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Economic Behaviour Versus Rice Farmer Environmental Behaviour in Making Food Independence: Case West Java-Indonesia

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ABSTRACT

This study aims to analyze the factors that influence the behavior of rice farmers who views of economic behavior and environmental behavior. This study was conducted in three districts, Cianjur, Tasikmalaya and Subang in West Java and it was held for two months from October and November 2013. There are 246 of respondents were chosen by using stratified random sampling. This research was conducted by using both qualitative and quantitative methods with logistics regression models analysis. In behavioral seeding, the results show that farmers with category 1 (planting rice) tend to have economic behavior in farmers' seed selection compared to category 2 (replace commodity). For fertilization behavior and the use of pesticides, farmers tend not to pay attention to one category of economic behavior in the selection of farmers fertilizer compared to category 2. Behavior in fertilization, farmers with category 1 (planting rice) tend to pay attention to the behavior of the environment in the selection of farmers fertilizer compared to category 2 (change of commodities).

Key words: Economic, environmental, logistic regression model, rice farmers behavior

INTRODUCTION

Study of the rice crop is still very interesting to be discussed because it deals with the problem of food commodities to the community, especially rice which is the staple food of Indonesian people. Currently the availability of food in the various countries, provinces or regions highly dependent on production in each of the centers of rice. When food availability have decreased in each region, it is necessary to find a way how to anticipate it (FAO, 2008). By adopting the method of Chernoff (1973), this study can be illustrated by observing, how the condition in a region is shown by Chernoff Face where the shape of the face depicts the state of food in a region today. Smiling face shape will appears when the state of food in an area is in a good condition and can be consumed by all the people in the region. Sad face shape shows the state of food has begun to make worry the public which would threaten the food self-sufficiency in the region. There are several factors that can cause food conditions in an unstable region. According to Irawan (2012), amounting to 2-3% of paddy fields is converted because of climate change. As the prediction, in 2030, the rice production in Java is around 14.4 million tonnes while the need for rice consumption and the stockpile for the Javanese population were 26.1 million tonnes, it means that there

will be a deficit of 11.7 million tons. According to Stern (2006), the impact of economic, social and environment from global warming is considered as one of the contributors to the food production system.

Fifi *et al.* (2014) reported that the behavior of farmers in seeding indicated that three of the varieties which is commonly used in West Java turns out to be tolerant to drought (Wihardjaka and Tani, 2006) and reduce the gas emissions of greenhouse. It is indicated that the behavior of farmers in West Java in seeding have already considered the risk of crop failure due to extreme climate change as well as pay attention to environmental aspects. While the behavior of farmers in the selection of fertilizers and pesticides have also been thinking about the environmental aspects of sustainability. Therefore, the interesting things that can be related to food self-sufficiency for further study is what are the factors that influence the behavior of farmers in farming decisions, particularly it is closely related to the economic behavior and environmental behavior? For answering this statement, the analysis will use logistic regression models.

MATERIALS AND METHODS

Study area: This study was conducted in West Java Province. The research locations were chosen by using purposive sampling which considered the methodological and geographical aspects, the research locations are located in Cianjur, Tasikmalaya and Subang district. Geographically, Cianjur is located at 106.25° to 107.25° East longitude and 6.21° to 7.32° south latitude, Tasikmalaya district lies between 7°02' and 7°50' South latitude and 109°97' and 108°25' East Longitude and Subang district lies between 107°31'-107°54' East Longitude and 6°11' to 6°49' south latitude with the boundaries as shown in Fig. 1.

Method: Respondents were chosen randomly (stratified random sampling) with a margin of error is about 6% of household population of rice farmers in West Java with the total are 2,321,878



Fig. 1: Map of the study area

households. Therefore, by using Slovin formula, the total numbers of respondents are 246 (Lemeshow and Hosmer, 1989). The techniques of data collection used in this study are: (1) Data collection through questionnaire survey method and (2) In-depth interviews (in-depth interviews). The data analysis use qualitative and quantitative methods by using logistic regression models. This analysis is used to examine what are the factors (behavioral and environmental economics) that influence the behavior of rice farmers, especially in the behavior of seeding, fertilizing, controlling of pests and planting diseases. In this study, farmers in each district are classified into two categories. They are category 1 and 2. Category 1 is the farmers who classified because of their consistency to plant of the paddy. For category 2, the farmers who always change the commodity. The category distinction is intended to examine whether there are differences in perception between the two categories of farmers.

RESULTS

Behavioral economics: Behavioral economics is the point where the human is always faced with many choices and sometimes in deciding its choice, it is not based on the cost-benefit but it based on the social and emotional consideration.

Seeding behavior: In a logistic regression model, the factors that determine or influence the economic behavior of farmers in selecting the seed are farmer's category, descendants and the suitability of the land. The farmers that include in this group are the farmers who have the economic view in the selection of seed compared to the farmers in category 2. While the farmers who tend to farm because of the heritage factors do not consider the important of economic view in the selection of seed, this was due to farming activities had an activity from one generation to the next generations. In category of sustainability land, farmers tend not to consider the important of economic review in the selection of seed. It means that the farmers who stated that the suitability of the land was important were more likely to state that the rice was suitable while the seeds are not suitable (Table 1).

Fertilization behaviour: In Logistic regression model, the factors that influence the economic behavior of farmers in the selection of fertilizer (Table 2). That is the position of farmers, farmer's age, farmer category and fertilizers.

Table 1: Logistic regression model and the factors that influence the economic behavior of farmers in behavior seeding

Predictors	Coefficient	SE coefficient	Z	p	Odd ratio
Constant	-0.252768	103.493	-0.24	0.807	
Position	0.169667	0.305110	0.56	0.578	1.18
Age	-0.0189894	0.313472	-0.06	0.952	0.98
Education	-0.138828	0.306651	-0.45	0.651	0.87
Membership	-0.451238	104.539	-0.43	0.666	0.64
Derivative	-0.580790	0.329399	-1.76	0.078	0.56
Market	0.0604047	0.120236	0.50	0.615	1.06
Price	0.477153	0.342200	1.39	0.163	1.61
Category	187.839	0.345573	5.44	0.000	6.54
Land area	0.0081425	0.0514165	0.16	0.874	1.01
Suitability of the land	-0.952625	0.422912	-2.25	0.024	0.39
Climate	0.886890	0.620418	1.43	0.153	2.43

Table 2: Logistic regression model factors that influencing behavior economics of farmers in fertilization

Predictors	Coefficient	SE coefficient	Z	p	Odd ratio
Constant	280.010	129.690	2.16	0.031	
Position	-117.334	0.325521	-3.60	0.000	0.31
Age	0.909277	0.340118	2.67	0.008	2.48
Education	-0.0887079	0.312046	-0.28	0.776	0.92
Membership	-0.401709	121.611	-0.33	0.741	0.67
Derivative	-0.160563	0.321196	-0.50	0.617	0.85
Category	-193.853	0.390675	-4.96	0.000	0.14
Land area	0.0489759	0.101631	0.48	0.630	1.05
Suitability of the land	-0.376184	0.399395	-0.94	0.346	0.69
Climate	-0.151268	0.596792	-0.25	0.800	0.86
Dose	-104.849	0.419529	-2.50	0.012	0.35

Table 3: Logistic regression model factors influencing farmers in behavioral economics of pesticide selection

Predictors	Coefficient	SE coefficient	Z	p	Odd ratio
Constant	-204.384	13471.5	-0.00	0.999	
Position	-125.173	0.323773	-3.87	0.000	0.29
Age	-0.0827375	0.347470	-0.24	0.812	0.92
Education	0.260176	0.325148	0.80	0.424	1.30
Membership	208.227	13471.5	0.00	0.999	1.10E+14
Derivative	-0.544672	0.388139	-1.40	0.161	0.58
Category	-136.841	0.407096	-3.36	0.001	0.25
Land area	-0.0793526	0.110180	-0.72	0.471	0.92
Suitability of the land	-0.0599890	0.444565	-0.13	0.893	0.94
Climate	-0.636884	0.740276	-0.86	0.390	0.53
Dose	-0.193308	0.499403	-0.39	0.699	0.82

Position of farmers: The farmers who have positions as the land owners tend not to pay attention to the behavior of the economy in the selection of fertilizer than farmers who are not the owners of the land. This is because of farming is a business that they consider to have been so common in the selection of fertilizer is only based on the past experience.

Age of farmers: Farmers with older age (≥ 50 years) tend to assume economic importance in the selection of behavior fertilizer than farmers younger age. This is presumably because farmers with older age already know about the history of the price of fertilizer, therefore, they are more sensitive for the changes.

Categories of farmers: Farmers with category 1 tend not to pay attention to the behavior of the economy in the selection of fertilizer than the farmer category 2.

Dose: Farmers who use organic fertilizers ≥ 1 tons ha^{-1} tend to assume significant economic behavior in the selection of fertilizer than farmers who use organic fertilizer < 1 ton ha^{-1} .

Selection of pesticides: Logistic regression model of factors that influence the economic behavior of farmers in the selection of pesticides (Table 3) are the positions of farmers and farmer category. Farmers with a position as landowners tend not to pay attention to the behavior of the economy

Table 4: Logistic regression model factors influencing the selection of environmental aspects farmers fertilizer

Predictors	Coefficient	SE coefficient	Z	p	Odd ratio
Constant	218.382	16504.2	0.00	0.999	
Position	-0.221278	0.489764	-0.45	0.651	0.80
Age	-0.125868	0.489996	-0.26	0.797	0.88
Education	0.459806	0.473274	0.97	0.331	1.58
Membership	-199.939	16504.2	-0.00	0.999	0.00
Derivative	-0.407874	0.463749	-0.88	0.379	0.67
Category	187.129	0.807997	2.32	0.021	6.50
Land area	-0.0821084	0.0599860	-1.37	0.171	0.92
Suitability of the land	0.113211	0.617006	0.18	0.854	1.12
Climate	-0.674840	0.886823	-0.76	0.447	0.51
Dose	0.295097	0.602580	0.49	0.624	1.34

Table 5: Logistic regression model factors affecting farmers in the election environmental aspects pesticides

Predictors	Coefficient	SE coefficient	Z	p	Odds ratio
Constant	218.840	21502.3	0.00	0.999	
Position	0.0941808	0.462366	0.20	0.839	1.10
Age	-0.330478	0.469407	-0.70	0.481	0.72
Education	0.581440	0.473987	1.23	0.220	1.79
Membership	-203.022	21502.3	-0.00	0.999	0.00
Derivative	0.320277	0.535954	0.60	0.550	1.38
Category	0.210270	0.505857	0.42	0.678	1.23
Land area	0.465315	0.414885	1.12	0.262	1.59
Suitability of the land	-0.225760	0.569992	-0.40	0.692	0.80
Climate	0.117281	0.854827	0.14	0.891	1.12
Dose	-0.359264	0.640716	-0.56	0.575	0.70

in the selection of pesticides than farmers who are not the owners of the land. And the farmers with category 1 tend not to pay attention to the behavior of the economy in the selection of pesticides than farmers in category 2.

Environmental behavior: In relation of environmental development, the role of human behavior becomes very important. In contrast to other creatures which are influenced by nature, man is capable in influencing the nature. Therefore, in the human relationship with its nature, humans may be possible to be a central point of the development environment (McAndrew, 1993).

Selection of fertilizers: In a logistic regression model, the factors that influence the farmer's environmental behavior in the selection of fertilizer is the farmer category (Table 4). Categories of farmers means that farmers with category 1 (planting rice) tend to pay attention to the behavior of the environment in the selection of fertilizer than the farmer category 2 (changing commodity).

Selection of pesticides: In logistic regression model, the factors that influence farmers' environmental behavior in selecting pesticides that does not have clear differentiate. This could be due to poor of detection power against the respondent so that the model can not represent the purpose of the study. In selecting pesticides ecological motives, all influencing factors is small so it does not look any different (Table 5).

DISCUSSION

The behavior of farmers in rice farming will always be dominated by the behavior of the economy and the environment. According to the DAWJ (2013), the reference of farmers in the selection of rice seeds is because of the seed has the advantage of resistance to brown plant hopper (WCK). Therefore, according to Kariyasa (2007), the need for mutual commitment in the distribution of subsidized seeds and friendly environment in order to effectively reach the farmers.

The behavior of farmers in fertilization according to Sundari (1997) will be closely related to income (behavioral economics) where fertilization behavior is directly related to expectations of farming income. This situation can be seen from the irrational attitude of farmers in the use of fertilizers in terms of increased production which is closely related to the attitude of the farmers who tend to resist risks.

CONCLUSION

In general, the behavior of rice farmers in West Java has been behaving economically and environmentally. In behavioral seeding, farmers with category 1 (planting rice) tend to have economic behavior in farmers' seed selection compared to category 2 (replace commodity). Meanwhile, in fertilization and pesticides, farmers with category 1 tend not to pay attention to farmers' economic behavior compared with category 2. Behavior in fertilization, farmers with category 1 (planting rice) tend to pay attention to the environmental behavior than the farmer category 2 (replace commodity). This means that here, food self-sufficiency in West Java can be achieved by maintaining an appropriate behavior in accordance with the environmental rules.

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