The Impact of Food Security on Economic Growth through Interaction with Poverty Levels

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ABSTRACT: Food security has a significant impact on economic aspects, poverty levels, and the quality of human resources in a region. Food security issues are something that must be watched out by the East Java Provincial government. The high population and poverty level can cause problems in economic growth in East Java Province. The purpose of the study is to determine how the poverty level can strengthen or weaken the relationship between economic growth and food security as measured from the Food Availability Index, Food Affordability Index, and Food Utilization Index. This research is important because food security not only talks about food consumption for the community but also how food availability, affordability, and utilization can be the basis of sustainable development. The data used are secondary data from the Central Bureau of Statistics of East Java Province and the Indonesian National Food Agency. This research was conducted with a quantitative approach using Moderation Regression Analysis (MRA) method on panel data. The results showed that partially the poverty level can strengthen the influence of the Food Availability Index and Food Utilization Index on economic growth. In this case, the poverty level is classified as quasi-moderation which has a dual role as a moderation variable and an independent variable directly affects economic growth. Meanwhile, the effect of the Food Affordability Index on economic growth is not moderated by the poverty level as a predictor of moderation.

KEYWORDS: Food Availability Index, Food Affordability Index, Food Utilization Index, Economic Growth, Poverty Level.

I. INTRODUCTION

There is a substantial relationship between growth and economic development, where economic growth plays a role as a factor influencing the process of regional economic development. One way to achieve regional economic development is by increasing per capita income. Per capita income in a region is determined by dividing the total income of that region by the population residing there during a specific timeframe. The concept of per capita income is very relevant to measure the average value of income per individual in an area and to evaluate the standard of living as well as the quality of life of the population(Helly Suharlina, 2020).

In theoretical terms, an elevation in per capita income is correlate with heightened levels of consumption and enhancements in public welfare. Engel's law states that the proportion of consumption expenditure allocated to food can be a clue as to a decent quality of life, reflecting the level of well-being. The Sustainable Development Goals (SDGs) set out 17 goals that the world's population wants to achieve, with two main priorities: creating a world without poverty and without hunger, and achieving food security. In the process of measuring poverty levels, the Directorate of Regional Development of Bappenas (2015) shows a close relationship between poverty and food aspects, and vice versa. This relationship arises because the macro measurement of poverty depends on the number of people who are unable to meet their basic needs.

Certain factors can affect the level of poverty in an area including the population or the number of people in the region (Nabibah and Hanifa, 2023). The increasing population can cause significant problems, especially related to the welfare of the population, and can even result in conditions trapped in poverty. The projected demographic bonus predicts an increase in population to reach 9.8 billion by 2050. This huge increase will have the consequence of increasing demand for food, water, and energy. Therefore, it is necessary to anticipate threats to food availability.

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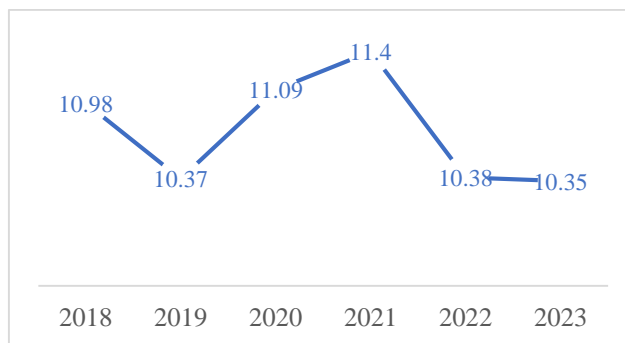
Figure 1. Poverty Level in East Java 2018 – 2023

Source: Central Bureau of Statistics of East Java Province, data processed 2023.

Food security has a significant impact on economic aspects, poverty levels, and the quality of human resources in a region. The Food Security Index is used as an instrument to measure food security, both at the provincial and national levels. The Food Security Index is a representation of the value of food security conditions resulting from three main dimensions, namely food availability, affordability, and utilization. As a national food granary area, East Java Province has been able to support regional food security and support national food insecurity in food granary activities. Through food granary activities, the East Java Provincial government regulates and supervises food price stability and food availability regionally and nationally. The indicator that is the highest driver of Food Security Index is the Availability Index. This index is calculated based on the availability of domestic food production, food stocks and reserves, and exports – imports.
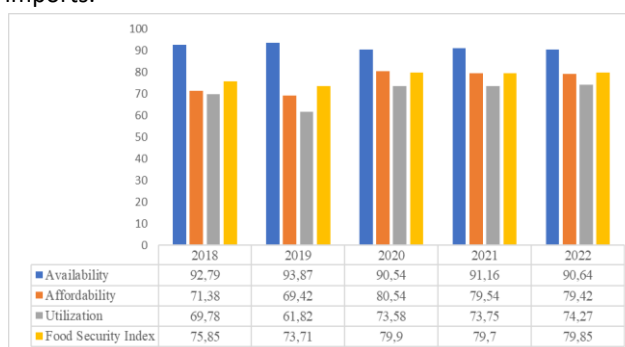
Figure 2. Food Security Index in East Java 2018 – 2022
Source: Indonesian National Food Agency, data processed 2023.

Meanwhile, the indicator with a low average increase in value is in the Food Utilization Index. This index is calculated through improvements in consumption patterns, diversification of consumption, improved nutrition, food safety, and quality. The capacity of individuals' purchasing power regarding food directly influences food consumption patterns, while the assessment of welfare level is determined by individuals' inclinations towards consumption, whether it pertains to food or non-food items. Individuals who tend to be able to buy non-food ingredients are considered more prosperous than individuals who can only afford food as basic necessities. Thus, the food security of a region can be influenced by the income received by an individual.

According to Safitriawati et al., (2020) Gross Regional Domestic Product (GDP) can be influenced by purchasing power positively and significantly. The level of purchasing power is closely related to the knowledge and opportunities that can be utilized in productive activities. The influence of people's purchasing power is seen in the increase in demand for goods and services, which is also a boost to economic growth. The ability of people's purchasing power also has an impact on people's welfare, especially in the context of meeting needs. With the problem of high poverty, researchers see problems that arise at the level of food security that can affect economic growth in East Java Province. The purpose of this study is to see how the influence of poverty level in the relationship between food security and economic growth and see changes and shifts in aspects of food security.

II. LITERATURE REVIEW

A. Economic Growth

Economic growth plays an important role as the success of economic development in a region. Economic growth occurs when per capita income increases, without taking into account the possibility of developments in the structure of the economy. The level of income inequality, especially in times of low average income, can have an impact on the quality and productivity of society

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(Listyawati, 2022). Countries with low-income levels often experience an increase in the number of poor people, this is due to a lack of investment efforts in human capital development and creates dependence on the government. According to the Solow-Swan theory, technological progress can reflect exogenous growth that determines the rate of output growth. Technological advances are able to produce sustainable economic growth through the optimization of labor efficiency that continues to grow. Meanwhile, according to Ricardo and Malthus, rapidly growing population growth can multiply population growth in one generation and will reduce the rate of development at a low rate. At this stage workers receive very low wages i.e. achieve only a sufficient standard of living (Finasri and Triani, 2023).

B. **Food Availability Index**

The Food Availability Index encompasses considerations of production factors, supply dynamics, and the equilibrium of food trade. Effective management of food availability remains imperative, particularly in contexts where production is constrained, subject to seasonality, and dispersed across diverse locations. Ensuring that the community has access to an adequate quantity and variety of food remains paramount despite these challenges. Food availability can be measured annually by calculating the amount of food stock that can be stored, especially for certain types of food such as rice, and other factors that can affect food production (Sehusman et al., 2022). Malthus's theory of population growth and food availability explains that population growth is increasing day by day like a series of measures that are inversely proportional to the availability of food that follows a series of calculations. Without restrictive measures against population growth, individuals will experience food shortages, which can be a trigger for economic hardship and underdevelopment (Rahman, 2023).

C. **Food Affordability Index**

The Food Affordability Index considers aspects of physically and financially equitable access to food. This system includes physical aspects, such as the availability of food to the community. Although there is an oversupply of food at the regional level, this does not guarantee that individual food needs will be met. The adequacy of food supply will be considered useless if people do not have the ability to access it, the government must be able to ensure that food prices remain affordable for everyone. Therefore, the food price factor is very important in an effort to meet the needs of food consumption. Engel's law proposed by Ernst Engel states that with the increase in income, the proportion of consumption allocated to foodstuffs will decrease proportionally, assuming fixed prices. High-income households allocate expenditure on food consumption by smaller portions when compared to low-income households (Tondok, Kalangi dan Rompas, 2023).

D. **Food Utilization Index**

The Food Utilization Index involves efforts to improve people's knowledge and skills to have a good understanding of food, nutrition, and health, to be able to control their consumption. The need for human health, strength, intelligence, and productivity must be met through adequate and balanced food intake. The quality of food is impacted by economic capacity, preferences in consumption, nutritional knowledge, and the accessibility of food resources. Food utilization is the final stage of the food security system that can have an impact on the quality of life of individuals in living a healthy, dynamic, and productive life. In addition to providing important benefits for health, food consumption becomes the basis for achieving sustainable economic growth(Hasselberg et al., 2020).

E. **Poverty Level**

According to BPS East Java (2023), based on the concept of basic needs approach, poverty is defined as the inability to fulfill fundamental requirements, encompassing both essential food and non-food necessities, quantified in expenditure terms. Individuals classified as impoverished are those whose average monthly per capita expenditure falls below the designated poverty threshold. The poverty line indicator measures the ability of income to meet basic needs or measures the minimum purchasing power of people in an area. Chamber's theory of poverty is based on the gap between urban and rural economic forms which further leads to gaps in the form of differences in living standards or welfare (Suaib, 2023).

III. RESEARCH METHODS

This study used a quantitative approach in associative research. This method aims to test established hypotheses, perform quantitative/statistical data analysis, collect data through research instruments, and is used to investigate a particular population or sample (Hardani et al., 2020). Sampling was carried out using the purposive sampling method which produced secondary data consisting of economic growth data, Food Availability Index, Food Affordability Index, Food Utilization Index, and poverty levels from 30 districts/cities in East Java Province from 2019 to 2022. Regional sampling was carried out based on areas with the best food security score in category 6 from each district/city.

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A. **Conceptual Framework**

The conceptual framework formed in this study looks at the influence of food security indicators on economic growth with the poverty level as moderation.
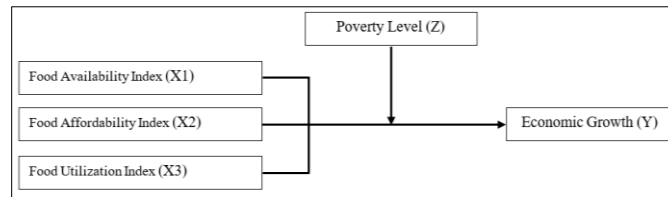
Figure 3. Conceptual Framework
Source: Researcher

B. **Hipotesis**

From the framework of the concept that has been formulated, the hypothesis in this study is as follows:

H1: The poverty level can amplify the effect of the Food Availability Index on economic growth

H2: The poverty level can strengthen the effect of the Food Affordability Index on economic growth

H3: Poverty level can strengthen the effect of Food Utilization Index on economic growth

C. **Moderated Regression Analysis (MRA)**

In this study, quantitative data was processed using the Moderated Regression Analysis (MRA) method. Here is the model of Moderated Regression Analysis in this study:

$$EG = \alpha + \beta_1 IK + \beta_2 IA + \beta_3 IP + \varepsilon \dots\dots\dots(1)$$

$$EG = \alpha + \beta_1 IK + \beta_2 IA + \beta_3 IP + \beta_4 PL + \varepsilon \dots\dots\dots(2)$$

$$EG = \alpha + \beta_1 IK + \beta_2 IA + \beta_3 IP + \beta_4 PL + \beta_5 IK.PL + \beta_6 IA.PL + \beta_7 IP.PL + \varepsilon \dots\dots\dots(3)$$

Information:

EG   = Economic Growth (Thousand Rupiah)

α = Constant

I   = Food Availability Index (Score)

IT   = Food Affordability Index (Score)

IP   = Food Utilization Index (Score)

PL   = Poverty Line (Percent)

ε = Error Term

IV. RESULTS AND DISCUSSION

A. Multicollinearity Test

A multicollinearity test is conducted to ascertain potential correlations among independent variables within the regression model. The resulting Variance Inflation Factor (VIF) values, all below 10, indicate the absence of multicollinearity across all three moderation regression models. This signifies the absence of significant correlations among the independent variables within the regression framework.

Table 1. Multicollinearity Test

Coefficients[a]			
Variabel	VIF Model 1	VIF Model 2	VIF Model 3
IK	1.274	1.560	1.921
IA	1.325	5.321	6.060
IP	1.083	1.486	1.948
PL		6.128	7.005
IK*PL			1.624
IA*PL			1.160
IP*PL			1.226
a. Dependent Variable: Ekonomic Growth			

Source: data processed, 2024.

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B. **Heteroscedasticity Test**

A heteroscedasticity test is conducted to assess disparities in residual variations across observations within the regression model. The outcomes of the heteroscedasticity test, employing Spearman's Rho test, indicate the absence of heteroscedasticity issues across the three moderation regression models where the value of Sig. (2-tailed) > 0.05. Thus, the classical assumption test is fulfilled.

Table 2. Heteroscedasticity Test

Correlations				
		Model 1	Model 2	Model 3
IK	Sig. (2-tailed)	.938	.744	.318
IA	Sig. (2-tailed)	.312	.555	.577
IP	Sig. (2-tailed)	.172	.152	.103
TK	Sig. (2-tailed)		.422	.411
IK*PL	Sig. (2-tailed)			.655
IA*PL	Sig. (2-tailed)			.391
IP*PL	Sig. (2-tailed)			.628
**. Correlation is significant at the 0.01 level (2-tailed).				
*. Correlation is significant at the 0.05 level (2-tailed).				

Source: data processed, 2024.

C. **Coefficient of Determination (R Square)**

A lower coefficient of determination signifies the ineffectiveness of the independent variable in elucidating fluctuations in the dependent variable, thereby indicating limitations in the model used. The test results on model 3 showed a higher R Square value compared to the previous model. Thus, the variable of moderation of the poverty level can strengthen the influence of the food Availability Index, Food Affordability Index, And Food Utilization Index on economic growth in East Java Province.

Table 3. Koefisien Determinasi (R Square)

Model Summary[b]	Model 1	Model 2	Model 3
R	630[a]	.671[a]	.839[a]
R Square	.397	.451	.704
Adjusted R Square	.381	.432	.686
Std. Error of the Estimate	20982.892	20112.281	14958.028
a. Dependent Variable: Economic Growth			

Source: data processed, 2024.

D. **Simultaneous Test (F-Test)**

The test results of the three models showed a significance value of 0.000 < 0.05, which means that simultaneously the Food Availability Index, Food Affordability Index, and Food Utilization Index affect economic growth in East Java Province, strengthened by the moderation of poverty level and interaction variables.

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Table 4. Simultaneous Test

ANOVAᵃ			
	Model 1	Model 2	Model 3
F Count	25.447	23.589	38.070
F Table	2.683	2.451	2.092
Sig.	.000ᵇ	.000ᵇ	.000ᵇ
a. Dependent Variable: Economic Growth			

Source: data processed, 2024

E. **t-Test**

The t-test is employed to assess the extent of impact exerted by each independent variable on the dependent variable. This statistical evaluation entails examining the significance level at the predetermined alpha threshold of 5%.

Table 5. t Test Model 1

Coefficientsᵃ			
Model		t	Sig.
1	(Constant)	-2.154	.033
	IK	-5.785	.000
	IA	2.029	.045
	IP	3.722	.000
a. Dependent Variable: Economic Growth			

Source: data processed, 2024.

The test results in model 1 show that the Food Availability Index (IK) has a significance value of 0.000 < 0.05, which means that the Food Availability Index (IK) has a partial effect on economic growth. The Food Affordability Index (IA) has a significance value of 0.045 < 0.05, which means that the Food Affordability Index (IA) has a partial effect on economic growth. The Food Utilization Index (IP) has a significance value of 0.000 < 0.05, which means that the Food Utilization Index (IP) has a partial effect on economic growth.

Table 6. t Test Model 2

Coefficientsᵃ			
Model		t	Sig.
1	(Constant)	1.642	.103
	IK	-4.018	.000
	IA	-1.851	.067
	IP	5.063	.000
	TK	-3.356	.001
a. Dependent Variable: Economic Growth			

Source: data processed, 2024.

The test results in model 2 show that the Food Availability Index (IK) has a significance value of 0.000 < 0.05, which means that the Food Availability Index (IK) has a partial effect on economic growth. The Food Affordability Index (IA) has a significance level value of 0.067 > 0.05, which means that the Food Affordability Index (IA) does not have a partial effect on economic growth. The Food Utilization Index (IP) has a significance value of 0.000 < 0.05, which means that the Food Utilization Index (IP) has a partial effect on economic growth. The poverty level (PL) has a significance value of 0.001 < 0.05, which means that the poverty level (PL) has a partial effect on economic growth.

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Table 7. t Test Model 3

Coefficients[a]			
Model		t	Sig.
1	(Constant)	-.017	.987
	IK	-.904	.368
	IA	-.373	.710
	IP	2.839	.005
	C_PL	-3.067	.003
	C_IK*PL	9.585	.000
	C_IA*PL	.445	.657
	C_IP*PL	2.682	.008
a. Dependent Variable: Economic Growth			

Source: data processed, 2024.

The results of moderation regression testing show that the interaction between the Food Availability Index (IK) and the poverty level (PL) has a significance value of 0.000 < 0.05, which means that the moderation variable of the poverty level can partially strengthen the influence of the Food Availability Index (IK) on economic growth. The Food Availability Index (IK) and poverty level negatively affect economic growth in East Java Province. This means that if the value of the Food Availability Index and poverty level decreases, economic growth in East Java Province will increase.

The food availability index score is determined through the computation of normative consumption ratios for food. A lower score on the food availability index suggests a propensity towards reduced consumption relative to total food production, indicating a surplus in food production within the region. Food production surplus can affect food prices in a region, where the more food supply available, the price of food will remain stable. Therefore, surplus food availability can increase economic growth because with food price stability, people can continue to meet food needs or switch to alternative food substitutes. The outcomes of this study are consistent with research carried out by Faradilla et al. (2021) and Marina et al. (2024) stating that food availability plays an importan role in determing strategic food prices in Indonesia.

The interaction between the Food Affordability Index (IA) and the poverty level (PL) has a significance value of 0.657 > 0.05, which means that the poverty level does not moderate the effect of the Food Affordability Index (IA) on economic growth. The Food Affordability Index (IA) does not exhibit any impact on the economic advancement within the East Java Province. This is attributed to the predominant consumption emphasis on fulfilling the basic dietary requirements of the local populace, despite the availability of adequate supporting infrastructure such as electricity access. The proportion of consumption patterns is notably influenced by the prevailing poverty levels, wherein elevated poverty rates correspond to a notable shift towards increased consumption allocation to essential necessities. The number of free food assistance programs and the availability of subsidies on the price of basic food from the government show that the poverty level in East Java Province is still very high, so people cannot meet their basic needs for food without assistance from the government. The outcomes of this study are consistent with research carried out by Zakiah (2016) which states that there is a relationship between poverty and food security from the level of energy consumption and the poverty level. While research by Mudrak et al., (2020) states that changes in food expenditure are not proportional to high economic growth.

The interaction between the Food Utilization Index (IP) and the poverty level (PL) has a significance level value of 0.008 < 0.05, with the moderation variable of the poverty level can partially strengthen the influence of the Food Utilization Index (IP) on economic growth. The Food Utilization Index (IP) has a positive effect on economic growth in East Java Province, while the poverty level has a negative effect on economic growth in East Java Province. Low-income levels can affect many households, especially the lowest economic groups (poor) who reduce the quality of their food consumption with lower nutrition or nutrition. Women play an important role in achieving food security, especially aspects of food utilization, because this can affect women's ability to achieve and guarantee the quality of food needed. When people do not have access to adequate nutrition, it has a negative impact on productivity and overall economic stability. The outcomes of this study are consistent with research carried out by Damayanti and Sentosa (2020) which states that stunting is common in poor people due to low income. With the fulfillment of nutritional intake will have an impact on one's productivity and can encourage increased economic growth. Meanwhile, research by Hendi Setiadi and Fifi Dwijayanti (2020) also states that the level of education affects the knowledge and understanding of mothers in an effort to reduce stunting.

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CONCLUSIONS

The aim of this research was to examine the status of food security and economic advancement in East Java Province, which is shaped by variables including the Food Affordability Index, Food Availability Index, and Food Utilization Index. In this study using poverty moderation variables that can strengthen or weaken the influence of food security on economic growth in East Java Province. The results of Moderated Regression Analysis show that the poverty level is able to strengthen the influence of the Food Availability Index and Food Utilization Index on economic growth. Meanwhile, the effect of the Food Affordability Index on economic growth in East Java Province is not moderated by the poverty level. The poverty level is a predictor variable that directly affects economic growth. From the results of research that shows the relationship between poverty levels to the relationship between food security and economic growth, local governments should not only provide assistance, but also need to encourage local economic development through empowerment programs such as skills training, business capital assistance, and business assistance for people in rural and urban areas that are vulnerable to poverty so as to create independence food in the household.

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