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An Analysis of Efficiency the Production of Commodities Corn in Belu, East Nusa Tenggara, Indonesia

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Abstract:This study aims to analyze the level of production efficiency and income from corn commodity farming in Belu Regency. The method of determining the sample used in this study is simple random sampling with the number of samples of 100 farmers. Hypothesis testing using method (1) method analysis of Coob-Douglas function and tool of the program of Ms. Excel to obtain the value of efficiency, and (2) methods of revenue and revenue analysis. The results showed that from the results of the analysis of allocative efficiency, known land, and seed area, its use has not been efficient. Maize farming in Belu Regency with an average land area of 1 ha total required a cost of Rp 2,199,304, total revenue of Rp 11,459,000, and income of Rp 9,259,696 per planting season.

Keywords: *Efficiency, Production, Corn*

I. Introduction

For Indonesia, corn is the second most important food commodity after rice, but for the life of some farmers in East Nusa Tenggara (NTT) to the present stage, corn is still a mainstay food commodity. Corn as a source of income and employment, as well as tradable commodities that can generate foreign exchange through export countries, especially in the future. In the future, there are strong indications that the level of demand for corn by the industry will continue to increase, along with the increase of population and the increase in people's nutritional awareness, although the level of consumption participation and the level of household consumption tends to decline both regionally and nationally.

During 2012, Indonesia exports corn (fresh and processed) to 22 (twenty-two) countries. In this period, Indonesia's maize exports to the Philippines reached the US $ 19.69 million so the Philippines was ranked first as the country importing Indonesian maize reaching 54.37%. The next country as Indonesia's corn importer is Vietnam which accounted for 24.34% of total Indonesian corn exports or the US $ 8.81 million. The next countries as the country importing Indonesian maize are Thailand and Japan, but in a much smaller quantity of 5.52% (the US $ 2 million) and 4.67% (the US $ 1.69 million) respectively. Furthermore, Indonesia's maize exports are aimed at China, the Republic of Korea and Malaysia with total exports during 2012 reaching 3.01% (the US $ 1.09 million), 2.39% (the US $ 866 thousand) and 2.39 % (the US $ 865 million) (Pusdatin, 2013).

In terms of imports, Indonesia has partnered with India for corn commodities, of which 61% of Indonesia's maize imports in 2012 are from India or the US $ 353.06 million. The country of origin of Indonesian maize imports is Argentina and Pakistan, with import value in 2012 amounting to the US $ 95.51 million (16.5%) and the US $ 45.92 million (7.93%), respectively. The next countries are China, Brasilia and the United States, with total imports of the US $ 26.34 million (4.55%), the US $ 23.05 million (3.98%), and the US $ 16.45 million (2.84%) (Pusdatin, 2013).

Although at certain times Indonesia is importing maize high enough, at other times (harvest season) Indonesia also exports to several Asian countries. The volume and value of Indonesian corn exports during 2008-2012 increased with a growth rate of 8.91 percent and 2.45 percent. Where in 2011, Indonesia's maize exports were 12,472 tons ($ 9.46 million), and in 2012 increased to 34,899 tons ($ 19.02 million) (Pusdatin, 2013). This phenomenon can illustrate the prospects and competitiveness of Indonesian maize in the future.

Farming in the face of competition for imported commodities should produce in a state of high efficiency, not only in terms of physical and agroecological (technical efficiency) which are necessary conditions but also produce in a price efficiency (allocative efficiency) condition as a sufficient condition. The possibility that happened at corn farming in Belu Regency that is still less efficient use of production factors, it is expected farm efficiency can be improved so that production also will increase. The use of production factors is still less efficient because of the difficulty of measuring the use of appropriate agricultural technology in increasing production. The use of efficient agricultural technology can increase the production and welfare of farmers.

Based on this information, high production increase aims to meet food and nutrition needs and meet market needs, expand employment opportunities, increase income and welfare of corn farmers. High corn production can not be separated from the role of various factors of production such as the area of business, seeds, labor and the use of production factors efficiently. Taking into account the efficient management of factors of production, it is hoped that this can provide a high level of income to corn farmers. Therefore, this

study aims to analyze the level of production efficiency and income from corn commodity farming in Belu Regency.

II. Method

2.1 Place and Time of Study

The method used is descriptive research method that aims to describe the systematic facts and characteristics of the object or subject that is examined appropriately. The research was conducted in Belu, in Raihat and Lakmanen Subdistricts. Selection of the location intentionally (purposive) with the criteria: (1) as the area of corn production centers in Belu Regency, and (2) potential as corn development areas in the future.

2.2 Data Collection Method

The population of this research is all the people who live as corn farmers in 2016/2017 planting season, either as the main livelihood or side livelihood in Belu Regency. The sample of farmers is taken by Simple Random Sampling where every existing population has equal opportunity to be sampled. The number of samples taken is as many as 100 respondents. This is in accordance with Roscoe's (1975) statement in Mustafa (2000) provides guidance on determining the number of samples as follows: 1) Preferably the sample size is between 30 s/d 500 elements; 2) If the sample is broken down again into the subsample, the minimum number of subsamples should be 30.

2.3 Production Efficiency Analysis

Cobb-Douglas production function is used to determine the effect of input on output in a production activity. Thus the influence of each of the factors of production in the cultivation of the inner coconut can be known through the Cobb-Douglas production function which is transformed into a ln or double log equation in order to be estimated by Ordinary Least Square (OLS) method (Masyhuri, 2012). In this study coconut production in (Y) is a function of the a number of plants (X1), number of labor (X2), plant age (X3), and farmer's experience (X4). To answer the first objective of analyzing the factors affecting coconut production in the use of Multiple Linear Regression Method, formulated as follows:

$$\text{Ln } Y = \ln b_0 + b_1 \ln X_1 + b_2 \ln X_2 + e$$

Information:

Y	: Corn production in (Kg)
b0	: Intercept
b1 - b2	: The coefficients of each variable
X1	: Land area (Ha)
X2	: Number of manpower (people)
e	: The error factor (error term)

The allocative efficiency of a farm is determined through its production function and is based on the assumption that farmers use the same technology. To know the level of efficiency of allocative use of production factor used ratio analysis between Marginal Product Value (NPM) with the price of production factor. Allocative efficiency occurs when the value of the marginal product equals the opportunity cost (market price) of the input or the marginal product value comparison index (NPMxi) with the opportunity cost of the input (Pxi) equal to one (ki = 1, the price efficiency index). Mathematically the allocative efficiency can be written as follows:

$$\text{NPM}_{xi} = \text{P}_{xi} \text{ or } \frac{NPM_{xi}}{P_{xi}} = 1 = ki$$

$$ki = \frac{NPM}{P_{xi}}$$

$$NPM = b_i \frac{\bar{Y}}{\bar{X}_i} \bar{P}_y$$

Information:

bi	: The regression coefficient of the i-th factor of production
Y	: Average production (output)
P¯_y	: Average output price
X¯_i	: Average use of i-th input factor

P¯_xi : Average factor price of i-th product
NPMxi : The Marginal Product Value of the i-th production factor
ki : Index of Allocative Efficiency

Soekartawi (1990) divides the criteria of allocative efficiency as follows:

〖NPM〗 _xi / P_xi = 1 = ki means production factor allocation is efficient
〖NPM〗 _xi / P_xi> 1> ki means the use of production factor is not efficient so it needs to be added again
〖NPM〗 _xi / P_xi <1 <ki means the use of inefficient production factors that should be reduced

2.5 Farm Revenue Analysis

Revenue is obtained from the multiplication of the total production of farming and the selling price of the product at that time which is valued by the rupiah. The statement is expressed in the formula:

$$R = Y \times Py$$

Where:
R = revenue (revenue)
Y = production
Py = product price

Farm income is the difference between revenue and expenses, which can be formulated as follows:

$$Pd = TR - TC$$

Where:
Pd = farm income
TR = total revenue (total revenue)
TC = total cost (total cost)

III. Result and Discussions

Efficiency Analysis of Factor Production Use

The allocative efficiency of the use of production factors in the activities of corn farming can be determined by calculating the ratio of the value of the marginal product to the price of each of the production factors per unit (NPMx / Px). In the efficiency analysis of the use of these factors of production use the allocative efficiency as measured by the value of the regression coefficient of the Cobb-Douglass production function, which will produce three possibilities: (if the efficiency value is greater than 1, meaning that the maximum efficiency has not been reached, the use of production factors needs to be improved to achieve efficient conditions, (2) if the efficiency value is equal to 1, meaning that the farming activities undertaken have reached the efficient level, (3) if the efficiency value is less than 1, meaning that the farming activity has not reached level efficiency, so the use of production factors need to be reduced to achieve efficient conditions.Based on the results of regression analysis that there are variables that significantly affect the amount of corn production.In the analysis of the allocative efficiency of the production factor, only the variables that have the real effect on corn production are analyzed by using the allocative efficiency formula. In this case, factors that have real effect are the variable land area and the use of production infrastructure facilities. The result of allocative efficiency analysis of production factors can be seen in Table 1 as follows.

Table 1. Results of Efficient Efficiency Analysis of Corn Production Factors in Belu Regency

Description	Bi	Xi	Pxi	Py	NPMxi	NPMxi/Pxi	Xi Optimal
Seed	1953.608	10,8	225.000	3500	2.116.245	9	94,05
Land area	118.068	10	22.5000	3500	2.187.731	0,05	21,88

Source. Data Analysis Results 2017

Efficiency of Seed Use Allocation

Based on the results of the analysis of the use of corn production factors in Belu Regency that the NPMxi / Pxi value of 9 kg indicates that the allocation of seed use is still not efficient because the value of NPMxi / Pxi is more than one. Thus, the addition of the allocation of the use of corn farming can be done if corn farmers in the research area want to increase their profits to be greater.To achieve optimal seed utilization in corn farming activity in Belu Regency, optimal seed utilization is 94,05 / kg / ha. The average use of seeds based on research results in units of land per hectare of 9 kg can only be used in a land area of 0.5 ha - 2 ha. Meanwhile, according to Junandar (2008) that the average use of seed per hectare of land ranging from 20 kg-40 kg. So one way is to use the analysis of allocative efficiency to increase farmers' profits by using seeds of 94.05 kg/ha.

The optimal amount of seed use is not something absolute because farmers also need to pay attention to the condition of agricultural land to manage the number of seeds. Based on the results of efficiency analysis of the use of seed input allocation, it is very difficult to be realized to farmers of Asumanu and Lamaknen Viallage of directly. This is because the maximum amount of seed used in the field is 40 kg (Junandar, 2008). Therefore, based on the results of the research in Cobb-Douglas production function, there are some disadvantages (Sudarman, 1989) in the theory, such as:

1. The variable specification is less precise, this causes the resulting production elasticity value is negative or the value is too large or small. This specification will lead to the occurrence of multicollinearity in the independent variable.
2. Error measurement variable, this occurs when the data is less valid causing the production elasticity too large or small.
3. Biased against management variables. Management factor is an important factor to increase production because it is directly related to dependent variable such as management of production factor use which will push the technical elasticity of the production function upward. This management is concerned with decision making in the allocation of input variables and sometimes difficult to measure in estimation of Cobb-Douglas function.
4. Multicollinearity, in this function is difficult to avoid even though it has been attempted so that the amount of correlation between the independent variables is not too high as improving the specification of the variables used.

Although this theory has some disadvantages, it is one theory that is relatively easier than the other, since the Cobb-Douglas function can be easily transferred to a linear form by melogarrying. By using the Cobb-Douglas production function, it can produce regression coefficients as well as indicate the magnitude of the production elasticity of each input used. In addition, by using the Cobb-Douglas production function, the amount of elasticity at the same time indicates the scale of the scale of the business (return of scale) is useful to determine whether the activities of a business follows the scale of the scale of business, fixed scale or business scale decreased for farmers maize in Belu Regency.

Farm Income

Farm income is the difference between the total receipts and the total costs incurred. Calculation of corn income analysis of corn commodity in Belu Regency shows that corn commodity farming is profitable.At the level of income with a land area of 1 ha obtained an average total revenue of Rp 11.459.000 with an average total cost of Rp 2,199,304 so that the average income of farmers in maize in Belu Regency for one-time production for three months amounting to Rp 9,259,696. The results of the analysis of income of corn farm per Ha in Belu Regency can be seen in Table 2 below.

Table 2. Revenue Analysis of Maize Farming per Ha in Belu Regency

Cost component	Unit	Total
1. Reception		
a. Average Production Of Maize	Kg/ Ha	3.274,-
b. Corn Selling Price	Rupiah	3.500,-
Total Receipts		**11.459.000,-**

Cost component	Unit	Total
2. Production cost		
A. Fixed Cost		

a. Taxes	Year	24.050,-
b. Machetes	Pieces	40,000,-
c. Hoes	Pieces	10,254,-
Fixed Amount of Cost		74,304,-
B. Variable cost		
a. Seed	Kg	-
b. Fertilizer	Kg	-
c. Pesticide	Liter	-
d. Outside Family Tk	People	2.125.000,-
Variable Amount of Cost		2.125.000,-
Total Cost (TC)		**2.199.304,-**
Income= TR –TC		**9.259.696,-**

Source. Data Analysis Results 2017

The maize in Belu Regency is classified as simple, reflected in the small area of production land, the unused machinery (such as hand tractor or harvesting machine), the use and arrangement of input production composition (seeds, fertilizers and medicines) still not balanced until the labor arrangements. The pattern of production in such a way affects the level of income and income of farmers from the farming done.

The only available transportation facilities are the motorcycle (motorcycle taxi) and several truck units. Means of motorcycle taxi is felt very expensive because of the cost of the house to the village market of Rp 20,000 per trip. These constraints make farmers difficult to obtain existing market information and potential in marketing. The collector of crops (middlemen) becomes the ultimate goal of farmers to sell their crops. This condition makes the collecting merchant as a savior harvest the farmers, but the price is sometimes set too low so that little harm to farmers. The price level is Rp 2,000 - 3,000 per kilogram, while for the market price it can reach Rp 3,500 - 4,000 per kilogram (price of 2015).

The difference in price level practically influences their farming acceptance. Given the low level of existing selling prices, creating a dilemma for temporary farmers in meeting the daily living costs of farmers costs money. Therefore there is no other option farmers have to sell some of their crops even at low prices, while some farmers save for their own consumption.

IV. Conclusions

1. The result of regression analysis of Cobb-Douglass production function on corn production factors shows that the area of land and production facilities have significant effect on corn production in Belu Regency.
2. The result of allocative efficiency analysis of production factors shows that the utilization of land area for corn plant and the use of production means that the seed is not efficient yet.
3. Corn Farming in Belu Regency with an average land area of 1 ha total cost required of Rp 2,199,304, total revenue of Rp 11,459,000, and income of Rp 9,259,696 per planting season.

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