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Analyzing Factors Affecting Farmers' Decisions in Applying Organic Vegetable Farming

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Abstract. Farming with organic systems is one of the important efforts to support sustainable agriculture. The purpose of this study is to determine the factors that influence farmers to decide to implement organic vegetable farming. This research was conducted in June 2018 until September 2018 in Selongisor Hamlet, Batur Village, Getasan Subdistrict, Semarang Regency. Taking this research was conducted on a non-probability sampling with purposive sampling technique with the required criteria, namely respondents who cultivated in multicultural/intercropping. Samples taken were 60 samples consisting of 30 samples for each system both organic and inorganic. The research analysis used logistic regression, where the independent variables analyzed included age, education level, farm area, farm income, cosmopolitan farmers. The results showed the influence of land area, farmer's income and cosmopolitan farmer's decision making in cultivating organic vegetables.

Keywords: batur viilage, farmers' decision, logistic regression, organic, vegetable farming

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1. Introduction

The Indonesian Agricultural sector consists of three sub-sectors, the plantation crop sub-sector, food crops and horticulture crops. The development of horticulture crops has increased annually, either in the production and harvest areas, ranked as third largest after food crops, and plantations [1].

The use of synthetic fertilizers and pesticides may occupy farmers' needs for plants which are more productive and fast complete pests-free. However, the production system has significant pressure on resources and it is also harmful to health. There are problems of conventional farming such as, high operating costs, land degradation, pest control. For a long period, the farmers were in a state of dependence on agricultural industrial products, then after the farmers realized and found out the negative impact of the dependence, the farmers began to get out of

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the situation. In addition, the consumers of agricultural products begin to understand the importance of the negative impact of "chemical farming" on human health. A lot of negative

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effects that have been caused by chemical farming so that it pushed the farmers to change their farming pattern into organic farming. Said (2001) [2].

The farmer's adoption towards agricultural technology is highly determined by the need for technology and the suitability of technology with biophysical and socio-cultural conditions. The new technological innovations should be adapted to site-specific conditions. Adoption is a decision to fully use new ideas as the best way to take an act. Decision innovation is a mental process, ever since a person knew the innovation to make its decision whether to accept or refuse until it being confirmed [3].

In the decision making process, it is not particularly determined by farmers, yet it is also influenced by outside factors from the farmer and the nature of the innovation itself. [4] said that education, social environment, and environment have a significant effect on farmers' decisions [5].

Selongisor is located on the slopes of Mount Merbabu, where agriculture is the prime profession. Based on the observation, most people farming conventionally, besides some people currently starting to go organic. Therefore, the researcher tried to scrutiny the factors that influence the process of adopting farmers' innovation in applying organic vegetables.

2. Material and Methods

This research was conducted on June 2018 – September 2018, in *Dusun* Selongisor, *Desa* Batur, Sub-district of Getasan, district of Semarang which selected purposively. The sample was taken by non-probability sampling and purposive sampling with multicultured/intercropping respondent as the needed criteria. The samples taken were 60 consisting of 30 samples for each system both either organic or inorganic.

The factors of the analysis technique that affecting the farmers' decision making towards the application of organic farming is logistic regression. This method is used to measure the function between one dependent variable (Y) which is dichotomous (only has two possible values) with independent variables (X) of the quantitative and qualitative types [6]. According to [7] logistic regression is derived based on the cumulative logistic opportunity function with the regression model used in this study arranged in the following equation:

$$Li = In\left(\frac{Pi}{1-Pi}\right) = \beta_o + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon_i \quad (1)$$

where:

Y_i 1 = If farmers apply organic farming

0 = If farmers do not apply organic farming

β : Parameter of the Xi variable

X_1 : Age

X_2 : Level of education

X_3 : Area of farming

X_4 : Farm income level

X_5 : Cosmopolitan farmers

B_0 : Constants

Ɛ : Other variables or error-term

3. Results and Discussion

3.1. Overview of Respondents

In this study, there are 60 respondents whom are consisting of 30 organic farmers and 30 inorganic farmers who were taken from Selongisor, Batur. The respondents have different characteristics based on their age, education level, land area, and cosmopolitan. An overview of the respondent characteristics is described in Table 1.

According to Table 1, the average respondents of organic farmers and inorganic farmers do not have any specific differences age. Nevertheless, the age of inorganic farmers are relatively above than 55 years old. It is suggests that organic vegetables farmers are relatively younger than inorganic farmers. The phenomenon of low-educated farmers is found in this study where the average education level of respondents is elementary school. Whereas, based on the land area, the respondents of organic farmers have land ownership with an average area of 1850 m^2. On the other side, the inorganic farmers have land ownership with an average area of 1420 m^2. Meanwhile cosmopolitan organic farmers have higher cosmopolitan rather than inorganic farmers. It shows that organic vegetable farmers have a curiosity level about agricultural innovations or new things and other sources for cultivation from agricultural experts. Overall, the respondent characters reflects that the quality of human resources for agriculture is still low, it is seen from the old age, low education, and small land ownership rather than the quality of organic farmers.

Table 1. Respondent Characteristics

Characteristics	Frequency (persons)		Percentage	
	Organic	**Inorganic**	**Organic**	**Inorganic**
Age (year)				
26 – 35	2	4	6.1%	13.3%
36 – 46	10	7	33.3%	23.3%
46 – 55	11	8	36.7%	26.7%
>55	7	11	23.3%	36.7%
Total	**30**	**30**	**100 %**	**100%**
Age Average	**51.3**	**53.2**		
Level of Education				
No School	0	3	0%	10.0%
Elementary School	23	23	80.0%	76.7%
Junior High School	3	4	10.0%	13.3%

Table 1. Continued

Characteristics	Frequency (persons)		Percentage	
	Organic	**Inorganic**	**Organic**	**Inorganic**
High School	2	0	6.7%	0%
S1,S2,S3	1	0	3.3%	0%
Total	**30**	**30**	**100 %**	**100%**
Education Average	**SD**	**SD**		
Land Area (m^2)				
<500	0	1	0%	3.3%
500 – 1500	15	20	50.0%	66.7%
1600 – 2500	12	4	40.0%	13.3%
2600 – 3500	2	3	6.7%	10.0%
>3500	1	2	3.3%	6.7%
Total	**30**	**30**	**100 %**	**100%**
Land Area Average	**1706.6**	**1500**		
Farm Income				
< 10.000.000	5	3	16.7%	10.0%
10,000,001 – 30,000,000	10	16	33.3%	53.3%
30,000,001 - 50,000,000	7	8	23.3%	26.7%
50,000,0001 – 70.000.000	5	1	16.7%	3.3%
>70.000.000	3	2	10.0%	6.7%
Total	**30**	**30**	**100 %**	**100%**
Average of farm income IDR/Ha	**36,461,860**	**28,719,173**		
Cosmopolitan				
Very low	0	0	0%	0%
Low	0	1	0%	3.3%
Medium	1	16	3.3%	53.3%
High	19	13	63.3%	43.3%
Very High	10	0	33.3%	0%
Total	**30**	**30**	**100%**	**100%**
Cosmopolitan average	**39.13**	**29.46**		

Source: Primary data processed (2018)

3.2. Costs and Business Income of Organic and Inorganic Vegetables

Table 2 explains that the comparison of organic and inorganic vegetables from the use of fixed costs and variable costs

Table 2. Comparison of Organic and Inorganic Vegetable Farming Costs

No	Description of cost proportion	Unit	Organic		Inorganic	
			Total	**%**	**Total**	**%**
A	**Fixed Cost**					
1	Land Tax	IDR/Ha	595.318	2,09	779.246	2,38
2	Equipment cost	IDR/Ha	1.139.676	4,0	1.201.039	3,67
B	**Variable Costs**					
1	Seeds	IDR/Ha	3.806.529	13,38	3.389.580	10,38
2	Fertilizer	IDR/Ha	**8.241.900**	28,77	**8.419.637**	25,79
	Manure	IDR/Ha	7.580.217		7.154.414	
	Urea	IDR/Ha	-		275.675	
	Phonska	IDR/Ha	-		823.099	

Table 2. Continued

No	Description of cost proportion	Unit	Organic		Inorganic	
			Total	%	Total	%
	SP-36	IDR/Ha	-		20.833	
	ZA	IDR/Ha	-		97.005	
	NPK	IDR/Ha	-		48.611	
	Power	IDR/Ha	661.682		-	
3	Pesticide	IDR/Ha	**409.121**	1,43	**1.041.787**	3,19
	Liquid chemical pesticides	IDR/Ha	-		885.954	
	Solid chemical pesticides	IDR/Ha	-		155.833	
	Cp	IDR/Ha	342.454		-	
	Bengkoang Seeds	IDR/Ha	66.667		-	
4	Worker Fees	IDR/Ha	14.252.417	50,10	17.812.639	54,56
	Total cost	**IDR/Ha**	**28.444.961**	**100**	**32.643.927**	**100**
	Reception	**IDR/Ha**	**64.906.822**		**61.363.101**	
	Income	**IDR/Ha**	**36.416.860**		**28.719.173**	

Source: Primary data processed (2018)

From the data in table 2, it can be concluded that inorganic agriculture has different agricultural costs, organic farming is lower than inorganic vegetable farming. This happens because the costs incurred are higher as in the prevention of pests and diseases. While for the income of organic vegetable farmers an average of Rp. 28,719,173. It can be concluded that organic farming gets higher income from inorganic vegetable farming. This happens because the market provides different vegetable prices, the selling price of organic vegetables is more expensive than inorganic vegetables. Table 3 describes the comparison of R/C ratio of organic and inorganic vegetables farming in one season with a land area of 1 Ha.

Table 3. R/C Ratio of organic and inorganic vegetable farming

Farming Costs	Organic Vegetable Farming	Inorganic Vegetable Farming
Total Receipt (IDR/Ha)	64,906,822	61,363,101
Total Cost (IDR/Ha)	28,444,961	32,643,927
R/C ratio	**2.28**	**1.87**

Source: Primary data processed (2018)

Based on the value, the R / C ratio of total organic vegetable farming is 2.28 in which every IDR 1,000from the total cost incurred by the organic vegetable farmers, will give a receipt around IDR. 2,280 and then it will be obtained R/C organic vegetable farming in the value of 1.87 in which every IDR. 1,000 incurred by organic farmer will give a receipt around IDR.1.870. Based on the R/C ratio, both vegetable farms in Selongisor, Batur are already efficient as the result of the farming is (R/C > 1) which means that is feasible to run.

3.3. Model and Parameter Estimation Results

Table 4 is the result of the logistic regression model analysis from several determinants factors on applying organic vegetable farming.

Table 4. Logistics Regression Decision Determinants of Farmer Applying Organic Farming

No.	Variable	Coefficient	W	Significance	Odds Value Ratio
1.	Age (X1)	-0.005	0.012	0.913	0.995
2.	Education (X2)	1.163	0.528	0.467	3.200
3.	Land Area (X3)	0.001	3.002	0.083*	1.001
4.	Farm Income(X4)	0.000	1.100	0.294	1.000
5.	Cosmopolitan Farmer(X5)	0.652	13.766	0.000**	1.360
	Constants	-27.691	9.917	0.002	

**Significant at α 5%, *Significant at α 10%
Source: Primary Data processed (2018)

$$\ln\left(\frac{p}{1-p)}\right) = -27.691 - 0.005X_1 + 1.163X_2 + 0.001X_3 + 0.000X_4 + 0.652X_5$$

3.4. Interpretation Results

a. Age

Age variable is not significant towards farmers' decision making because the age variable has a P value of 0.913. This is in line with [8]. This study explains that the age of farmers does not affect the decision to choose the salak marketing channel. According to [5] it explains that the age of farmers does not significantly influence the decision making of farmers in cultivating organic vegetables. It is known that the age of farmers based on the characteristics is old, where organic and inorganic farmers do not have any specific gap, organic vegetable farmers are in the age group of 46 to 55 years intervals, while inorganic vegetable farmers are in the age group of intervals> 55 years [9] proposes that the younger farmers usually tend to have more enthusiasm to discover something new. Thus, they quickly try to adopt innovation even though they are still inexperienced in terms of adopting the innovation.

b. Education

Variable education does not significantly influence farmers' decision making because the education variable has *p-value of* 0.467. This is also in line with the research conducted by [10]. This study reveals that education does not significantly affect the productivity results cabbage. This research is also in line with [11] research which reveals that education does not significantly influence the decisions of hybrid corn farming farmers. The average education of farmers in this study is primary school either both farming organic vegetables and organic vegetable farming, so that education does not influence farmers decision, it is because formal education do not teach cultivating skills. Therefore education does not influence the decision making of cultivating organic vegetables. According to [12]. Formal education is an activity that is systematic, multilevel/ tiered, starting from elementary school up to tertiary institutions which including to academic oriented study activity.

c. Land area

Variabel land area significantly influence decision making for variable land area farmers have *p-value* 0.083 or has a value smaller than the value of α (0.1). This is not in line with previous research according to [4], the area of farming land is not significant with farmers 'decision making in organic vegetable cultivation. However it is in line with [5] which reveals that significant land area variables affecting farmers' decision making in applying organic vegetable farmin. This variable has a positive coefficient value and shows the value of the *odds ratio* of 1.001 which means that the opportunity ratio of farmers who own land is increasingly broadly applying organic farming 1.001 times higher, compared to farmers who are not applying organic farming. The land area average owned by organic vegetable farmer is wider than organic farmers. According to [13], the size of agricultural land is identified as a factor that influences farmers' decisions to convert to agriculture and become an obstacle to try more efficiently while according to [14], the actual level of efficiency lies in the application of technology. Because in a narrower land area, the application of technology tends to be less efficient.

d. Income

The farm income variable does not significantly influence farmers' decision making because the land area variable has a *p-value of* 0,294. This result is not in line with previous research, which according to Saleh (2016) that the farm income significantly influences the taking of the needs of farmers cultivating vegetables. However, this result is in line with [15] which reveals that farming income does not significantly affect farmers in making decisions to cultivate long bean vegetables. The income for organic vegetable farmers has a greater income than inorganic vegetable farmers but if it is tested by t income test, the both farmers do not have a real difference. According to [9] the higher the level of income usually the faster the adoption of innovation High farm income often has to do with the level of diffusion of agricultural innovation. The willingness to conduct experiments or changes in the rapid diffusion of agricultural innovations in accordance with the conditions of agriculture owned by farmers, generally this will lead to higher farmer incomes

e. Cosmopolitan

Cosmopolitan variables of farmers significantly influence farmer decision making because the cosmopolitan variables of farmers have *p-value* 0.000 or has a smaller value than the value of α (0,05). This is in line with Efendy's research (2010) which states that cosmopolitan has a significant influence on farmers' decision making adoption of technological innovations in rice cultivation in South Sumatra. The coefficient value from this variable is positive and shows the *odds ratio* of 1,136, which means that the farmer's opportunity ratio that has a high cosmopolitan level has the opportunity to take the need for cultivation as low as 1.136 times higher than, farmers who have low cosmopolitan. According to [16]. a person who has a high

cosmopolitan is relatively open to innovation and with their ability to see the needs and problems of a social system that is unknown to social members who are less outwardly oriented.

4. Conclusion

From the results of the analysis, the factors that influence the farmers decision in the application of organic vegetable farming are as follows:

1. Land Area (X3) has a significant effect and positive coefficient. It has an understanding that the wider the land owned by farmers, the more likely farmers have the opportunity to choose on applying organic vegetables.
2. Cosmopolitan farmers (X5) have a significant effect on farmers' decision making in applying organic vegetable farming and have a positive coefficient value so that the higher curiosity level of farmers or the frequency of farmers in learning vegetable cultivation, the farmers are more likely have the opportunity to apply organic vegetable farming.
3. Age (X1), Education (X2), and Income (X4) are not affecting farmers in making decision in applying organic vegetable farming.

REFERENCES

[1] Ministry of Agriculture of the Republic of Indonesia, "*Buletin PDB Sektor Pertanian Tahun 2015*," Agricultural Data Center and Information System, Secretariat General of the Ministry of Agriculture, Jakarta, 2015.

[2] G. E. Said, *Manajemen Agribisnis*. Jakarta: Ghalia Indonesia, 2001.

[3] T. Suprapto and Fahrianoor, *Komunikasi Penyuluhan dalam Teori dan Praktek*. Yogyakarta: Arti Bumi Intaran, 2004.

[4] L. W, Susanti, "Faktor-Faktor yang mempengaruhi pengambilan keputusan petani dalam penerapan pertanian padi organik di Desa Sukorejo Kecamatan Sambirejo Kabupaten Sragen," [Thesis], Universitas Negeri Surakarta, 2008.

[5] I. Saleh, "Faktor-faktor yang mempengaruhi pengambilan keputusan petani dalam penerapan sayuran organik," Thesis, Universitas Muhamaddiyah Yogyakarta, 2016.

[6] I. Ghozali, *Aplikasi Analisis Multivariate dengan Program SPSS*. Edition 12. Semarang: Universitas Diponegoro, 2007.

[7] B. Juanda, *Metodologi Penelitian Ekonomi dan Bisnis*. Bogor: IPB Press, 2009,

[8] J. Harahap, Sriyoto dan E. Yuliarti, "Faktor faktor yang mempengaruhi pengambilan keputusan petani salak dalam memilih saluran pemasaran," *AGRISEP*, vol. 17, no. 1, pp. 95-106, March 2018

[9] Soekartawi, *Agroindustri Dalam Perspektif Sosial Ekonomi*. Jakarta: Raja Grafindo Persada, 2005.

[10] M. Lama and S. J. Kune, "Faktor-faktor yang mempengaruhi produksi usaha tani sayur sawi di Kelurahan Bensone Kecamatan Kota Kefamenanu Kabupaten Timor Tengah Utara," *AGRIMOR*, vol. 1, no. 2, pp. 27-29, 2016.

[11] G. Ginanjar, S. A. Andayani, and Dinar, "Analisis faktor faktor yang mempengaruhi pengambilan keputusan petani melakukan usahatani jagung hibrida (Zea mays L.) (Suatu Kasus di Blok Pancurendang Tonggoh Kelurahan Babakan Jawa Kecamatan Majalengka Kabupaten Majalengka)," *AGRIVET*, vol. 5, no. 2, Dec. 2017.

[12] Aida, *Ilmu Pendidikan.* Semarang: Putra Sanjaya, 2005.

[13] A. A. Shaban, "Factors influencing farmers' decision to shift to organic farming: The case of Gaza Strip," *British Journal of Economics, Management & Trade*, vol. 5, no. 1, pp. 78-87, 2014.

[14] M. Daniel, *Pengantar Ekonom Pertanian.* Jakarta: Bumi aksara, 2004.

[15] N. Santika, A. Suwandari, and T. Agustina, "Faktor-faktor yang mempengaruhi pengambilan keputusan untuk melakukan usahatani kacang panjang di Desa Andongsari Kecamatan Ambulu Kabupaten Jember (Studi kasus kemitraan usahatani benih kacang panjang dengan PT. Benih Citra Asia, PT. Bisi, dan PT. Matahari)," *Berkala Ilmiah PERTANIAN*, vol. x, no. x, June 2014.

[16] E. M. Rogers. *Diffusion of Innovations*. London: The Free Press, 2003.