data Processed, 2025

Furthermore, the strategies of *Developing weather modification technology* (0.085) and *On-farm and off-farm expansion* (0.100) are also important priorities. Both are under the *Stability* and *Availability* criteria, which represent the need for production resilience and increased national production capacity to ensure food supply in the long term. The Central Java Provincial Government can develop weather modification technology with the aim of obtaining the desired weather conditions so that food agricultural productivity will be maintained and even increased. Increased productivity results in higher income, farmers can easily pay the wages of the laborers involved, and prices will become affordable for consumers [22,23,38]. As farmers' income increases, farming households will spend most of their

income on various consumer goods and non-agricultural services [27,28,39]. Cumulatively, there will be economic growth and inevitably poverty reduction [31,45,46]. The expansion of *on-farm* and *off-farm* activities is critical in strengthening food security and reducing poverty, which has a significant impact on the value of PoU [29,30,44,45]. On-farm expansion focuses on increasing agricultural productivity through innovative practices such as improved crop varieties, precision farming and sustainable land management techniques. In addition, higher productivity increases farm income, allowing households to invest in education, health and other essential services, thereby promoting long-term poverty reduction [32,33,51].

Increase the number of households with access to adequate sanitation (Rank 4; GW 0.085) has an 8.5% influence on reducing the PoU value. Adequate sanitation plays a critical role in public health, reducing the prevalence of waterborne diseases that can hinder productivity and overall well-being. When households are healthy, they are better able to participate in economic activities and invest in their agricultural practices. By integrating clean water and sanitation initiatives into food security programs, it can create a holistic approach in addressing the interlinked issues of health, nutrition and poverty [34,35,6]. *Conducting technology transfer to increase domestic production* (Rank 5; GW 0.080) Conducting technology transfer is essential to increase food production in Central Java nutrition. Sharing innovative agricultural techniques, such as improved crop varieties, efficient irrigation methods, and sustainable farming practices, can empower local farmers to maximize crop yields and reduce dependence on imports [17, 28, 30, 36].

On the other hand, there are some attributes with lower global weights, such as *Market guarantee* (0.023), *Ease of distribution of food crops* (0.034), and *Improving food market information and transparency* (0.045). Although they cannot be completely ignored, these attributes have a relatively small contribution to the main objective, so they can be used as supporting strategies in the long run. With market guarantees that ensure consistent food supply and fair prices, local farmers are empowered to grow and sell their crops without fear of market fluctuations [37,38,50,51]. The ease of distribution of food crops is the last priority in the access dimension of food security that Central Java can do as a food hub [47,48,49,50]. Ensuring the ease of distribution of food crops is also crucial for improving food security and reducing poverty and malnutrition in the long term [39,40,28]. An efficient distribution system allows food to move quickly from producers to consumers, minimizing delays that can lead to spoilage and waste [41,42,49].

To be able to see the feasibility of respondents' opinions to be used as a basis for decision making with AHP, a sensitivity analysis was carried out [43,44,45]. Based on Figure 6. it can be explained that the priority order in the sensitivity test is the same as the previous alternative priority. This shows the stability of the assessment.

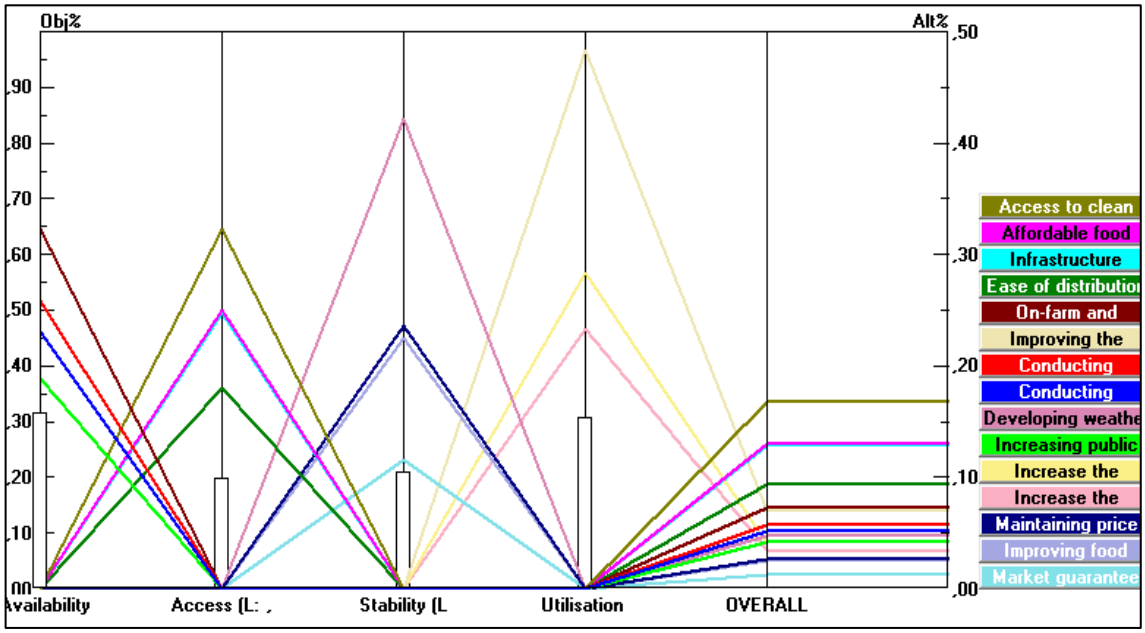

Figure 6. Sensitivity Analysis Results

Source: Data Processed, 2025

From the sensitivity graph, it can be seen that the *Improving the quality of food crops* strategy remains the strategy with the highest global weight and consistently occupies the top position despite variations in the weight of each criterion, especially in the *Utilization* criterion. This indicates that the strategy has high resilience and is the most stable choice in various policy scenarios, so it deserves to be the top priority in efforts to reduce the *Prevalence of Undernourishment (PoU)*. Other strategies such as *On-farm and off-farm expansion* also show good performance stability, especially in the *Availability* criterion, indicating that efforts to increase production capacity remain relevant even though the weight of the criteria changes. On the other hand, some strategies such as *Market guarantee* show low and insignificant contributions to all criteria, so their sensitivity to changes in criterion weights is also low. This finding indicates that strategies with small global weights are less flexible to changes in policy focus, and are more appropriately positioned as complementary strategies. Overall, the results of the sensitivity analysis provide confidence that the main strategies that have been prioritized based on the AHP results are robust and remain relevant in the face of dynamic changes in food security development priorities.

Conclusions and Policy Implications

According to data from the Central Statistics Agency (BPS), the PoU value of Central Java has tended to increase since 2018. This means that the population of Central Java who consume substandard food is increasing every year. The increase in the PoU value in Central Java could be due to the high poverty rate in Central Java, which makes it unable to access food. The first priority of Central Javas policy in reducing the PoU value and reducing poverty is *Improving the quality of food crops.* High-quality food crops not only have a better nutritional profile, but also generate higher market value, thus providing greater income and economic stability for farmers. The second prioritized strategy is *Developing weather modification technology*. The Central Java Provincial Government can develop weather modification technology with the aim of obtaining the desired weather conditions so that food agricultural productivity will be maintained and even increased. Increased productivity results in higher incomes, farmers can easily pay the wages of the laborers involved, and prices will become affordable for consumers. The next strategy is through *On-farm and off-farm expansion*. On-farm expansion focuses on increasing agricultural productivity through innovative practices such as improved crop varieties, precision farming, and sustainable land management techniques. Other policy strategies that have a low weight in the research cannot be completely ignored. Strategies such as *Market guarantee*, *Ease of distribution of food crops*, and *Improving food market information and transparency* can be used as supporting strategies to reduce the PoU value and alleviate poverty in Central Java in the long run.

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