Journal of Economics and Sustainable Development
ISSN 2222-1700 (Paper) ISSN 2222-2855 (Online)
Vol.5, No.10, 2014

The Analysis of Application, Knowledge and Perception Rates of Farmers about Organic Vegetable Farming in Samarinda City
(Case Study at North Samarinda Subdistrict, East Kalimantan)

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Abstract

The objectives of research are: (1) to identify the application rate of organic vegetable farming in Samarinda City, and (2) to understand the knowledge and perception rates of farmers in Samarinda City about organic vegetable farming.

Research is conducted in North Samarinda Subdistrict, Samarinda City, from April to June of 2013. Method of research is survey and sampling technique is simple random sampling. Result of research indicates that (1) the application of organic vegetable farming in Samarinda City is divided into four categories, which are: conventional category for very low application rate, knowing-organic category for low application rate, interest-in-organic category for moderate application rate, and toward-organic category for high application rate; and (2) in average, farmers have moderate knowledge rate about the application of organic vegetable farming. Also, in average, farmers have good perception about or agree for the application of organic vegetable farming in Samarinda City.
Keywords: vegetable, application, organic, knowledge, perception

1. Introduction

Samarinda City is a prominent economic center in East Kalimantan region with strategic position and standing for any industries, including goods and services trading, and also with environmental friendly residence. As an urban region, its development policy strategy is focused more on the development of urban where the land use pattern always follows the pattern of population distribution. The increasing population rate every year may also increase the food consumption rate in Samarinda City. Therefore, in favor of agriculture development, the government of Samarinda City applies optimization strategy for agriculture resources through intensification of agriculture resources. Intensification technology which relies greatly on the application of agrochemical material in the agriculture has forced farmers to be the target of agrochemical intake and high dependence on the outsider. Environmental impact due to the use of chemicals in agriculture also pushes forward sustainable agriculture technology. Such agriculture must qualify requirements such as ecologically mature, economically sustainable, equitable, humane, and flexible (Reijntjes, et al, 2006). One interpretation of this agriculture into agriculture system may take form as organic agriculture (Mutiarawati, 2006). Organic agriculture is a term that is consistent to the environmental friendliness and producing healthy food. It is highly expected that environmental impact due to the use of chemicals in agriculture field may be avoided (Sutanto, 2002). Organic farmers only use non-synthetic product for organic production. It may warrant the care for environment and also offer food and fiber free from usual chemicals usually used in the commercial food production (Giovannucci, 2007; Wright, et al, 2012). Therefore, organic agriculture can be said as the base for agriculture result production, the base for animal breeding, and the base for natural ecology balance (Rosenow, et al, 1996).

The population in Samarinda City has varied background. However, mostly are the migrant who work for mining and service sectors. This background may precede the familiarity of the people of Samarinda City with organic agriculture output such as vegetable, or their willingness to pay expensive cost for health, safety, and environmental friendliness of the food product. This opportunity is welcomed by the market actor to supply organic products in the modern market. However, organic producer is not widely recognized in Samarinda City and therefore, the supply of organic product in Samarinda City is still dominated from outside producer.

Mixed background of the actor of organic agriculture also brings along difernt motive and interest. Economic orientation mostly understates the aspect of environmental protection (Suwantoro, 2008). Therefore, the application of organic agriculture depends greatly on local knowledge of farmers

(Sutanto, 2002). The knowledge and perception rates of farmers must be needed to maintain the principles of organic agriculture such as health, ecology, equitable and protection, and also to apply these principles into agriculture. Knowledge or cognitive is always a very important domain for behavior (Notoatmodjo, 2003) and in parallel with the attitude toward the acceptable science, knowledge or information (Sulistyono, et al, 2008). Perception is a process when a person realizes something in the environment through the use of senses. Knowledge of environment may be acquired by interpreting data of senses (Kartono and Gulo, 1987; 343).

Organic agriculture which is easiest to apply and measure among farmers includes the use of organic fertilizer, the use of local variety seed, the control of pest and disease using organic pesticide, and the separation of land, and also water source for organic agriculture from conventional agriculture (Sutanto, 2002).

The objectives of research are: (1) to identify the application rate of organic vegetable farming in Samarinda City, and (2) to understand the knowledge and perception rates of farmers in Samarinda City about organic vegetable farming.

2. Method of research

Location of research is determined "*purposively*" by considering that the location of research is an agriculture center in Samarinda City. Duration of research for primary data collection is 3 months, from April 2013 to June 2013.

The allocation of sampling is using *simple random sampling* as sampling technique. Following is the equation of this sampling:

$$n = \frac{N}{N.d^2 + 1} = \frac{171}{171 \text{ x } 0.1^2 + 1} = 63$$

where:
n = the number of total sample
N = the number of total population
d = the determined precision for 10 %

Data are collected with field study. It means that data are acquired directly by observation and by taking the data from research object. To understand the knowledge rate of farmers, the perception rate of farmers and the application rate of organic agriculture, it is then the author giving questions to be answered by respondents. Different score is given for every answer. Highest score is five and lowest score is one. Score from each respondent is summed to determine the category. According to Suparman (1990), class interval is determined as following:

$$C = \frac{Xn - Xi}{K}$$

where:
C = Class Interval
K = Number of Class
Xn = Maximum Score
Xi = Minimum Score

Result of this calculation is used to determine the category of knowledge rate, the perception rate of farmers, and the organic application rate as shown in the Table 1.

Table 1. Measurement scale of the application, knowledge, and perception of organic farming

Research Objectives	Scoring				
	(1)	(2)	(3)	(4)	(5)
1. To identify the application rate of farmers for organic agriculture system.	Never	Once	Sometimes	Often	Always
2. To identify the knowledge rate of farmers about organic agriculture system.	Very Not Familiar	Less Familiar	Rather Familiar	Familiar	Very Familiar
3. To identify the perception rate of farmers about organic agriculture system.	Not Know	Disagree	Less Agree	Agree	Very Agree
Knowledge, perception, and application rates	Very low	Low	Moderate	High	Very High
Application category	Convent	Tor	Minor	Major	Organic

The income from organic vegetable farming is using mathematic equation as following:

$$I = P_y . Y - (r_1x_1 + r_2x_2 + r_3x_3 + wx_4 + Z_2)$$

where:
I = farming income (Rp)
X_1 = land rent rate, etc.
X_2 = seed cost (Rp)
X_3 = nutrition and pesticide costs (Rp)
X_4 = the expended worker wage (HOK)
r_1 = ith input price (Rp)
W = worker wage (Rp)

The comparison between organic and non-organic vegetable farming income is made by One-Way Analysis of Variance. The proposed hypothesis is as following:

H0 : $\mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_5$
H1 : minimally, two averages are different.

Note:
μ_1 = the average of conventional vegetable farming income.
μ_2 = the average of vegetable farming income in the application category of know-organic.
μ_3 = the average of vegetable farming income in the application category of interest-in-organic.
μ_4 = the average of vegetable farming income in the application category of toward-organic.
μ_5 = the average of vegetable farming income in the application category of pure-organic.

3. Result and discussion

3.1 The identification of application rate of organic vegetable farming

The identification of application rate of farmers in Samarinda City involves five application rates which are then converted into five categories of organic application. These categories are conventional category for very low application rate, knowing-organic category for low application rate, interest-in-organic category for moderate application rate, and toward-organic category for high application rate. The percentage of farmers in any application rates is shown in Table 2.

Organic application rate by farmers as indicated in Table 2 can be explained as following: 30.16 % farmers apply conventional vegetable farming; 26.98 % farmers apply conventional vegetable farming but with knowledge about the application of organic vegetable farming; 30.16 % farmers apply conventional vegetable farming but with interest in the application of organic vegetable farming; 12.7 % apply conventional vegetable farming but manage toward the application of organic vegetable farming. Indeed, no farmers have actually applied organic vegetable farming.

Table 2. Total of application of organic farming indicators in samarinda city

Variables and indicators	Frequency (%)				
	Never (1)	Once (2)	Sometimes (3)	Often (4)	Always (5)
1. Organic seeds	27.8	17.46	22.22	16.67	15.87
2. Conversion of organic land	50.79	28.57	20.63	0	0
3. The use of water source	18.25	5.55	20.63	8.73	46.82
4. Maintenance of soil fertility	24.12	17.14	20.95	15.87	21.90
5. Control over pest, disease and weed	40.87	24.20	22.02	9.32	3.57
6. Treatment of harvest and post-harvest	95.23	3.17	1.58	0	0
Average frequency	42.84	16.01	18.01	8.43	14.69
Rate total	20-35	36-51	52.67	68-83	84-100
Frequency	30.16	26.98	30.16	12.70	0.00
Application rate	Very low	Low	Moderate	High	Very high
Application category	Convent	Tor	Minor	Major	Organic

Note:
Convent : Conventional
TOR : Know-Organic
MINOR : Interest-in-Organic
MAJOR : Toward-Organic
ORGANIC : Pure Organic
*Source : Result of Primary Data Processing

Organic application rate by farmers as indicated in Table 2 can be explained as following: 30.16 % farmers apply conventional vegetable farming; 26.98 % farmers apply conventional vegetable farming but with knowledge about the application of organic vegetable farming; 30.16 % farmers apply conventional vegetable farming but with interest in the application of organic vegetable farming; 12.7 % apply conventional vegetable farming but manage toward the application of organic vegetable farming. Indeed, no farmers have actually applied organic vegetable farming.
The absence of respondent farmers who have applied pure-organic vegetable farming may be caused by trend that farmers only know about and agree with organic farming but they do not understand about techniques of organic farming. Unavailability of market for organic farming harvest is a main reason why the farmers hesitate themselves from applying pure-organic farming. The limited land and resource have forced farmers to do farming to supply vegetable to conventional market. Local official has contributed the land to be the trial land for organic vegetable farming, but farmers cannot cultivate it well because they still cannot share the time and effort because the location is far away from the location they cultivate daily.
Respondent farmers analyze this situation based on the information they can obtain and their experience. They expect that the application of organic farming can reduce their dependence on chemical. Farmers know that the use of chemicals for land cultivation is harmful because the fertility of land deteriorates greatly. Bigger fertilization dose is needed to catch with the declined fertility, thus increasing the expense of fertilizer purchase.

Table 3. Vegetable farming income

No.	Items	Vegetable farming	
		0.04 ha	1 ha
1	Variable costs:		
	• Worker	882,539.68	22,063,492.06
	• Seed	34,794.27	869,856.75
	• Fertilizer	200,079.37	5,001,984.13
	• Pesticide	20,031.75	500,793.65
	• Herbicide	51,571.43	1,289,285.71
2	• Total cost	1,189,016.49	29,725,412.30
	• Production (kg)	593.17	14,829.26
	• Price (rp/kg)	4,476.92	4,476.92
3	• Revenue	2,655,573.53	66,389,338.23
	• Income (5-4)	1,466,557.04	36,663,925.93

Source: Result of primary data processing
Table 3 indicates that organic vegetable farming, either cultivated in the self-owned land or in the rented land, has given positive net income for the farmer family. It is the outcome of factors such as the input of self-owned land used for farming, the household worker used for farming, and the farmer management or the farmer as manager. The average production price is Rp. 4,476.92 per kilogram where the price of a production unit is relatively higher. The production rate is still low with 14,829.26 kilograms per hectare, but it can be compensated with relatively higher price of production unit. Therefore, net income average is 36,663,925.93 per hectare per planting season.

The Analysis of R/C Ratio against Total Cost in research location has found:

R/C = 66,389,338.23 / 29,725,412.30 = 2.23

The Average of R/C Ratio against Total Cost is 2.23 meaning that every Rp 1.00 of the expended cost will produce income of Rp. 2.23, or in other words, the price is profitable. The income per hectare of vegetable farming in conventional, know-organic, interest-in-organic and toward-organic categories is shown in Table 4.

Table 4. The average of farmer income (rp / ha) from organic vegetable

Organic agriculture type	Mean (average)
Conventional	7.9629×10^6
Know-organic	2.5254×10^6
Interest-in-organic	2.1288×10^7
Toward-organic	7.1960×10^7

Source: Result of Primary Data Processing

Table 4 reveals that the income of toward-organic vegetable farmers is higher than that of conventional, know-organic, and interest-in-organic vegetable farmers. It is because toward-organic vegetable farmers in their production have combined the use of organic fertilizer, the appropriate control against the disturbing organism, and the precise technology innovation which gives relatively higher production. Organic agriculture has guarantee better soil quality and local ecosystem, which is then increasing the production and income of farmers.

The use of chemical pesticide is hardly avoided because such pesticide is needed to maintain good harvest. Although farmers know that pesticide may be harmful for health, they still worry if the reduction of pesticide will allow the pest and disease in the neighbor land to occupy their land. Therefore, they assume that if organic farming is applied simultaneously, risk of failed harvest may be collectively incurred.

Organic agriculture is the specific-context adaptation that still goes on and also representing the practical complex conducted by local actors. It is closely related to trial-error process by organic farmers and consumers. It also reflects the result of invention and innovation (Kummer et al, 2010). Final decision made by farmers to use new practice, including organic agriculture system, is the product of their knowledge about the practice and their perception (Asssis and Ismail, 2011). Singha (2012) and Abdullah and Samah (2013) have shown that education has positive and significant correlation with the adoption of technology. Current research also is aligned with Effendy et al (2013) who say that education has positive, but not significant, correlation with the adoption of side-joint technology in cacao plant in Sigi District, Indonesia.

3.2 The identification of farmers' knowledge rate in samarinda city

Farmers' knowledge rate about organic vegetable farming in Samarinda City is divided into three groups of knowledge such as knowledge rate of farmers about organic farming, knowledge rate of farmers about the principles and benefits of organic farming, and knowledge rate of farmers about method or technique of organic farming.

Table 5. Total of farmers' knowledge about organic vegetable farming

Type of knowledge	Frequency (%)				
	Very not familiar (1)	Less familiar (2)	Rather familiar (3)	Familiar (4)	Very familiar (5)
1. Organic vegetable farming	0.35	2.64	9.35	76.54	11.11
2. The principles and benefits of organic vegetable farming	0.158	25.87	13.65	54.6	5.71
3. The technique of organic vegetable farming	4.60	26.66	22.70	22.70	11.58
Average frequency (%)	1.70	18.39	15.23	55.18	9.46
Score total	29-51	52-74	75-97	98-120	121-145
Frequency (%)	0	3.17	38.10	50.70	7.94
Knowledge category	Very low	Low	Moderate	High	Very high

Source: Result of Primary Data Processing

Tabel 5 showed in total, farmers' knowledge about organic farming is explained as following: 7.94 % farmers have very high knowledge rate, 50.79 % farmers have high knowledge rate, 38.1 % farmers have moderate knowledge rate, and 3.17 % farmers have low knowledge rate. Therefore, no farmers are really with very low knowledge rate.

It is asserted then that in average, farmers have high knowledge rate about organic vegetable farming.

Result of research in Iran indicates that the age and the access to information about agriculture and

environment are two important variables with positive and direct impact on organic knowledge. Other variables such as social norms of organic agriculture including health attitude, nutrient attitude and general attitude on environment, may have weak but direct effect on knowledge about organic agriculture (Saedi et al, 2011). Therefore, knowledge of farmers about organic agriculture, especially that about the use of chemical-based insecticide, herbicide and fertilizer, needs to be improved because farmers still show negative attitude and high dependence on conventional practice (the use of chemicals) in dealing with pest and disease (Assis and Ismail, 2011; Oeysola and Obabire, 2011).

The increase of farmers' knowledge about organic vegetable farming is evident because the information about it now can be accessed from mass media, electronic media, or even from friends, families and counselors. The Official of Agriculture, Forestry and Plantation of Samarinda City has developed programs to support the application of organic farming. Some comparative study programs have been carried out to the regions where organic farming programs haven been successfully implemented. The sending of employee staffs and farmer group representatives into training about organic farming is also helpful to improve the knowledge rate about organic farming.

3.3 The identification of farmers' perception in samarinda city

The identification of the perception rate of farmers in Samarinda City about organic vegetable farming is also grouped into five categories, which are (1) not know, (2) disagree, (3) less agree, (4) agree, and (5) very agree.

In total, the perception of farmers about the application of organic vegetable farming in Samarinda City is shown in Table 4 and can be explained as following: 9.25 % farmers say very agree, 58.73 farmers respond with agree, 11.11 % farmers show less agree, 17.46 % farmers are disagree, and 3.17 % farmers say not know.

Table 6. The frequency of the perception rate of farmers in samarinda city

Type of Perception	Frequency (%)				
	Not know (1)	Disagree (2)	Less agree (3)	Agree (4)	Very agree (5)
1. Farmers' perception about the principles and benefit of organic vegetable farming	7.61	13.65	6.82	62.06	9.84
2. Farmers' perception about the technique of organic vegetable farming	10.47	9.04	11.42	62.53	6.34
Average frequency (%)	9.04	11.34	13.48	62.29	8.09
Score total	20-35	36-51	52-67	68-83	84-100
Frequency (%)	3.17	17.46	11.11	58.73	9.52
Perception category	Not know	Disagree	Less agree	Agree	Very agree

It can be said that in average, farmers do not agree with the application of organic vegetable farming in Samarinda City. It is evident because farmers know about the benefits of organic application either for themselves, for others, or for environment.

Farmers with great access to information about organic agriculture tend to have good perception about organic agriculture than those with less access to information about organic agriculture. Besides, farmers with high knowledge about organic agriculture tend to have good perception about organic agriculture than those with less knowledge about organic agriculture (Assis and Ismail, 2011).

Respondent farmers start to understand that sale rate of organic farming harvest is higher than conventional farming. It shall increase their income. However, unavailability of market for organic farming harvest has forced farmers to only agree with the concept of organic farming. Farmers know that their consumers in traditional market still prefer for conventional vegetable which is cheaper than expensive organic vegetable. It can be said then that the understanding about the importance of organic application is not only needed for producer level, which farmers, but also meaningful for the community as the consumer. It shall be opportunity for the government and other stakeholder to act as the bridge for farmers as the producer and the community as the consumer.

4. Conclusions and suggestions

4.1 Conclusions

1. The identification of farming in Samarinda City is dividend into four application rates, which are: conventional category for very low application rate, knowing-organic category for low application rate, interest-in-organic category for moderate application rate, and toward-organic category for high application rate.
2. In average, farmers have moderate knowledge rate in the application of organic vegetable farming. It is because information about organic agriculture can be accessed in research location, either by mass media, electronic media or information from family friend, and counselor. In average, farmers have good perception or agree with the application of organic vegetable farming in Samarinda City because mainly, farmers have already acknowledged the benefits of organic agriculture, either for themselves, other, or their environment.

4.2 Suggestions

1. The application rate of organic vegetable farming in Samarinda City has not yet achieved the category of genuine organic application but it has potential to reach this category. Therefore, the enthusiasm toward this category shall be kept by giving knowledge about organic food either for farmers or community.
2. The specific organization must be founded as the partner for farmers to monitor farmers during the application of organic agriculture and as the connecting bridge between farmers as producer and community as consumer.
3. Government plays important role in enforcing the application of organic vegetable farming in Samarinda City either by making policy related to this issue or by providing structure and infrastructure.

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