Allocative Efficiency Analysis of Production Function of Cassava Farming (Manihot, Sp.) in Tenayan Raya Sub-District of Pekanbaru City

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Abstract: Cassava (Manihot sp) has long been known and cultivated by Indonesian farmers. The economic and social potential of cassava aside from foodstuffs can also be used as raw materials for industrial use and animal feed. In Riau Province, cassava has the potential to be developed considering cassava is a plant that can easily grow on low altitude to high altitude lands. Cassava does not need a complex maintenance. Conventionally, this plant can be planted and left alone by itself. Cassava roots can be developed to be a processed products that society needs as main foodstuffs ingredients. This research is done in three months and the purpose is to know the influence of input use (pesticide, seeds, fertilizers and labor) on cassava farming to cassava farming by the model of cobb-douglas. Other than that is also the effect on economical efficiency. The method used in this research is a quantitative research by using Cobb-Douglas Function Model. This research was done in the Tenayan Raya sub-district with 55 farmer samples. This research shows Cobb-Douglas Production Function can be used as the predictor for cassava production function in Tenayan Raya Sub-district of Pekanbaru City. Altogether the production factor used by farmers influence production. Partially only usage of organic fertilizer that does not affect production, while other production factor such as seeds, pesticides, an-organic fertilizer (urea) and labor affect production by quite a bit. Usage of production factor seeds, urea and pesticides is not yet efficient while usage of organic fertilizer is not efficient and usage of labor on cassava agriculture by respondent farmers is relatively efficient.

Keyword: Production Function, economical efficiency

1. Introduction
The value of economic and social potential of Cassava (Manihot sp) other than foodstuffs also function as materials to other industry and animal feeders. In Riau Province, cassava has the potential to be developed on the other hand cassava can be also developed as main product needed by society. Because the carbohydrate content is high enough and it can also be processed into other culinary foodstuffs such as kemojo cake which is a typical Riau food, tapioca flour, mocaf flour, and snacks. Derivative products from cassava such as chips are dried raw cassava pieces that can be reprocessed into cassava flour, cattle feed, bioethanol and dried cassava. all of them are export commodities. Cassava as one of the food commodities experienced significant demand spike in 2016 (Detik Finance, Monday 17/7/2016). on the other hand, eventhough the productivity of cassava in Riau Province is still higher compared to the national average productivity, but the productivity growth rate from 2015 to 2014 has decreased.
Problems in the research is low productivity allegedly due to the cultivation technology used by farmers is still not maximal so it affects the production and income of farmers who are also low, from Cassava farming. This study aims to determine the effect of inputs (seeds, fertilizer, pest, labor and fertilizer) production through the cassava production model on cassava farmers in Tenayan Raya City Pekanbaru and the determination of economic efficiency.

2. Research Method
This research was conducted in Tenayan Raya District Pekanbaru City. Data type used in this research is primary data and secondary data. Samples were taken by using the Skaran table with a Margin of Error of 5%, as many as 55 people. The analysis method used in this research is Cobb-Douglas Function. Mathematically, the Cobb-Douglas function can be written as follows:

\[ Y = \alpha X_1^{b_1} X_2^{b_2} \ldots \ldots X_n^{b_n} \]

To facilitate the estimation of the equation above, the equation is converted to multiple linear form by Alogarythm with equation as follows:

\[ \log Y = \log a + b_1 \log X_1 + b_2 \log X_2 + \ldots + b_n \log X_n + e \]

To see Optimal Use of Production Factor using the formula \((b.Y.Py) / (X.Px) = 1\)

3. Result and Discussion
3.1 Characteristic of Respondent
The average land area cultivated by the farmers of respondents is 1.45 ha, decreased when compared to the research conducted Fatmiwati (2012) that is 2.5 Ha.

Seeds used by farmers of respondents are sanjai which is a local superior seed from West Sumatara. The average use of farmer seedlings is 3,525 stem cuttings. While the yield is 18 tons. This result is still lower than the productivity of cassava Riau Province (2015) which is 28.96 tons per ha. Seeds used by farmers in cassava farming is obtained from cassava stems that have been harvested before. In general, farmers have used about 3 times the original seedlings of origin. This condition also affects the resulting yields decrease productivity.

The average use of inputs is urea 303.64 kg, ponska 241.09 kg and organic Fertilizer is 120.55 ku for each farmer farm. Other production factors used by farmers of respondents are pesticides and labor. The average use of production and production factors and prices can be seen in table 1 below:

| No | Description              | Amount | Price Input per Unit |
|----|--------------------------|--------|----------------------|
| 1  | Production (ton)         | 18     | 1.500                |
| 2  | Seeds (sticks)           | 3.525  | 500                  |
| 3  | Pesticides (liter)       | 18.38  | 48.500               |
| 4  | Urea (Kg)                | 303.64 | 5.000                |
| 5  | Fertilizer (ku)          | 120.55 | 20.000               |
| 6  | Labor (hok)              | 50.67  | 80.000               |

3.2 Model Production Cobb-Douglas on Respondent Farmers
In terms of statistics and econometrics, the cassava production function model is good enough as an estimator. Based on the estimation result of production function obtained from Cobb-Douglas model is as follows:

\[ \ln Y = 6.27 - 0.606 \ln X_1 - 0.477 \ln X_2 + 0.0953 \ln X_3 + 0.0707 \ln X_4 + 0.1785 \ln X_5 + u \]

Then the Cobb-Douglas equation can be written as follows:

\[ Y = 528.48 X_1^{-0.606} X_2^{-0.477} X_3^{0.0953} X_4^{0.0707} X_5^{0.1785} \]

Desc : Prod. = Y; Seeds = X_1; Pest = X_2; Urea = X_3; organic Fertilizer = X_4; Labor = X_5
From the test results known the value of termination coefficient (R²) of this study amounted to 0.8326, this value indicates simultaneously (simultaneously) production of cassava farmers affected by seeds, pest, urea, Fertilizer and labor of 83.26% Other factors. The value of interception coefficient in this research is 528.48, it states total productivity for seed, pest, urea, Fertilizer and labor is equal to index of production efficiency that is equal to 528.48. The higher the production efficiency index means the process of transforming inputs into output becomes more efficient. Based on the results of t test for seeds obtained value t - hit - 3.06 at 95% confidence level with the value of elasticity of - 0.606 this shows there is a significant or significant influence between seeds on cassava production. The value of regression coefficient for seedlings is -0.606. This means that if the seeds increased by 1% then cassava production will be reduced by 0.606%. This can happen because it is caused by the seeds used by the farmer is already a third derivative of the parent seed, and has not paid attention to the requirements of good seeds to be planted.

Result of t test for pesticide that have been done obtained result that is t-count value -8.65 at 95% confidence level, there is real influence between pesticide with cassava production. The value of regression coefficient for pesticide is -0.477. This means that if the pesticide increases by 1% then the production of cassava is reduced by 0.477%. This condition is made possible by the use and manner of giving crops not in accordance with the correct instructions or recommendations. Based on the t test for urea that has been done obtained the result that is t-count value 2.42 at 95% confidence level, there is a real influence between urea with cassava production. The regression coefficient value for urea fertilizer is 0.0953. This means that if urea increased by 1% then cassava production will increase by 0.0953%. Based on t test that has been done for fertilizer obtained result that is t value count 1.61 at 95% confidence level, there is influence which is not real between fertilizer with cassava production. The regression coefficient value for Fertilizer is 0.0707. This means that if fertilizer is increased by 1% then cassava production will increase by 0.0707%. Effect of Labor Usage on Increasing Cassava Production.

Based on t test calculation for labor usage, the result is t-count 2.32 at 95% confidence level, labor has significant effect to cassava production. The coefficient value for labor is 0.1785. This means that if the labor increased by 1% then cassava production will increase by 0.1785%.

Allocative Efficiency Analysis on Production Factor

The calculation results for the allocative efficiency of each production factor used in cassava farming can be seen in table 2 below:

| No | Description      | Value | Explanation    |
|----|------------------|-------|----------------|
| 1  | Seeds            | 10.06 | Not yet Efficient |
| 2  | Pesticide        | 14.45 | Not yet Efficient |
| 3  | Urea             | 1.69  | Not Efficient   |
| 4  | Organic Fertilizer | 0.079 | Not efficient   |
| 5  | Labor            | 0.95  | Relatively Efficient |

Table 2 above shows that the use of production factors of cassava farming by respondent farmers. Seedlings, Pesticides and urea are inefficient, while organic Fertilizer is inefficient and labor is relatively efficient. Judging from the analysis of allocative efficiency indicates the use of seeds is not efficient, meaning that the use of seeds should be added. Field conditions indicate that farmers use superior local cassava seedlings from West Sumatra (sanjai) obtained from propagation of third derivative crops not from F1 plant propagation. According to the recommendation of Plant Nutrition Research Institute and Tuber, the material used in the propagation of cassava cuttings for seedlings is F1 plant. Propagation of the F1 plant is used as a source seed with due regard to the origin, purity and quality of the cuttings should be kept in mind. The recommended number of cassava cuttings / seedlings used with the normal cultivation distance (100 x 80) cm² was 12,500 stems while the sample farmers used 3,525 stem cuttings. This condition explains that the use of cassava seeds should be superior seeds and in accordance with the correct way of planting.
Pesticides are negatively related to production. This is due to: (a). The use of pesticides does not fit the rules. Farmers often ignore the rules of pesticide use correctly, (b). High prices of pesticides. The high price of pesticides resulted in the giving of pesticides to cassava plants are not as recommended. From the analysis of the efficiency of the allocation of pesticides has not been efficient, meaning its use should be added. The weakness in this research is pesticide data used is the sum of the use of round up and other pesticides by farmers, so less can be analyzed the influence of each type of pesticide on production. Pesticide. However, pesticides have a significant effect on production. From result of analysis of efficiency of allocation of urea fertilizer by farmer not yet efficient this mean the use of urea fertilizer must be added by farmer. Urea fertilizer has a significant effect on cassava production. Analysis of the efficiency of the allocation of Fertilizer is not efficient means that the use of Fertilizer needs to be reduced. Fertilizer has no significant effect on cassava production. The use of labor is a factor that must be met for the sustainability of cassava business activities. The use of labor must be careful and really - taken into account. The use of excessive labor will surely increase the production cost so that the income earned will be reduced and even have the potential to bring losses. Based on the analysis of the efficiency of the allocation of labor by the farmers in the cultivation of cassava relatifie efficient and have a significant effect on the production of cassava.

4. Conclusion
It can be concluded that firstly, the Cobb-Douglass production function model can be used as a predictor of the cassava production function. Together the factors of production used to influence cassava production. Partially production factors that have real effect on the production are seeds, pesticides, urea fertilizer and labor. Secondly, the use of seed, pesticide, and urea production factors has not been efficient while the use of organic Fertilizer is inefficient and labor is relatively efficient in cassava farming by farmers in Kecamatan Kulim Tenayan Raya District Pekanbaru City.

5. Suggestion
The use of seeds by farmers should use superior seeds or should pay attention to the requirements of good cassava seedlings to be planted. The use of doses of fertilizers and pesticides should take into consideration the recommended recommendations. Need to do research to determine the appropriate dosage of fertilizers and pesticides at cassava farming in Kulim Village, Tenayan Raya District, Pekanbaru City.

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