

The effects of dairy cattle ownership and farmers' demography factors on the evacuation moving farmers' behavior at Merapi volcano area (case study at Kaliadem Sub Village, Yogyakarta, Indonesia)

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ABSTRACT: A survey on 60 respondents taken by purposive random sampling was conducted to determine the effects of dairy cattle ownership and the farmers' demography factors on the farmer's decision whether to do evacuation moving or not, and to explore the feedback of the farmers around the Merapi volcano area relating with the operational planning expected by the farmers to face the disaster of Merapi volcano activities. Logit model and descriptive analysis were used. The value of McFadden (R^2) was 0.25, meaning that 25.1 % of the variance of dependent variable (decision) was affected by the variance of independent variables (dairy ownership, land ownership, length of stay, age, education and location distance to evacuation lane) and 74.9% was affected by variables not included in the study. The only variable affecting the farmer's decision whether to do evacuation moving or not was dairy cattle ownership. The negative coefficient of logit showed that farmers with higher dairy cattle ownership tended not to do evacuation moving. The farmers made three suggestions relating with the evacuation moving of their dairy cattle to face the disaster caused Merapi volcano activities, i. e. 1) the government builds animal housing in the area of evacuation with good conditions including proper structure of housing to give security, comfortable condition and enough water supply for the animals during the period of evacuation, 2) the government should grant the farmers with security and feed supply during the evacuation, and 3) the government temporarily buys the animals at the market price. The government was expected to give serious attention on the farmers suggestions for formulating the steps of strategy to anticipate the disaster of Merapi volcano activities, especially to minimize the human victim and to make the dairy farming sustains.

Key words: dairy cattle, evacuation, Merapi volcano, disaster

INTRODUCTION

Phenomena of Merapi volcano, with the type of Strato volcano, is interesting to study. The number of human victim, caused by Merapi hot cloud and lava eruption, had been 3000-5000 people since 1672 (Simkin and Siebert, 1994 in Anonymous, 2006). The last eruption, in 2006, caused thousand people to do evacuation moving to avoid hot cloud disaster. According to data from Bakornas, there were 5,621 people who were evacuated from hot cloud area in May 16th 2006 (Anonymous, 2008). The refugees came from districts of Turi (1,017 people), Pakem (2,679 people) and Cangkringan (1,925 people). Based on the data from Office of Agricultural Services, there were 2,242 dairy cows threatened by Merapi hot cloud, most located at Kepuharjo Village, especially at Kaliadem Sub Village (Anonymous, 2006).

Facing this uncertainty situation, both local and central governments should have and execute programs to minimize the number of victim (human and animals) as well as property loss. Until now, there was no any program planning created using bottom-up approach, whether for medium or long term periods. There was only governmental incidentally program, with top-down approach, to face the Merapi volcano disaster. Practically, the constraint has been the difficulty of evacuating the farmers around the disaster area.

Human behavior is affected by some internally and externally factors including individual and environmental characteristics. There are three assumptions regarding with human behavior: 1) people doing things using their rationality, 2) people consider all of information they have and 3) people consider the implication of what they have done (Azwar, 2005). Relating with the farmers' behavior

in the Merapi volcano area to do evacuation moving or not, it is hypothesized that internal and external factors affect farmers' behavior significantly.

The aims of the study were 1) to determine the effect of dairy cattle and agricultural land ownership, length of stay in Merapi volcano area, age, education and the distance from the farmers' home to the evacuation lane on the farmers' behavior to do evacuation moving, and 2) to explore the farmers' feedback on the operational planning to cope with Merapi volcano disaster.

MATERIALS AND METHODS

Sixty farmers living at Kaliadem Sub Village in the Merapi volcano area, the prone area of disaster, were taken in purposive random sampling (Singarimbun and Effendi, 1995) as respondents. Kaliadem Sub Village was a area with the highest dairy cattle population, nearest to the peak of Merapi volcano (classified in Grade 3 disaster area (Anonymous, 2007). They lived at this area before May 2006 and they had the experience facing the disaster of Merapi volcano eruption. They also had been looking after their dairy cattle the time eruption happened in May 2006.

Descriptive analysis was used to discuss the actual problems faced by the farmers in the area of Merapi volcano. To analyze the effects of dairy cattle ownership and farmer demography factors on farmers' behavior regarding withevacuation moving, logit model was used with the tools of EVIEWS. Arif (1993) stated that logit model was formulated in probability form. The equation model of logit was as follow:

$$Li = \ln(P_i / (1 - P_i)) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + U_i$$

where

$Li = \ln(P_i / (1 - P_i))$: Farmers' decision whether to do evacuation moving (1) or not (0)
β_0	: Constant
$\beta_1, \beta_2, \dots, \beta_6$: Coefficient of regression
X_1	: Ownership of dairy cattle, head
X_2	: Agriculture land ownership, m ²
X_3	: Length of stay in Merapi volcano area, yr
X_4	: Age, yr
X_5	: Education, year
X_6	: Distance from the farmers' home to the evacuation lane, m
U_i	: Error

RESULTS AND DISCUSSION

Table 1 showed that McFadden R-Squared was 0.25, meaning that 25.1% of dependent variance variable (Y) was affected by the variance of independent variables (X's), and 74.9% was affected by variables which were not included in the model. Variable X_1 affected ($P < 0.10$) the decision whether to do evacuation or not (Table 1.). It means that the variable of dairy cattle ownership affected the farmers' decision to do evacuation or not. The negative coefficient of logit showed that farmers with higher dairy cattle ownership tended not to do evacuation moving.

Table 2 showed that the value of exponent of variable X_1 was 0.085879475. This value indicated that the increase of 1 dairy cattle ownership caused the farmer's decision tended not to do evacuation moving by 8%. It could be explained that there were some technically constraints relating with the area for evacuating cattle. Condition of animal housing was not proper. The farmers found difficulties looking for feed. According the farmers, relocating their dairy cattle to the evacuation area caused inefficient livestock management. The farmers also worried about the decrease of milk production, as the cows were under stress. This conditions were supported by the theory of planned behavior that the aspect of behavior control was determined by the experience and the farmer's individually estimation relating with the level of difficulties to do evacuation moving (Ajzen, 1998).

Table 1. Logit analysis for the effects of dairy cattle ownership and farmers demography factors on farmers' behavior

Variable	Coefficient	Std. Errors	z-Statistic	Probability
C	- 2.698464	4.023521	- 0.670672	0.5024
X ₁	- 0.554624	0.331367	- 1.673742	0.0942
X ₂	- 1.42E-05	7.56E-05	- 0.188074	0.8508
X ₃	0.005785	0.092679	0.062418	0.9502
X ₄	0.112781	0.124147	0.908443	0.3636
X ₅	0.480616	0.322919	1.488348	0.1367
X ₆	0.002403	0.003928	0.611608	0.5408

McFadden R-Squared = 0.251315

Table 2. Exponential function

Variable	Coefficient	Exponential
C	- 1.08158	1.169813133
X ₁	- 2.93E-01	0.085879475
X ₂	- 1.86E-05	3.4596E-10
X ₃	0.003441	1.18405E-05
X ₄	0.056498	0.003192024
X ₅	0.239227	0.057229558
X ₆	0.001201	1.4424E-06

Dairy cattle were the main source of the farmers' income which was very important in daily life of farmers, so that keeping the dairy cattle was their priority for their security. Most farmers (90%) tried to maintain their dairy cattle in any condition including in disaster condition. Some farmers (8.33%) had planned to sell their dairy cattle as long as the price set by the government was the market price (Table 3.). However, the farmers did not want to sell all of their dairy cattle. They still maintained and kept some of their dairy cattle although the activity of Merapi volcano increased any time. The government and other related institution should understand these phenomena, so that they could make strategic planning that was accepted by the farmers.

Table 3. Farmers' opinions as feedback on Government's program of evacuation moving

Opinion	Respondents, %
The Government should build the animal housing in a good condition	41,67
The Government should guarantee the security of the animals and assists to provide the feed during disaster	48,33
The Government buys livestock in market price	8,33
Abstein (do not have an opinion)	1,67

CONCLUSIONS

Based on the results and discussion of the research, it could be concluded that dairy cattle ownership affected the farmer's decision making whether to do evacuation moving or not. Farmers with higher number of dairy cattle owned, tended not do do evacuation moving. There were no any farmers' demography factors affecting the farmer's decision making whether to do evacuation moving or not.

Based on the farmers' opinions, it is suggested that 1) the government build animal housing in the area of evacuation in a good condition, with secure structure, comfortable, and enough water supply for the animals during the period of evacuation, 2) the government grants the security and the availability of feed for animals during evacuation, and 3) the government temporarily buy the animals at the market price.

The government should pay more attention for any suggestions given by the farmers living at Merapi volcano area in formulating the strategy facing disaster of Merapi volcano activities, especially to minimize the human victim and to sustain the dairy cattle farming.

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