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has successfully presented a research paper titled

Analysis Factors Influencing Food Crops Farmers Exchange Rate in Gorontalo Province

at the Centre for Business in Society, Coventry University,

19 November 2018

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ANALYSIS FACTORS INFLUENCING FOOD CROPS FARMERS EXCHANGE RATE IN GORONTALO PROVINCE

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2018

ABSTRACT

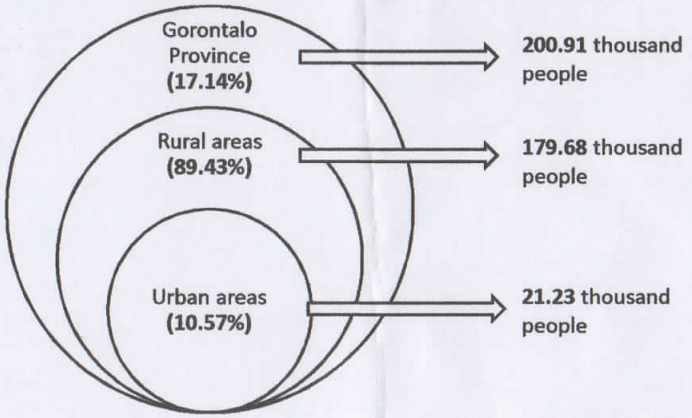
The purpose of this study is to analyze the exchange rate of food crop farmers in Gorontalo Province and the factors that influence it and examine the effect of grain price, corn price, rural inflation, and the package price of production costs on the exchange rate of food crop farmers in Gorontalo Province. This research was conducted from February to March 2018. The research method used was the method of error correction model analysis and multiple linear regression analysis. The data used is secondary data from the Central Statistics Agency of Gorontalo Province. The results showed that in the long and short term, grain price variables, corn prices, rural inflation, significantly affected the exchange rate of food crop farmers in Gorontalo Province. The variable price of the package of production costs only has a significant effect in the long run, while in the short term there is no significant effect on the exchange rate of food crop farmers in Gorontalo Province.

Keywords : Farmers Exchange rate, Grain Price, Corn Price, Rural Inflation, Package Price of Production Cost

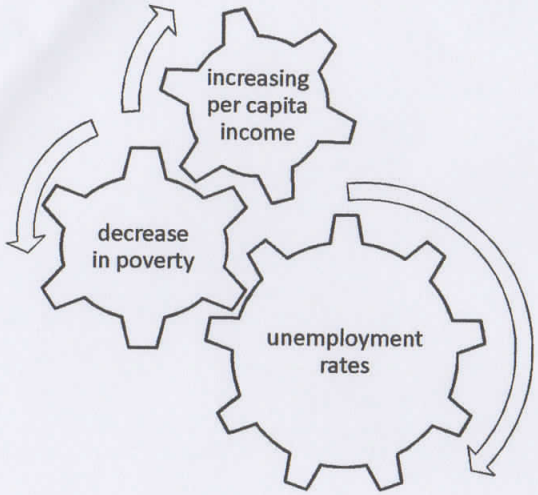
1 INTRODUCTION

Data on the number of poor people in Indonesia, especially in Gorontalo, especially in rural areas is still **very large**.

BPS shows the data in September 2017 of the number of poor:



Improving people's welfare is shown by the improvement in various indicators of human resource development:



The Meaning of Farmer Exchange Rate (NTP)

The general view that has prevailed as stated by Indonesia Statistical Department (BPS), is that increasing NTP means an increase in welfare, and vice versa.

- **NTP > 100**, means that the farmer has a surplus. The production price rises more than the increase in consumption prices and production costs.
- **NTP = 100**, means that farmers experience breakeven point. The increase / decrease in production prices is equal to the percentage of increase / decrease in consumption prices and production costs.
- **NTP < 100**, means that farmers experience a deficit. The production price rises less than the increase in consumption prices and production costs.

2 Research Methodology

The research will be carried out for 2 months start from February to March 2018.

Located at the Gorontalo Province, Central Statistics Agency (BPS)

The research carried out by processing and analyzing secondary data of the Gorontalo Province Farmer Exchange Rate (NTP) in 2008-2017 source from Gorontalo Provincial Statistics Agency.

POPULASI DAN SAMPEL

The Analytical Method

The analytical method that will be used is an Error Correction Model (ECM) and Multiple Linear Regression analysis. The model of farmer exchange rate relations with these variables can be arranged in the following function or equation:

$$NTP = a + \beta 1\ HG + \beta 2\ HJ + \beta 3\ IKRT + \beta 4\ BP + e$$

where:

NTP	= Farmers Exchange Rate
a	= Constant
β	= Resgressin Coefficient
HG	= Grain Price
HJ	= Corn Price
IKRT	= Household Consumption Index
BP	= Price Package for Production Cost

3 Result and Discussion

Research Variable Analysis

❑ Farmer Exchange Rate (NTP)

No.	Year	NTP Score (Y)	Growth/ Year (%)
1	2008	94.93	-
2	2009	91.91	-3.29
3	2010	96.01	4.27
4	2011	101.63	5.53
5	2012	99.91	-1.72
6	2013	96.44	-3.60
7	2014	96.44	0.00
8	2015	98.30	1.90
9	2016	108.49	9.39
10	2017	108.69	0.19
Average		99,2763	
Deviation Standard		5,6545	
Minimum Score		90,1771	
Maximum Score		111,5344	

Source:
Data Processed, 2018

Research Variable Analysis (Cont...)

❑ Grain Price (HG)

No.	Year	Grain Price Score (HG)	Growth/ Year (%)
1	2008	77,29	-
2	2009	86,92	11,08
3	2010	91,82	5,34
4	2011	102,15	10,11
5	2012	101,96	-0,19
6	2013	104,57	2,50
7	2014	114,09	8,35
8	2015	122,71	7,03
9	2016	130,57	6,02
10	2017	126,55	-3,18
Average		105,8619	
Deviation Standard		17,0931	
Minimum Score		76,4140	
Maximum Score		134,1453	

Source:
Data Processed, 2018

Research Variable Analysis (Cont...)

❑ Corn Price (HJ)

No.	Year	Corn Price Score (HJ)	Growth/ Year (%)
1	2008	81,02	-
2	2009	80,97	-0,07
3	2010	85,75	5,58
4	2011	96,66	11,29
5	2012	99,40	2,75
6	2013	100,89	1,48
7	2014	107,29	5,97
8	2015	120,32	10,83
9	2016	146,61	17,94
10	2017	157,60	6,98
Average		107,6505	
Deviation Standard		25,6770	
Minimum Score		75,8995	
Maximum Score		162,38813	

Source:
Data Processed, 2018

Research Variable Analysis (Cont...)

❑ Household Consumption Index (IKRT)

No.	Year	Household Consumption Index Score (IKRT)	Growth/ Year (%)
1	2008	83,66	-
2	2009	90,54	7,60
3	2010	91,60	1,15
4	2011	96,72	5,30
5	2012	100,90	4,14
6	2013	107,26	5,93
7	2014	116,38	7,83
8	2015	126,28	7,84
9	2016	130,94	3,56
10	2017	134,41	2,58
Average		107,8681	
Deviation Standard		17,5710	
Minimum Score		79,9885	
Maximum Score		136,9625	

Source:
Data Processed, 2018

Research Variable Analysis (Cont...)

❑ Production Cost Package Price Index (BP)

No.	Year	Production Cost Package Price Index Score (BP)	Growth/ Year (%)
1	2008	94,12	-
2	2009	99,16	5,09
3	2010	100,78	1,60
4	2011	102,12	1,32
5	2012	103,39	1,23
6	2013	105,37	1,88
7	2014	108,12	2,54
8	2015	112,28	3,71
9	2016	114,31	1,78
10	2017	116,25	1,66
Average		105,5883	
Deviation Standard		6,8604	
Minimum Score		92,225	
Maximum Score		116,7708	

Source:
Data Processed, 2018

Stationary Variable Test

Method		Statistics	Prob. **
PP - Fisher Chi-square		1.96590	0.9966
PP - Choi Z-stat		3.16804	0.9992
Series	**Prob.**	**Bandwidth**	**Obs**
IH_GRAIN	0.7658	11.0	36
IH_CORN	0.9996	3.0	36
INFLATION	0.9716	2.0	36
IH_PAY BACK PERIOD	0.7213	3.0	36
FARMER EXCHAGE RATE (NTP)	0.6976	2.0	36
Source: Data Processed, 2018			

The result of variable stationary test shows the significance value obtained by each variable, namely the price of grain at 0.7658; corn prices 0.9996; inflation of 0.9716; and the price of the production cost package is 0.7213; still greater than 0.05 so Ho is accepted. In other words, all variables are not stationary. For this reason, the difference process will be done gradually until all stationary variables. The first stage was tested using first difference (differentiating order 1).

Stationary Testing (at first difference)

Method		Statistics	Prob. **
PP - Fisher Chi-square		102.566	0.0000
PP - Choi Z-stat		-8.68061	0.0000
Series	**Prob.**	**Bandwidth**	**Obs**
D(IH_GRAIN)	0.0000	10.0	35
D(IH_CORN)	0.0000	2.0	35
D(INFLATION)	0.0000	2.0	35
D(IH_PBP)	0.0184	4.0	35
D(NTP)	0.0000	0.0	35
Source: Data Processed, 2018			

The result of variable stationary test shows that the significance value obtained by each variable is smaller than 0.05 so Ho is rejected. In other words, all variables are stationary at first diference.

Long Run Model Estimation Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	113.3422	7.730381	14.66192	0.0000
IH_GRAIN	0.473054	0.033323	14.19585	0.0000
IH_CORN	0.421870	0.015114	27.91322	0.0000
INFLATION	-0.664103	0.044167	-15.03607	0.0000
IH_PBP	-0.359196	0.120069	-2.991566	0.0053
R-squared	0.985148	Mean dependent var		98.47553
Adjusted R-squared	0.983292	S.D. dependent var		5.060261
S.E. of regression	0.654092	Akaike info criterion		2.113952
Sum squared resid	13.69078	Schwarz criterion		2.331643
Log likelihood	-34.10811	Hannan-Quinn criter.		2.190698
F-statistic	530.6545	Durbin-Watson stat		1.535695
Prob(F-statistic)	0.000000			
Source: Data Processed, 2018				

Long Run Model

The long-term estimation model for farmer exchange rates below:

NTP = 113,3422 + 0,473I HG + 0,4219 HJ - 0,664 IKRT - 0,3592 BP

The regression equation above can mean a constant of 113,3422; that is, if the price of grain (HG), the price of corn (HG), rural inflation (IP), and the package price of production costs (BP) value is 0, then the Farmer Exchange Rate (NTP) value is 113.34 percent. The grain price variable regression coefficient (HG) is 0.4731; that is, if other independent variables are of constant value, and Grain Prices (HG) have increased 1 percent, then the Farmer Exchange Rate (NTP) will increase by 0.4731 percent. Positive coefficient means that there is a positive relationship between the price of grain with the exchange rate of the farmer, the higher the price of grain, the higher the exchange rate of the farmer.

Cointegration Test

The equation used for cointegration tests is the Dickey Fuller Regression equation :

$$\Delta\hat{u} = \phi\hat{u}_{t-1} + v_t$$

The Hypothesis for Cointegration Test are :

$H_0 : \phi = 0$ (variables in model are not cointegrated)
$H_1 : \phi \neq 0$ (variables in model are cointegrated)

Based on the results of **Table Cointegration Test Result,** obtained the ADF (Augmented Dickey Fuller) value of -5.034 with a significance value of 0.0000. This significance value is smaller than 0.05 so Ho is rejected. Thus it can be concluded that the variables in the model are cointegrated.

Cointegration Test Result

		t-Statistics	Prob. *
Augmented Dickey-Fuller test statistic		-5.034256	0.0002
Test critical values:	1% level	-3.626784	
	5% level	-2.945842	
	10% level	-2.611531	

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LONGRUN_RES(-1)	-0.809391	0.160777	-5.034256	0.0000
C	-0.030128	0. 099116	-0.303965	0.7630
R-squared	0.427067	Mean dependent var		-0.032248
Adjusted R-squared	0.410216	S.D. dependent var		0.774365
S.E. of regression	0.594692	Akaike info criterion		1.852407
Sum squared resid	12.02440	Schwarz criterion		1.940380
Log likelihood	-31.34332	Hannan-Quinn criter.		1.883112
F-statistic	25.34373	Durbin-Watson stat		1.693685
Prob(F-statistic)	0.000016			
Source: Data Processed, 2018				

Short Run Model Estimation Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.125883	0.156714	-0.803267	0.4281
D(IH_GRAIN)	0.375270	0.035522	10.56443	0.0000
D(IH_CORN)	0.479070	0. 026507	18.07305	0.0000
D(INFLASI)	-0.551733	0. 083245	-6.627841	0.0000
D(IH_PBP)	-0.430399	0.216256	-1.990231	0.0557
LONGRUN_RES(-1)	-0.631080	0.120069	-3.788412	0.0007
R-squared	0.962658	Mean dependent var		0.241712
Adjusted R-squared	0.956434	S.D. dependent var		2.587923
S.E. of regression	0.540163	Akaike info criterion		1.757119
Sum squared resid	8.753273	Schwarz criterion		2.021039
Log likelihood	-25.62814	Hannan-Quinn criter.		1.849234
F-statistic	154.6762	Durbin-Watson stat		1.772666
Prob(F-statistic)	0.000000			
Source: Data Processed, 2018				

Short Run Model

Based on the output in **Table Short Run Model Estimation Result**, the short-term estimation model is obtained as follows:

D(NTP) = -0,1259 + 0,3753 D(IH_grain) + 0,4791 D(IH_corn) - 0,5517 D(INF) -0,4304 D(IH_PBP) - 0,6311E CT(-1)

Conslusion

Based on long-term estimates and short-term estimates, the grain price(HG) has a significant and positive effect on the food crop (NTP) exchange rate of Gorontalo Province. The regression coefficient generated based on the short-term estimation model is 0.3752. This proves that the higher the price of grain, the level of welfare as measured by NTP will increase. The cornprice (HJ) has a significant and positive effect on the exchange rate of farmers (NTP) of Gorontalo Province food crops. The regression coefficient generated based on a short-term estimation model is 0.4791.

Rural inflation has a significant and negative effect on the exchange rate of Gorontalo Province food crop farmers. The resulting regression coefficient is -0.5517. This proves that the higher the household consumption index (rural inflation) will reduce the purchasing power / exchange rate of farmers. Inflation occurring at the rural level reflects the price index paid by farmers for consumption needs, and others. If inflation continues to increase, the purchasing power / exchange rate of farmers will be increasingly depressed.

In the long run, the price of the production cost package has a significant and negative effect on the farmers' (NTP) exchange rate of Gorontalo Province food crops. However, for short-term estimates, the results of the study indicate that the price of the production cost package does not have a significant effect on the farmer exchange rate.

Recommendation

The results of the regression analysis for the selling price of agricultural products have a significant effect in increasing the farmer exchange rate (NTP), therefore the government policy and the role in determining the basic price of grain and controlling the selling price of corn is very important, so the price policy must provide incentives for farmers to continue to produce.

This research model is still focused on government economic policies that affect the farmer exchange rate (NTP), so this research model still has some limitations with the inclusion of several variables such as budget policy for the development of the agricultural sector. There are allegations that the construction of irrigation networks plays a significant role in increasing NTP, it becomes relevant to include these variables in the model.

Thank You...

Analysis factors Influencing Food Crops farmers Exchange Rate

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Agribusinessn Studi Program of Post Graduated, Universitas Negeri Gorontalo

ABSTRACT

The purpose of this study is to analyze the exchange rate of food crop farmers in Gorontalo Province and the factors that influence it and examine the effect of grain price, corn price, rural inflation, and the package price of production costs on the exchange rate of food crop farmers in Gorontalo Province. This research was conducted from February to March 2018. The research method used was the method of error correction model analysis and multiple linear regression analysis. The data used is secondary data from the Central Statistics Agency of Gorontalo Province. The results showed that in the long and short term, grain price variables, corn prices, rural inflation, significantly affected the exchange rate of food crop farmers in Gorontalo Province. The variable price of the package of production costs only has a significant effect in the long run, while in the short term there is no significant effect on the exchange rate of food crop farmers in Gorontalo Province.

Key Words :Farmers Exchange rate, Grain Price, Corn Price, Rural Inflation, Package Price of Production Cost

INTRODUCTION

Improving public welfare is very relevant to continue to receive attention, this relates to several aspects, including: (a) a prosperous life is the right of every member of the community, (b) The opening of the 1945 Constitution explicitly states that a prosperous Indonesia is the ultimate goal of the establishment of a unitary state of the Republic of Indonesia, (c) increasing welfare has become a world agreement as stated in the Sustainable Development Goals (SDGs), and (d) public welfare has always been a national development priority. Improving people's welfare is shown by the improvement in various indicators of human resource development, including increasing per capita income; decrease in poverty and unemployment rates.

Data on the number of poor people in Indonesia, especially in Gorontalo, especially in rural areas is still very large. BPS shows the data in September 2017 of the number of poor people in Gorontalo reached 17.14 percent or around 200.91 thousand people, where most of them, namely 179.68 thousand (89.43%) were in rural areas and 21.23 thousand people (10.57%) poor people are in urban areas. Meanwhile, the percentage of the poor in the period 2008-2017 also fluctuated, ranging from 16-18 percent.

From the background above the problem can be formulated as follows: (1) How is the description of the exchange rate of food crop farmers in Gorontalo Province and the factors that influence it. (2) Is the price of grain, corn prices, rural inflation, and the price of the production cost package affect simultaneously and partially on the exchange rate of food crop farmers in Gorontalo Province. Based on the formulation of the problems described above, the research objectives to be achieved are (1) Analyzing the exchange rate of food crop farmers in Gorontalo Province and the influencing factors, (2) Assessing the effect of grain prices, corn prices, rural inflation, and prices package of production costs for the exchange rate of food crop farmers in Gorontalo Province.

LITERATURE REVIEW

Indonesian Agricultural Development

The planning of agricultural development in Indonesia purpose to achieve 4 main targets, there are (1) achieving self-sufficiency and sustainable self-sufficiency, (2) increasing food diversification, (3) increasing value added, competitiveness, and export of agricultural commodities, as well (4) improving the welfare of farmers. One of the main targets of agricultural development is the improvement of farmers 'welfare which is reflected in the increase in farmers' income, the reduction of the poor population, the reduction of food shortages, and the decline in income inequality between groups of people (Ministry of Agriculture, 2009. Asep Sunandar, 2012).

Mubyarto (2001) explain that agricultural sector has an important meaning in economic development. For example, its role in the formation of national income, employment provide and its contribution in obtaining foreign exchange. In the implementation of economic development, each sector is interrelated, including between the agricultural sector, the industrial sector and the service sector.

Government Policy to Improving Farmers Welfare

Improving the welfare of farmers has been and is believed to remain a priority for future agricultural development, in line with the directions contained in the long-term national development plan. Indicators of achieving the target of improving farmer welfare are reflected in increased farmer income, a decrease in the level of unemployment in the countryside, and improvement in the quality of life of farmers. Agricultural policy is basically a series of actions that have been, are and will be carried out by the government to achieve agricultural development goals, namely to advance agriculture, to make agriculture more productive and efficient and to improve the livelihoods / welfare of farmers (Directorate of Food and Agriculture, 2013).

Farmer Exchange Rate as Farmer Welfare Indicator

Simatupang dan Maulana (2008) stated that welfare markers that are unique to farm households are practically non-existent, so that FTT is the only choice for observers of agricultural development in assessing the level of welfare of farmers. Thus, NTP is one indicator of the relative level of welfare of farmers. The higher the FTT, the more prosperous the level of livelihood of farmers (Silitonga, 1995; Sumodiningrat, 2001; Tambunan, 2003; BPS, 2006; Masyhuri, 2007).

The Calculation of Farmers Exchange Rate

(Rachmat, 2000), stated that there are 4 concepts of farmer exchange rate:

1. Exchange Concept.

The Exchange Value refers to the relative price of a particular agricultural commodity to non-agricultural goods / products. Barter Exchange Rate (NTB) is defined as the ratio between the price of agriculture and the price of non-agricultural products. The concept of exchange rates is able to identify the comparison of the relative prices of certain agricultural commodities to the prices of products exchanged. The increase in NTB means that the stronger the exchange rate of agricultural commodity prices for goods exchanged.

2. Factorial Concept

The factorial concept is an improvement from the concept of barter, by incorporating the effects of technological change (productivity). Factorial Exchange Rate (NTF) of agriculture is defined as the ratio between the price of agriculture and non-agricultural prices, multiplied by agricultural productivity (Zx). If you only pay attention to agricultural productivity, it is called Single Factorial Exchange Rate (NTFT). If non-agricultural productivity (Zy) is also taken into account, it is called Dual Factorial Exchange Rate (NTFG).

3. Revenue Concept.

The revenueconcept (Exchange Rate revenue) is the development of the concept of factorial exchange rates. Revenue Exchange Rate (NTR) is the exchange rate of revenue (yield value) of agricultural commodities produced by farmers per unit (hectares) of the value of production inputs to produce these results. Thus NTR illustrates the level of profitability of certain commodity farming. However, the NTR only describes the exchange rate of certain commodities, not all components of farmers' income and expenditure.

4. Substistence Concept.

The concept of subsistence exchange rates (NTS) is a further development of NTR. NTS describes the exchange power of the total farmer income to the total expenditure of farmers for their life needs (Pramonosidhi, 1984). Farmer acceptance is the sum of all the value of the production of agricultural commodities produced by farmers and the expenditure of the value of the production of agricultural commodities produced by farmers.

The Meaning of Farmer Exchange Rate

The general view that has prevailed as stated by Indonesia Statistical Department (BPS), is that increasing NTP means an increase in welfare, and vice versa. BPS defines and gives the meaning of NTP below:

1. NTP>100, means that the farmer has a surplus. The production price rises more than the increase in consumption prices and production costs. Farmer income increases more than their expenses, thus the level of welfare of farmers is better than the level of welfare of previous farmers.
2. NTP = 100, means that farmers experience breakeven point. The increase / decrease in production prices is equal to the percentage of increase / decrease in consumption prices and production costs. The level of welfare of farmers has not changed.
3. NTP <100, means that farmers experience a deficit. The production price rises less than the increase in consumption prices and production costs. The level of welfare of farmers has decreased compared to the level of welfare of previous farmers

The Use of farmer Exchange Rate

The use of farmer exchange rate (NTP) by Indonesia Statistical Department:

1. From the price index received by farmers can be seen fluctuations in the prices of goods produced by farmers. This index is also used as supporting data in calculating agricultural sector revenues.
2. From the household consumption group in the price index paid by farmers (Ib), it can be seen that the price fluctuations of goods consumed by farmers are the largest part of rural communities.
3. The exchange rate of farmers has a purpose to measure the ability to exchange products sold by farmers with the products needed by farmers in producing. This is seen when compared to the ability of the exchange rate in the base year. Thus, NTP can be used as an indicator in assessing the level of welfare of farmers.

Production Factors

The factor of production is everything needed to produce goods and services. Production factors consist of natural resources, labor, capital, and skills or entrepreneurial resources. Factors of natural and labor production are called the original (main) production factors, while capital and labor are called derivative factors of production.

1. Natural Production Factor/Land:

The factor of naturalproduction / land is all the wealth contained in the universe that can be used in the production process. Natural production factors are often called original production factors. Natural production factors consist of land, water, sunlight, air, and mining goods. Nature is one of the most important factors of production, even when labor is often considered the most important. Nature has provided many factors of production, such as land and all the substances that are in it and on its surface, air and everything in space, etc.

2. Labor Production Factor

Factors of labor production are is production factors directly or indirectly carrying out production activities. Factors of labor production are categorized as original production factors. Although machines have replaced many humans as the executors of the production process, human existence is absolutely necessary.

3. Capital Production Factor

Capital production factors are supporting factors in accelerating or increasing the ability to produce. Capital production factors can be in the form of machinery, transportation equipment, transportation facilities, or buildings.

4. Skill Production Factor

The production factor of expertise is the skill or skill used by a person in coordinating and managing production factors to produce goods and services.

RESEARCH METHOD

The research will be carried out for 2 months start from February to March 2018, located at the Gorontalo Province Central Statistics Agency (BPS). The research carried out by processing and analyzing secondary data of the Gorontalo Province Farmer Exchange Rate (NTP) in 2008-2017 source from Gorontalo Provincial Statistics Agency. The analytical method that will be used is an error correction model and multiple linear regression analysis. Hasan (2008), multiple linear analysis is where the dependent variable (Y) is connected or explained by more than one variable, maybe two, three, and so on independent variables (X1, X2, X3, ..., Xn) but still shows linear relationship diagram of multiple linear regression equations, the model of farmer exchange rate relations with these variables can be arranged in the following function or equation:

$$\mathbf{NTP = a + b_1.HG + b_2.HJ + b_3.IKRT + b4.BP} \quad \text{..... (1)}$$

Where:

NTP = Farmers Exchange Rate
a = Constant (nilai Y' apabila $X_1, X_2 \ldots X_n = 0$)
b = Resgressin Coefficient
HG = Grain Price
HJ = Corn Price
IKRT = Household Consumption Index
BP = Price Package for Production Cost

RESULT AND DISCUSSION

A. Research Variable Analysis

1. Farmer Exchange Rate (NTP)

Table 1. The Average of farmer Exchange (NTP) Crops in Gorontalo Province from 2008-2017

Number	Year	NTP Score(Y)	Growth/ Year (%)
1	2008	94,93	-
2	2009	91,91	-3.29
3	2010	96,01	4.27
4	2011	101,63	5.53
5	2012	99,91	-1.72
6	2013	96,44	-3.60
7	2014	96,44	0.00
8	2015	98,30	1.90
9	2016	108,49	9.39
10	2017	108,69	0.19
Average		**99,2763**	
Deviation Standard		**5,6545**	
Minimum Score		**90,1771**	
MaximumScore		**111,5344**	

Source : Data processed, 2018

Statistically, the standard deviation (SD) value of NTP is 5.6545. These results indicate that the standard deviation value of NTP is smaller than the average value (5.6545 <99.2763), which indicates that the NTP variable data has little volatility. A small standard deviation value compared to the average also shows that the NTP data used from year to year has a value that is not much different.

The minimum value of NTP of food crops that have been obtained by Gorontalo Province farmers during the study period was 90.171 which occurred in the second quarter of 2009; while the maximum value that has ever been obtained is equal to 111.5344 which occurs in the fourth quarter of 2017. In 2011, 2016 and 2017 the NTP value was above 100 (> 100), where in the years the level of welfare of farmers was better than the year previous year.

2. Grain Price(HG)

Table 2. The Developmentof Average Grain Price (HG) Index in Gorontalo Province from 2008-2017

Nu.	Year	Grain Price (HG)Score (X1)	Growth/ Year (%)
1	2008	77,29	-
2	2009	86,92	11,08
3	2010	91,82	5,34
4	2011	102,15	10,11
5	2012	101,96	-0,19
6	2013	104,57	2,50
7	2014	114,09	8,35
8	2015	122,71	7,03
9	2016	130,57	6,02
10	2017	126,55	-3,18
Average		**105,8619**	
Deviation Standard		**17,0931**	
Minimum Score		**76,4140**	
Maximum Score		**134,1453**	

Source : Data processed, 2018

Statistically, the standard deviation (SD) value of Grain is 17.0931. These results indicate that the standard deviation value is smaller than the average value (17.0931 <105.8619), which indicates that the grain price variable (HG) data used is good data. The standard deviation value that is small compared to the average also shows that the grain price data from year to year has a value that is not much different.

The minimum value of grain prices obtained by Gorontalo Province farmers during the study period was 76.4140 which occurred in the first quarter of 2008; while the maximum value that has been obtained is 134,1453 which occurs in the first quarter of 2016. Starting from 2011 to 2017 the grain price index is above 100 (> 100), which means that in these years the price level of grain is above the price in the base year so that farmers' income also increased compared to conditions in the base year. However, it needs to be understood that prices tend to rise when production decreases. While at the time of harvest, the price of grain farmers usually decrease.

3. Corn Price (HJ)

Table 3.The Developmentof Average Grain Price Corn Price (HJ) Index in Gorontalo Province from 2008-2017

Nu.	Year	Corn Price (HJ)Score (X2)	Growth/ Year (%)
1	2008	81,02	-
2	2009	80,97	-0,07
3	2010	85,75	5,58
4	2011	96,66	11,29
5	2012	99,40	2,75
6	2013	100,89	1,48
7	2014	107,29	5,97
8	2015	120,32	10,83
9	2016	146,61	17,94
10	2017	157,60	6,98
Average		**107,6505**	
Deviation Standard		**25,6770**	
Minimum Score		**75,8995**	
Maximum Score		**162,3881**	

Source : Data processed, 2018

4. Household Consumption Index (IKRT)

Table4. The Developmentof Average Grain Price Household Consumption Index (IKRT) in Gorontalo Province from 2008-2017

Nu.	Year	Household Consumption Index (IKRT) Score(X3)	Growth/ Year (%)
1	2008	83,66	-
2	2009	90,54	7,60
3	2010	91,60	1,15
4	2011	96,72	5,30
5	2012	100,90	4,14
6	2013	107,26	5,93
7	2014	116,38	7,83
8	2015	126,28	7,84
9	2016	130,94	3,56
10	2017	134,41	2,58
Average		**107,8681**	
Deviation Standard		**17,5710**	
Minimum Score		**79,9885**	
Maximum Score		**136,9625**	

Source : Data processed, 2018

Throughout 2012-2015 the development of the farmers household consumption index (rural inflation) was consistently positive, which was due to an increase in the foodstuffs group by an average of 1.68%. The highest household consumption index (rural inflation) occurred in 2009, 2014 and 2015 with an average of 7% -8%. During the period of 2008 to 2017 the farmer household consumption index continued to grow from 83.66 to 134.41. The increase in numbers indicates the level of expenditure of farmer household groups on food. Overall, the average value of the farmer's household consumption index is 107.87. This shows that on average, farmers' expenditure in the countryside is higher than the base year, where the prices of consumer consumption goods continue to rise from year to year which will result in increased expenditure or index of farmers.

5. Production Cost Package Price Index (BP)

Table5. The Developmentof Average Production Cost Package Price (BP) in Gorontalo Province from 2008-2017

Nu.	Year	Household Consumption Index (BP) Score (X3)	Growth/ Year (%)
1	2008	94.12	-
2	2009	99,16	5,09
3	2010	100,78	1,60
4	2011	102,12	1,32
5	2012	103,39	1,23
6	2013	105,37	1,88
7	2014	108,12	2,54
8	2015	112,28	3,71
9	2016	114,31	1,78
10	2017	116,25	1,66
Average		**105,5883**	
Deviation Standard		**6,8604**	
Minimum Score		**92,2250**	
Maximum Score		**116,7708**	

Source : Data processed, 2018

Statistically, the standard deviation (SD) value of the package price of the production cost is 6.8604. The SD value is still smaller than the average value (6.8604 <105.5883). This result shows that the variable price of the production cost package (BP) used is good, and also shows that the value obtained from year to year is not much different. The minimum value of the price of the production cost package paid by the Gorontalo Province farmers during the study period was 92.2250 which occurred in the first quarter of 2008; while the maximum value that has ever been obtained is equal to 116.7708, which occurs in the fourth quarter of 2017.

B. *Error Correction Model* (ECM) Analysis

1. Stationary Variable Test

Table 6. Stationary Test Result at Level

Method	Statistic	Prob.**
PP - Fisher Chi-square	1.96590	0.9966
PP - Choi Z-stat	3.16804	0.9992

Series	Prob.	Bandwidth	Obs
IH GRAIN	0.7658	11.0	36
IH_CORN	0.9996	3.0	36
INFLATION	0.9716	2.0	36
IH_PAY BACK PERIOD	0.7213	3.0	36
FARMER EXCHAGE RATE (NTP)	0.6976	2.0	36

Source : Data processed, 2018

The result of variable stationary test shows the significance value obtained by each variable, namely the price of grain at 0.7658; corn prices 0.9996; inflation of 0.9716; and the price of the production cost package is 0.7213; still greater than 0.05 so Ho is accepted. In other words, all variables are not stationary. For this reason, the difference process will be done gradually until all stationary variables. The first stage was tested using first difference (differentiating order 1). The results of stationary testing at first difference are below:

Table7. Stationary Test at*first difference* Level

Method	Statistic	Prob.**
PP - Fisher Chi-square	102.566	0.0000
PP - Choi Z-stat	-8.68061	0.0000

Series	Prob.	Bandwidth	Obs
D(IH_GRAIN)	0.0000	10.0	35
D(IH_CORN)	0.0000	2.0	35
D(INFLATION)	0.0000	2.0	35
D(IH_PBP)	0.0184	4.0	35
D(NTP)	0.0000	0.0	35

Source : Data processed, 2018

The result of variable stationary test shows that the significance value obtained by each variable is smaller than 0.05 so Ho is rejected. In other words, all variables are stationary at first diference.

2. Long Run Model

The long-term estimation model for farmer exchange rates below:

$$NTP = 113{,}3422 + 0{,}473IH_{Gabah} + 0{,}4219H_{jagung} - 0{,}664INF - 0{,}3592H_{PBP}$$

The regression equation above can mean a constant of 113,3422; that is, if the price of grain (HG), the price of corn (HG), rural inflation (IP), and the package price of production costs (BP) value is 0, then the Farmer Exchange Rate (NTP) value is 113.34 percent. The grain price variable regression coefficient (HG) is 0.4731; that is, if other independent variables are of constant value, and Grain Prices (HG) have increased 1 percent, then the Farmer Exchange Rate (NTP) will increase by 0.4731 percent. Positive coefficient means that there is a positive relationship between the price of grain with the exchange rate of the farmer, the higher the price of grain, the higher the exchange rate of the farmer.

Table 8. Long Run Model Estimation Test Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	113.3422	7.730381	14.66192	0.0000
IH_GRAIN	0.473054	0.033323	14.19585	0.0000
IH_CORN	0.421870	0.015114	27.91322	0.0000
INFLATION	-0.664103	0.044167	-15.03607	0.0000
IH_PBP	-0.359196	0.120069	-2.991566	0.0053

R-squared	0.985148	Mean dependent var	98.47553
Adjusted R-squared	0.983292	S.D. dependent var	5.060261
S.E. of regression	0.654092	Akaike info criterion	2.113952
Sum squared resid	13.69078	Schwarz criterion	2.331643
Log likelihood	-34.10811	Hannan-Quinn criter.	2.190698
F-statistic	530.6545	Durbin-Watson stat	1.535695
Prob(F-statistic)	0.000000		

Source : Data processed, 2018

3. Cointegration Test

The equation used for cointegration tests is the Dickey Fuller Regression equation :

$$\Delta\hat{u} = \phi\hat{u}_{t-1} + v_t$$

The Hypothesis for Cointegration Test are :

H_0 : $\phi = 0$ (variables in model are not cointegrated)
H_1 : $\phi \neq 0$ (variables in model are cointegrated)

Table9. Cointegration Test Result

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.034256	0.0002
Test critical values:	1% level	-3.626784	
	5% level	-2.945842	
	10% level	-2.611531	

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LONGRUN_RES(-1)	-0.809391	0.160777	-5.034256	0.0000
C	-0.030128	0.099116	-0.303965	0.7630

R-squared	0.427067	Mean dependent var	-0.032248
Adjusted R-squared	0.410216	S.D. dependent var	0.774365
S.E. of regression	0.594692	Akaike info criterion	1.852407
Sum squared resid	12.02440	Schwarz criterion	1.940380
Log likelihood	-31.34332	Hannan-Quinn criter.	1.883112
F-statistic	25.34373	Durbin-Watson stat	1.693685
Prob(F-statistic)	0.000016		

Source : Data processed, 2018

Based on the results of Table 9 above obtained the ADF (Augmented Dickey Fuller) value of -5.034 with a significance value of 0.0000. This significance value is smaller than 0.05 so Ho is rejected. Thus it can be concluded that the variables in the model are cointegrated.

4. Short Run Model

Table 10. Short Run Model Estimation Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.125883	0.156714	-0.803267	0.4281
D(IH_GRAIN)	0.375270	0.035522	10.56443	0.0000
D(IH_CORN)	0.479070	0.026507	18.07305	0.0000
D(INFLASI)	-0.551733	0.083245	-6.627841	0.0000
D(IH_PBP)	-0.430399	0.216256	-1.990231	0.0557
LONGRUN_RES(-1)	-0.631080	0.166582	-3.788412	0.0007
R-squared	0.962658	Mean dependent var		0.241712
Adjusted R-squared	0.956434	S.D. dependent var		2.587923
S.E. of regression	0.540163	Akaike info criterion		1.757119
Sum squared resid	8.753273	Schwarz criterion		2.021039
Log likelihood	-25.62814	Hannan-Quinn criter.		1.849234
F-statistic	154.6762	Durbin-Watson stat		1.772666
Prob(F-statistic)	0.000000			

Source : Data processed, 2018

Based on the output in Table 10 above, the short-term estimation model is obtained as follows:

$$D(NTP) = -0{,}1259 + 0{,}3753D(IH_{grain}) + 0{,}4791D(IH_{corn}) - 0{,}5517D(INF) - 0{,}4304D(IH_{PBP}) - 0{,}6311ECT(-1)$$

C. Classical Assumption

1. Multicollinearity Test

Table11. Grain Variable Multicollinearity test Result

Dependent Variable: IH_GRAIN

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-113.7484	35.19479	-3.231967	0.0028
IH_CORN	0.117229	0.076269	1.537042	0.1338
INFLATION	0.152672	0.229189	0.666142	0.5100
IH_PBP	1.811669	0.542178	3.341465	0.0021
R-squared	0.961683	Mean dependent var		104.2142
Adjusted R-squared	0.958199	S.D. dependent var		16.71246
S.E. of regression	3.416901	Akaike info criterion		5.397151
Sum squared resid	385.2821	Schwarz criterion		5.571305
Log likelihood	-95.84730	Hannan-Quinn criter.		5.458548
F-statistic	276.0763	Durbin-Watson stat		0.760531
Prob(F-statistic)	0.000000			

Source : Data processed, 2018

Table 12. Corn Variable Multicollinearity test Result

Dependent Variable: IH_CORN

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	34.51307	88.83498	0.388508	0.7001
IH_GRAIN	0.569895	0.370774	1.537042	0.1338
INFLATION	1.045830	0.475024	2.201637	0.0348
IH_PBP	-0.964587	1.372719	-0.702683	0.4872

R-squared	0.889775	Mean dependent var	103.4513
Adjusted R-squared	0.879755	S.D. dependent var	21.72598
S.E. of regression	7.533782	Akaike info criterion	6.978477
Sum squared resid	1873.010	Schwarz criterion	7.152631
Log likelihood	-125.1018	Hannan-Quinn criter.	7.039875
F-statistic	88.79615	Durbin-Watson stat	0.276136
Prob(F-statistic)	0.000000		

Source : Data processed, 2018

Table 13. Inflation Variable Multicollinearity test Result

Dependent Variable: INFLATION

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-119.0229	22.33848	-5.328157	0.0000
IH_GRAIN	0.086908	0.130464	0.666142	0.5100
IH_CORN	0.122461	0.055623	2.201637	0.0348
IH_PBP	1.938719	0.331739	5.844105	0.0000

R-squared	0.977435	Mean dependent var	105.7032
Adjusted R-squared	0.975384	S.D. dependent var	16.43135
S.E. of regression	2.577988	Akaike info criterion	4.833702
Sum squared resid	219.3188	Schwarz criterion	5.007855
Log likelihood	-85.42348	Hannan-Quinn criter.	4.895099
F-statistic	476.4903	Durbin-Watson stat	0.232914
Prob(F-statistic)	0.000000		

Source : Data processed, 2018

Tabel 14. Production Cost Package Price IndexVariable Multicollinearity test Result

Dependent Variable: IH_PBP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	64.01768	1.191557	53.72607	0.0000
IH_GRAIN	0.139545	0.041761	3.341465	0.0021
IH_CORN	-0.015283	0.021750	-0.702683	0.4872
INFLATION	0.262333	0.044888	5.844105	0.0000

R-squared	0.979583	Mean dependent var	104.7085
Adjusted R-squared	0.977727	S.D. dependent var	6.354201
S.E. of regression	0.948308	Akaike info criterion	2.833532
Sum squared resid	29.67652	Schwarz criterion	3.007685
Log likelihood	-48.42034	Hannan-Quinn criter.	2.894929
F-statistic	527.7709	Durbin-Watson stat	0.463344
Prob(F-statistic)	0.000000		

Source : Data processed, 2018

CONLUSION AND RECOMMENDATION

Conslusion

1. Based on long-term estimates and short-term estimates, the grain price(HG) has a significant and positive effect on the food crop (NTP) exchange rate of Gorontalo Province. The regression coefficient generated based on the short-term estimation model is 0.3752. This proves that the higher the price of grain, the level of welfare as measured by NTP will increase. The cornprice (HJ) has a significant and positive effect on the exchange rate of farmers (NTP) of Gorontalo Province food crops. The regression coefficient generated based on a short-term estimation model is 0.4791.
2. Rural inflation has a significant and negative effect on the exchange rate of Gorontalo Province food crop farmers. The resulting regression coefficient is -0.5517. This proves that the higher the household consumption index (rural inflation) will reduce the purchasing power / exchange rate of farmers. Inflation occurring at the rural level reflects the price index paid by farmers for consumption needs, and others. If inflation continues to increase, the purchasing power / exchange rate of farmers will be increasingly depressed.
3. In the long run, the price of the production cost package has a significant and negative effect on the farmers' (NTP) exchange rate of Gorontalo Province food crops. However, for short-term estimates, the results of the study indicate that the price of the production cost package does not have a significant effect on the farmer exchange rate.

Recommendation

1. The results of the regression analysis for the selling price of agricultural products have a significant effect in increasing the farmer exchange rate (NTP), therefore the government policy and the role in determining the basic price of grain and controlling the selling price of corn is very important, so the price policy must provide incentives for farmers to continue to produce.
2. This research model is still focused on government economic policies that affect the farmer exchange rate (NTP), so this research model still has some limitations with the inclusion of several variables such as budget policy for the development of the agricultural sector. There are allegations that the construction of irrigation networks plays a significant role in increasing NTP, it becomes relevant to include these variables in the model.

REFERENCES

Badan Pusat Statistik, 2012. Diagram Timbang Nilai Tukar Petani. BPS: Jakarta

Direktorat Pangan dan Pertanian Bappenas, 2013, Provinsi Gorontalo

Hasan, M. Iqbal. 2008. Pokok-Pokok Materi Statistik 1 (Statistik Deskriptif). Bumi Aksara: Jakarta

Helmi, Akhmad. 2006. Analisis Faktor-Faktor Yang Mempengaruhi NTP. Tesis PPS Universitas Indonesia. (Dipublikasikan)

Mubyarto, 2001. Pengantar Ekonomi Pertanian Edisi ketiga. LPES: Jakarta

Muhammad Ilham Riyadh, 2015. Analisis Nilai Tukar Petani Komoditas Tanaman Pangan Di Sumatera Utara *(Analysis Of Farmers Term Of Trade Of Crops Commodities In North Sumatra)*, *Jurnal Ekonomi dan Kebijakan Publik* Vol. 6 No. 1 Hlm. 17-32

Rachmat Hendayana, 2001. Analisis faktor-faktor yang Mempengaruhi Nilai Tukar Petani. Pusat Penelitian dan Pengembangan Sosial Ekonomi Pertanian Badan Penelitian dan Pengembangan Pertanian, Bogor

Rachmat M. dan Sri Nuryanti. 2015. Nilai Tukar Usaha Tani Palawija: Jagung, Kedelai, Dan Ubi Kayu. Panel Petani Nasional: Rekonstruksi Agenda Peningkatan Kesejahteraan Petani

Simatupang, P. dan Isdijoso B. 1992. Pengaruh Pertumbuhan Ekonomi Terhadap Nilai Tukar Sektor Pertanian: Landasan Teoritis dan Bukti Empiris, Ekonomi dan Keuangan Indonesia 40 (1, 1992): 33-48

Rachmat, M. 2000. Analisis Nilai Tukar Petani Di Indonesia: Perilaku, Dampak Perubahan Harga-Harga dan Relevansi Nilai Tukar Petani Sebagai Indikator Kesejahteraan Petani. Disertasi Ilmu Ekonomi Pertanian. IPB: Bogor. (Dipublikasikan)

Rahayu Eka Agustin, Badjuri, Sarwedi, 2016. Analisis Nilai Tukar Petani sebagai indikator Kesejahteraan Petani di Provinsi Jawa Timur Periode Tahun 2012-2014. Artikel Ilmiah Fakultas Ekonomi, Universitas Jember (UNEJ). (Dipublikasikan)