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Impact of Increase in Input And Output Prices Toward Rice Production In Banten Province-Indonesia

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ABSTRACT

In year 2014 the production of rice in Banten amounted to 2,045,883 tons with a harvested area of 386,398 ha. The objective of this study are: 1) to know the factors of influencing rice production in Banten Province, 2) to know the impact of price increase of input and output on paddy production in Banten Province. This method of study used survey method with 120 respondents. The analysis method uses Simultaneous Equations Model which was estimated using Two Stages Least Squares (2SLS) method. The results of the study were 1) The factors that affect rice production in Banten Province significantly are: Total Use of Certified Seeds, Total Use of SP-36 Fertilizers, Total Use of Solid Growing Substances, Total Use of Solid Pesticides, Total Use of Liquid Herbicides, Total Use of Labor Rent, Land area, and Farm Household Income per year. 2) From the simulation results that the increase in grain prices by 20% will increase production by 4.4% and household income of 11.6%. A 20% increase in the price of Urea and NPK fertilizers could increase rice production by 2.5% and farm household income by 1.1%. So the increase of farm input prices (fertilizer and wage of tractor and labor rent) by 20% does not affect rice production and farmer's income.

Keywords: simultaneous equation model, input and output prices, rice production.

INTRODUCTION

Banten province has an area of 9,662 km^2, with the population in 2014 year amounted to 11,704,877 people. Banten is one of the food granaries in Indonesia. The area of rice harvest in 2014 is 386,398 ha with production 2,045,883 tons or with productivity 5,29 ton of unhusked rice per ha (CBS, Banten in Figure 2015, 2015).

Based on districts, in 2014 year, Pandeglang district was the highest production of 588,539 tons (28.8%), then Lebak with 512,238 tons (25.0%), Tangerang with 380,476 tons (18,6%) then Serang 465,858 tons (18.6%). Rice production in 2014 decreased 1,8% compared to 2013 namely 2 083 608 tons due to decreasing of harvest area by 7,306 ha due to drought.

The government has raised the price of fuel oil of the earth on June 21, 2013 which is gasoline from IDR 4,500 per liter to IDR 6,500 per liter and diesel from IDR 4,500 per/ liter to IDR 5,500 per liter. This increase will have an impact on the increase of farming cost, especially on the tractor rental business for the plowing of the land. The government has raised the Government Purchase Price (GPP) of paddy on February 22, 2012 through President Instructions No.8 of 2012 which is GPP dry milled rice at present is IDR 4,400 for dry milled grain and IDR 6,600 for rice, compared to GPP in 2009. This is GPP up 30% (www.neraca.co.id). How big is the effect on paddy production and farmer income due to the increase of input and output price is need to be done in-depth study in Banten Province. Therefore, it is necessary to study the impact of the increase of input and output prices on the production and income of paddy farmers in Banten Province.

METHODOLOGY

Research method data collection data

The method used in this study was the survey method. The survey method was conducted for primary data collection. Primary data were collected by interview using structured questionnaire to rice farmer respondents. It is also collected secondary data from desk study that related to this study. Primary data collection at the farm level using a simple random sampling method. Simple random sampling is done if the sample is homogeneous namely rice farmer (Singarimbun and Sofian E., 1989). From each sample district, one representative sub-district was selected and each sub-district selected a representative

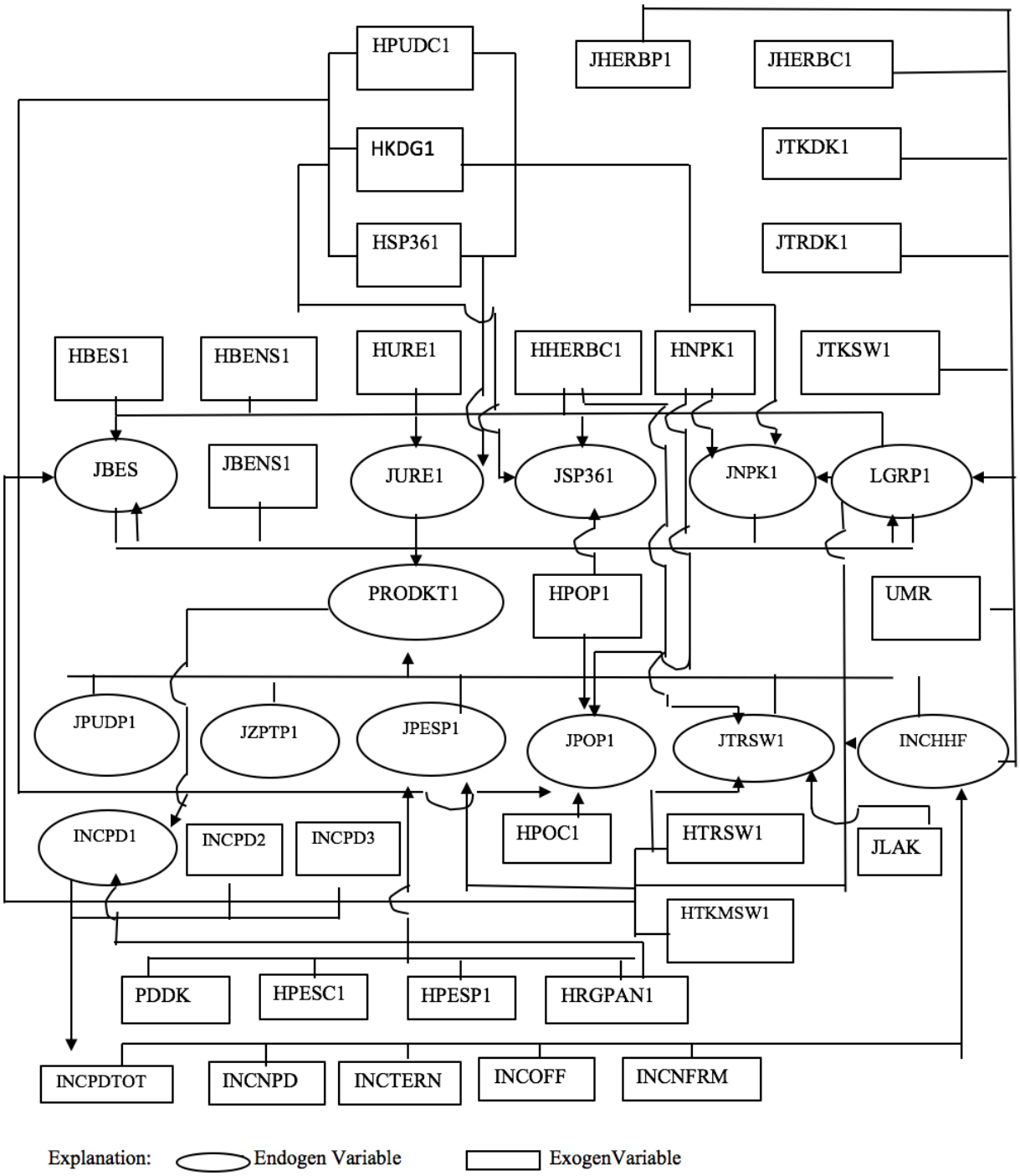

Figure 1. Model Frame of Income and Production of Irrigated Land Farmer in Banten Province

sample village. From each sample village, 30 farmers were selected. Thus total farmers respondents amounted to 120 respondents farmers. In this study, the Simultaneous Equation Model is used to characterize the relationship between the observed variables so that more than one equation can be found in the model (Gujarati, 1978). Figure 1 explain the frame of model of Income and Production of Irrigated land in Banten Province. The production model and income of farmers in irrigated lands which see the linkages between each of the endogenous and exogenous variables which influence each other simultaneously are presented in Figure 1. According to Intriligator (1980) the econometric model is a special pattern of algebraic models where there is a stochastic element that includes one or more disruptive variables.

Location and Time

The assessment was conducted in Banten Province. The location of this study was conducted in four districts of rice producer: 1) Tangerang District, 2) Serang District, 3) Pandeglang District, and 4) Lebak District. This study had been conducted since January 2014 - December 2014.

Methods Data Processing and Analysis

This study used consisted of qualitative and quantitative analysis. Qualitative analysis used descriptive statistics and quantitative analysis used simultaneous equations model to determine the impact of rising input and output prices. The Farmers Production Equation Model and Revenue in the Rainy Season (RS) 2013/2104 consists of nine structural equations and three identity equations.

The structural equation is:

Certified Seed Use Equation:

$$JBES1 = a_0 + a_1HBES_1 + a_2HBENS1 + a_3HURE1 + a_4HNPK1 + a_5HHERBC1 + a_6\,HTRSW1 + a_7\,HTKMSW1 + a_8\,LGRP1 + U_1 \quad \ldots\ldots (1)$$

Where:

$JBES_1$ = Total Use of Certified Seed (kg) .
$HBES_1$ = Price of Certified Seeds per kg (IDR) .
$HBENS_1$ = Price of Non Certificate Seeds per kg (IDR) .
$HURE_1$ = Urea Price per kg (IDR) .
$HNPK_1$ = Price NPK per kg (IDR)
$HHERBC_1$ = Liquid Herbicide Price per liter (IDR)
$HTRSW_1$ = Rental Tractors Rent per Tractor Working Day or TWD (IDR)
$HTKMSW_1$ = Wage of Human Labor per Man Working Day or MWD (IDR)
$LGRP_1$ = Wide land of Cultivated (Ha).
U1 = Interfering Variables.
Expected parameter parameters (hypothesis): $a_1, a_3, a_4, a_5, a_6, a_7 < 0$; $a_2, a_8 > 02$.

The Urea Fertilizer Usage Equation:

$$JURE_1 = b_0 + b_1HURE_1 + b_2HSP36_1 + b_3HNPK_1 + b_4HKDG_1 + b_5HPUDC_1 + b_6LGRP_1 + U_2 \ldots\ldots (2)$$

Where:

$JURE_1$ = Total Urea Fertilizer (kg) .
$HSP36_1$ = Price Fertilizer SP-36 per kg (IDR) .
$HKDG_1$ = Price of Manure Fertilizer per kg (IDR) .
$HPUDC_1$ = Liquid Fertilizer Price per liter (IDR)
U_2 = Disturbing Variables.
Expected parameter signals: $b_1 < 0$; $b_2, b_3, b_4, b_5, b_6 > 03$.

SP36 Fertilizer Use Equation:

$JSP36_1 = c_0 + c_1HSP36_1 + c_2HURE_1 + c_3HNPK_1 + c_4HPUDC_1 + c_5HPOP_1 + c_6LGRP_1 + U_3$ ..... (3)

Where:

$JSP36_1$ = Total Fertilizer SP36 (kg) .

$HPOP_1$ = Solid Organic Fertilizer Price per kg (IDR)

U_3 = Disturbing Variables.

Expected parameter signals: $c_1, c_2, <0$; $c_3, c_4, c_5, c_6 > 0$

Equation of Total Use of NPK Fertilizer:

$JNPK_1 = d_0 + d_1HNPK_1 + d_2HURE_1 + d_3HSP36_1 + d_4HKDG_1 + d_5HPUDC_1 + d_6LGRP + U_4$ ... (4)

Where :

$JNPK_1$ = Total Use of NPK Fertilizer (kg) .

U_4 = Disturbing Variable.

Expected parameter signals: $d_1, <0$; $d_2, d_3, d_4, d_5, d_6, > 0$

Equation of Total Use of Solid Organic Fertilizer:

$JPOP_1 = e_0 + e_1HPOP_1 + e_2HPOC_1 + e_3HURE_1 + e_4HKDG_1 + e_5HNPK_1 + e_6HPUDC_1 + e_7LGRP_1 + U_5$ ..... (5)

Where:

$JPOP_1$ = Total Use of Solid Organic Fertilizer (kg) .

U_5 = Interfering Variables.

Expected parameter signals: $e_1, e_2, e_3, e_4, e_5 <0$; $e_6, e_7 > 0$

Equation of Total Use of Solid Pesticide:

$JPESP_1 = f_0 + f1HPESP_1 + f_2\ HPESC_1 + f_3HHERBC_1 + f_4HTKMSW_1 + f_5LGRP_1 + f_6PDDK + f_7HRGPAN_1 + U_6$ ..... (6)

Where:

$JPESP_1$ = Total Use of Pesticides (kg).

HPESP1 = Solid Pesticide Price per kg (IDR).

HPESC1 = Liquid Pesticide Price per liter (IDR).

PDDK = Duration of Education (years)

HRGPAN1 = Grain harvest price (IDR)

U_6 = Interference variable.

Expected parameter signals: f1, f2, f3, <0; f4, f5, f6, f7> 0

Equation of Total Use of Leased Tractors:

$JTRSW_1 = g_0 + g_1HTRSW_1 + g_2HTKMSW_1 + g_3HHERBC_1 + g_{4J}LAK + g_5LGRP_1 + g_6HRGPAN_1 + U_7$ ..... (7)

Where:

$JTRSW_1$ = Total Use of Tractor Lease (TWD).

JLAK = Number of Family Members (people)

U_7 = Interference variable.

Expected parameter signals: $g_1, <0$; $g_2, g_3, g_4, g_5, g_6, > 0$

Wide Land Area Equation:

$LGRP_1 = h_0 + h_1JTRSW_1 + h_2JTKSW_1 + h_3JTRDK_1 + h_4JTKD_1 + h_5JHERBC_1 + h_6JHERBP_1 + h_7JBES_1 + h_8UMR + h_9INCHHF + U_8$..... (8)

Where:

$LGRP_1$ = Land Area of Cultivated (Ha).

$JTRDK_1$ = Number of Tractors In Family (TMD).

$JTKDK_1$ = Number of Labor in the Family (MWD).

$JHERBC_1$ = Total Use of Liquid Herbicides (liter)
$JHERBP_1$ = Total Use of Solid Herbicides (kg)
UMR = Age of respondent (year)
INCHHF = Farmer household income (IDR)
U_8 = Interrupt variable.
Expected parameter signals: $h_1, h_2, h_3, h_4, h_5, h_6, h_7, h_8, h_9 > 0$

Rice Production Equation:

$$PRODKT_1 = i_0 + i_1JBES_1 + i_2JBENS_1 + i_3JURE_1 + i_4JSP36_1 + i_5JNPK_1 + i_6JPUDP_1 + i_7JZPTP_1 + i_8JPESP_1 + i_9JHERBC_1 + i_{10}JTKSW_1 + i_{11}LGRP_1 + i_{12}INCHHF + U_9 \quad (9)$$

Where:
$PRODKT_1$ = Gross production of paddy in husked rice (kg).
$JBENS_1$ = Number of Non Certificate Seeds (kg)
$JPUDP_1$ = Total Use of Solid Leaf Fertilizer (kg)
$JZPTP_1$ = Total Use of Growing Stimulants (kg)
$JTKSW_1$ = Total Use of Hired Labor (MWD)
U_9 = Interrupt Variables.
Expected parameter signals: $i_1, i_2, i_3, i_4, i_5, i_6, i_7, i_8, i_9, i_{10}, i_{11}, i_{12} > 0$;

The identity equation is as follows:
1. Equal Income of Rice Farming at RS 2013/2014:

$$INCPD_1 = PRODKT_1 * HRGPAN_1 \quad (10)$$

2. Equal Total Income from Rice Farm in a year:

$$INCPDTOT = INCPD_1 + INCPD_2 + INCPD_3 \quad (11)$$

Where:
INPDTOT = Total Rice farm income in a year (IDR)
$INCPD_1$ = Rice farm income at RS 2013 / 2014 (IDR).
$INCPD_2$ = Rice farm income at DS-I 2013 (IDR).
$INCPD_3$ = Rice farming income at RS 2012/2013 (IDR).

3. Equal Income of Farmer's Household in a year:

$$INCHHF = INPDTOT + INCNPD + INCTERN + INCOFF + INCNFRM \quad (12)$$

Where:
INCNPD =Income of non paddy farmer in a year (IDR)
INCTERN= Income of Livestock farmer in a year (IDR)
INCOFF = Income from off farm in a year (IDR)
INCNFRM = Non-farm income per year (IDR)

Model Identification and Estimation

Identification of structural equation model is needed to know the method used to estimate the model equation. Identification of structural model according to order condition (Koutsyiannis, 1977) that is if:
(K - M) = (G - 1) is called exactly identified
(K - M) > (G - 1) is called over identified
(K - M) < (G - 1) is called under identified
Where:
K = Number of variables in the model
M = Number of endogenous and exogenous variables in an equation (most variables)
G = Number of endogenous variables in the model.

It consists of 12 equations consist nine structural equations and three identity equations. The number of K are 49 variables, the number of M are 13 variables (contained in PRODKT1 equation) and G is 13 pieces, so that (K - M)> (G - 1) is (49 - 13)> (13 - 1) = 36> 12, thus the above equation is over identified. The data is processed by computerized, for tabulative analysis and B / C ratio processed with Excel program, while for multiple linear regression analysis processed with SAS program version 9.10.

According to Sinaga (1997), the simulation aims to determine the direction (sign) and size change of one or more endogenous variables by making changes to one or more exogenous variables within the model. According to Labys (1973), policy simulations are conducted at certain sample periods in order to help explain the behavior of commodity markets if new policies are implemented. Before the simulation required validation model, its usefulness to determine whether a model is valid enough to be done simulation. The commonly used statistical criteria for model validation are: a. Root Mean Squares Error (RMSE):

$$RMSPE = 100 * \{ 1/ T \sum_{t=1}^{T} (Yts - Yta/Yta) 2 \} 0.5$$

RMSE is a measure of the simulated pathway deviation from the previous pathway period. The smaller the RMSE value the higher the level of accuracy of the simulation.

b. Root Mean Squares Percent Error (RMSPE):

$$RMSPE = 100 * \{ 1/ T \sum_{t=1}^{T} (Yts - Yta/Yta) 2 \} 0.5$$

RMSPE value is getting smaller then the better level of simulation accuracy.

RESULTS AND DISCUSSION

Characteristics of Farmers Sample and Farming System in Banten Province

Based on the survey results, the average age of family head is 45.9 years old with a range of 23 - 72 years. The average length of education of the family head is 7.2 years with the lowest education one year (first grade of elementary school) and the highest 16 years or university graduated. The average number of family members (including the head of the family) is 4.7 people with a range of 1 - 9 people. From the survey results, it is known that the average of cultivated land area in Banten Province is 0.89 ha per household (hh) with a range of 0 - 6.5 ha. This land area consists of a owned land area of 0.47 ha /hh with a range of 0 - 6.1 ha, and a non owned land area of 0.42 ha / hh with a range of 0 - 6.5 ha. The width of rice field cultivation in Rainy Season (RS) 2013/2014 is 0.85 ha per household, at Dry Season-I (DS-I) 2013 of 0.79 ha per household and at RS 2012/2013 of 0.76 ha per household. In general, cropping pattern in the survey area is rice - rice - fallow. Because of the limitation of the page only three equation models presented namely:1) Total Use of Sertified Seeds, 2) Cultivated Land Area, 3) Rice production on irrigated land.

Equation of Total Use of Certified Seeds

Details of the guess equation of the Number of Certified Seeds ($JBES_1$) is listed in Table 1. From all explanatory variables only variable of Rent Hand Tractor Wage ($HTRSW_1$) and Cultivated Land Area ($LGRP_1$) are significantly different (the italic symbol). The Rent Hand Tractor differed significantly at a real level of 10 percent. Coefficient value of alleged parameter of -0.00002 means the increase of Rent Tractor Wage of IDR 100.000 per ha

decreased the number of use (demand) certified seed of 2 kg per ha. Value of coefficient of elasticity The amount of Certified Seed Seeds to Rent Rental Tractor ($EJBES_1$, $HTRSW_1$) is - 0.21 (in elastic), meaning that 1% increase in tractor wage will decrease the seed demand by 0.21%, meaning Total Seed Use is unresponsive to change Price of Rent Tractor. Seed is a basic requirement so that the change of Rent Tractor Rent Price only has small impact on Seed Use. Variable Cultivated Land Area (LLG) is differed significantly at 1% significant level, where coefficient value of the alleged parameter was 24.94277. The value of short-run elasticity coefficient ($EJBES_1$, $LGRP_1$)

Table 1. Results of Allegations of Equation of Total Use of Certified Seeds

Variable	Symbol	Guess Parameter	t-counted	Significant level	Elasticity
Intersep	a_0	2.207558	0.35	0.7249	
Price of Certified Seeds	$HBES_1$	0.000233	1.11	0.2693	
Price of Non Certified Seeds	$HBENS_1$	-0.00537	-5.68	<0.000.1	
Price of Urea Fertilizer	$HURE_1$	0.002314	1.62	0.1088	
Price of NPK Fertilizer	$HNPK_1$	-0.00038	-0.36	0.7167	
Price of Liquid Pesticide	$HHERBC_1$	0.000060	1.46	0.1480	
Wage of Rent tractor	*$HTRSW_1$*	-0.00002	-1.88	*0.0622*	-0.21013
Wage of Rent labours	$HTKMSW_1$	-0.00006	-0.67	0.5056	
Cultivated Land Area	*$LGRP_1$*	24.94277	17.37	*<.0001*	1.037756
R^2	0.80588				
F Count	57.60				

Source: Primary data was processed, 2014.

is 1.037, it means that every increase of 1% Cultivated Land Area will increase the Number of Utilization of Certified Seeds by 1.03%, which means the Use of Seed responsive to Changes of Land Area or Elasticity of Land Area Work on certified seed demand (EJBES1, LGRP1) is elastic (≥1). The above results are supported by Siagian research (2005) in West Java Province, where the Variable Land Area of Garage (LLG) is positively correlated with Total Seed Use. The coefficient value of the alleged parameter was 28.9352 and differed statistically at a real 1 percent level. So it means that every increase of land area of 1.0 Ha will increase the use of seeds by 28.9 kg and vice versa. Short-term coefficient of elasticity value is 0.92, which means that Seed Use is relatively responsive to LLG changes. Also based on study of Siagian (2011) in South Sumatra province, found that demand of paddy certified seed responsive to change of certified seeds and Solid Growth Stimulan.

Cultivated Land Area Equation

The result of the allegation of Cultivated Land Area Equalization is shown in Table 2. Explanatory variables that influence significantly Land area is Total Use of Lease Tractor (JTRSW1), Number of Leased Labor (JTKSW1), Total Use of Family Tractors (JTRDK1), Number of Family Workers (JTKDK1), Total Use of Certified Seed (JBES1), Farmers Household Income (INCHHF).

Table 2. Result of Alleged Equation of Land Area

Variable	Symbol	Guess Parameter	t-counted	Significant level	Elasticity
Intersep		-0.08133	-0.80	0.4260	
Number of Rental Tractor	*JTRSW1*	0.039909	3.00	*0.0034*	*0.096251*
Number of Leased Labours	*JTKSW1*	0.003748	7.51	*0.0001*	*0.358485*
Number of Family Tractors	*JTRDK1*	0.044625	2.38	*0.0193*	*0.029925*
Number of Family Labours	JTKDK1	-0.00074	-0.60	0.5508	
Number of Liquid Pesticide	JHERBC1	0.003208	0.16	0.8709	
Number of Solid Herbicyde	JHERBP1	-0.12075	-0.73	0.4699	
Number of Certified Seed	*JBES1*	0.011903	6.95	*<.0001*	*0.286092*
Farmer Age	UMR	0.003767	1.65	0.1009	0.203418
Income of Farmer Household	*INCHHF*	4.182E-9	3.90	*0.0002*	*0.145997*
R^2	0.93924				
F Count	188.94				

Source: Primary data was processed, 2014.

Variable Number of Rented Tractors (JTRSW1) differs significantly at 1 percent level. Based on the value of coefficient of elasticity of LGRP1 to JTRSW1 (ELGRP1, JTRSW1) is equal to 0.10 (in elastic), in other words Cultivated Land Area (LLG) less responsive to change of Total Use of Rent Tractor. This is supported also by Siagian (2005) where the Number of Number of Extra Tractors (JTRLK) differs significantly at 1 percent level, with relatively small regression coefficient of 0.00815. Based on the value of coefficient of elasticity of LLG to JTRLK is equal to 0145, in other words Cultivated Land Area less responsive to change of Total Use of Lease Tractor / Outer Family. The following table describes the Alleged Results of Land Extent Equation.

Based on the study of Aslam (2015) in Sri Lanka, it was found that labour use, paddy filed extension, fertilizer using, number of seeds, plant protec chemical, weed control chemical, and quality of seed were statistically significant to paddy cultivated area.

Equation of Rice Field Production

The results of the guess equation of Wetland Rice Production at RS 2013/2014 (PRODKT1) are described in detail in Table 3. The explanatory variables that significantly affect rice paddy production in RS 2013/2014 are Total Use of Certified Seed (JBES1), Total Fertilizer SP36 (JSP361), Total Use of Solid Incentive ($JZPTP_1$), Total Use of Solid Pesticides (JPESP1), Total Use of Liquid Herbicides ($JHERBC_1$), Total Labor For Rent (JTKSW1), Land Area Cultivated (LGRP1), Farmer's Income (INCHHF).

The value of the coefficient of elasticity of paddy production on the number of certified seeds (EPRODKT1, JBES1) is 0.2 means that any increase in the number of seeds 1% will increase rice production by 0.2%, meaning that Paddy production is unresponsive to the change in the number of labeled seeds.

The coefficient value of rice production elasticity to the amount of SP-36 fertilizer (EPRODKT1, JSP361) is 0.14 (in elastic) meaning that every 1% increase of seedlings will increase rice production by 0.14%, that means Paddy Production Unresponsive to change of amount SP-36 fertilizer. This is supported by Siagian research (2005) where paddy productivity (PDTP) elasticity to amount of TSP (JTSP) is in elastic with coefficient value of 0.04. So 1.0 percent increase in JTSP will only raise PDTP by 0.04 percent. So the change of TSP Usage is not responsive to Rice Productivity.

The coefficient value of rice production elasticity to the amount of SP-36 fertilizer (EPRODKT1, JSP361) is 0.02 meaning that any increase of 1% seed amount will increase production rice by 0.02%, meaning that Paddy Field Production is not responsive to changes in the amount of solid ZPT. Variable Total Use of Pesticide Solid has regression coefficient value 36.13777. The value of the coefficient of elasticity of paddy production to the number of solid pesticides (EPRODKT1, JPESP1) is 0.02 (in elastic) meaning that any increase in the amount of solid pesticide by 1% will increase rice production by 0.02%, meaning that Rice Production is unresponsive to changes in amount Use of solid pesticides. This is supported by Siagian (2005) research where Variable Total Use of Pesticides (JPES) differs significantly at the 99 percent confidence level. With regression coefficient value is 111.2849. The coefficient value of elasticity is 0.18 (in elastic). Based on study of Muhajirin *et al.* (2014), factors

Table 3. Result of Alleged Equation of Rice Production on Irrigated Land

Variable	Symbol	Guess Parameter	t-count	Significant level	Elasticity
Intercept		-508.085	-2.70	0.0081	
Number of Certified Seed	*JBES1*	45.93895	1.70	*0.0929*	*0.197312*
Number of Non Certified Seed Using	JBENS1	33.76796	1.09	0.2782	
Number of Urea Using	JURE1	0.178769	0.16	0.8742	0.135563
Number of SP36 Using	*JSP361*	8.269055	2.45	*0.0161*	*0.135563*
Number of NPK Using	JNPK1	2.489242	1.35	0.1814	
Number of Solid Leaf Fertilizer	JPUDP1	-251.886	-0.06	0.9519	
Number of Growing Stimulants	*JZPTP1*	1679.673	1.82	*0.0715*	*0.021187*
Number of Solid Pesticide	*JPESP1*	36.13777	1.62	*0.1074*	*0.022564*
Number of Liquid Herbicide	*JHERBC1*	421.7587	3.69	*0.0004*	*0.063841*
Number of Rent Labour	*JTKSW1*	14.42887	3.99	*0.0001*	*0.246619*
Land Area Cultivated	*LGRP1*	1651.913	1.80	*0.0742*	*0.295195*
Income of Farmer Household	*INCHHF*	0.000016	2.54	*0.0124*	*0.099816*
R^2	0.97508				
F Count	348.96				

Source: Primary data was processed, 2014.

affected of wetland rice production significantly in Sarolangun district, province of Jambi are Land area, number of seed, number of KCL fertilizer, and number of Curater pesticide. Based on the study of Prabandari *et al*. (2013) in Mambal Subak, Badung Regency and Subak Pagutan in Denpasar City, Bali Province, it is known that the factors that influence rice production significantly are: Number of workers, fertilizer and water at 99% confidence level. Sembiring (2018) also conducted research in North Sumatra province, Indonesia it was found that factors that significantly affected production of paddy namely paddy planted area with value of elasticity is 1.398, that's mean elastic.

Asnawi (2013) in his research in Lampung Province found that the factors that influenced the production of inbred and hybrid paddy rice were the area of land and NPK fertilizer. Based on the results of the Siagian (2011) study in South Sumatra Province, Indonesia it was found that the factors that significantly affected the production of paddy in the 2009 in Dry Season I were,

Number of Certified Seeds, Amount of Urea, Number of SP-36, Amount of Other Fertilizers, Amount of Solid Leaf Fertilizer , Extent of Working Land, while in Dry Season II 2009 are Amount of Urea, Amount of SP-36, and Amount of Liquid Pesticides.

Based on the study of Nwaobiala and Adesope (2014) in Ebonyi State, Nigeria, found that the factors that significantly affected rice production on dry land were farmer's age, farming experience, farm size, input variable, and farmer's income. While the factors that influence rice production in swamps are significantly the level of education, labor costs, farm size, input variable and farming income.

Based on the results of the study of Onibala *et al*. (2017) in the District of South Tondano-Celebes, Indonesia, it is known that the factors that influence the production of rice fields significantly are: land area, seeds, and Urea fertilizer. Also the results of the study by Akbar *et al.* (2017) in Kesesi Sub district, Pekalongan District, Cental Java Province in Indonesia found that factors that significantly affected rice production were land area, production, number of seed purchases, while vriabel urea and cropping systems did not affect rice productivity.

Policy Simulation

Price Raise Policy of Paddy Harvest, Urea Fertilizer, SP-36 Fertilizer, and NPK Fertilizer of 20%

The increase of the four variables simultaneously increased the Total Use of Certified Seeds 11.7%, and other inputs ranged from 4.4 to 11 , 8%. The highest increase was on the number of solid pesticides use (JPESP1) of 11.8% and the lowest was 4.4% SP-36 usage. From Table 4 it is also known that the increase of paddy price and the three fertilizers will simultaneously increase the 0.07% cultivated land area and 7.4% production, so the farmer household income will increase 13.3%.The detail shown in Table 4.

Table 4. Simulation Result Price Increasing of Paddy Harvest, Urea Fertilizer, SP-36 and NPK of 20 Percent

No.	Endogen Variable	Value of Basic Simulation	Value of Policy Simulation	Changing of Unit	Percentasion (percent)
1	JBES	31.0305	34.6721	3.64	11.7
2	JURE1	229.9	240.3	10.4	4.5
3	JSP361	109.7	114.5	4.8	4.4
4	JNPK1	102.5	106.4	3.9	3.80
5	JPOP1	142.8	167.7	24.9	17.4
6	JPESP1	4.4215	4.9400	0.52	11.76
7	JTRSW1	3.3950	3.5606	0.166	4.9
8	LGRP1	1.1288	1.20776	0.079	0.07
9	PRODKT1	6454.8	6932.6	477.8	7.40
10	INCPD1	30016557	36901771	6885214	22.9
11	INCPDTOT	41032322	47917536	6885214	16.8
12	INCHHF	51847979	58733192	6885214	13.3

Source: Primary data was processed, 2014.

Price Raise Policy of Rent Hand Tractor Wage and Hired Labour Wage of 20 Percent

If the price of fuel oil (gasoline and diesel) rises (as now the price of gasoline increases from Rp 6,500 to Rp 7,400 and diesel from Rp 4,500 to Rp 5,500 / liter) had an impact on the increase in the wage of rented tractors and labor. If this policy is implemented then overall does not affect the use of production factors / input farming, which keeps increasing from 1.2 to 8.3% with the highest increase in the solid pesticide and the lowest in the amount of organic

fertilizer use of 1.2%. The productivity still increase 4.4% and farmer household income also increase 11.6%. This Table 5 below show detailed.

Table 5. Simulation Result Price Rise Policy of Rent Hand Tractor Wage and Hired Labour Wage of 20 percent

No.	Endogen Variable	Value of Basic Simulation	Value of Policy Simulation	Changing of Unit	Percentasion (percent)
1	JBES	31.0305	32.1105	1.08	3.5
2	JURE1	229.9	239.4	9.5	4.13
3	JSP361	109.7	114.8	5.1	4.65
4	JNPK1	102.5	105.6	3.1	3.02
5	JPOP1	142.8	144.5	1.7	1.19
6	JPESP1	4.4215	4.8044	0.38	8.6
7	JTRSW1	3.3950	3.526	0.131	3.86
8	LGRP1	1.1288	1.1721	0.0043	0.38
9	PRODKT1	6454.8	6737.7	282.9	4.38
10	INCPD1	30016557	36050272	6033715	20.1
11	INCPDTOT	41032322	47066036	6033714	14.7
12	INCHHF	51847979	57881693	6033714	11.6

Source: Primary data was processed, 2014.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

1. Factors affecting rice production in Banten Province significantly: Total Use of Certified Seeds, Total Use of SP-36 Fertilizers, Total Use of Solid Growing Substances, Total Use of Solid Pesticides, Total Use of Liquid Herbicides, Total Use of Rent Labor, Cultivated Land area, and Farm Household Income per year.
2. The increase of paddy price, Urea fertilizer price, SP-36 and NPK Ponska respectively by 20% which increase production equal to 7,4% and farmer household income 13, 3%. The increase of rent tractor wage and hired labor wage by 20% does not affect rice production and farmer's income.

Recommendations

1. It was necessary to increase the productivity of rice by increasing the use of inputs are Total Use of Certified Seeds, Total Use of SP-36, Total Use of Solid Growing Substance, Total Use of Solid Pesticides, Total Use of Liquid Herbicides, Total Use of Rent Labor, Cultivated Land Area, and Farm Household.
2. The government may raise the cost of paddy purchases ands imultaneously to increase fertilizer price of Urea, SP-36 and NPK.

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References

Akbar I, K. Budiraharjo, Mukson. 2017. Analysis of Factors Affecting Rice Productivity in Kesesi District, Pekalongan Regency. *J. Social Economics of Agriculture.* 1 (2): 99 -111.

Asnawi R. 2013. Analysis of Factors Affecting Paddy and Hybrid Rice Production in Lampung Province. SEPA. 10 (1): 11-18.

Aslam ALM. 2015. An Econometric Analysis of Factors Affecting on Paddy Cultivation in Amapara District. Second International Symposium, FIA-SEUSL. Page:117 – 121.

Anonymous. (2015). Banten in Figure 2015. Central Bureau of Statistic of Banten Province, Serang.

Anonymous. (2013). Banten in Figure 2012. Central Bureau of Statistic of Banten Province, Serang.

Anonymous. (2012). Increaing of Rice GPP not Guarantee the Farmer Welfare. www.neraca.co.id/article/1090/ Download on 4th September 2014.

Gujarati D. 1988. Basic Econometric. Translation. Erlangga Publisher, Jakarta.

Intriligator, M. 1980. Econometric Model, Techniques and Applications. Prentice Hall of India, New Delhi.

Koutsoyiannis A. (1978). *The Theory of Econometrics*: *An Introductory Exposition of Econometric Methods*. Harper and Row Publishers. Inc., New York.

Labys. W. C. 1973. Dynamic Commodity Models: Specification. Estimation and Simulation.D. C. Health and Company. Lexington. Mass.

Muhajirin, Y.Damayanti. Elwamendri. 2014. Analysis of Factors that Affect of Wetland Rice Production in Batang Asai Sub district, Sarolangun District. *J. Socio Economica of Bussiness.* 17 (1) : 82 – 91. ISSN:1412-8241.

Nwaobiola C.U., Adesope OM. 2014. Economic Analysis of Small holder Rice Production System in Ebonyi State South East Nigeria. *J. Agriculture and Economic Sciences.* 11 (23) : 1 – 10.

Onibala AG, Sondakh ML, Kaunang R, Mandei J. 2017. Analysis of Factors Affecting Rice Paddy in Koya Village, South Tondano District. *J. Agri-Socio Economic* of Sam Ratulangi University. 13 (2): 237 - 242.

Prabandari AC, M. Sudarma, P.U..Wijayanti. 2013. Analysis of Factors that Affect Wetland Paddy Production in Middle stream and Upstream of Ayung Watershed. *E-Jurnal of Agribussiness and Ecotourism..* 2 (3) : 89 – 98.

Sembiring SA. 2018. Analysis of rice policy based on presidential instruction on household food security: simultaneous equation model. International Conference on Agriculture, Environment, and Food Security.IOP Conf. Series, Earth and Environmental Science. IOPPublishing. Page: 1 – 6. doi:10.1088/1755-1315/122/1/012010.

Sinaga. B. M. 1997. Quantitative Approach in Agribusiness. Journal of Agricultural And Resource Socio-Economics). Faculty of Agriculture. Bogor Agricultural University, Bogor. 10 (1): 48 – 64.

Singarimbun. M., Sofian E.. (1989). Methode of Survey Research. Research Institution Education and Information of Economic Social, Jakarta

Siagian.V. (2005). Impact Policy of Increase Price of Input and Output toward Production and Farmer Income in Irrigation Land in West Java Province. Thesis of Master Sciences. Postgraduate Faculty. Bogor: Bogor Agricultural University.

Siagian V. 2011. Factors which Affect Wetland Rice Production on Dry Season in South Sumatra Province. *Proceeding of National Seminar of Empowering Farmer Through Technology Innovation of Specific Location. Yogyakarta,25th October 2011.* Cooperation between AIAT of Central Java and Agriculture Extension School of Yogyakarta. Page: 1255 – 1270.

Siagian V. 2011. Factors that influence certified paddy seeds in South Sumatra in 2009/2010 Rainy Season. *Proceeding of National Seminar of Acceleration of Agricultural Development and Rural Based Innovation and Local Resources*. Manokwari, 28th September 2011. Cooperatioon between Center for Agricultural Technology Assesment and Development and Departement of Agriculture, Animal Husbandary and Food Security of West Papua Province. Page: 632 – 637.

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