Analysis on the Application, Production, and Earnings of the Organic Farming in Samarinda (A Case Study at the Subdistrict of North Samarinda, East Kalimantan)

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ABSTRACT

Objectives of this research were: (1) to identify the application level of the organic vegetable farming in Samarinda, (2) to analyze the effect of organic farming application on productivity and earnings of the farmers. This research was conducted at the Subdistrict of North Samarinda in Samarinda from April – June 2013. Method of the research used survey and simple random sampling. Results of the research showed that (1) 30.16% of the farmers have still applied a conventional farming or very little organic application level, 26.98% of the farmers have recognized the organic products but low application level, 30.16% of the farmers have been interested in organic products but in medium application level, and 12.70% of the farmers have been more concerned with the organic products that lead to high application level, (2) the application level of organic farming have provided significant influence on production and earnings of the farmers. Farmers who have been more concerned with the organic vegetables farming have shown higher production and earnings in comparison with the conventional farming, recognizing the organic, and being interested in organic products.

INTRODUCTION

Samarinda lies in a strategic position and location for industrial activities, trading of goods and services, as well as housings as one of the most important regional economy center in East Kalimantan. The rapid growth of population is accompanied with the increasing demand for foods in Samarinda. However, as urban area, strategy of the developmental policy has been more focused on urban development, such as land use pattern that following the population distribution pattern. Therefore, the Municipality of Samarinda has still applied the strategy of agricultural resources optimization through agricultural resources intensification to develop the agricultural aspects. The intensification technology, which relies on the applied agrichemical materials in agriculture, has made the farmers to be the target of agrichemical intake and depends on the outsiders. However, the emergence of environmental problems in relation to the chemicals use in farming have promoted the development of continuous farming technology that can be translated by the implementation of various farming systems, such as organic farming, which is hospitable to environment and produces healthy foods, therefore the problem that concerning with the environmental impact due to the chemicals can be avoided [8,6,11]. The organic farmers have only applied non-synthetic products for organic products, which could guarantee the concern with the environment and offer healthy foods and fibers free chemicals that are used to be applied in commercial foods [4,12]. Therefore, the organic farming is considered as the base of farming yield, base of animal husbandry, and base for natural-ecological equilibrium [9].

Population in Samarinda who come from various background of origin create an opportunity for the market of organic farming products, due to they are newcomers who have already known the organic farming products, such as vegetables, and they are willing to pay higher for healthy, safe, and environmental hospitable products. Such opportunity is directly accepted by the market agents where the organic products are easily found in modern markets. However, due to the organic producers in Samarinda have not well-known, so that the supplies of organic products in Samarinda have been still dominated by producers out of Samarinda. Therefore,
identification on the organic farming application is required, particularly that concerns with vegetables. The most easiest and measurable organic farming applications among the farmers include: the application of organic fertilizer, the application of local variety seeds, controlling pests and diseases using organic pesticide, as well as land separation and irrigation water source for the organic farming from the conventional farming [11].

Method of the research:
Location of the research was determined “purposively” by considering location of the research as agricultural center in Samarinda. During the research, the primary data has been collected for 3 months, from April 2013 to June 2013. Allocation of the sample determination of this research used a simple random sampling method, by the equation as follows:

\[
n = \frac{N}{N.d^2 + 1} = \frac{171}{171 \times 0.1^2 + 1} = 63
\]

In which:
- \(n\) = number of the whole samples;
- \(N\) = number of the whole population;
- \(d\) = determined precision, 10%

Data collection was done through study in the field, in which the data was collected directly by observing and collecting data on object of the research. In order to find out the application level of organic farming, the researcher applied scoring method by asking some questions to the respondents with different score for each available answer. The highest score is five and the lowest is one. Scores for each respondent will be counted up to determine the category of each objective of the research. In accordance with Suparman (1990), class interval can be determined as follows:

\[C = \frac{Xn - Xi}{K}\]

In which :
- \(C\) = Class Interval
- \(K\) = Number of Class
- \(Xn\) = Maximum Score
- \(Xi\) = Minimum Score

Result of the calculation will be used to determine category of the organic application, as described in Table 1.

<table>
<thead>
<tr>
<th>No.</th>
<th>Variable Concept and Indicator Variable</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Never (1)</td>
</tr>
<tr>
<td>1</td>
<td>SEEDS : The seeds are obtained from local superior varieties or superior varieties as a result of crossbred, not the genetic engineering, which is grown by organic culturing technique or grown using organic culturing technique for two generations or more</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>DURATION OF CONVERSION : Land of the ex-conventional farming, the conversion has been done by managing the land using organic fertilizer and avoiding the application of synthetic chemical fertilizer for (\geq 2) years</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>WATER SOURCES: Water source from the spring, which is distributed through channels that do not pass through the regions of conventional farming or water source from reservoir which is believed not contaminated an inorganic material</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>MAINTAINING SOIL FERTILITY · Planting leguminose, green manure of planting rotation. · Activating compost, adding microorganism or other plant-based materials. · Using biodynamic of the stable manures compost or plant compost for biological activities of the soil. · Using organic material or other permitted materials, such as; drugs Natural herbs (except nihii and rotenon), natural vitamin, homoeophatic drugs, by-products of industrial organic feeds, organic feeds and organic</td>
<td></td>
</tr>
</tbody>
</table>
CONTROLLING PESTS, DISEASES, WEEDS

By:

- Selecting the appropriate variety or species
- Rotation program
- Cultivating the soil mechanically
- Applying natural enemies including releasing products and parasite
- Mechanic control (traps, blocks, light and sound)
- Without using synthetic ZPT and organism or product of genetic engineering, and no chemical pesticide
- Using other suggested materials, such as: natural herbs (except nimb, rotenon), natural vitamin, homeopathic drugs, by-products of industrial organic feeds, organic feeds and organic grazing land.

MANAGING HARVEST AND POST HARVEST

- The harvest yield will be collected in planting area and it is guaranteed not to be mixed with the yield of conventional vegetables and stored in a separate room/storage and attached by label that relates to the origin
- Transporting/distributing the organic products using container, and specific transportation means with guaranteed sanitary.

Success of the farmers in managing farm has been reflected on the achievable result (productivity), so that it will bring about such satisfying result, which will support and motivate better farming activities. As the description given before, productivity has been measured using two approaches, partial productivity (yield per hectare) and total productivity of production factor that uses the index number of TFP (total factor productivity) transitive.

Partial Productivity:

In order to compare the partial productivity (production per hectare; vegetable farming, which applies various organic farming, has used One-way Analysis of Variance by the hypothesis as follows:

\[ H_0: \mu_1 = \mu_2 = \mu_3 = \mu_4 \]

\[ H_1: \text{At least there are two different averages} \]

Notes:

- \( \mu_1 \) = average productivity of conventional farming
- \( \mu_2 \) = average productivity of farming that relates to recognition in organic application
- \( \mu_3 \) = average productivity of farming that relates to interest in organic application
- \( \mu_4 \) = average productivity of farming that relates to concern with organic application

Criteria to reject or accept \( H_0 \) that based on \( P-value \) is as follows: If \( P-value < \alpha \), so that \( H_0 \) is rejected. If \( P-value > \alpha \), so that \( H_0 \) is accepted.

Moreover, in order to examine which average is different, the Post Hoc Multiple Comparison test of Bonferroni and Scheffe was used. Such testing was done using SPSS 18.0 program.

Total Factor Productivity:

In comparing total productivity of the production factor, data of quantitative analysis and local input-output prices were used as comparative base in relating to vegetable farming, which applied the conventional farming. In an empirical TFP study, formula that is frequently used to compare total factor productivity (OFK) is Fisher’s index using TFP/IP Version 1.0 Program. Meanwhile, formula to measure Fisher’s index, is as follows:

<table>
<thead>
<tr>
<th>Total Score</th>
<th>Application Level</th>
<th>Application Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 – 35</td>
<td>Very low</td>
<td>Convetional</td>
</tr>
<tr>
<td>36 – 51</td>
<td>Low</td>
<td>Recognize the organic</td>
</tr>
<tr>
<td>52 – 67</td>
<td>Medium</td>
<td>Interested in organic</td>
</tr>
<tr>
<td>68 – 83</td>
<td>High</td>
<td>More concerned with Organic</td>
</tr>
<tr>
<td>84 – 100</td>
<td>Very high</td>
<td>Pure Organic</td>
</tr>
</tbody>
</table>

Measuring the Productivity:

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\[ TFP_{st} = \frac{\text{output index}_{st}(\text{Fisher})}{\text{input index}_{st}(\text{Fisher})} \] (4.5)

Output index_{st}(\text{Fisher}) = Q^F_{st}(\text{quantity Output index}) = \sqrt{Q^L_{st}xQ^P_{st}}

\[ Q^L_{st} = \frac{\sum_{i=1}^{N} p_{is}q_{is}}{\sum_{i=1}^{N} p_{is}q_{is}}, \quad Q^P_{st} = \frac{\sum_{i=1}^{N} p_{is}q_{is}}{\sum_{i=1}^{N} p_{is}q_{is}} \] (4.6)

In which:

\( Q^F_{st} \) = Quantity Output Index (Fisher)

\( Q^L_{st} \) = Quantity Output Index (Laspeyres)

\( Q^P_{st} \) = Quantity Output Index (Paasche)

\( p_{is} \) = Output price at the-\( i \)

\( q_{is} \) = number of output at the-\( i \)

\( i \) = number of output (\( i = 1,..,N \))

\( s \) = conventional farming application

\( t \) = organic farming application

Input index_{st}(\text{Fisher}) = Q^F_{st}(\text{quantity Input index}) = \sqrt{Q^L_{st}xQ^P_{st}}

\[ Q^L_{st} = \frac{\sum_{i=1}^{N} p_{is}q_{is}}{\sum_{i=1}^{N} p_{is}q_{is}}, \quad Q^P_{st} = \frac{\sum_{i=1}^{N} p_{is}q_{is}}{\sum_{i=1}^{N} p_{is}q_{is}} \] (4.7)

In which:

\( Q^F_{st} \) = Quantity Output Index (Fisher)

\( Q^L_{st} \) = Quantity Output Index (Laspeyres)

\( Q^P_{st} \) = Quantity Output Index (Paasche)

\( p_{is} \) = Output price at the-\( i \)

\( q_{is} \) = number of output at the-\( i \)

\( i \) = number of output (\( i = 1,..,N \))

\( s \) = conventional farming application

\( t \) = organic farming application

Measuring the Earnings:

In order to obtain earnings from the organic farming, the mathematic equation is given as follow :

\[ I = P_{yr}. \ Y - (r_1X_1 + r_2X_2 + r_3X_3 + wx_4 + Z_2) \]

In which:

\( I \) = earnings from farming (Rp)

\( X_1 \) = land rent value etc.

\( X_2 \) = seed cost (Rp)

\( X_3 \) = nutrient and pesticide costs (Rp)

\( X_4 \) = Wages for the employed laborers outside the family (HOK)

\( r_1 \) = input price at the-\( i \) (Rp)

\( w \) = wages for the laborers (Rp)

Moreover, in order to compare earnings of organic farming and non-organic farming, the One-way Analysis of Variance was used by the hypothesis as follows :
H₀: \( \mu_1 = \mu_2 = \mu_3 = \mu_4 \)
H₁: At least there are two different averages

Notes:
- \( \mu_1 \) = average earnings of conventional farming
- \( \mu_2 \) = average earnings of farming that relates to recognition in organic application
- \( \mu_3 \) = average earnings of farming that relates to interest in organic application
- \( \mu_4 \) = average earnings of farming that relates to concern with organic application
- \( \mu_5 \) = average earnings of farming that relates to pure organic application

Due to most of the respondents in location of the research make a living in farming, therefore analysis on earnings contribution has only gained from vegetable commodity.

RESULT AND DISCUSSIONS

Identification of the Organic Farming Application Level in Samarinda:

Identification of the farming application in Samarinda is divided into five (5) levels, which is conversed into five (5) categories of organic application, such as: lower application level for the conventional category, and then followed by low application level for category of recognizing the organics, medium level for interested in organics, high application level for more concerned with the organics, and higher application level for pure organics. However, percentage of the farmers for those application levels is presented in Table 2 as follows:

The existence of specific market for the organic products has also the main reason of the farmers for being not applied the pure organic farming. They prefer providing the crop products for the conventional market in order to avoid any economic risks due to restricted cultivation land and resources to supply the crop products for both organic and conventional markets. However, the organic farming application has potential to be improved that based on information they get as well as their own experiences, the farmers could analyze that by applying the organic farming, they would diminish their dependency on chemicals. They know that the chemicals use would inflict great losses and reduce soil fertility, so that higher dosages of fertilizers would be applied and, of course, it would have great impact on their expenses to buy the fertilizers.

The effect of organic farming application on productivity and earnings of the farmers:

1. The effect of organic farming application on productivity:

1.1 Partial Productivity:

In measuring the productivity aspect, this research used 2 (two) approaches, such as partial productivity and total factor productivity by using TFP index. Productivity per hectare for the conventional, recognizing the organic, interested in organic, and more concerned with organic, are presented in Table 3.
Table 3: Mean of Productivity (ton/ha) of Organic Vegetables after being transformed by Natural Logarithm.

<table>
<thead>
<tr>
<th>Type of Organic Farming</th>
<th>Mean</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional</td>
<td>2.2664</td>
<td>a</td>
</tr>
<tr>
<td>Recognize the Organic</td>
<td>2.4543</td>
<td>ab</td>
</tr>
<tr>
<td>Interested in Organic</td>
<td>2.6846</td>
<td>ab</td>
</tr>
<tr>
<td>More Concerned with Organic</td>
<td>3.1838</td>
<td>b</td>
</tr>
</tbody>
</table>

Source: Result of the Primary Data Processing

Notes:

The same letter shows insignificant difference, based on Post Hoc Multiple Comparison Scheffe test at the level $\alpha = 5\%$.

Table 3 shows that the vegetable productivities have insignificant differences for the conventional, recognize the organic, and interested in organic. However, the productivities have significant differences for the conventional and more concerned with the organic, but they show insignificant differences for recognize the organic, interested in organic, and concerned in organic. In general, productivity, which is more concerned with organic farming, is higher than productivity of the conventional, recognize the organic, and interested in organic. This is due to the organic farming is considered unprofitable in a short-term. As the organic farming, with the same technology and lower fertilizer treatment would bring about less optimal yield than the conventional breeding. But, if the organic fertilizer application and pest/weed controls are well-combined, as well as appropriate technological innovation, they will be able to provide relative comparable yield. Certainly, long-term organic farming has guaranteed better quality of soil and local ecosystem, which will be able to increase crops production.

1.2 Total Factor Productivity:

In comparing total factor productivity among types of the organic farming, mean of quantity data and prices of input-output conventional farming is used as a comparative base. PFT index values as a result of measurement were obtained using TFPIP V 1.0 program as presented in Table 4.

Table 4: Mean for Index of Quantity on Output, Input and PFT.

<table>
<thead>
<tr>
<th>Farming System</th>
<th>Index of Quantity</th>
<th>Index of PFT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Output</td>
<td>Input</td>
</tr>
<tr>
<td>Conventional</td>
<td>1.000</td>
<td>1.000</td>
</tr>
<tr>
<td>Recognize the Organic</td>
<td>0.763</td>
<td>0.834</td>
</tr>
<tr>
<td>Interested in Organic</td>
<td>1.427</td>
<td>1.118</td>
</tr>
<tr>
<td>More concerned with Organic</td>
<td>4.313</td>
<td>1.732</td>
</tr>
</tbody>
</table>

Source: Result of the Primary Data Processing

Table 4 shows that mean for quantity index of input and output has increased for all categories of organic farming application. This is due to vegetables are vulnerable to pests and diseases, so that more inputs are used. PFT index has also increased, application that more concerned with organic farming has higher PFT index in comparison with the conventional, recognize the organic, and interested in the organic. This is due to the application that concerned with the organic, application of the organic indicator is more intense to be done even has not come to the pure organic stage. For instance, more organic fertilizers have been used than the chemical fertilizers, the use of pesticides has been reduced both dosage and frequency of the application. As well as the use of herbicide in preparing the field, it is only applied if the farmers face any obstacle that concerning with time and energy to cultivate the field. However, soil cultivation is more frequently applied even though it may accelerate the growth of weeds. Actually, the farmers have applied the organic farming, even though they did not realize at first, they have just done it due to high costs of workforces and availability of herbicides.

2 The effect of organic farming application on earnings of the farmers:

Measuring the earnings was done on private farming and farming-land rent because land status could differentiate revenue/earnings of the farmers. For private farming, the field is an input factor that belongs to the family and gains the revenue from farming yield, in which it is part of the net earnings of the farmer’s family. For land rent, the field has become the outer input factor that requires the expended costs, so that land rent is the expended costs, which reduce net earnings of the farmer’s family. Result of the analysis on the farmer’s earnings from the vegetable farming is presented in Table 5.

Table 5: Earnings of the Vegetable Farming

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Vegetable Farming per hectare</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Variable Cost:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Workforces</td>
<td>22,063,492.06</td>
</tr>
<tr>
<td></td>
<td>Seeds</td>
<td>869,856.75</td>
</tr>
<tr>
<td></td>
<td>Fertilizers</td>
<td>5,001,984.13</td>
</tr>
<tr>
<td></td>
<td>Pesticide</td>
<td>500,793.65</td>
</tr>
</tbody>
</table>
Table 5 shows that earnings from vegetable farming has offered positive net earnings as revenue on input factor of private farming, which is used for farm operations, the obtainable laborers of the household are devoted to farm operations, and managerial factor of the farmer, which means that the farmer is the manager. The average production price is Rp 4,476.92 per kilogram, in which the unit price of production is relatively high. Even the amount of production is low, 14,829.26 kilogram per hectare, but it can be handled by relative high unit price of the production, so that it will provide average net earnings 36,663,925.93 per hectare per planting season.

Ratio analysis of R/C for total cost at the research site was 2.23, which meant that for each expended cost, Rp 1.00, the revenue was 2.23, which meant profitable. Earnings per hectare for the conventional farming, recognizing the organic, interested in organic, and more concerned with organic, are presented in Table 6.

Table 6: Mean Earnings of the Farmer (Rp/ha) in Organic Vegetable.

<table>
<thead>
<tr>
<th>Type of Organic Farming</th>
<th>Mean Earning (Rp/Ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional</td>
<td>13,147.856</td>
</tr>
<tr>
<td>Recognize the Organic</td>
<td>14,787.978</td>
</tr>
<tr>
<td>Interested in Organic</td>
<td>33,524.463</td>
</tr>
<tr>
<td>More concerned with Organic</td>
<td>86,401.635</td>
</tr>
</tbody>
</table>

Source: Result of the Primary Data Processing.

Table 6 shows that earnings of the farmers for conventional, recognizing the organic, and interested in organic, have insignificant difference. Earnings of the farmers that applied conventional, recognizing the organic, and interested in organic, have significant difference with earnings of the farmers who have more concerned with the organic farming. In general, earnings of the farmers, who are more concerned with the organic farming, are higher than the farmers who have applied conventional, recognizing the organic, and interested in organic. This is due to farming, which is more concerned with organic during the production process, have combined the application of organic fertilizer, controlling pest and disease, as well as effective and efficient innovation of technology will be able to provide higher yields. Organic farming has guaranteed better quality for the soil and local ecosystem, which of course, will be able to increase production and earnings of the farmers.

The use of chemical pesticide is difficult to be avoided for reason maintaining the harvest yield. Even they know that the use of pesticides might harm their health, they worry that by reducing the pesticide, however, pests or diseases from the neighboring fields might transfer and infect to their fields. Therefore, they assume that if such farming application can be done simultaneously, the risk of great loss could be handled together.

Conclusion and suggestion:

Conclusion:

The application of farm operations in Samarinda is divided into four application categories, such as: conventional category for lower application, recognize the organic for low application, interested in organic for medium application, and more concerned with organic for high application. On average, the respondents are included in categories of conventional and interested in organic, but they are potential to be more concerned with the organic farming.

The organic farming application has significant effect on productivity and earnings of the farmers. Farmers who are more concerned with the organic farming application, have higher productivities and earnings in comparison with the farmers who apply conventional, recognize the organic, and interested in organic.

Organic farming is an adaptation of specific-context and practice complexes, which are done by the local actors. This relates to trial-error process and-by the organic farmers and the consumer, and this is the result of invention and innovation [5]. Final decisions made by the farmers to apply the new practices, such as organic farming system, are usually the result of their knowledge that concern with practices and their perceptions [2]. Research by Singha [10] and Abdullah and Samah [1] suggested that education has positive and significant correlation with the adoption of technology. This research has gone along with research by Effendy, et al. (2013), which suggested that education has positive but insignificant correlation with the adoption of side-grafting technology in cocoa farming at Sigi Regency – Indonesia.
Suggestion:
1. Spirit in applying the organic farming in Samarinda should be maintained in order to achieve the category of pure organic farming application. Besides that, training and information about organic farming should be improved to disseminate knowledge that concern with organic foods to the farmers and the public.
2. An institution should be established as partner and assistant of the farmers, particularly in applying the organic farming and acting as a bridge between the farmers as producer and the public as consumer.
3. The role of government is required in initiating the application of organic farming in Samarinda, which is not only in establishing policy, but also in providing means and infrastructures.

REFERENCES