

Policy Analysis of Increasing Food Production in Efforts to Increase Food Security in Indonesia

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Abstract. Indonesia has achieved self-sufficiency in rice since the New Order era, but unfortunately it turns out that there are still several provinces in Indonesia that have a Food Security Index in the low category, especially in the eastern provinces of Indonesia. The policy of providing People's Business Credit (KUR) and fertilizer subsidy budgets for farmers is one of the policies aimed at farmers. The distribution of KUR and fertilizer subsidies is not yet optimal, resulting in an increase in the Food Security Index that is still not evenly distributed across all provinces in Indonesia. This research tries to analyze how effective the KUR and Fertilizer Subsidy distribution policies are on the Food Security Index in all provinces in Indonesia, outlining distribution constraints. Next, it is hoped to obtain a Food Security Index Model for each province in Indonesia which can later be used as a basis for policy making for local regional governments. Data from the National Socio-Economic Survey (Susenas) and BPS 2015 - 2023, using the ECM Model, which tests assumptions that must be met. The research results show that KUR distribution and fertilizer subsidies have a significant effect on the Food Security Index in Indonesia.

Keywords: IKP, KUR, Fertilizer Subsidy.

1. Introduction

Food has consistently been a central topic in policy discussions at both national and international levels, as it is a fundamental human need that must be fulfilled, and it is the responsibility of the state to ensure its availability for the population. The government holds the obligation to meet the population's food needs, ensuring both the quality and quantity of food. Food consumption is intrinsically tied to poverty, as household spending tends to prioritize food consumption over non-food items. Food security, self-sufficiency, and sovereignty are defined by the availability of food that is safe, diverse, nutritious, accessible, affordable, and in line with religious, cultural, and ethical values, enabling individuals to lead healthy, active, and productive lives sustainably [1]

As a basic need food, must be provided adequately by the government, both in terms of quantity and quality. The government is tasked with ensuring food supply for Indonesia's population of

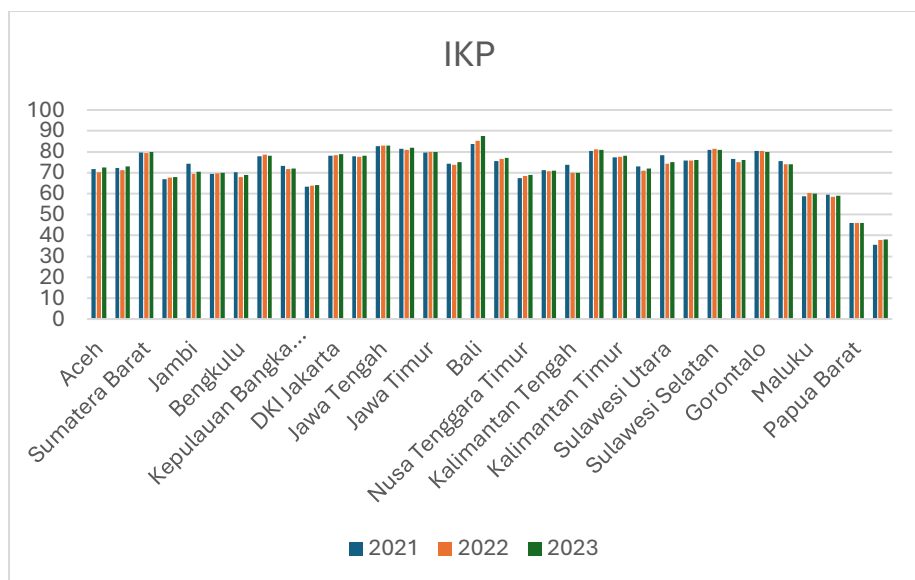
270.2 million people, as outlined by Law No. 18 of 2012, to foster a healthy, productive, active, and competitive society. Indonesia is also dedicated to achieving the Sustainable Development Goals (SDGs), particularly target 1, which aims to eliminate poverty, and target 2, which focuses on ending hunger, achieving food security, improving nutrition, and promoting sustainable agriculture. To meet these goals, the National Food Agency is responsible for coordinating, establishing, and implementing policies to prevent and address food and nutrition insecurity, promote food consumption diversification, and ensure food safety. The development of an integrated Food and Nutrition Information System is crucial in supporting these responsibilities. The National Food Agency continues to innovate through initiatives such as the Food Security Index (FSI). [2]

The FSI rankings in Table 1 and Fig 1, show that some Indonesian provinces, such as Papua and West Papua, still have low FSI scores. Although the overall FSI ranking in 2022 improved compared to 2021, some provinces still fall into the low category. The low FSI rankings in some provinces reflect the limited availability, affordability, and utilization of food in Papua and West Papua. Changes in provincial rankings are also observed by comparing the conditions of the 34 provinces between FSI 2021 and FSI 2022. Fourteen provinces (41.18%) experienced an increase in ranking, eight provinces (23.53%) remained the same, and twelve provinces (35.29%) saw a decrease in ranking [3] Even though Indonesia has achieved self-sufficiency in rice production, food security remains a pressing issue and a priority for development. This is because food is still a basic need that cannot be substituted with other materials, and the growing population requires a large amount of food supply. On the other hand, the capacity to provide food is facing many challenges.

Table 1. Provincial Food Security Rankings and Index for 2022

Ranking	Province	IKP	Ranking	Province	IKP
1	Bali	85,19	18	Banten	73,78
2	Jawa Tengah	82,95	19	Kep.Bangka Belitung	71,71
3	Sulawesi Selatan	81,38	20	Sumatera Utara	71,22
4	Kalimantan Selatan	81,05	21	Kalimantan Utara	71,04
5	DI.Yogyakarta	80,88	22	Kalimantan Barat	70,81
6	Gorontalo	80,35	23	Aceh	70,16
7	Jawa Timur	79,85	24	Kalimantan Tengah	69,96
8	Sumatera Barat	79,45	25	Sumatera Selatan	69,64
9	Lampung	78,61	26	Jambi	69,50
10	DKI.Jakarta	78,25	27	NTT	68,42
11	Kalimantan Timur	77,65	28	Bengkulu	67,99
12	Jawa Barat	77,55	29	Riau	67,59
13	NTB	76,58	30	Kep.Riau	63,83
14	Sulawesi Tengah	75,92	31	Maluku	60,20
15	Sulawesi Tenggara	75,04	32	Maluku Utara	58,39
16	Sulawesi Utara	74,30	33	Papua Barat	45,92
17	Sulawesi Barat	74,04	34	Papua	37,80

Source : [4]



Source : [4] **Fig 1.** Provincial Food Security Rankings and Index for 2022

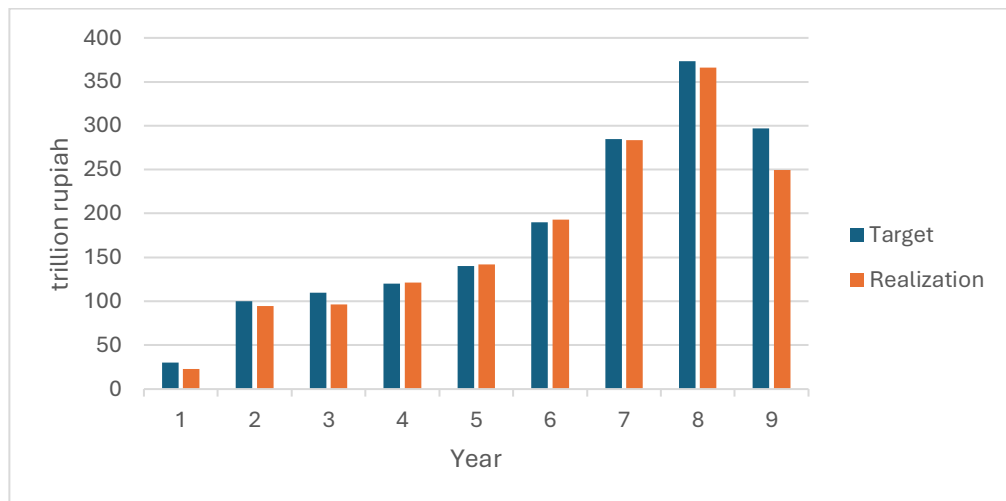
The policy of strengthening food security through agricultural revitalization involves improving and modernizing infrastructure, technology, and agricultural practices. This aims to enhance productivity and efficiency in agricultural production, thus increasing the availability and accessibility of food for the population. Some measures that can be implemented for revitalization include improving access to agricultural technology, developing agricultural infrastructure, providing education and training, offering support, and developing local markets.

Challenges in the implementation of revitalization efforts include suboptimal execution, lack of comprehensiveness, and a somewhat haphazard approach, as well as the limited involvement of academics, entrepreneurs, and farmers [5]. The policy to strengthen farmer corporations is implemented through the distribution of fertilizers and the People's Business Credit (KUR), which forms part of the government's broader strategy to boost farmer corporations and enhance food production. These efforts are crucial to maintaining national economic stability, particularly in the face of challenges posed by climate change and global geopolitical factors that contribute to food, energy, and financial crises. KUR serves as a key government initiative to promote the agricultural sector's growth and sustainability.

To achieve an advanced, self-sufficient, and modern agricultural system, government intervention, particularly in terms of capital reinforcement, is essential. KUR provides vital financial support to farmers, aiding the development of the agricultural sector from upstream to downstream. However, despite ongoing government efforts to expedite KUR distribution, some Non-Bank Financial Institutions and Credit Unions responsible for distributing KUR continue to face obstacles. The transition from Bank Indonesia's Debtor Information System (SID BI) to the Financial Services Authority's Financial Information Services System (SLIK OJK) has impacted KUR distribution processes. Additionally, other challenges include administrative

requirements for potential KUR borrowers, the need for system synchronization between KUR distributors and the Integrated Agricultural Credit Information System (SIKP), and the establishment of technical implementation guidelines for the Special KUR scheme.

The gap between realization and distribution targets is still visible even though in several years the realization has exceeded the targets set by the government for banks as KUR distributors, as in Figure 2. The challenges mentioned above still continue to occur in society, causing the absorption of distributed KUR funds to not be optimal. , especially if it is associated with increased production in the agricultural sector. Therefore, it is natural that several provinces still have low Food Security Index scores because their supporting facilities have not been utilized optimally. It is interesting to study the influence of KUR absorption on food security, which mostly occurs in the agricultural sector. Policies related to the Food Security Program include farmer corporations through the provision of subsidized fertilizer.

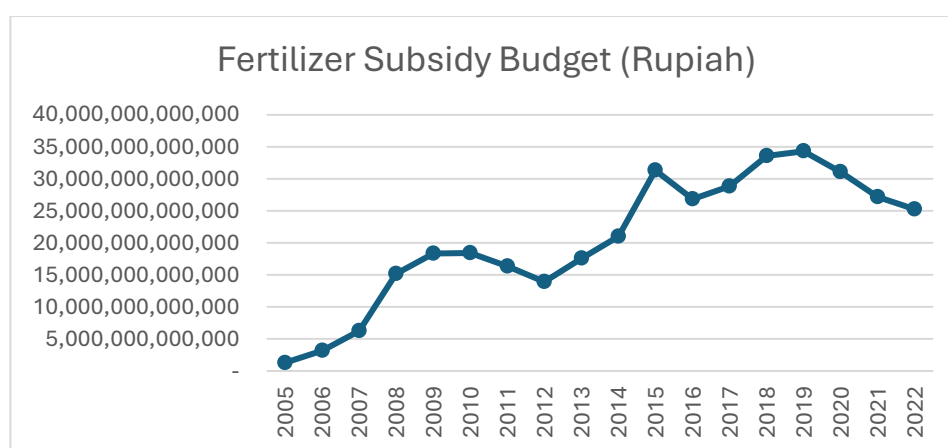


Source : [6] **Fig 2.** Target – The Realization of People's Business Credit (KUR) in Indonesia

As an effort to increase food production and reduce the production costs for farmers, the fertilizer subsidy policy is a fiscal measure implemented by the government aimed at farmers. Fertilizer subsidies are designed to enable farmers to access fertilizers for their crops at more affordable prices, with the goal of promoting food security and increasing farmers' incomes. The impact of fertilizer subsidies remains a topic of debate. The budget for subsidized fertilizers is designated for nine vital and strategic food commodities, including rice, corn, soybeans, chili, shallots, garlic, sugarcane, coffee, and cocoa. These essential commodities play a significant role in reinforcing the food security sector. The fertilizers supplied to farmers primarily consist of Urea and NPK. Additionally, the fertilizer subsidy is intended to streamline the supply chain for fertilizer distribution. [7]

The fertilizer subsidy policy positively influences agricultural productivity and boosts farmers'

incomes. It supports the agricultural sector by providing input subsidies through the establishment of subsidized fertilizer prices (HET). This policy has been proven to expand the harvested area and boost national agricultural production. However, despite the benefits to agriculture, the government incurs substantial costs for the subsidy program. On the other hand, the policy is considered inefficient in terms of cost, targeting the right farmers, timing, and pricing, and it may even encourage excessive fertilizer use. [8].



Source : [9]

Fig. 3. Agricultural Fertilizer Subsidy in Indonesia

The size of the fertilizer subsidy budget can be seen in Fig 3. The substantial budget allocated by the government for fertilizer subsidies is expected to reduce production costs for farmers, increase agricultural output, and ultimately improve the welfare of farmers. However, distribution issues continue to be a challenge for farmers, even though this subsidy program has been in place since the 1970s. Farmers still face difficulties accessing fertilizers, frequently encountering shortages, fertilizer prices exceeding the Highest Retail Price (HET), and misuse of the fertilizer distribution mechanism. This persists despite current regulations that have established procurement and distribution systems with controlled prices through official channels. Furthermore, the recipients of subsidized fertilizers are clearly defined, targeting the agricultural sector, which includes the cultivation of food crops, horticulture, plantations, livestock fodder, and fish/shrimp farming. [10]

Although Indonesia has achieved self-sufficiency in rice production since the New Order era, some provinces, particularly in North Sumatra and the eastern regions of Indonesia, still have low Food Security Index scores. This situation highlights that the government has not yet been able to guarantee the availability, affordability, and utilization of food in these regions. The government has implemented various policies to strengthen food security across all provinces, such as encouraging food commodity production through improved infrastructure and technology, revitalizing the national food system by strengthening farmer and fisher cooperatives, and enhancing food distribution systems.

Farmers, as pivotal contributors to food security, require special attention. Policies such as the

People's Business Credit (KUR) and fertilizer subsidies are designed to support farmers. However, inefficiencies in the distribution of KUR and fertilizer subsidies have resulted in uneven progress in the Food Security Index across Indonesia's provinces. This study aims to assess the effectiveness of KUR and fertilizer subsidy distribution on the Food Security Index across provinces, highlighting the challenges posed by unequal distribution that has impeded improvements in food security. The objective is to develop a province-specific Food Security Index model to guide local government policy decisions.

2 Literature Review

2.1 The Concept of the Food Security Index

Food security refers to a condition where sufficient food is available both at the national and individual levels, characterized by the availability of adequate, safe, diverse, nutritious, and affordable food that aligns with religious beliefs, societal values, and cultural norms. This ensures that individuals can maintain healthy, active, and productive lives in a sustainable manner. The development of food and nutrition security involves a systematic, multi-sectoral approach aimed at ensuring sufficient food availability through domestic production and trade, achieving supply and access stability at various levels (macro, meso, and micro), and meeting the quality (diversity and safety) and quantity of food consumption through infrastructure improvements.

To achieve these conditions, macroeconomic policies are essential for maintaining economic stability and ensuring the consistency of food supply and prices. A Food Security Index (FSI) system has been established to evaluate the level of food security in a region and the factors that support it. The FSI is based on the definition of food security and its subsystems, using nine indicators derived from three key aspects: food availability, accessibility, and utilization.

Table 2. Cut Off Point IKP

IKP Group	Regency	City	Province
1	<= 41,52	<= 28,82	<= 37,61
2	> 41,52 - 51,42	> 28,84 - 41,44	> 37,61 - 48,27
3	> 51,42 - 59,58	> 41,44 - 51,29	> 48,27 - 57,11
4	> 59,58 - 67,75	> 51,29 - 61,13	> 57,11 - 65,96
5	> 67,75 - 75,68	> 61,13 - 70,64	> 65,96 - 74,40
6	>75,68	> 70,64	> 74,40

The Food Security Index (FSI) for each region is grouped into six categories based on the FSI cut-off points (Table 2). The FSI cut-off point is derived from the sum of each multiplication of individual indicator weights with the cut-off points of standardized individual indicators using the z-score and distance-to-scale methods (0-100). Regions classified in Group 1 are those (districts/cities/provinces) with a higher level of vulnerability compared to regions in higher groups. In contrast, regions in Group 6 represent those with the best food security. [11]

2.2 Definition and Purpose of People's Business Credit (KUR)

Community Empowerment Programs based on feasibility and bankability indicators can be mapped into four mutually integrated quadrants, namely quadrants one (revolving funds) and two (commercial credit) are feasible quadrants while quadrants three (interest subsidies) and quadrant 4 (social assistance) are quadrants. not feasible. Super micro companies (quadrant four), lack information regarding various program financing, either due to low levels of knowledge or damaged communication and information channels. Those in this group experience asymmetric information. Often they run their businesses just to survive and do not have assets that can be used as collateral to obtain loans from financial institutions. [12]

The People's Business Credit (KUR) program is designed to bridge this gap by providing affordable financing for small-scale businesses, especially for those who do not have access to traditional banking services. The aim of KUR is to support the growth of micro, small and medium enterprises (MSMEs) by providing the capital necessary to develop their businesses, thereby improving their livelihoods and contributing to the economy.

Procurement and distribution of fertilizer, especially subsidized fertilizer, is carried out in accordance with Minister of Trade Regulation Number 15/MDAG/Per/2015 which regulates the procurement and distribution of subsidized fertilizer for the agricultural sector. The effectiveness of this distribution process is measured through the "6 T" analysis, while the efficiency is measured by marketing margin analysis.

3 Research Method

The data utilized in this research includes both monthly and annual data sets, spanning from January 2015 to December 2023. The study is conducted across all provinces in Indonesia. The data collection method applied is the documentation technique, relying on secondary data obtained from sources such as the National Socioeconomic Survey (Susenas) and the National Statistics Agency (BPS).

3.1. Data Analysis Model

The following is the model used in the study below:

$IKP = f(\text{REV}, \text{SP}, \text{KUR}, \text{Fertilizer})$.

$$IKPt = \alpha_0 + \alpha_1 \text{REV} + \alpha_2 \text{SP} + \alpha_3 \text{KUR} + \epsilon_i$$

Where :

IKP	= Food Security Index (FSI)
REV (X1)	= Revitalization (Rupiah)
SP (X2)	= Facilities and Infrastructure (Rupiah)
KUR (X3)	= People's Business Credit. (Rupiah)
α_0	= Constanta
$\alpha_1 : \alpha_2 : \alpha_3$	= coefisien regression
ϵ_i	= disturbance error

3.2. Data Analysis

Various tests were conducted in this study, including the Coefficient of Determination (R^2), which is used to measure the proportion of variation in the dependent variable that is explained by the independent variables. Additionally, the Simultaneous Test (F-Test) was employed to statistically assess whether all the independent variables in the model collectively influence the dependent variable. This hypothesis testing involves comparing the probability (F-statistic) value with a significance level of 0.05 (5%). If the Prob. (F-statistic) value is less than 0.05, the alternative hypothesis (H_a) is accepted, and the null hypothesis (H_0) is rejected. Conversely, if the value exceeds 0.05, H_a is rejected, and H_0 is accepted. Furthermore, the Partial Test (T-Test) was used to determine whether each independent variable individually affects the dependent variable. This test compares the probability of each independent variable with a significance level of 0.05, using the same criteria for hypothesis acceptance or rejection.

In addition to these, Classical Assumption Violation Tests were conducted to ensure that the research model provides reliable parameter estimates. These assumptions include tests for autocorrelation, multicollinearity, and heteroscedasticity. [13]. The Stationarity Test (Unit Root Test) was also performed to determine whether a variable's mean, variance, and covariance remain constant over time, as stationarity is critical for accurate regression estimations. Following the unit root test, the Degree of Integration Test was carried out when the data was found not to be stationary at degree zero or one. This test helps establish the level at which the data becomes stationary, and if necessary, further testing is conducted until all variables achieve stationarity. The Dickey-Fuller (DF) Test was used for this purpose, with the rule that a variable is considered stationary if its calculated DF value exceeds the MacKinnon critical value.

Moreover, the Cointegration Test was conducted to identify long-term equilibrium relationships between non-stationary variable. [14]. While individual variables may not be stationary, their combination can exhibit stationarity. In this context, the Johansen Cointegration Test was applied, and the presence of cointegration was determined using the likelihood ratio (LR) test. If the calculated LR value is greater than the critical LR value, it indicates that the variables are cointegrated, otherwise, no cointegration exists.

4. Research Result

4.1. Stationarity Test (Root Test)

Table 3. Results of the Unit Root Test with Metode *Second Difference*

Variable	ADF T- Statistik	Value Critis			Prob.	Conclusion
		1%	5%	10%		
Revitalization (X1)	-4.37	-3.68	-2.97	-2.62	0.0019	Stationary
Facilities and Infrastructure (X2)	-6.90	-3.69	-2.97	-2.62	0.0000	Stationary
KUR (X3)	-6.88	-3.69	-2.97	-2.62	0.0000	Stationary
IKP (Y)	-6.12	-3.769	-3.01	-2.64	0.0001	Stationary

Based on Table 3, the data is shown to be stationary at the second difference degree. Therefore, this research can proceed with the analysis using the Error Correction Model (ECM).

4.2 Test Cointegration

Table 4. Cointegration Test Results

Null Hypothesis: D(ECT) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, max lag=7)

Augmented Dickey-Fuller test statistic		t-Statistic	Prob.
		-5.200350	0.0002
Test critical values	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.

Based on Table 4, the ADF value is -5.200350, with a critical value of 2.042272 and an ECT probability of 0.0002, which is less than 0.05. The ECT value is stationary at the level, meaning the residuals from the equation are stationary at degree zero (0) or the level. Therefore, it can be concluded that there is a significant long-term relationship (cointegration) between the independent variables and the dependent variable. Hence, further testing can be conducted.

4.3 Error Correction Model

Table 5. Short-Term Equation

Variable	Coefficient	Std. Error	t-Statistic	Prob
C	0.026874	0.010711	2.508934	0.0190
D(X1)	0.398871	0.144986	2.751101	0.0109
D(X2)	0.007263	0.135385	0.053649	0.9576
D(X3)	-0.060324	0.056192	-1.073525	0.2933
ECT(-1)	-0.225310	0.099436	-2.265868	0.0324
R-squared		0.386508	Mean dependent var	0.046651
Adjusted R-squared		0.288349	S.D. dependent var	0.053460
S.E. of regression		0.045858	Akaike info criterion	-3.175519
Sum squared resid		0.052574	Schwarz criterion	-2.941198
Log likelihood		52.632379	Hannan-Quinn	-3.100810
F-statistic		3.937578	criteria.	2.131577
Prob(F-statistic)		0.012983	Durbin-Watson stat	0.046651
Adjusted R-squared		0.288349	Mean dependent var	

$$DIKP_t = 0.026874 + 0.398871DX1 + 0.007263DX2 - 0.060324DX3$$

Based on the results from the error correction model test, among the various independent

variables included in the Food Security Index (FSI) equation for Indonesia, the Revitalization variable (X1) has a positive and significant influence on the FSI. In contrast, the variables of Facilities and Infrastructure (X2) and People's Business Credit (KUR) (X3) do not have a significant short-term effect on the FSI. Therefore, it can be concluded that, in the short term, Revitalization plays a key role in determining whether the FSI increases or decreases in relation to rice availability in Indonesia.

Table 6. Long-Term Equation

Variable	Coefficient	Std. Error	t-Statistic	Prob
C	-1.977295	2.468685	-0.800951	0.4302
X1	0.890862	0.119716	7.441488	0.0000
X2	-0.398797	0.306548	-1.300928	0.2043
X3	0.222259	0.066838	3.325363	0.0026
C	-1.977295	2.468685	-0.800951	0.4302
R-squared		0.955656	Mean dependent var	8.022873
Adjusted R-squared		0.950729	S.D. dependent var	0.420802
S.E. of regression		0.093406	Akaike info criterion	-1.783809
Sum squared resid		0.235556	Schwarz criterion	-1.598778
Log likelihood		31.649404	Hannan-Quinn criteria.	-1.723494
F-statistic		193.9582	Durbin-Watson stat	0.592937
Prob(F-statistic)		0.000000		

$$DIKP_t = -1.977295 + 0.890862DX1 - 0.398797X2 - 0.022259DX3$$

In the long term, both Revitalization (X1) and KUR (X3) exhibit a positive and significant relationship with the FSI in Indonesia. However, the Facilities and Infrastructure variable (X2) does not significantly impact the FSI over the long term.

4.4 Classic Assumption Test

Normality Test

The normality test is conducted to assess whether the data for both the independent and dependent variables in the regression model follow a normal distribution. This test utilizes the Jarque-Bera (J-B) statistic, and the normality assumption is considered satisfied if the probability value of the J-B statistic exceeds 0.05. In this case, the test results indicate a Jarque-Bera probability value of 0.288126, which is greater than 0.05. This confirms that the data used in the ECM model is normally distributed, and thus the normality assumption for the model is met.

Autocorrelation Test

Table 7. Autocorrelation Test Results

F Statistic	0.115591	Prob F(2,23)	0.8914
Obs* R-Square	0.298541	Prob. Chi-Square(2)	0.8613

The autocorrelation test in the table above shows a calculated F-probability value of 0.8613, which is greater than 0.05. This means that H_0 is rejected and H_a is accepted, leading to the conclusion that the ECM model is free from the problem of autocorrelation.

Test Multicollinearity

Table 8. Multicollinearity Test Results

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.000115	1.636765	NA
D(X1)	0.021021	2.081391	NA
D(X2)	0.018329	1.473484	1.382037
D(X3)	0.003158	1.094479	1.078952

According to the multicollinearity test results presented in Table 8, all variance values are below 10, or the Variance Inflation Factor (VIF) values are less than 10. This indicates that there is no multicollinearity present among the independent variables.

4.5 Test Hypothesis

Test Partial (Test -t)

Table 9. Term Partial (Test-t) Short Term

Variable	Coefficient	Std. Error	t-Statistic	Prob
c	0.026874	0.010711	2.508934	0.0190
D (X1)	0.398871	0.144986	2.751101	0.0109
D (X2)	0.007263	0.135385	0.053649	0.9576
D (X3)	-0.060324	0.056192	-1.073525	0.2933
ECT (-1)	-0.225310	0.099436	-2.265868	0.0324

The Revitalization, Variable (X1) has a t-value of 0.0109, showing a positive and significant coefficient of 0.398871. When comparing the t-value with the t-table value (0.0109 < 0.05), it suggests that Revitalization significantly influence the Food Security Index (FSI) (Y) in the short term.

The Facilities and Infrastructure, Variable (X2) has a t-value of 0.9576, showing a positive and significant coefficient of 0.007263. When comparing the t-value with the t-table value ($0.9576 > 0,05$), it suggests that Facilities and Infrastructure not significantly influence the Food Security Index (FSI) (Y) in the short term.

The KUR Variable (X3) has a t-value of 0,2933, with the data showing a negative and insignificant coefficient of -0.060324. Comparing this t-value with the t-table value ($0,2933 > 0,05$) leads to the conclusion that KUR (X3) does not have a significant impact on the Food Security Index (FSI) (Y) in the short term.

Table 10. Partial Test (Test-t) Long Term

Variable	Coefficient	Std. Error	t-Statistic	Prob
c	-1.977295	2.468685	-0.800951	0.4302
D (X1)	0.890862	0.119716	7.441488	0.0000
D (X2)	-0.398797	0.306548	-1.300928	0.2043
D (X3)	0.222259	0.066838	3.325363	0.0026

The Revitalization, Variable (X1) has a t-value of 0.0000, showing a positive and significant coefficient of 0.890862. When comparing the t-value with the t-table value ($0.0000 < 0,05$), it suggests that Revitalization significantly influence the Food Security Index (FSI) (Y) in the long term.

The Facilities and Infrastructure, Variable (X2) has a t-value of 0.2043, showing a negative and significant coefficient of -0.398797. When comparing the t-value with the t-table value ($0.2043 > 0,05$), it suggests that Facilities and Infrastructure not significantly influence the Food Security Index (FSI) (Y) in the long term.

The KUR Variable (X3) has a t-value of 0.0026, with the data showing a negative and insignificant coefficient of 0.222259. Comparing this t-value with the t-table value ($0,2933 > 0,05$) leads to the conclusion that KUR (X3) does not have a significant impact on the Food Security Index (FSI) (Y) in the long term.

Simultaneous Test (F-Test)

Table 11. Simultaneous Test (F-Test)

Variable	Value F	Probability	Explanation
Short Term	3.937578	0.012983	Sig at 5 %
Long Term	193.9582	0.000000	

Based on Table 11, the F-calculated value of 3.937578 is greater than the F-table value of 2.96, with a probability of 0.012983, which is less than 0.05. This indicates that Revitalization (X1), Facilities and Infrastructure (X2), and KUR (X3) have a significant impact on the IKP (Y) variable in the short term. Similarly, in the long term, the F-calculated value of 193.9582 exceeds the F-table value of 2.96, with a probability of 0.000000, which is also less than 0.05, meaning that Revitalization (X1), Facilities and Infrastructure (X2), and KUR (X3) significantly influence the IKP (Y) variable in the long term.

4.6 Coefficient Determination Test (Uji R²)

Table 12. Short Term Coefficient of Determination Test

R Square	0.386508	Mean dependent Var	0.046651
Adjusted R-Squared	0.288349	SD. dependent variable	0.054360
SE of regression	0.045858	Akaike in for criterion	-3.175519
Sum Squared resid	0.052574	Swartz criterion	-2.941986
Log likelihood	52.63279	Hannan-Quin criteria	-3.100810
Prob (F Statistic)	0.012983		

Table 13. Long Term Coefficient of Determination Test

R Square	0.9555658	Mean dependent Var	8.022873
Adjusted R-Squared	0.950729	SD. dependent variable	0.420802
SE of regression	0.093406	Akaike in for criterion	-1.783809
Sum Squared resid	0.235566	Swartz criterion	-1.598778
Log likelihood	31.64904	Hannan-Quin criteria	-1.723494
F Statistic	193.9582	Durbin-Watson Stat	0.5929937
Prob (F Statistic)	0.000000		

In the long term, 95.56% (0.9555656) of the variance is accounted for by the model, while the remaining 4.44% is attributed to other variables that were not included in this study.

5. Conclusion

According to the results of the error correction model test, among the independent variables included in the Food Security Index (IKP) equation for Indonesia, Revitalization (X1) has a positive and significant impact on the Food Security Index. However, the variables related to Facilities and Infrastructure (X2) and People's Business Credit (KUR) (X3) do not exhibit a significant short-term effect on the IKP. Therefore, in the short term, Revitalization is a key factor influencing fluctuations in the IKP, particularly concerning rice availability in Indonesia. In the long term, both Revitalization (X1) and KUR (X3) have a positive and significant effect on the IKP, while the Facilities and Infrastructure variable (X2) remains non-significant.

Regarding the coefficient of determination (R²), the research using the error correction model reveals that in the short term, the independent variables of Revitalization, Facilities and Infrastructure, and KUR explain 38.65% (0.386508) of the variation in the IKP in Indonesia,

with the remaining 61.35% attributable to factors outside the study. In the long term, 95.56% (0.955656) of the variation in the IKP is explained by the model, leaving 4.44% influenced by other variables not considered in this research.

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