



FACTORS INFLUENCED PADDY FARMERS TO USE OR NOT USE ORGANIC FERTILIZERS IN SOUTH SUMATERA, INDONESIA

Siti Komariah Hildayanti, Juhaini Alie

Indo Global Mandiri University, Palembang, Indonesia

s.k.hildayanti@gmail.com, juhainialie@yahoo.com

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ABSTRACT

Rice farming in the tidal wetland require specific cultivation techniques. The using of anorganic fertilizers can cause soil damage and loss of production. One way to minimize the loss was by introducing the use of organic fertilizer to improve the soil fertility. This research tries to elaborate the probability of farmers to use the organic fertilizer under some factors influence in a case tidal wetland at South Sumatera, Indonesia.

This research aimed to analyze factors influenced paddy farmers to use or not use organic fertilizer. This research implemented in 9 villages, 5 districts in Banyuasin as one of tidal wetland in South Sumatera. Techniques used in the sampling of this research is randomly layered unbalanced. Population farmers grouped into paddy farmers who had already used organic fertilizers, either fully or semi-organic, and only used inorganic fertilizers.

The probability of rice farmers to use or not use organic fertilizers is affected by some aspects could be value by binary choice model or Logit Model. The results showed that the land size, experiences, a ratio of fertilizer to rice price were significantly affect chances of paddy farmers to use organic fertilizers in the tidal wetland.

Keywords : *organic fertilizers, paddy farmers, tidal wetland, semi-organic, anorganic fertilizer.*

INTRODUCTION

The using of inorganic fertilizers with a high dose of the usual Indonesian farmers only able to increase agricultural productivity in the short term, while in the long term stagnation. This condition is concerned about the adequacy and durability of national food because of Indonesia's population continues to increase and largely still consumes rice as a staple food .

Green Revolution relied on inorganic fertilizers and pesticides have a negative impact on soil fertility in a sustainable manner as well as the result of mutation of pests and pathogens unwanted. Continued agricultural land fertilized with urea apparently only shows the response of plant fertility instantaneous but a quick impact on the exhaustion of soil organic matter. This situation could be lower the land productivity (Las et al ., 2002).

On the other hand, the using of organic fertilizer in Indonesia is still low. According to the Council Fertilizer Indonesia, in 2010 the using of organic fertilizer is only 4.55 percent of the total fertilizer using entirely. Paddy farmer motivation to use organic fertilizer is still low too in South Sumatra. Low motivation of the farmers to use organic fertilizer is influenced by many external and internal factors of the farmers themselves.

RESEARCH METODOLOGY

The research was conducted in Banyuasin, South Sumatera, Indonesia. Determination of the area carried out with purposive sampling. The sample means are set intentionally by the researchers based on specific criteria or considerations (Wirartha , 2006). Banyuasin is a region with a widest harvested area of paddy and highest rice production in South Sumatra. The sample in this research is in Air Saleh District (Saleh Agung, Srikaton, Sidoharjo, and Bintaran Village), Makarti Jaya District (Tirta Mulya and Tirta Kencana Village), Muara Telang District (Telang Makmur Village), and Tanjung Lago District (Telang Sari Village), and Banyuasin I District (Mariana Village) .

This research is used a survey method to reach the facts that occurred in the field through visits and direct interviews. Survey methods performed by conducting an investigation to obtain the facts of real phenomena that exist and seek factual information about the behavior of rice farmers organic fertilizer users either in full organic or semi-organic. For comparison, the study was also carried out on rice farmers who do not use an organic fertilizer at all.

This study is used disroportionate stratified random sampling technique, where the population is divided into homogeneous groups of rice farmers who are already using organic fertilizers, either fully or semi-organic, and who use only inorganic fertilizer. For more details, sampling frame of the study are presented in Table 1 .

Based on preliminary research, the rice farmers that have used full of organic fertilizers are in the Tanjung Lago District (Telang Sari Village) and Banyuasin I (Mariana Village).

For comparison, samples of rice farmers who have not used an organic fertilizer at all (only using inorganic fertilizers) taken at the same location. Because of the large population, the sample of farmers who use only inorganic fertilizer is taken as many as 10 farmers in each District.

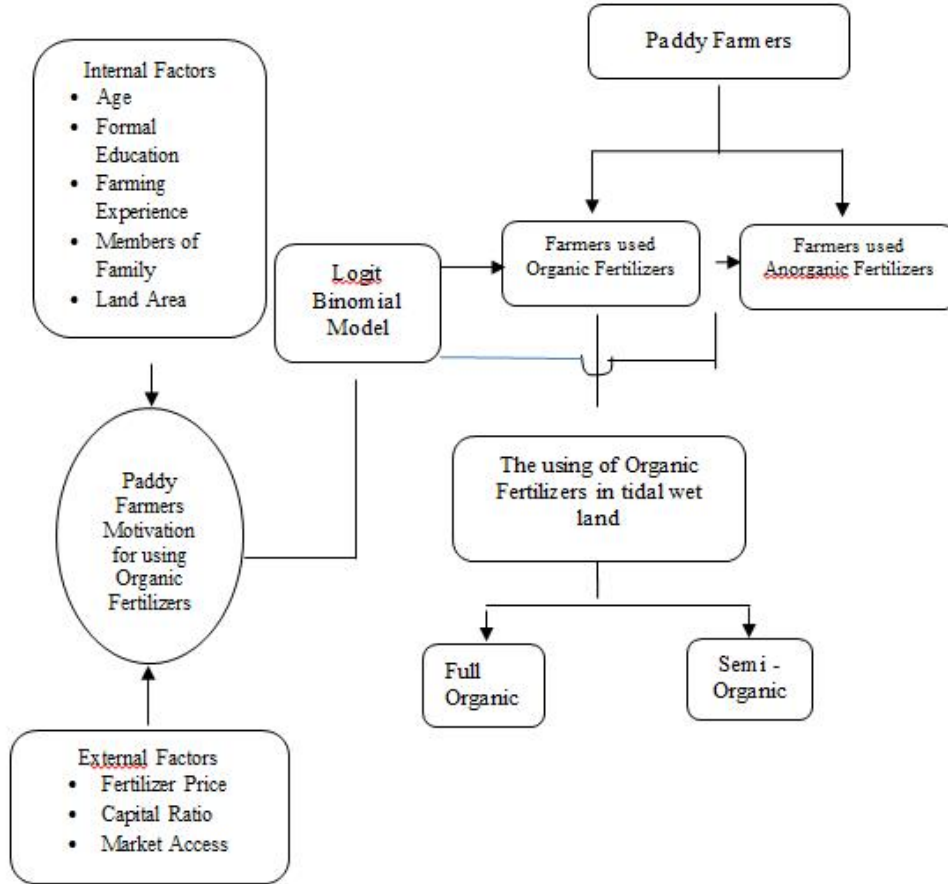


Figure 1. Research Framework

TABLE 1. SAMPLING RESEARCH FRAMEWORK

Location		PF	PF Full Organic		PF Semi Organic		PF An Organic	
		Pop.	Pop.	Sample	Pop.	Sample	Pop.	Sample
a.	Air Saleh	8.017	0	0	19	19	8.008	10
b.	Makarti Jaya	6.891	0	0	5	5	6.886	10
c.	Muara Telang	12.846	0	0	3	3	12.844	10
d.	Tanjung Lago	6.567	0	0	12	12	6.555	10
e.	Banyuasin I	4.171	6	6	25	5	4.146	5
Sum		34.321		6		44		45
Total Sample								95
Note : PF = Paddy Farmers								
Pop. = Populatin								
Source : Primary Data (2014)								

To answer the question about the factors influenced farmers to use or not use organic fertilizer in this study is analyzed by descriptive analysis and comparatived them. The comparison method is ex post facto (Nasir , 2009) , meaning that the data collected after all the events have been completed in progress. To determine the factors that affect rice farmers motivation use organic fertilizer, there implemented a binary decision analysis with logistic regression. According to Firdaus and Farid (2008), part of a logistic regression analysis were used as the dependent variable (response) is a dichotomous variable which are usually only consists two values represent appearance of an event. The model used is named as logit models. Logit model can be used to analyze the data variables, respondents valued 0 or 1 in binary scale. Binary decision model in this study as follows :

$$Y_i = F (U , LL , Ex , Ed , JAK , AP , RM , RH) \dots\dots\dots (1)$$

Logit analysis is used to look at the factors affect farmers use organic fertilizers. Logit model formulation according to Gujarati (1991) as follows :

$$\ln \left(\frac{P_i}{1 - P_i} \right) = + X_i \dots\dots\dots (2)$$

$$K = \ln \left(\frac{P_i}{1 - P_i} \right) = - {}_1 U + {}_2 LL + {}_3 Ex + {}_4 Ed + {}_5 JAK + {}_6 AP + {}_7 RM - {}_8 RH + e \dots\dots\dots (3)$$

Description

- Y_i = Variable decisions rice farmers used organic fertilizers, where
- Y_i = 1 if farmers used organic fertilizers, and
- Y_i = 0 if farmers did not use organic fertilizer.
- K = The decision to use or not farmers use organic fertilizers ,

where the value 1 is the use of organic fertilizers and 0 not use organic fertilizer .

- U = Age (Years)
- LL = Land Area (Hectares)
- Ex = Experience (Years)
- Ed = Education (Years)
- JAK = Number of Family Members (People)
- AP = Market Access (Dummy 1 = Easy , 0 = Hard)
- RM = Capital Ratio (%)
- RH = Ratio Price (%)
- E = Error

To determine whether the model approach is used appropriately or not , there was tested Likelihood values using the following :

$$H_0 ; \beta_1 = \beta_2 \dots \dots \dots \beta_{10} = 0$$

$$H_1 ; \text{at least one } \beta_i \neq 0$$

Decision Rule :

$$- 2 \log \text{ likelihood } d_1 (k - 1) \sim \chi^2 (k - 1 , n) \dots \dots \dots \text{ accept } H_0$$

$$> \chi^2 (k - 1 , n) \dots \dots \dots \text{ reject } H_0$$

Furthermore, to see the effect of each independent variable on the dependent variable observed, there was tested β_1 value by using the t test (t - test) as follows

$$H_0 ; \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7 = 0$$

$$H_1 ; \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7 > 0 \text{ and } H_1 : \beta_1 \text{ and } \beta_8 < 0$$

Calculations used the following equation :

$$T \text{ count} = \frac{\beta_i - \text{latau } \beta_i}{\text{Se} (\beta_i)}$$

$$\text{Se} (\beta_i) = \text{se} (\beta_i)$$

Decision-making rules :

$$\text{If } t\text{-count} \leq t\text{-table} , \text{ accept } H_0$$

$$\text{If } t\text{-count} > t\text{-table} , \text{ reject } H_0$$

Interpretation of magnitude and relationships between variables, which affected opportunity farmers to use or not to use organic fertilizers, is a change of value odds. Because the value in the exponent, then the interpretation is different. The impact is multiplicative, meaning that the effect of the coefficient is not added to the dependent variable (odds) but multiplied to each independent variable. According to Junior, JFH et. al. (2010), a simple approach to the interpretation of the changes referred to in the form of opportunities of value odds as follows :

$$\text{odds Change Percentage} = (\text{Exponential Coefficient}-1) \times 100$$

RESULTS AND DISCUSSION

The influence of these variables and the opportunities of farmers using organic fertilizers assessed based on logit test, that was twice of the value of statistical Nagelkerke R² is equal to 0459, thus it can be concluded the ability of independent variables explaining the model is at 45.9 percent, or the value of the log-likelihood statistics for 91 365. While the effect of each variable partially on the opportunities of farmers using organic fertilizers valued at the three criteria in explaining the results of logit model. The suitability of the theory indicated mark (sign), the amount (magnitude) and the level of significance. The value of statistics as presented in Table 2 shows the logistic regression coefficient (logit), wald test, and significance for each variable in accordance with the original allegation. The results obtained can be used to explain the phenomenon occurs.

TABLE 2. LOGIT MODEL COEFFICIENT CHANCE OF PADDY FARMERS USING ORGANIC FERTILIZERS AT TIDAL WET LAND

No	Variable		S.E.	Wald	Sig.	Exp()
1	Age	-0,005	0,036	0,021	0,886	0,995
2	Area Land	-1,284	0,456	7,943	0,005a	0,277
3	Experience	0,065	0,033	3,823	0,051b	1,067
4	Formal Education	0,181	0,113	2,541	0,111c	1,198
5	Member of Family	0,196	0,255	0,589	0,443	1,216
6	Market Access	0,936	0,716	1,710	0,191c	2,550
7	Capital Ratio	0,004	0,012	0,110	0,740	1,004
8	Input Output Price Rasio	-0,065	0,021	9,949	0,002a	0,937
	Konstan	11,216	2,300	0,279	0,597	0,296

*Note:*A very real at taraf 1, b real at taraf 5, dan c real at taraf 15

Source : primer data, 2014

At the significance level of 5 percent is known that the land area is negative and very real, the experience is positive and very real, the ratio of fertilizer price to the price of rice is positive and partially real effect on the chances of farmers using organic fertilizers. While the real level of formal education and 15 variables influenced the market access opportunities of farmers using organic fertilizers. When it compared with the variables that affect the opportunities for farmers use organic fertilizer in irrigated fields, the variable ratio of price and number of family members had no significant effect on the opportunities of farmers use organic fertilizer in the tidal wet land. Both rice production centers has several distinct characteristics include transportation infrastructure, type of farming, market accessibility and others. Partially, the influence of each of these variables on the chances of farmers use organic fertilizers are described in the following sections :

Experience significant effect on the level of 1 percent. Age coefficient values indicate that when other variables are assumed constant (*ceteris paribus*) the more experienced farmers odds of 1 year to use organic fertilizers 6.7 percent higher than in-experienced farmers.

Increased rice field area of 1 hectare will decrease the chances of farmers using organic fertilizers by 72.3 percent. Average area of 1.64 hectares of paddy fields farmers, where farmers organic fertilizer users an average area of only 1.4 hectares lower. In general, farmers apply more than one type of fertilizer, especially organic farmers fertilizer user, even these farmers also use inorganic fertilizer as the additional fertilizer. With a large quantity of fertilizers and that many large businesses require capital, where land area increased. For farmers produce organic fertilizer independently with the materials available in the surrounding rice fields such as straw and animal manure and decomposing organisms are needed more labor and thus require workforce in greater numbers. The members of the family rice farmers is 4 people. Labor shortages in the family met through labor outside the family wage is Rp.65.000 - Rp.70.000 per day.

Increasing the price of organic fertilizer input to the output (grain) by 1 percent would decrease the chances of the using of organic fertilizers by farmers to 6.3 percent. The price of fertilizer to be one of the parameters important for the price of rice farmers in the wet tidal land to use organic fertilizers. On the other hand, the price of output (grain) is also a parameter prices encourage farmers to increase the using of organic fertilizers. Both the price factor can be used as one of the government's policy incentives to socialize the using of organic fertilizers.

Improved education of farmers for 1 year will increase the chances of farmers using organic fertilizers amounted to 19.8 percent. The average education rice farmers studied for 8 years or equivalent with junior high school (SMP). Full organic fertilizer farmers has a higher education for 10 years or equivalent with senior high school (SMA). Organic fertilizer application requires a certain knowledge for example fertilizer production process, process of mixing various types of organic and inorganic fertilizers, and so on. Farmers need additional education or training. The average farmer which are full organic or semi organic fertilizers follow the non-formal education for 4 times. This figure is much higher than the average inorganic fertilizer farmers. They were follow the non-formal education is only 3 times.

Market access is a positive effect on increasing the chances of farmers using organic fertilizers. It means that the availability of organic fertilizer ready for use or material for organic fertilizers such as straw, animal waste, local microorganisms, organic fertilizer ready for use on the market, stall - stall or stall - stall the means of agricultural production that are close to production centers to increase using of organic fertilizers by paddy rice farmers. Improving the quality of access to the market by 1 percent would increase the chances of farmers using organic fertilizers amounted to 155 percent. Location farms are mostly located in the waters of tidal wet land where transportation access to economic centers such as market product and input markets that provide farming needs a complete example to the district or provincial capital must be reached by water transportation such as traditional boat. This transit frequency of production centers and economic centers into just one time every day.

CONCLUSION

Based on the results of this study can be given some of the conclusions that the factors are land, experience, the fertilizer price significantly affect chances of rice farmers to use organic fertilizer in the wet tidal land.

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