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THE RELATION OF PRICE AND RED CHILI PRODUCTION IN BATURAJA OGAN KOMERING ULU REGENCY

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ABSTRACT

The purpose of this study was to analyze the existence and level of market integration of red chili and the relationship between prices and red chili production in Ogan Komering Ulu (OKU) Regency. This research was conducted in East Baturaja District, OKU Regency. This study uses monthly Times Series data for 5 years from 2017-2021. The research method used was library research method and the analytical tool used in this research is a VAR model approach to prove the existence of red chili market integration in the Ogan Komering Ulu Regency, East Baturaja District. Data processing is carried out with the Eviews program.6. The variables in this study were measured using the data stationarity test, determining the optimal lag level, cointegration analysis, impulse response analysis and variance decomposition. The results showed that all research variables, namely the price and production of chili in each short-term period, tend to adjust to each other to achieve long-term equilibrium. The results of the VECM analysis show that there is a short-term and long-term relationship between research variables.

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1. INTRODUCTION

Indonesia is an agrarian country whose majority of the population are farmers (Rohman, 2020). This is indicated by the condition of the soil that contains good nutrients to assist in plant growth. One of the agricultural commodities that thrives is horticultural commodities. Vegetable crops become horticultural products in the agricultural sector in the form of eggplant, mustard greens, cabbage, chili, carrots, potatoes which have long been cultivated by farmers because these products are needed by almost every level of society as a daily menu (Nawangshi, 2001).

Many farmers in Indonesia cultivate chili plants. Chili is a herbaceous plant from the eggplant family which has the scientific name Capsium sp. Chili comes from the Americas, Europe and Asia including Indonesia (Rohman, 2020). Initially, the chili plant grew on the mainland of South America and Central America, including Mexico, around the year BC. The people who first used and developed chilies were the Incas in South America, the Maya in Central America, and the Aztecs in Mexico. . They use this spicy fruit plant as a flavoring for their dishes. One of the inscriptions found in America also shows that the last Aztec leader, Montezuma, always drank imperial chocolate with chili powder for breakfast (Wiryanta et al., 2002).

In Southeast Asia, chili is very popular as a food flavor enhancer (Afrilia, 2017). Chili is known to the public as one of the spices in the kitchen, has a spicy taste that makes dishes delicious and enhances the appetite. Chili contains many nutrients and vitamins, namely Calories, Protein, Fat, Carbohydrates, Calcium, Phosphorus, Riboflavin, Vit.A, B1 and C. Besides that, this plant also functions as industrial raw material which has export opportunities, opening up job opportunities. Red chili is known to the public as one of the spices in the kitchen which has a spicy taste that makes dishes delicious and can increase the taste of food appetite. Most of the red chili is

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consumed by the population regardless of their social level which is very attractive to prices. (Fisheries and Forestry, Ogan Komering Ulu District, 2012). People are used to when chili prices go up and down in the span of a year. Especially if the increase and decrease in price is not too significant. However, when the spike in the price of red chili is quite drastic, it can certainly make people restless.

The price of chili commodities is increasingly disturbing the public, last year chili often experienced an increase, even now the price of chili is still increasing. In March 2021, the price of curly red chili in Ogan Komering Ulu district experienced a significant increase, this made the community even more restless. The increase in red chilies has been complained of by housewives, food business actors, and retail traders. Some of them chose to reduce the purchase of chili from the usual to replace the food menu at home. The retailer chose to reduce the red chili stock, because he was afraid that it would not run out.

The capitalist system emerged as the cause of the increase in the price of food needs. This is due to the lack of availability of certain food commodities. This condition is considered an economic problem because prices are determined based on supply and demand for these goods. If the quantity of goods supplied is abundant, while the demand is small, the price will fall. On the other hand, if the quantity of goods supplied is small, while the demand is large, the price will rise. Ahead of the big holidays, a number of basic commodities such as chilies of various types to oil will experience a fairly high price increase. This is because there are many requests for red chili, but the number of red chilies is small. Many food menus use red chilies, for example, after the Eid al-Adha holiday, many people hold weddings, so they need a lot of red chili for cooking. The following is data on the average price of red chili at the Ogan Komering Ulu Regency, South Sumatra Province.

The average price of chili that continues to change fluctuates every month. Although it tends to rise at the end of the year, the price of chili has decreased significantly in 2020. Simultaneously, almost all red chili producing areas in particular. The current state of the chili market is in a condition where the amount of demand is greater than the amount of supply so that there is a limited supply of chili in the market. Several factors that can cause chili prices to fluctuate, among others, the supply of chilies to the market is not continuous, and extreme weather has hit agriculture. (Wahyudi, 2011). Dry weather conditions that make chili plants die a lot, it hasn't rained for a long time so the chili plants are drying up more and more day by day. And chili plants are affected by pests and diseases that cannot be controlled and cannot produce optimally. Based on the above background, the author is interested in conducting a research entitled "The Relationship of Prices to Red Chili Production in Ogan Komering Ulu Regency".

2. RESEARCH METHOD

The research method used was library research method and the analytical tool used in this research is a VAR model approach to prove the existence of red chili market integration in the Ogan Komering Ulu Regency, East Baturaja District. This research was conducted in East Baturaja District, OKU Regency. This study uses monthly Times Series data for 5 years from 2017-2021. Data processing is carried out with the Eviews program.6. The variables in this study were measured using the data stationarity test, determining the optimal lag level, cointegration analysis, impulse response analysis and variance decomposition. The results showed that all research variables, namely the price and production of chili in each short-term period, tend to adjust to each other to achieve long-term equilibrium. The results of the VECM analysis show that there is a short-term and long-term relationship between research variables.

3. RESULTS AND ANALYSIS

a. Johansen Cointegration Test

Cointegration is a long-term relationship or equilibrium between variables that are not stationary. That is, although individually these variables are not stationary, but the linear combination between these variables can be stationary. Cointegration test aims to determine whether the non-stationary variables are cointegrated or not. The existence of a variable that is stationary at the same degree can indicate a long-term relationship between these variables; therefore it will be proven by conducting a cointegration test (Johansen cointegration). Johansen cointegration is based on the VAR model framework by including an error-correction component to prove the existence of cointegration, which is commonly called Vector Error Correction.

Cointegration testing is carried out in order to obtain a long-term relationship between variables that have met the requirements in the integration process, namely where all variables are stationary. Determination of cointegration is done by comparing the probability value that occurs with the significance value (0.05). Johansen's cointegration test results are shown in Table 1 below:

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Table 1. Johansen's cointegration test results

Date: 05/25/22 Time: 18:12 Sample (adjusted): 3 60
Included observations: 58 after adjustments Trend assumption: No deterministic trend Series: Price of production
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized of CE(s)	No. Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.369553	28.36682	12.32090	0.0001
At most 1	0.027375	1.609908	4.129906	0.2401

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Based on the Johansen cointegration test results in Table 4.5, it is known that the probability value in the None row is 0.0001 (sig <0.05) so it can be seen that there is a cointegration equation at a significance level of 5 percent. This information indicates that there is a long-term relationship between these variables.

This shows that there is a relationship between stability or balance and the similarity of movements in the long term between the chili price variable and chili production. The conclusion drawn from the Johansen test is that there is a mutually influencing relationship that can be seen from the cointegration that occurs between the variables themselves. If there is cointegration between variables, then all of these variables have an influence in the long term with a mutually influencing relationship that runs as a whole and information is spread in parallel. In other words, in any short-run period, all variables tend to adjust to each other, to reach long-run equilibrium. Furthermore, the VECM model will be used, from the VECM analysis it can be seen the short-term and long-term effects at once

b. Estimation of VECM

To find out the comparison of the determinants of chili prices will be analyzed using the VAR method. This method is used to determine the relationship between chili prices and chili production. Then if the data used is stationary at the level, then the VAR model will be combined with the error correction model (ECM) to become cointegrated VAR or commonly known as VECM. The results of the VECM estimation are as shown in Table 2 below:

Table 2. VECM . Model estimation results

Vector Error Correction Estimates Date: 05/25/22 Time: 18:28 Sample (adjusted): 3 60
Included observations: 58 after adjustments Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1	
Price (-1)	1.000000	
Production (-1)	-767.7355	
	(105.912)	
	[-7.24883]	
Error Correction:	**D(Price)**	**D(Production)**
CointEq1	-0.026598	0.001087
	(0.02765)	(0.00020)
	[-0.96202]	[5.40736]
D(Price(-1))	0.082278	-0.000485
	(0.13464)	(0.00098)
	[0.61109]	[-0.49527]
D(Production(-1))	5.196924	0.032135
	(16.5577)	(0.12037)
	[0.31387]	[0.26695]
R-squared	0.048479	0.468364

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Adj. R-squared	0.013878	0.449032
Sum sq. resids	9.06E+09	478745.4
S.E. equation	12833.29	93.29771
F-statistic	1.401097	24.22711
Log likelihood	-629.4265	-343.8344
Akaike AIC	21.80781	11.95981
Schwarz SC	21.91439	12.06638
Mean dependent	-29.74138	-6.896552
S.D. dependent	12923.28	125.6920
Determinant resid covariance (dof adj.)		1.41E+12
Determinant resid covariance		1.26E+12
Log likelihood		-972.6928
Akaike information criterion		33.81699
Schwarz criterion		34.10119
Number of coefficients		8

As it is known that the results of the E.Views analysis are as in Table 2 which shows that the results of the upper estimate are long-term estimates and the lower estimates are short-term. Based on the results in Table 2, it is known that the table above is a long-term relationship between the two variables (price and production). Meanwhile at the bottom of the table is an interpretation of the short-term relationship between the two variables. The t-statistical value (t-count) obtained is compared with the critical t (t-table), where the value used is the 95% confidence level.

The following are the decision making criteria based on the t statistical test:

- If the statistic value is t |t statistic| < |t is critical|, then it has no significant effect
- If the statistic value is t |t statistic| > |t is critical|, then it has a significant effect. It is known that the number of observations (n) = 60, df = n-1 = 60-1 = 59, at a significance level of 0.05, then the critical value t = 2,000995

Based on the results of the VECM model in Table 4.6, it can be interpreted as follows:

- In the short term, changes in chili prices in the past month have no significant effect on chili production this month, this can be seen by the statistical value t |-0.49527| < critical value t |2,000995|
- In the short term, changes in chili production in the past month have no significant effect on chili prices this month, this can be seen by the statistical value t |0.31387| < critical value t |2,000995|
- In the long term, chili production has a significant effect on chili prices, with a statistical value of t |-7.24883| > critical value t |2,000995|

c. Granger causality test

Granger causality test is used to see whether there is causality or not, and if there is one-way or two-way causality. The results of the Granger caseality test can be seen in Table 3 below:

Tabel 3. Granger causality test

Pairwise Granger Causality Tests Date: 05/26/22 Time: 18:34 Sample: 1 60
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
Production does not Granger Cause price	59	0.73552	0.3948
Price does not Granger Cause production		0.48606	0.4886

Based on the results of Granger causality in Table 3, it is known that chili production has no significant effect on chili prices, with a probability value of 0.3948 > sig 0.05, and also chili prices have no significant effect on chili production, with a probability value of 0.4886 > sig 0 ,05. So that there is no bidirectional causality between Chili Production and Chili prices, this means that the Production and Chili Prices do not affect each other.

d. Impulse Response Function

Impulse Response Function (IRF) serves to see the dynamic response of a dependent variable if it gets a certain shock or an independent variable innovation of one standard deviation. This response indicates the effect of a shock on the dependent variable on the independent variable. Fundamentally, in this analysis, it will be known the positive or negative response of a variable to other variables. The response in the long term is usually quite significant and tends to change. In the long term, the response tends to be consistent and continues to shrink. To facilitate interpretation, the results of the analysis will be presented in graphical form.

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IRF in this research analysis was conducted to analyze the response of chili prices to chili production shocks. The ordering of variables in the IRF analysis is based on Cholesky's factorization. The horizontal axis is the time in months ahead after the shock, while the vertical is the response value. In this study, the data used is level with a period of 10 months. Chili prices are an increase in the value of the variable by one standard deviation at the beginning of the period which results in monthly changes over the next 5 years. The selection of the 5-year period is only based on the assumption that the time is not too fast and not too long to observe the effect of changes in one variable on other variables. This research focuses on the analysis of influence in general. Therefore, the magnitude of the response indicates the magnitude of the rate of change, not the magnitude of the change. IRF results were obtained using the software eviews 6.

Figure 1 below shows the IRF analysis of chili prices.

Response of Price to production (d.f. adjusted)

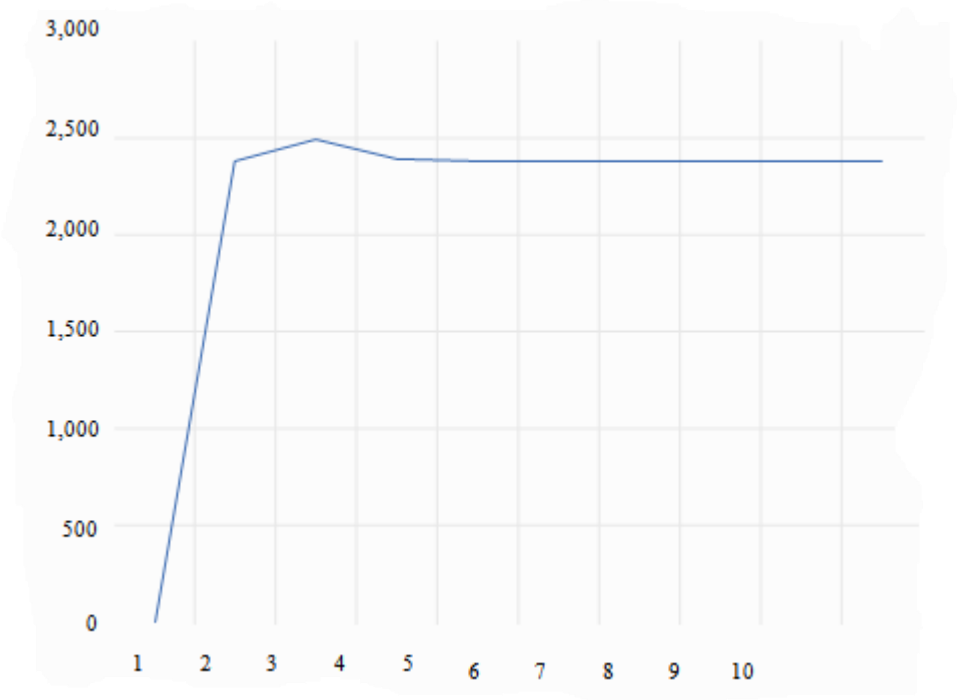

Figure 1. Response of Price to production

Based on the IRF above, it can be seen that at the beginning of the period until the 4th period, the chili price response increased quite sharply, and after the 4th period, the price no longer increased and the graph showed stability.

e. Analysis of Forecasting Error Variance Decomposition

Analysis of variance decomposition or Forecast Error Variance Decomposition (FEVD) is used to calculate and analyze how much influence random shocks from certain variables have on endogenous variables. FEVD produces information about the relative importance of each random innovation or how strong the composition of the role of a particular variable is against other variables, respectively, in the VECM and VAR first difference models. With this method, it can also be seen the strengths and weaknesses of each variable in influencing other variables over a long period of time.

Forecasting the decomposition of variance in this study is to provide information about how big the role of changes in chili production is in explaining changes in chili prices. In other words, the Variance Decomposition of the variable whose shock has the most important role in explaining changes in a variable. Thus, it can be seen how big the contribution of shock to the variation of changes in various other variables. The variance decomposition of a variable is 100. The greater the decomposition value of the shocks of a variable, the more important the variable is. This simulation analysis is projected over 20 time periods in order to analyze its long-term effects.

The results of the analysis of variance decomposition can be seen in Table 4 below

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Tabel 4.8. Hasil Analisis Forecasting Error Variance Decomposition
Variance Decomposition of Price:

Period	S.E.	Price	Production	
1		12833.29	100.0000	0.000000
2		19051.78	98.45677	1.543232
3		23652.17	97.89373	2.106267
4		27478.22	97.68420	2.315800
5		30834.72	97.57075	2.429253
6		33861.01	97.49571	2.504291
7		36638.24	97.44228	2.557717
8		39219.29	97.40244	2.597558
9		41640.65	97.37161	2.628394
10		43928.76	97.34703	2.652972
11		46103.44	97.32698	2.673023
12		48180.06	97.31031	2.689691
13		50170.81	97.29623	2.703766
14		52085.52	97.28419	2.715809
15		53932.30	97.27377	2.726231
16		55717.90	97.26466	2.735338
17		57448.03	97.25663	2.743365
18		59127.55	97.24951	2.750493
19		60760.67	97.24314	2.756865
20		62351.03	97.23741	2.762595

Based on the simulation results of the analysis of the decomposition of variance presented in Table 4.8, it can show the variability of chili prices. Where, in the first period the chili price variable itself had the most role in chili price variability by 100 basis points and the role of the chili price itself was still dominant until the last observation period. It can be seen from the table that chili production affects prices starting in the 2nd period although it is not very strong / significant and there is an increasing influence until the 20th period. For the following periods there is a stable movement of the role of variables in explaining the variability of chili prices. These results indicate that the role of the chili price itself is still dominant until the last observation period. However, apart from the price of chili itself, in the long term chili production has a strong role in explaining the chili price variable.

4. CONCLUSION

Based on the results of the study showed:

1. Through Johansen's cointegration test, it shows that all research variables, namely chili prices and chili production in each short-term period tend to adjust to each other to achieve long-term equilibrium.
2. The results of the VECM analysis show that there is a short-term and long-term relationship between research variables, including:
   - In the short term, changes in chili prices in the past month have no significant effect on chili production this month, this can be seen by the statistical value t |-0.49527| < critical value t |2,000995|
   - In the short term, changes in chili production in the past month have no significant effect on chili prices this month, this can be seen by the statistical value t |0.31387| < critical value t |2,000995|
   - In the long term, chili production has a significant effect on chili prices, with a statistical value of t |-7.24883| > critical value t |2,000995|
3. Based on the analysis of the Impulse Response Function, it can be concluded as follows:
   - at the beginning of the period until the 4th period, the chili price response increased quite sharply, and after the 4th period, the price no longer increased and the graph showed stability
   - there was a drastic decrease in the 2nd period, then there was a sharp increase in chili production until the 4th period. After the 4th period, production showed stability
4. Based on the results of the Forecast Error Decomposition of Variance analysis, in general, each variable can explain each other if there is a shock to one of the variables. The contribution to the development of the chili price variable is dominated by the chili production variable

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