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FARMERSBEHAVIORTOWARD RISKSOF POTATO FARMING FORGRANOLA AND ATLANTIC VARIETIES IN BANJARNEGARA REGENCY

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Abstract

The research aims to determine farmers behavior toward risks of potato farming of Granola and Atlantic varieties and factors influencing farmers behavior towards risk.This research was conducted in the three districts of Banjarnegara Regency, those are Batur, Pejawaran and Wanayasa. From a sampling frame of 270 farmers, it was taken 151 farmers as sample by applying purposive sampling method. statistical t-test, test of variance and ordinary least square. (OLS) were applied in analysis.

The result of the research showed that, most farmers in these area are risk averter who were mostly planting Atlantic variety and the risk loving or neutral farmers chosed to plant Granola variety. The factors to induce their risk aversion are the level of pest disease attack and productivity risk. Meanwhile farm size, farmer education and off-farm income influence the preference of farmers toward risk.

Keywords*:risks, potato, farmers behavior toward risks*

A. BACKGROUND

Potato (*Solanum tuberosum*)is one of the horticulture products which enriched with high nutrition as alternative food after the rice and corn needed by people for foodstuff. There are some benefits of potatoes, i.e., (1) an alternative for food diversification with high value of nutrition; (2) a crop which give an income for the farmers; (3) a non-fuel commodity export; (4) raw materials for food industry and fast food (Foragri, 2009).

After 1980s, new varieties of potatoes hadbeen introducedinIndonesia, such as: (1) **Granola**, with productivity reaches25 tons/hectare; counted for 18 tons of high quality, 4 tons of medium quality, 2 tons of mixed quality, and a ton of low quality.Its crop harvest was normally about 90 days; (2) **Atlantic**, has two types as long and round shapes. The solidness of its tuber is 22-34% (while Granola is 18%), low sugar content, white flesh tuber and it will turn yellow by frying, its tuber can reach 8 cm long and 4 cm wide, and its diameter is 6 cm with a shallow sapling.Its crop harvesting periode is 90 days (Worldplant, 2010).

Banjarnegara is one of the regencies at the southwest of Central Java Province. It is center for the potatoes production of Granola and Atlantic variety. The Granola has been planting by farmers in this area since 1985, while the Atlantic was introduced in this area in 2006. Thereare three centers of potato production in this regent as in districts of Batur, Pejawaran, and Wanayasa (BPS Kabupaten Banjarnegara, 2009).

B. RESEARCH OBJECTIVES

Determine farmers' behavior toward risk of potato farming of Granola and Atlantic varietiesand their determinantfactors of the farmers' behavior toward risk.

C. LITERATURE REVIEW

1. Farm Risks

Every farm activity is posed with risks and uncertainties which farmers can hardly control. The climate problems like a long drought, uncertain climate, unpredicted pest disease attacks, and natural disaster are aspects of the risk and uncertainties (Soekartawi, 2002).Hardaker *et al.* (1997); Debertin (1986); Cassavant and Infanger (1984) argued that the risk is an imperfect knowledge in which the probability result is impossible to find out, and uncertainty occurs as the probability is not known well.

To quantify the risks, there are three kinds of perspectives on risks (Roumasset, 1979) that are:

a. Risk as one of the measures on the probable results dispersion, for example as a variant;
b. Risk as a probability which results in a certain decision; and
c. Risk of how much an individual should pay to avoid the risk he or she does not prefer.

2. Farmers's Behavior

The farmers' behaviortoward risk of farm, according to Salvatore (1993); Hardaker *et al.* (1997), can be divided into three types, i.e.: refusing the risk (*risk averter*), neutral behave to

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the risk (*risk neutral*), and prefer to the risk (*risk lover*).

D. THEORETICAL FRAMEWORK

The Behavior of Farmers to the Risks

de Janvry (1972) stated that the relation between the input (vector *X* vector) and result (*Y*) which is explained in *the generalized power production function*is as follows:

$$Y = A \prod_{i=1}^{I} X_i^{fi(X)} e^{g(X)} \qquad (1)$$

In which $f_i(X)$ and $g(X)$are polynomials of an extent describing a dimension *K*of the input of *X*vector. For the productionfunction of Cobb Douglas, then $g(X) = 0$ and $f_i(X) = \alpha_i$for i.

Based on the equation (1), the profit equation will be found out by regarding all productioncost is based on the cost variable (Yotopoulos and Nugent, 1976), and it can be formulated into:

$$\pi = P_y . Y - \sum_{i=1}^{n} PxiXi \qquad (2)$$

In a case of physical relation between the productionfactors and production, the productionfunction of Cobb Douglas is used, and described as follows:

$$Y = AX_i^{\alpha i + \beta iXi} e^{\gamma iXi} \qquad (3)$$

It requires that $\beta_i = \gamma_i = 0$ and the elasticity of production for the variable α_i , if $\gamma_i = 0$. Thus, the profit equation will be:

$$\pi = P_y . (AX_i^{\alpha i}) - \sum_{i=1}^{n} PxiXi \qquad (4)$$

Based on an assumption of perfectly competitive market, either the market for production factors or the market of production, meaning that the cost of the production factors and the production for each farmer is constant, to maximize the profit, the equation (4) is derived in condition of $d\pi/dX = 0$. Thus, on the first order, to maximize the option of input use (Moscardi and de Janvry:1977) is:

$$Pyfi \frac{E(Y)}{Xi} = \frac{Pxi}{1 - \theta K(S)} . \qquad (5)$$

Note:

- $E(Y)$ = *expected* production(μ_y = *average* production)
- θ = Variant coefficient of production ($\theta = \delta_Y/\mu_Y$) whereδ_Y = deviation standard of production and μ_Y = average production
- Py = Price of the product
- f_i = production elasticity of input of -i (elasticity of the most significant and has biggest contribution)
- X_i = Number of input -i (the most significant input and contributes most to each respondent)
- Px_i = The price of input -i (the most significant input and contributes most to each respondent)
- $K(S)$ = The parameter measurement of relactance to the risk, *S* is a variable representing the farmers' characteristics.

Assuming that the model is right in depicting the process of decision making on farmers, farmers' reluctance to risks, the parameter of $K(S)$can be calculated from the production level and the input observed in the equation (6) as follows:

$$K(S) = \frac{1}{\theta}(1 - \frac{PxiXi}{Pyfi\mu y}) \qquad (6)$$

Equation (6) provides a gauge to calculate the risks $K(S)$which is then derived for each farmer in the productionfunction, coefficient of production variation, production and cost factors, and the level of the input use in question (Olarinde *et al.*, 2007).

Furthermore, Moscardi and de Janvry (1977) formulates the parameter of risks rejection $K(S)$which is used to classify the farmers into three groups, i.e.:

- Taking the risks (*risk lover*) – low risks ($0 < K(S) < 0.4$)
- Taking a neutral position (*risk neutral*) – medium risks ($0.4 \leq K(S) \leq 1.2$)
- Rejecting the risks (*risk averter*) –high risks ($1.2 < K(S) < 2.0$)

E. HIPOTHESIS

Itishypothesized that the farmers tend to avoid the risk (*risk averter*). The factorsinfluencing negative effect to the behavior or the parameter of $K(S)$are farm size, the farmers' age, their education, their farm experience, number of their family's dependants, income of potato farm, other incomes, potato variety (Granola), the seed origin (certified), the farm pattern (independence), and terracing technology (permanent). Meanwhile, the level of pest disease attack, the sloping level of the land, the productivity risk, and the income risk positively impose their behavior to the risk.

F. RESEARCH METHOD

The basic method applied in this research is a descriptive analysismethod. The location of the research was purposively chosen in the region of Banjarnegara regency, since the regency is one of the production centers of potatoes of Granola and Atlantic varieties in Central Java. Then three districts were selected purposively, i.e. Batur,

Pejawaran and Wanayasa as the production center of the potatoes.

Among the farmers in the districts, the sampling frame is used to screen the relevant samples, by selecting the farmers who cultivate the two varieties of potatoes in the recent year (three cropping seasons). This gave 110 farmers (Batur), 68 (Pejawaran) and 92 farmers (Wanayasa). Among the 270 farmers selected based on the sampling frame,they were then refined using the Slovin formula in Consuelo (1993). It resulted in 151 farmers. Each district was sampled proportionally, by taking 60% of the whole population. The data types collected in the study are primary and secondary data. The data were collected through observation, and interview using questionnaire.

To answer the hypothesis that the farmers tend to avoid the risk. To test the hypothesis, it is used the model approach of production function of Cobb Douglas which is analyzed with OLS. It is then obtained the most significant and most contributing production factors (*standarddized coefficiant beta*), the formula used is the input as stated by Moscardi and de Janvry (1977) and Olarinde *et al* (2007), that is:

$$K(S) = \frac{1}{\theta}(1 - \frac{PxiXi}{Pyfi\mu y}) \qquad (7)$$

The parameter of risk refusal *K(S)* is used to classify the farmers into three groups, those are: (1) *risk lover*- low risks (0 <*K(S)*<0.4); (2) *risk neutral*-medium risk (0.4 ≤*K(S)*≤ 1.2); *risk averter*-high risks (1.2 <*K(S)*< 2.0)

Meanwhile the hypothesis saying that the factorsinfluencing effect to the farmers' behavior include cropping area, the farmers' age, their education, their farm experience, number of their family's dependants, income of potato farm, other incomes, Granola variety, certified seed, the farm pattern (independence), terracing technology (permanent), the pest disease attack, the sloping level of the land, the productivity risk, and the income risk. To test it, it is used a regression analysis model below:

$$K(S) = \alpha_0 L\_TANAM^{\alpha 1} U\_PETANI^{\alpha 2} PENDK^{\alpha 3} P\_USTAN^{\alpha 4} JMLTGKLG^{\alpha 5} PENDUSTAN^{\alpha 6} PENDLUSTAN^{\alpha 7} SRNG\_HPT^{\alpha 8} KMR\_LHN^{\alpha 9} RISPROD^{\alpha 10} RISPEND^{\alpha 11} D\_VAR^{d1} D\_ASBNH^{d2} D\_POLUT^{d3} D\_TTERAS^{d4} \qquad (8)$$

In ln, it can be formulated as follows:

$$\ln K(S) = \ln\alpha_0 + \alpha_1 \ln L\_TANAM + \alpha_2 \ln U\_PETANI + \alpha_3 \ln PENDK + \alpha_4 \ln P\_USTAN + \alpha_5 \ln JMLTGKLG + \alpha_6 \ln PENDUSTAN + \alpha_7 \ln PENDLUSTAN + \alpha_8 \ln SRNG\_HPT + \alpha_9 \ln KMR\_LHN + \alpha_{10} \ln RISPROD + \alpha_{11} \ln RISPEND + d_1 D\_VAR + d_2 D\_ASBNH + d_3 D\_POLUT + d_4 D\_TTERAS \qquad (9)$$

The hypothesis of the model is:

$H_0 : \alpha_i = 0$ It means that there is no effect of i[tch] independent variable to the dependent variable (risk averting).

$Ha : \alpha_i \neq 0$ It means that there is an effect of i[tch] independent variable to the dependent variable (risk averting).

G. FINDINGS AND DISCUSSION

In all season, the percentage of farmers who avoid the risk (*risk averter*) of the Atlantic variety is more than that of Granolavariety. In general, the farmers in all season tends to avoid the risk (*risk averter*) with the most at third cropping season (dry-rainy) (79,167 percent of Granola and 83,636 percent of Atlantic); first cropping season (rainy) (72,917 percent of Granola and 76,363 percent of Atlantic); and at the second season (dry) (55,208 percent of Granola and 72,727 percent of Atlantic). Aanalyzed in three seasons (in a year), farmers cultivate Granola variety and many of them (69,097 %) avoid the risk and the 77,576 percent of Atlantic variety farmers are the risk averter.

The avoidance behavior among the farm farmers is generally realized by taking the certified seed, expecting for a high productivity, applying more organic and phonska fertilizers to satisfy the NPK needs. This is done to reduce the risk of the fertility decrease because of the erosion and the land sloping. Besides, they also water the plants daily in the drought and control the pest diseases regularly to avoid the pest disease attack.

The factors of farm size, the education of farmers, and other incomes influence to decrease the farmers' avoidance to the risk, meanwhile the level of pest disease attack and productivity risks influence to increase the farmers' avoidance to the risk. The farmers planting Atlantic variety avoid the risk more than those of Granola variety. The farmers applying an impermanent terracing avoid the risk more than those of permanent terracing.

H. CONCLUSION AND ITS POLICY IMPLICATION

1. Conclusion

Most potato farmers in the research field tend to be *risk averter*. The percentage of risk averters among the farmers cultivating the Atlanticvarietyis more than those among the farmers of Granola

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variety. The factors influencing the farmers' avoidance to the risk are the level of pest disease attack and the productivity risk. Meanwhile, the farm size, the education of farmers and other incomes reduce the farmers' avoidance to the risk, meaning influencing farmer's preference to the risk.

2. Policy Implication

The development of potato farmin the research location can be done by cultivating the Granolavariety. The percentage of risk averter among the Atlantic variety is more than those among the Granola variety farmers. This is due to the lower income given by the Atlantic than that of Granola. The farmers do not choose the Atlantic because it only promises lower income. Thus, the farmers are suggested to cultivate the potato of Granola variety.

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