ECONOMIC ANALYSIS OF LEADING VEGETABLE FARMING IN KEDIRI DISTRICT, EAST JAVA

ANALISIS EKONOMI USAHATANI SAYURAN UNGGULAN DI KABUPATEN KEDIRI, JAWA TIMUR

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ABSTRACT

The facts show that vegetable sector produces provide more income and employment than cereal and staple crops sectors. This paper attempts to provide economic analyses of leading vegetable farming in Kediri, East Java. Kediri is one of potential production areas for vegetables. Secondary data were collected from Agricultural District Service of Kediri in 2011. Five vegetables: chili peppers (big and small), eggplant, yard-long bean, and tomato, which were considered leading commodities in the region, were selected for these analyses. A factor share approach, which is commonly used for economic analysis of farming system, was employed in this study. Other financial analytical approaches were also used to alternate selection criteria. As a deterministic approach, sensitivity analysis was conducted to determine the profitability of each vegetable commodity. The results show that, chili and tomato are more labor intensive, at which suitable for regions with abundance of rural labor. Each vegetable has positive profit, and thus recommended grow vegetables to increase households’ income. Big-chili is superior in terms of absolute profit, and it is recommended that big-chili can be used as main crop. In terms of R/C ratio and factor share, eggplant is superior, it is recommended that eggplant can be used as alternative crop. Small-chili and tomato can be interchangeable, since it is not recommended to grow the same family of crops sequentially. Yard-long bean is recommended only for intercrop.

Keywords: economic analysis, leading vegetables, factor share, Kediri – East Java

INTRODUCTION

In Indonesia the agricultural sector is undergoing transformation, with changes in the contribution of the different sub-sectors occurring. High value agricultural products are defined here as products that are typically perishable, that are of specific high-value, and that are sold through specialized markets (CGIAR, 2004). They can include vegetables.

Indonesia is coping with food and nutrition security in terms of household hunger and malnutrition. While hunger remains closely associated with poverty, malnutrition affects both the poor and richer populations through lack or excessive intake of an imbalanced diet.
The facts show that vegetable sector produces provide more income and employment than cereal and staple crops sectors (Weinberger and Lumpkin, 2007). The importance of vegetables in Indonesia has grown both for domestic consumption and in exports to some extents. It is also true that many of the regions are low and middle-income ones, with large, often poor rural populations, with large numbers of marginal and small-scale farmers, as well as landless households.

Diversification into vegetables could benefit these poor farmers and landless laborers by increasing both production and employment (Mariyono and Bhattarai, 2010). It could benefit the rural and sub-urban poor through growth in the rural and sub-urban non-farm economy and by making food available that is high in nutrients. Such diversification could also empower the poor by increasing their access to decision-making processes, by increasing their capacity for collective action, and reducing their vulnerability to shocks through asset accumulation. Diversification into vegetables could thus play a significant role in poverty reduction and food security in Indonesia (Mariyono et al., 2010).

Vegetables have an important role in breaking the cycle of both poverty (through increased production and higher income) and malnutrition (through a more balanced, nutritious diet). They are suitable for production in small plots and are labor intensive, thus offering a unique opportunity for smallholder farmers to diversify production and to generate employment for enhanced incomes for all participants in the value chain. Vegetables are high value cash crops, their production could well be targeted for inter-island and export marketing. As a major source of nutrients in the diet, providing a broad spectrum of essential micronutrients including pro-vitamin A, iron, and zinc, vegetables can contribute to the prevention of malnutrition disorders. While global types of vegetables (such as tomato and onion) are often more popular, there is a need to increase the utilization of indigenous vegetables’ great potential for daily sustenance, to diversify production systems and diets with indigenous vegetables, and to expand their use as cash crops.

Enhancing production and per capita consumption of vegetables must be a key strategy and is a critical opportunity to answer the challenges of food and nutritional security. This paper attempts to provide economic analyses of leading vegetable farming in Kediri, East Java. Kediri is one of potential production areas for vegetables.

**LITERATURE REVIEW**

Economic analysis of farming is important because it provides economic factor affecting the performance of farms. Factors determining production and income can be identified and valuable suggestions can be provided for policy makers and researchers to follow up. Various studies on economics of vegetable producing have been conducted.

Vegetable farming commonly is labor and input intensive. In Bangladesh, factor share of labor and fertilizer in vegetable production is around 48 and 24 per-cents.
respectively (Ali and Hau, 2001). Weinberger and Genova II (2005) found that fraction of hired labor employed in the vegetable farming is high. In terms of profitability, a study on eggplant production in India by Baral et al. (2006) shows that eggplant farming is profitable, where farmers can get profit around 40 percent of the price of eggplant. In chili production Rajur et al. (2008) reports that benefit cost ratio is 1.73, meaning that chili is also profitable.

In Indonesia, economic analysis of chili farming by Musafa et al. (2006) show that benefit cost ratio is greater than 2, meaning that chili is more profitable. In rice, the benefit ratio is only 0.5, meaning that farmers gained negative profit or loss.¹

The factor share of chemicals was highest because of its peculiar production system that required large amount of initial investment on its basic infrastructural development; and the labor share was around 20 percent. Fertilizer was the next important input; and seeds played the major role in productivity, despite lowest factor share, i.e., only one percent or less. This is consistent to the finding of Sukiyono (2004) that there is excessive use of labor and certain inorganic fertilizers. This means that more use of labor and such fertilizers diminish the yield of chili.

In terms of efficiency, chili farming in Indonesia was still low (Sukiyono, 2005). Different level of education determines the level of efficiency. The variation in the efficiency of production is very high meaning that not all farmers are able to apply chili production technology appropriately. This is consistent to the finding of Musafa et al. (2006) that the variation of yield in chili production is high. Among vegetables, chili shows the second highest in terms of variation in yield. Coefficient variation of chili is 26.4, while that of rice is only 1.7.

High variability in production generally leads to high, unstable prices. Variability in producers’ price is higher in chili and also higher for vegetables as a group, than producers’ price variability of rice(Darwanan and Pasandaran, 2000). At least, there are four factors affecting the high fluctuation in price of chili and other vegetables. First, production is highly concentrated in certain location. In this case, 82 percent of chili is produced in 7 provinces. Thus, there is an anomaly in production; there will be a shock in production that market equilibrium. Second, there is no synchronization in the planting season of chili. Commonly, chili is planted at relatively the same time in all producing areas. Third, the demand for chili (and other vegetables) is very sensitive to the freshness of product. Chili is not durable, and farmers cannot manage the supply, and they have to sell the product as soon as possible after harvesting. Last, the facility of good storing of chili and other vegetables has not been available, and consequently, it is difficult to manage the supply of chili(Irawan, 2007). This is not the case for rice, and indication that chili farming is riskier than rice farming.

¹ In the 1980s, the BC ration of rice was 1.59 (Darwanan and Pasandaran, 2000)
RESEARCH METHOD

Secondary data were collected from Agricultural District Service of Kediri in 2011. Five vegetables: big-chili, small-chili, eggplant, yard-long bean and tomato, which are considered leading commodities in the region, were selected for these analyses. A factor share approach, which is commonly used for economic analysis of farming system, was employed in this study.

Factor shares are the ratio of costs of factor inputs used in a production process to the total value of output. Factor share is a fundamental concept in economics that plays a critical role in research concerning production structure, costs and return analysis. (Kikuchi, 1991). The share of each cost item in the total cost was estimated in percent. In this analysis, the factor shares for labor, seed, fertilizer, manure, irrigation, pesticide, and others (including staking, mulching, land, and interest rate) were computed. In estimating these shares, the cost of labor used to apply an input was excluded and was aggregated into the labor cost. Consider a production function of producing Q using material inputs X, labor input L, and land A, formulated as:

\( Q = f(X, L, A) \)

then, the factor shares of material inputs (\( S_X \)), labor (\( S_L \)) and land (\( S_A \)) can be respectively formulated as:

\[
\begin{align*}
(1a) \quad S_X & = \frac{P_X X}{P_Q Q} \times 100 \\
(1b) \quad S_L & = \frac{wL}{P_Q Q} \times 100 \\
(1c) \quad S_A & = \frac{rA}{P_Q Q} \times 100
\end{align*}
\]

where \( P_X \) is the prevailing price of material inputs, \( P_Q \) is the prevailing price of output, and \( r \) is current rental cost of land. Return to the management (\( S_M \)) is calculated using

\[
S_M = 100 - \left( S_X + S_L + S_A \right)
\]

Return to the management could be positive or negative. Higher value of this value represents better farm management.

Other financial analytical approaches were also used to alternate selection criteria. Gross revenue was estimated as outputs (main and by-products) produced from a piece of land in a season multiplied by their respective market prices. Net return is obtained from the gross revenue which is deducted by total cost. In this case, family labor is not included. Real net revenue is obtained from real return which is deducted by imputed family labor. Family labor devoted into production practices was imputed using prevailing average wage rate. This paper follows analysis of economic farming which
was applied in livestock farming by Kumar et al. (2008). As a deterministic approach, sensitivity analysis was conducted to determine the profitability of each vegetable commodity.

RESULTS AND DISCUSSION

Let first us to provide the basic data for further analysis in Table 1. The table shows economic performances of vegetable farming of five crops. Costs of production are broken down into land rent, material costs, and labor cost. From Table 1, we proceed with advantage of each vegetable based on several criteria.

Table 1. Economic performance of vegetable farming

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Vegetable Crops</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Big Chili</td>
</tr>
<tr>
<td>Land rent (Rp)</td>
<td>9,200,000</td>
</tr>
<tr>
<td>Material cost (Rp)</td>
<td>15,250,000</td>
</tr>
<tr>
<td>Labor cost (Rp)</td>
<td>19,400,000</td>
</tr>
<tr>
<td>Production (kg)</td>
<td>10,500</td>
</tr>
<tr>
<td>Value product (Rp)</td>
<td>78,750,000</td>
</tr>
<tr>
<td>Total cost (Rp)</td>
<td>43,850,000</td>
</tr>
<tr>
<td>Profit (Rp)</td>
<td>34,900,000</td>
</tr>
</tbody>
</table>


Chili farming, both small and big ones, and tomato are labor intensive. But, yard-long bean and eggplant are material intensive. In terms of physical production, tomato and eggplant are superior, but this does not necessarily mean that those are economically superior.

Figure 1. Profitability of vegetable farming

Figure 1 shows profitability of vegetable farming. All vegetables perform positive profit. It can be seen that big-chili is the most profitable farming; in contrast, yard-long bean is the least profitable farming. However, most profitable one does not guarantee that the farming is the best. We need other indicators to judge the best one.
Based on R/C ratio, which is shown in Figure 2, big-chili and eggplant have similar R/C ratio, which account for around 1.8. It means that investing Rp1 will have profit of Rp 0.8. Up to this point, big-chili farming is superior. Consistently, yard-long bean farming has the lowest R/C ratio, which accounts for around 1.2. This means that the same level of investment will only get Rp 0.2. It is therefore yard-long bean is inferior.

Figure 3 shows factor share of vegetable farming. We can see that eggplant and big-chili provide almost similar share for return to management, which account for around 45%. This means that in relative terms, both vegetables are superior. Yard-long bean has the lowest share for return to management, which account for only 15%. Small-chili and tomato have similar share, which account for about 30%. Labor is the highest share in small-chili farming, material is the highest share in yard-long bean farming. Up to this point, both eggplant and big-chili farming are still superior in terms of absolute and relative profitability.

![Figure 2. R/C ratio of vegetable farming](image2.png)

![Figure 3. Factor share of vegetable farming](image3.png)
Market price of product and level of production are uncertain and fluctuating. Change in both can cause level of profitability. Now, we need to see the sensitivity analysis of each vegetable. This is to determine whether or not each vegetable is sensitive to change in either level of production or price of product, using break-even-point (BEP). Table 2 shows the BEP of each vegetable, and Figure 4 describes maximum acceptable percentage change in price or level of production to BEP.

Table 2. Sensitivity analysis using BEP

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Big chili</th>
<th>Eggplant</th>
<th>Y-long bean</th>
<th>Tomato</th>
<th>Small chili</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected Price (Rp)</td>
<td>7,500</td>
<td>750</td>
<td>1,500</td>
<td>1,000</td>
<td>12,000</td>
</tr>
<tr>
<td>Expected Production (kg)</td>
<td>10,500</td>
<td>40,000</td>
<td>10,000</td>
<td>42,000</td>
<td>4,200</td>
</tr>
<tr>
<td>Price of BEP (Rp/kg)</td>
<td>4,176</td>
<td>412</td>
<td>1,289</td>
<td>693</td>
<td>8,087</td>
</tr>
<tr>
<td>Production of BEP (kg)</td>
<td>5,847</td>
<td>21,948</td>
<td>8,593</td>
<td>29,108</td>
<td>2,830</td>
</tr>
<tr>
<td>% Change</td>
<td>44%</td>
<td>45%</td>
<td>14%</td>
<td>31%</td>
<td>33%</td>
</tr>
</tbody>
</table>

It seems that eggplant and big-chili farming are superior in terms of sensitivity to change in either price of product or level of production. Decrease in either price of product or level of production by around 40%, the farming is still profitable. Tomato and small-chili are relatively sensitive since the same case as big-chili and eggplant will cause tomato and small-chili farming is no longer profitable. Yard-long bean is the most sensitive to such changes. It only accommodates fall in either price of product or level of production by 14% to be BEP.

**Conclusion and Policy Implication**

Chili and tomato are more labor intensive that others. This is recommended to regions where there is abundance of rural labor. With current average prices, each vegetable has positive profit, and hence the five vegetables are recommended to increase households’ income. Big-chili is superior in terms of absolute profit, and it is recommended that big-chili can be used as main crop. In terms of R/C ratio and factor share, eggplant is superior, it is recommended that eggplant can be used as alternative crop. Small-chili and tomato can be interchangeable, since it is not recommended to
grow the same family of crops sequentially. Yard-long bean is recommended only for intercrop.

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