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VALUE CHAIN ANALYSIS

To Whom Farmer Must Sell Their Mangosteen, Broker (Ijon) or Exporter?
Reny Andriyanty, and Linar Humaira 219

The Financial Feasibility of Coffee Farm Technologies in Lampung Province
Anna Fariyanti, Tintin Sarianti and Triana Gita Dewi 227

Assessment of Beef Distribution Channel Performance in Purworejo Regency
Dyah Panuntun Utami, Zulfanita, and Faruq Iskandar 235

Marketing Analysis of Broccoli in Lembang West Java Indonesia (Case Study: CV. Yan's Fruits and Vegetables, Lembang, West Java)
Clara Yolandika, Rita Nurmalina, and Suharno 241

Vertical Market Integration Performance of Indonesian Rice Market Chain
Husnul Khotimah, Stefan Von Cramon-Taubadel, Suharno, and Rita Nurmalina 251

The Degree of Integration of Coffee Supply Chain in Lampung Province
Rita Nurmalina, Prisca Nurmala Sari, and Anggita Tresliyana Suryana 265

Marketing Channel Analysis of Marine Capture in Rembang Regency, Central Java Province
Jaka Sulaksana 275

RURAL ECONOMY

Improving Oil Palm Smallholders Participation in Global Market to Strengthening Indonesian Agribusiness Rural Development
Diana Chalil, and Riantri Barus 283

Analysis of Household Income Communities Living in The Surrounding of Sabangau National Park in Palangka Raya Central Kalimantan
Suharno, and Trisna Anggreini 295

The Economic Analysis of Coconut Farmer Households in Indragiri Hilir Municipality, Riau Province
Djaimi Bakce 301

Group Strengthening Strategy in Farming Group Empowerment
Achmad Faqih, and Nurul Atikah Fauzi 313

The Impact of Rice Price on Coconut Farmer Household Consumption in Indragiri Hilir Regency
Elinur, and Asrol 323

Dynamic System Simulation Model of the Non Hulled Paddy Price and Farm Income of The Rice Peasants In The District of Indramayu, West Java
Ivonne Ayesha, Tuhpawana Priatna Sendjaja, Muhammad Tasrif, and Tomy Perdana 331

Determinants Factors of Paddy Field Conversion in Java 1995-2013
Wina Dwi Febrina, D.S. Priyarsono, and Noer Azam Achsani 337

THE IMPACT OF RICE PRICE ON COCONUT FARMER HOUSEHOLD CONSUMPTION IN INDRAGIRI HILIR REGENCY

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ABSTRACT

Rice is dominant staple food for most of Indonesians. Instability of rice price affects to its consumption by society, including coconut farmer households. The objective of this research is to analyze price elasticity on household consumption and to analyze the impact of rice price and coconut farmers' income on their rice consumption. This research was carried out through survey. Sampling was conducted through simple random sampling of 40 people. Method of data analysis used was econometric; single equation. Results of this research revealed that, first: price elasticity of rice and cassava was responsive to household rice consumption. This indicated that price changed of rice and cassava affecting significant change in rice consumption of coconut farmer households. Second, 10 percent increase in rice price showed negative impact, whereas the increase of household income showed positive impact on rice consumption of coconut farmer households. Combination of the rice price and farmers income in the same proportion resulted negative impact on household rice consumption. This indicated that income increase could not eliminate the negative impact of rice price increase. These findings imply that stabilization policy of rice price was better for coconut farmers than increasing income policy.

Keywords: *Elasticity and Impact of Rice Price, Rice Price*

INTRODUCTION

Rice is an important commodity for Indonesian people's in daily lives because rice is the staple food sources that have not been replaced for more than 85 percent of Indonesian who prioritizes rice as a main food. As a source of staple food, the demand of it, tends to increase concurrently with the population increase. If consumption of rice is amounted to 114 kg/ capita / year with a total population of Indonesia as much as 241.45 million, then it is needed 27.53 million tons of rice per year. So that rice consumption has a tendency to increase every year. However, the production can not keep pace with consumption.

The main important issue of rice in this country is the availability and consumption of rice. The gap between them will cause problems. If consumption is not followed by the increase of production, then it will lead to a scarcity of rice in the market. Scarcity of rice will increase the price of rice, there by purchasing power will decrease. Low purchasing power will affect the decline rice consumption both in quality and quantity of rice. The decline of consumption. In the short term, it may lower the productivity of labor. In the long term, it will effect to the nutritional status of the community, especially for vulnerable groups of nutrition and children under five years old and pregnant or lactating. The continued impact of the decline of nutrition in vulnerable groups will reduce the nutritional quality of Indonesian human resources.

Indragiri Hilir is part of Riau province where the people also consume rice as a staple food, rice cannot be replaced by other foods, such as cassava, sago, corn and other foods. As the staple food, rice is a major requirement for the household, as well as coconut farmer households. Population increase of the number of households has also increasing the consumption of rice. According to the national survey in 2014, the economic and social needs 114 kg of rice per capita per year. Seeing the population growth of Indragiri Hilir which is likely to increase its rice consumption. The development of rice consumption in Indragiri Hilir is presented in Figure 1.

Figure 1 shows the population increase of Indragiri Hilir from 2011 to 2014 was in line with population, rice consumption tends to increase with an average growth of 1.5 percent per year.

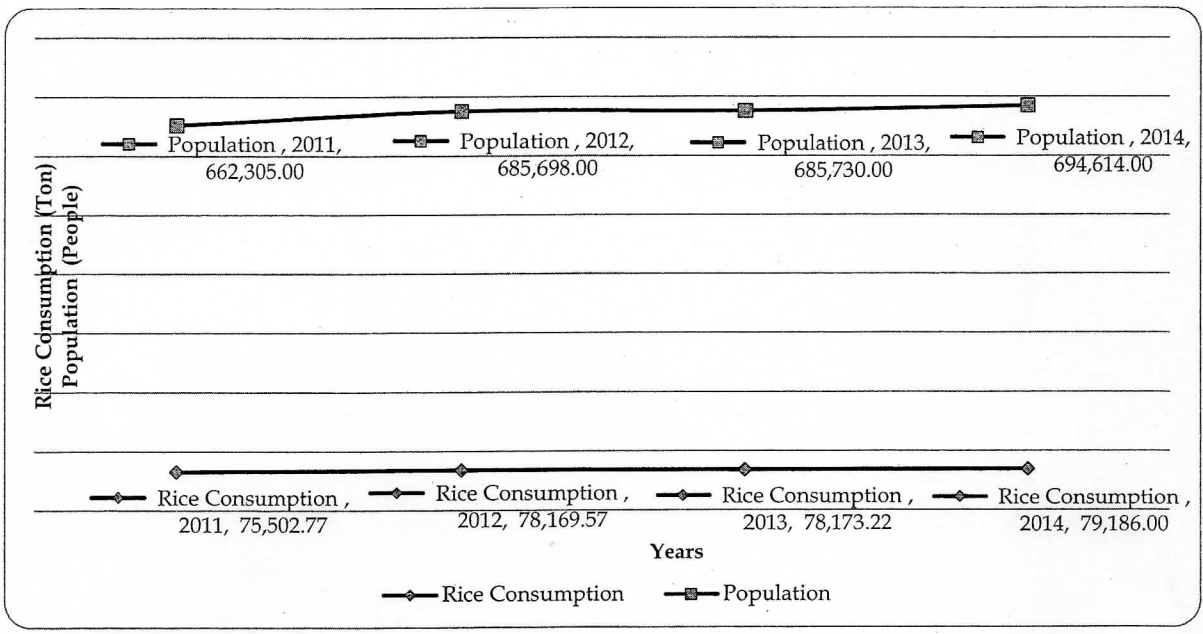

Figure 1. Number of Population and Rice Consumption in Indragiri Hilir Regency in 2011 – 2014
Source: Food Security Agency of Riau Province, 2015 and Central Bureau of Statistics of Indragiri Hilir, 2015

The increasing in consumption is quite high. When compared to the amount of rice production in Indragiri Hilir, rice production showed a downward trend with average growth per year from 2011-2014 amounted to -9.01 percent. This situation is certainly going to cause problems for the availability of rice in the future.

According to the theory, the demand for a commodity is determined by the price of the goods themselves, the price of other goods, income per capita, number of people, taste and forecasts regarding future circumstances (Kousyannis, 1979 and Sugiarto, et al., 2007). Variable of total population was approximated by the number of family members. Variable appetite in the short term can be assumed to be unchanged. Therefore, the demand of a commodity can be determined by the level o commodity prices, the level of commodity price related to income level and number of family members (Bakce, et al., 2012).

The phenomenon of food prices show rising trend, the increase in food prices is influenced by the supply of food that is no balanced with the demand for food, one of it is the price of rice. The development of the price o rice in Indragiri Hilir tends to increase. But the development and production of rice harvested area tends to decrease. The development of rice prices is presented in Figure 2

Figure 2 shows the highest price in May and the lowest price in January 2015. The trend

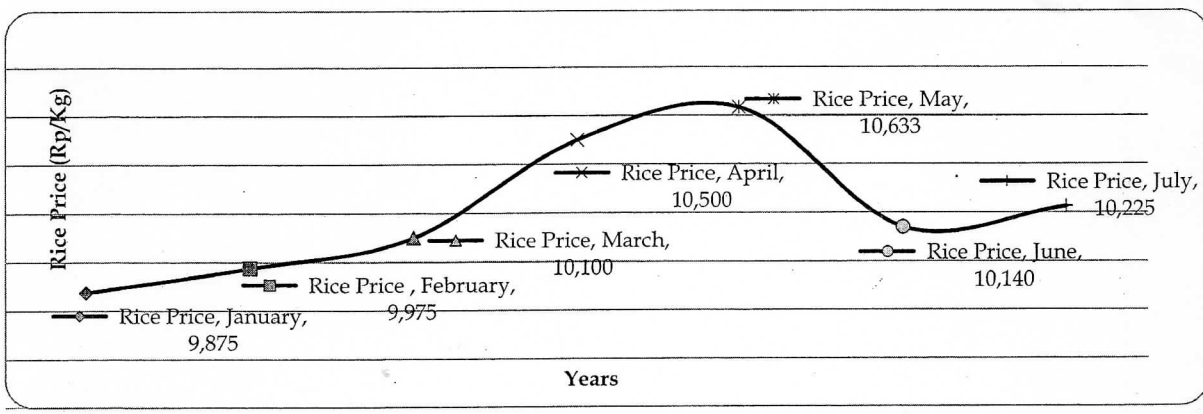

Figure 2. Monthly Update of Rice Price in Indragiri Hilir Regency in 2015.
Source: Food Security Agency of Riau Province, 2015.

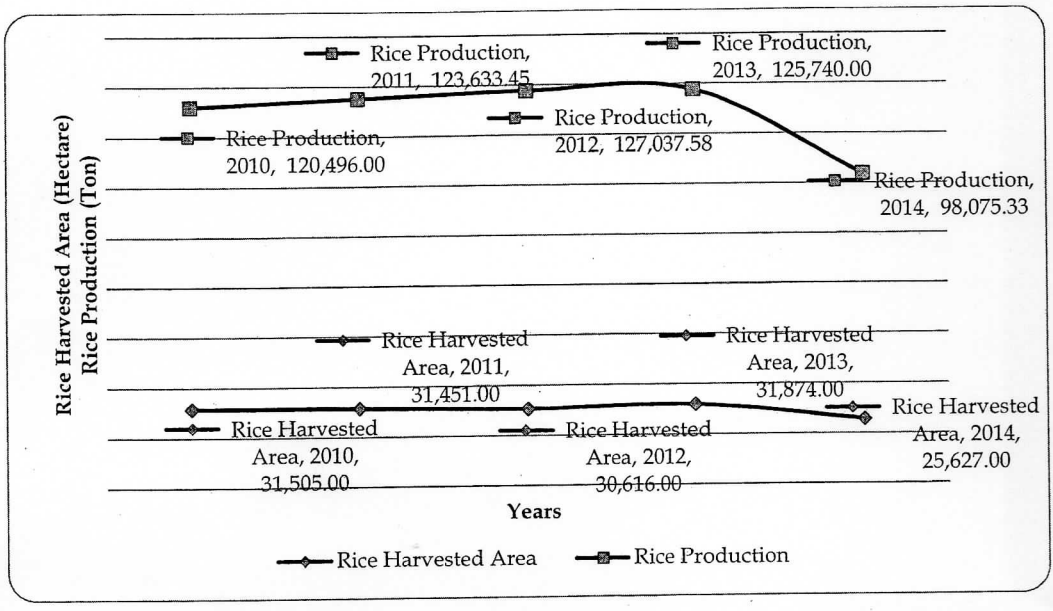

Figure 3. Update of Rice Harvested Area vs Rice Production in Indragiri Hilir Regency in 2015
Source: Central Bureau of Statistic of Indragiri Hilir, 2015

of rice prices showed a tendency to increase with the highest growth of 3.96 percent from April to May and the lowest from May to June was -0.46, average growth rate was 0.62 percent per month. A high rice price is caused by the production of rice which likely to decrease and the increasing of the number of people who are likely to rise. Development and production of rice harvested area is presented in Figure 3.

Figure 3 shows the rice harvested area has been coming down with negative growth, but by 2013 that had increasing with the growth at 4.11. The annual average growth of harvested area is12.43 percent. Meanwhile the production of rice on upward trend with average growth is 1.45 percent per year. But in 2013 and 2014 rice production has decrease with the growth of each of 1.02 and 22.00 percent. This condition will create problems with the availability of rice in Indragiri Hilir.

The key problem affecting demand or consumption of staple foods are the relevant commodity prices fluctuate and tend to raise, limited food availability, relative income levels tend to decline and population tends to increase. Therefore, research on behavior of indispensable household food consumption as an integral part in efforts to achieve national food security.

In general, this study aims to analyze the impact of the price of rice on rice consumption of coconut farmer households in Indragiri Hilir. Specifically, this study aimed to analyze the response of rice consumption to observe the factors that influence and impact of the price of rice and farmer household income on rice consumption of coconut farmer households.

METHODS

DATA COLLECTION AND ANALYSIS

This research was conducted by survey method, samples were taken in five sub-districts in Indragiri Hilir regency, i.e. Tempuling, Tembilahan, Tembilahan Ulu, Kempas and Batang Tuaka, from the five sub-districts selected 16 villages. The reason of selection of this area because the township was a broad coconut plantations from the highest to the lowest and most populated livelihood as coconut farmers. The sampling method is multi stage random sampling by taking the 16 villages of the five districts.

Type of data collected was a cross sectional of primary data. The primary data obtained from interviews with coconut farmer households using a questionnaire that has been prepared. Besides that, secondary data also collected from several agencies, such as the Security Agency of Riau Province and District

the Central Bureau of Statistics and other sources that support these activities.

There were five analytical procedures performed in this study, namely (1) the model specification; (2) estimation of the model; (3) classical assumption test; (4) validation of the model; and (5) simulation models. The first stage is a model specification rice consumption of coconut farmer households. Model of rice consumption of coconut farmer households in Indragiri Hilir was:

$$KB_i = a_0 + a_1PB_i + a_2PU_i + a_3YRT_i + a_4EP_i + a_5JAK_i + e_i \quad \text{.....(1)}$$

Where:
KB_i = Rice consumption (kg/month)
PB_i = Rice price (Rp/kg)
PU_i = Tapioca price (Rp/kg)
YRT_i = Farmer income (Rp/month)
EP_i = Farmer education (Year)
JAK_i = Number of family members (person)
e_i = error term
Parameter estimation expected: a0, a3, a4>0 and a1, a2 < 0.

The second stage was the model estimation. Model equation (1) was a single-equation econometric model, multiple linear regressions. Estimation models of rice consumption of coconut farmer households using Ordinary Linear Square method (OLS). Software used was Statistical Analysis System-Econometric Time Series (SAS-ETS) version 9.0. The third stage was the classic assumption test. Testing included detection of classical assumption of normality, multicollinearity and heteroscedasticity of the equation. Normality test by using Shapiro Wilk, Multicollinearity detection by using Inflation Variance Factor (VIF) and the detection of heteroscedasticity by using White's test (Thomas, 1997 and Verbeek et al., 2000).

The fourth stage was the validation of the model. Model validation was conducted in order to determine whether a model was quite good (valid) to use for simulation analysis. Indicators model validation performed in this study, the RMSE (Root Mean Square Error), RMSPE (Root Mean Square Percent Error) and U-Thaeil (Theil's Inequality Coefficient). Validity criteria of the model wasless than 50 percent RMSPE and U-thaeil close to zero. The indicators are defined as follows (Pindyck and Rubinfield, 1991):

$$RMSE = \sqrt{(1/n) * \sum(Pi - Ai)^2} \quad \text{.....(2)}$$

$$RMSPE = 100 * \sqrt{(1/n) * \sum\{(Pi - Ai)^2/Ai\}} \quad \text{.....(3)}$$

$$U = \frac{\sqrt{(1/n)*\sum(Pi-Ai)^2}}{\sqrt{(1/n)*\sum(Pi)^2}+\sqrt{(1/n)*\sum(Ai)^2}} \quad \text{.....(4)}$$

Where:
n = Number of observation.
Pi = Value of estimation model (*predicted*)
Ai = Value of sample observation (*actual*)

Fifth stage was the simulation models. Model simulations conducted to see the impact on a policy with multiple scenarios. Scenario simulations used were a 10 percent increase in rice prices, an increase in household income of 10 percent and a combination of both.

RESULT AND DISCUSSION

MODEL FRAMEWORK OF RICE CONSUMPTION BY COCONUT FARMER HOUSEHOLD

The results of the model estimation of rice consumption of coconut farmer households showed the influence of independent variables on the variable of rice consumption. Parameter estimation resulted the value as expected. Parameters estimation of rice consumption model of coconut farmer households and response factors which were influencing presented in Table 1

Based on Table 1, domestic rice consumption of coconut farmers significantly influenced by the price of rice, the price of cassava, household income and number of family members at 10 percent level of significance. Rice price was negatively affected farmer households' consumption of rice with estimation of the parameter was -0.013. This means that if the price increased by a unit, then the household rice consumption will decrease by 0.013 units. In line with, the cassava price

Table 1. Parameters Estimation of Consumption of Rice in Coconut Farmer Households in Indragiri Hilir Regency, Riau Province in 2014

Variabel	Parameter Estimation	t Value	Pr > |t|	Elasticity
Intercept	217.13508	6.89	<.0001	
Rice price	-0.01317	-6.06	<.0001	-4.701
Cassava price	-0.00933	-6.69	<.0001	-1.267
Household income of farmers	7.60E-08	0.89	0.0809	0.007
Number of family members	1.31323	1.90	0.0659	0.199
Farmer education	-0.10014	-0.74	0.4637	-0.034
	R^2 =	0.9803		
	F Value =	338.96		
	Prob. F =	< 0.0001		

showed significant negative effect on consumption of rice coconut farmer households. While household income and number of family members has positively influenced to the rice consumption of coconut farmer households. Farmer education was not significant to coconut farmer households' consumption of rice.

Rice consumption model of coconut farmer households obtained the determination coefficient (R^2) of 98.03 percent. This showed that the variation of independent variables such as the price of rice, the cassava price, household income of farmers, number of family members and farmer education are able to explain 98.03 percents of the variable of rice consumption of farming households and the remaining 2:07 percent was explained by other variables that were not incorporated into the model. F test results showed significant at the level of 0.1 percent. This suggests that rice consumption model of coconut farmer households was good.

Table 1 also explained that the price elasticity of rice was 4,701 percent. This means that if the price of rice increased by 10 percent, the consumption of rice was going down 47.01 percent. The flexibility of responsive on rice consumption of coconut farming households had the implication showed by the rice prices resulted in major changes in rice consumption of coconut farmer households. The results of this research in line with the results of Asrol and Elinur (2015) research which stated that the price elasticity of rice responsive to the rice consumption of palm farmer households.

Likewise, the cassava price was significant and had a negative effect to consumption of rice of coconut farmer households. Price elasticity of cassava on rice consumption of coconut farmer households were significant in the value up to 12.67 percent and responsive. This means that if the cassava price increased by 10 percent, the rice consumption of coconut farmer households fell by 12.67 per cent. Changes in cassava prices resulted in a major change on rice consumption. According to Sugiarto, et al. (2007), the cross elasticity marked negative showed the relationship between commodities were complementary to and if it was positive, showing the relationship between comodities was substitutive. Thus the negative sign on the price elasticity of cassava showed that it was complement to the rice commodity, so the cassava was a food supplement for coconut farmer households.

Unlike the case with a household income of coconut farmers, Table 1 showed that household income elasticity of coconut farmer at 0.007 percent. This means that if household income increased by 10 percent, household consumption increased by 12.07 percent. The value showed the income was not responsive to the consumption of rice. So that changes in household income of coconut farmers was unchanged against the rice consumption of coconut farmer households. In addition, the increasing in household income would increase household consumption of rice. This showed that the rice for coconut farmer households were normally distributed.

Elasticity of the number of family members on the rice consumption of coconut farmer households was amounted to 0.1

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Elasticity of the number of family members on the rice consumption of coconut farmer households was amounted to 0.199

Table 2. Classical Asumption Test of Rice Consumption Model of Coconut Farmer Household i Indragiri Hilir Regency, Province Riau in 2014

No	Econometric Asumption Test	Statistical Test	Statistical Value	Probability
1.	Normality test	Shapiro-Wilk	0.099	0.095
2.	Multicolinearity test	VIF	1.740 – 6.044	-
3.	Heteroscedasticity test	White's Test	24.75	0.022
		Breusch Pagan	10.71	0.057
4.	Autocorrelation test	Durbin Watson	1.377	-

percent and unresponsive. This means if household members increased by 10 percent, household consumption would increase by 1.99 percent. Changes to the number of family members resulted in minor changes of rice consumption of coconut rice farmer households.

CLASSICAL ASSUMPTION TEST

In multiple linear regression analysis were estimated using ordinary least squares (OLS) would violate the classical assumptions. The classical assumptions model such as normality, multicollinearity, autocorrelation and heteroscedasticity. This normality, multicollinearity, heteroscedasticity and auto correlation were tested by using the program of Statistical Analysis System (SAS) version 9. The test results of econometric assumptions were presented in Table 2.

Table 2 shows the results of tests of normality using the Shapiro-Wilk test, multicolinearity test with Variance Inflation Factor (VIF), heteroscedasticity with White's Test and Breusch Pagan Test and autocorrelation test with Durbin Watson expressed that the parameter estimation in this study was significant at the level of significance of 10 percent. It mean that the model of coconut farmer households consumption of rice was normally distributed and multicolinearty did not occur. Likewise, with heteroscesdaticity and autocorrelation test, concluded that heteroscesdaticity and autocorrelation did not happen.

MODEL VALIDATION

Model validation was performed to determine whether the model of coconut farmer households consumption validity, so the model was a simulation of development policy. Indicators of validation testing model used wa the Root Mean Square Percent Error (RMSPE and U-Thaeil (Theil's Inequality Coefficient). Th results showed that the model validation RMSP depending on variable value was 3,606 percen and amounted to 0.0144 U Thaeil (0144 percent) With that RMSPE value below 20 percent and U Thaeil close to 0. This indicated that the ric consumption model of coconut farmers households declared invalid so that it could b simulated policy.

THE IMPACT OF INCREASING RICE PRICE AND HOUSEHOLD INCOME OF COCONUT FARMER

Simulation of the impact of the price changes and incomes on rice consumption would be carried out separately, each describing three policy scenarios. The scenario was a 10 percent increase in rice prices, an increase in farm household income 10 percent and a combination of both. The result of the calculation of the impact of price changes on rice consumption and household income were presented in Table 3.

Table 3 showed the simulation of a 10 percent increase of rice prices and negatively affecting farm household consumption of rice by 47.43 percent. Simulation increase in household income of coconut farmers was a positive impact on coconut farmer households' consumption of rice increased by 0.07 percent. The combination of simulation increased prices and farm household income by the same proportion had a negative impact on decreasing 47.35 percent the consumption of coconut farmer households. This suggests that the increase in household income of coconut farmers was not able to accommodate the negative impact caused by the increase in rice prices. These findings indicate that the rice price

Table 3. Simulation of Impact Increasing Rice Price and Household Income to Rice Consumptio of Coconut Farmer Household and The Effect to Rice Consumption Changes i Kabupaten Indragiri Hilir, Riau Province in 2014.

No	Description	Rice Consumption Changes	
		Value	Percentage
1	Base value	31.7417	-
2	Increasing of rice price 10 percent	16.6871	-47.4285
3	Increasing of household income 10 percent	31.7651	0.0737
4	Combination of price increasing and income for each household and tax up to 10 percent perday.	16.7105	-47.3547

stabilization policy was better done than the policy efforts to increase household income of coconut farmers.

CONCLUSION AND RECOMMENDATION

1. The results of calculation of elasticity state that the price of rice responsive to the rice consumption of coconut farmer households. This indicates that the change in the price of rice resulted in a considerable influence on changes in household consumption of rice coconut farmers.
2. The elasticity of cassava responsive price to the consumption of rice for coconut farmer households is negative. This shows the cassava as complement commodities of rice, so the cassava as a food supplement for coconut farming households.
3. The elasticity of income for coconut farmer household is not responsive to the consumption of rice and coconut farming households is positive. This indicates that changes in household income resulting in small effect on changes in rice consumption of coconut farming households.
4. The numbers of elasticity in family members are not responsive to the coconut farmers household consumption is positive. This indicates that the change in the number of family members of farmers resulted in minor changes in the consumption of rice farming households.
5. The increasing of rice prices negatively affecting to household consumption of coconut farmers. The increase in farmer household had a positive impact on ric consumption of farmer households.
6. The combination of the increasing in the pric of rice and farmer household income by th same proportion is negative impact o household consumption of coconut farmer Increased household income of coconu farmers can not eliminate the negative impa of the increasing of rice prices. These findin indicate that the rice price stabilization polic is better compare than the policy efforts t increase household income of coconu farmers.

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