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Efficiency Analysis of Cabbage Production in Lombok Island

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Abstract

The horticulture sub-sector occupies a strategic position in agricultural development. The development of horticultural production from year to year is quite fluctuating. An important function of this sub-sector is a source of income for the population. One of the most potential cabbage plants on Lombok Island is East Lombok Regency with the highest production amount of 59,300 tons and a land area of 338 hectares where cabbage is produced. Statistics of Horticultural Crop Production in West Nusa Tenggara Province in 2020 show that the area of land and cabbage production in NTB fluctuates. This study uses a descriptive method carried out in East Lombok Regency, selected from 3 villages as the sample area by purvosive sampling because it has the highest number of production. This research was conducted by Quota sampling with the number of respondents selected as many as 45 people and from each District 15 respondents were taken. The types of data in this study are quantitative data and qualitative data. The analysis used in this research is analysis, descriptive, ANOVA, LSD, Coob-Douglas production function analysis, economic efficiency, technical efficiency, and economic efficiency. From the analysis results show, quantitative data, namely the data obtained in the form of numbers and qualitative data, namely the data obtained. The average production level of cabbage farming is 19 tons/ha and the average production in the lowlands, medium plains and highlands in East Lombok Regency is significantly and significantly different. The factors that significantly affect cabbage production in East Lombok Regency are seeds and fertilizers. The use of production factors is technically efficient while allocative efficiency and prices for land area, seeds, fertilizers, pesticides and labor are not efficient because >1. This means that there must be additional use of production factors from land area, fertilizer, and labor.

Keywords: *Horticulture; Factors of Production; Efficiency*

Introduction

Until now, agriculture is believed to be one of the roots of the Indonesian economy. One of them is the horticulture sub-sector which occupies a strategic position in agricultural development. This continues to increase as reflected in several indicators of economic growth, such as Gross Domestic Product (GDP), export values, and employment (Ministry of Agriculture, 2013). The development of horticultural production from year to year is quite fluctuating. This is influenced by seasonal factors, especially for annual fruit crops. In addition, the attack of OPT (Plant Destruction Organisms) is also

suspected to be one of the causes of the decline in the production of horticultural commodities. An important function of this sub-sector is a source of income for the population. The 2018 inter-census agricultural survey shows that of the 666,375 agricultural business households in West Nusa Tenggara (NTB), 25.22 percent of them are cultivating horticultural crops. In addition, almost 10 percent of agricultural business households, located in NTB, make horticultural crop cultivation as their main business. One of the horticultural commodities cultivated in NTB is cabbage. It is equally important to contribute from an economic perspective, horticulture business can be used as a source of income.

Statistics of Horticultural Crop Production in West Nusa Tenggara Province in 2020 show that land area and cabbage production in NTB fluctuated from 2017 to 2019 with a total land area of 396 and production of 72,310 tons in 2017 the total harvested area and total production decreased from harvested area. 390 hectares and production decreased by 54,700 tons in 2018 and increased sharply in 2019 from a harvested area of 550 hectares and a total harvest of 10,344 tons where cabbage is grown, still does not meet market needs in NTB.

One of the most potential cabbage plants on Lombok Island is East Lombok Regency where East Lombok Regency is quite potential for the development of horticultural crops such as cabbage and other horticultural crops, because East Lombok Regency is very supportive of its territorial area which is partly mountainous and the weather climate is quite affecting the level of We can see that the fertility and growing conditions of horticultural crops, especially cabbage, can be seen from the highest production amount, which is 59,300 tons and a land area of 338 hectares where cabbage is produced, compared to other regencies and cities which differ in production and land area. quite far the difference (BPS Lombok Timur, 2019).

Research in Japan concluded that the cucumber temperature for cabbage plants is 15°c-20°c. However, in Indonesia, differences in climate factors, temperature, day length, radiation, humidity and rainfall can be seen in the lowland and highland environments (Warajito, 1993). Seeing from each sub-district which is in the high, medium and low lands, of course this affects the amount of land area and production cultivated differently because the climate and geographical conditions of each sub-district give different treatment in cabbage farming. Of course the use of production factors such as land area, labor capital, fertilizers etc. Be influential in increasing production of cabbage farming.

According to Sukirno (2003: 192) the production function shows the nature of the relationship between the factors of production and the level of production produced. The factors of production are known as inputs and the amount of production is called output. Factors of production or inputs are absolute things to produce production. In this production, a farmer is required to be able to combine several factors of production so as to produce optimal production.

The marketing channels through which goods and services pass will greatly determine the value of a product's profits and affect the distribution of revenues received by each of the marketing agencies involved in it. The shorter the marketing channel will provide greater profits than the long marketing channel. Efficient marketing is the ultimate goal to be achieved in the marketing system, where the marketing system provides satisfaction to all parties involved, producers, consumers, and marketing institutions. To measure marketing efficiency, a structure, diversity and market behavior approach can be used. . Efforts to improve marketing efficiency can be done by increasing marketing output and reducing marketing costs (Sudiono, 2001).

The production factors in question are land area, labor, seeds and fertilizers. The factor of land area and labor is an important role to support the success of cabbage production. Land area and seeds are very important means of production. Proper and efficient planting and care of seedlings will result in high production. In addition, the largest contributor of cabbage vegetables to each market in West Nusa Tenggara. From an economic perspective, horticulture can be used as a source of income. Marketing of horticultural commodities starts from farmers, harvest workers, collectors, wholesalers, and retailers

which is carried out between villages, sub-districts, regencies, and even provinces. In addition to absorbing labor, this business is also able to generate added value for the horticulture sub-sector itself, as well as for other sectors such as trade as its multiplier effect.

So that the formulation of the problems that will be discussed in this study are: analysis of differences in production in the highlands, medium and lowlands, factors that affect cabbage production in East Lombok Regency, analyzing the efficiency of the use of production factors on cabbage production in East Lombok Regency.

Research Methods

This study uses a descriptive method, which is a method of examining the status of a human group, an object, a set of conditions, a system of thought, or a class of events in the present by making a systematic, factual and accurate description, picture or painting about the facts. , the properties and the relationship between the investigated phenomena. This research was carried out in East Lombok Regency, which was divided into 3 criteria, namely highland areas (700 > MPdl), medium plains (400-700 masl), and lowland areas (400 < mpdl). For each criterion, one sub-district will be taken as the sample area using a porposive sampling method, namely the area that has the highest cabbage production in each criterion. Selected from 3 villages in each sub-district as the sample area by purvosive sampling, namely Sembalun Bumbung Village, Sembalun District (800-1180 Mpdl), Bebidas Village, Wanasaba District (200-522 Mdpl) and Peneda Gandor Village, Laubah Haji District (13-81 MPDl).), with the consideration that this village has the highest amount of production compared to other villages in each sub-district as the sample area. Farmers who are respondents in this study are farmers who cultivate Cabbage in Sembalun Bumbung Village, Sembalun Village, Bebidas Village, Wanasaba District, and Peneda Gandor Village, Labuhan Haji District, East Lombok Regency. Number of Cabbage farmers in Sembalun Bumbung 512 Bebidas Village 60 and Peneda Gandor 20 Village The determination of respondent farmers in this study was carried out by Quota sampling with the number of respondents selected as many as 45 people and from each District 15 respondents were taken. The types of data in this study are quantitative data and qualitative data. Quantitative data is data obtained in the form of numbers and qualitative data, namely data obtained is not in the form of numbers. Data sources consist of two, namely primary data and secondary data. Primary data is data received from direct respondents through interviews guided by a list of questions, while secondary data is data obtained from agencies, agencies, and other institutions.

Results and Discussion

The average cabbage production in East Lombok Regency in this study was 193 kg per acre or about 19.3 tonnes/ha (Table 4.8). Meanwhile, according to the Center for Vegetable Research Plants (2007), cabbage production can reach 15-40 tons/ha. It means that cabbage production in East Lombok Regency is still possible to be increased, because it has only reached half of the maximum productivity capacity of cabbage plants.

Table 1 Cabbage production rates per cultivated area (0.19 are) and per are in High, Medium and Lowlands 2021

No.	Location / Plain	Production Rate	
		Kg/Area Cultivated	Kg/Are
1	Plateau	5.225	348
2	Medium Plains	3.276	175
3	Lowland	2.845	165
	Total Average	3.728	193

Data source: secondary data processed 2021

From Table 1, the average production received by farmers in the highlands is 348 kg/are, and the average production per arable area is 5,225 kg. Meanwhile, the average production level in the medium plains is 175 kg/are, the production level per area of arable land in the highlands is 3,275 kg, the average production level in the lowlands is 165 kg/are and the average production level is 165 kg/are. per arable area of 2,845 kg, while the average of the overall production level between highlands, medium and lowlands is 193 kg/are and the production level of arable land area is 3,728 kg.

Analysis of Variance (Anova) Differences in Cabbage Production in the Highlands, Medium and Lowlands

Table 2 ANOVA analysis of differences in cabbage farming production in the Highlands, Medium Plains and Lowlands in East Lombok regency, 2021

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	1125271560.533	2	562635780.267	21.606	.000
Within Groups	1093727950.667	42	26041141.683		
Total	2218999511.200	44			

Data source: secondary data processed 2021

From the results of the F-test calculation, it is known that the F-count value is 21.606 > greater than F-table = Fα, (k-1), k (n-1) of 3.22 or a significance value of 0.000 less than 0.05. So Ho is rejected and Ha is accepted, meaning that there is a difference in production in the highlands to the medium plains with the lowlands.

LSD Analysis of Differences in Cabbage Production in the Highlands, Medium and Lowlands. Furthermore, to see individually between high, medium and low altitudes, further tests can be carried out with the LSD test.

Table 3 LSD analysis of differences in cabbage farming production in the Highlands, Medium Plains and Lowlands in East Lombok regency, 2021

		Mean Difference			95% Confidence Interval	
(I) Plain	(J) Dataran	(I-J)	Std. Error	Sig.	Lower Bound	Upper Bound
1 Height	2 Medium	10351.46667*	1863.37120	.000	6591.0313	14111.9020
	3 Rendah	10846.93333*	1863.37120	.000	7086.4980	14607.3687
2 Medium	1 Tinggi	-10351.46667*	1863.37120	.000	-14111.9020	-6591.0313
	3 Rendah	495.46667	1863.37120	.792	-3264.9687	4255.9020
3 Low	1 Tinggi	-10846.93333*	1863.37120	.000	-14607.3687	-7086.4980
	2 Medium	-495.46667	1863.37120	.792	-4255.9020	3264.9687

*. The mean difference is significant at the 0.05 level.

From Table 3 shows where in column one highlands between medium and lowlands there is a significant difference in the significance value between highlands and medium of 0.000 smaller than 0.005 there is a significant difference, for highlands and lowlands the significance value of 0.000 is smaller than 0.005 then there is a significant difference. Meanwhile, for the medium and lowlands, the significance value is 0.792, which is greater than 0.005. Average use of production factors between highlands, medium and low.

Through the analysis of the production function of cob-douglass in cabbage farming, a linear regression test, t test, f test and classical assumption test are statistical requirements that must be met in multiple linear regression analysis based on Ordinary Least Square (OLS). can know the effect of the use of factors of production.

The F test is a simultaneous test to determine whether the variables X1 land area, X2 seeds X3 fertilizers, X4 pesticides, X5 labor, D1 highlands and D2 lowlands together have a significant effect on the amount of cabbage production Y. From the results of the analysis can seen in Table 3

Table 4 Anova effect of all production inputs together on cabbage production in East Lombok regency

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.623	7	1.946	13.883	.000[b]
	Residual	5.187	37	.140		
	Total	18.809	44			

a. Dependent Variable: Y

b. Predictors: (Constant), D2, X4, X1, X3, X5, D1, X2

From the regression results shown in Table 4 the effect of the variables X1 land area, X2 seeds X3 fertilizer, X4 pesticides X5 labor, D1 highlands and D2 lowlands on production in cabbage farming (Y), then obtained a significant value of 0.000 < 0, 05. This shows that the five independent variables simultaneously have a significant effect on the dependent variable.

Table 5 Correlation coefficient test results

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.851[a]	.724	.672	.37440

a. Predictors: (Constant), D2, X4, X1, X3, X5, D1, X2

Based on the SPSS output, it appears that the results of the calculation obtained an R value of 0.851 in other words the relationship between the X variable and the Y variable is 0.851 or 8.51%. And the value of the coefficient of determination (R Square) is 0.724 in other words this shows that the large percentage of variation in cabbage farming production which can be explained by variations of the independent variables, namely X1 land area, X2 seeds, X3 fertilizers, X4 pesticides and X5 labor is 72 .4% while the remaining 27.6% is explained by other variables outside the research model

The regression equation can be seen from the table of coefficient test results based on the output of SPSS version 22 on the five variables of land area, seeds, fertilizers, pesticides and labor in cabbage farming production as shown in table 5.

Table 6 Results of regression analysis

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	.068	1.347		.051	.960
	X1	.016	.149	.015	.105	.917
	X2	.491	.187	.484	2.627	.012
	X3	.360	.166	.301	2.171	.036
	X4	.079	.128	.084	.618	.540
	X5	.239	.225	.155	1.060	.296
	D1	.859	.196	.626	4.373	.000
	D2	.428	.187	.312	2.291	.028

Data source: secondary data processed 2021

Based on table 5 it can be seen the results of the regression coefficient (β) above, then the regression equation is obtained as follows:

Ln Y = Lnβ0a+ 1LnX1 + 2LnX2 + β3X3 + β4LnX4 + 5LnX5 + D1 +

Y = Ln0.068+ 0.0.16X1+0.491X2+0.360X3+0.079 X4 + 0.239 X5 +0.859D1+μ

The results of the regression equation above can be interpreted as follows:

1. Value constant, constant or coefficient 0 of 0.068, if the variables of land area (X1), seeds (X2), fertilizers (X3), pesticides (X4) and labor (X5) are constant or X = 0, then cabbage production at farming is 0.068.

2. The value of the coefficient 1 or the land area variable has a regression coefficient with a positive relationship of 0.016 indicating, if other variables are considered constant, every 1% increase in land area will increase cabbage production by 0.016%. a significant value of 0.917, indicating that the significant value is greater than the level of significance (α = 0.05). This means that the variable land area does not significantly affect the increase in cabbage production statistically.

3. The value of the coefficient 2 or the seed variable has a regression coefficient with a positive relationship with a value of 0.491 indicating, if other variables are considered constant, then every 1% increase in seed use will increase the amount of cabbage production by 0.491%. The significant value is 0.012, this value indicates that the significant value is less than the level of significance (α = 0.05). This means that the seed variable has a significant effect on the statistical increase in cabbage production.

4. The value of the coefficient 3 or the fertilizer variable has a regression coefficient with a positive relationship with a value of 0.360 indicating, if other variables are held constant, then every 1% increase in fertilizer use will increase the amount of cabbage production by 0.360%. and a significant value of 0.036, this value indicates that the value is significantly less than the level of significance (α = 0.05). This means that the fertilizer variable has a significant effect on the statistical increase in cabbage production.

5. The value of the coefficient 4 or the pesticide variable has a regression coefficient with a positive relationship with a value of 0.079 indicating, if other variables are considered constant then every 1% increase in pesticide use will increase the amount of cabbage production by 0.079%, and a significant value of 0.540, the value This indicates that the significant value is greater than the level of significance (α = 0.05). This means that the pesticide variable does not significantly affect the increase in cabbage production statistically.

6. The value of the coefficient 5 or the labor variable has a regression coefficient with a positive relationship with a value of 0.239 indicating, if other variables are considered constant, every 1% increase in the use of labor will increase the amount of cabbage production by 0.239%. The significant value is 0.540, this value indicates that the significant value is greater than the level of significance (α = 0.05). This means that the pesticide variable does not significantly affect the increase in cabbage production statistically.

7. The value of the coefficient D1 or the highland variable has a regression coefficient with a positive relationship with a value of 0.859 indicating that every place to plant cabbage in the highlands of 1% of land will provide a total production of cabbage of 0.859% compared to the medium plains and lowlands of 0.402. and a significant value of 0.000, this value indicates that the significant value is less than the level of significance (α = 0.05). This means that cabbage farming in the

highlands gives a higher yield of cabbage production levels by 85.9% and is significantly different from other plains, namely the medium and lowlands only contribute 40.2% of cabbage production.

Economic Efficiency Analysis of the Use of Production Factors in Cabbage Farming

1. Technical Efficiency

The technical efficiency of using production inputs can be seen from the regression coefficient value of the Cobb Douglass model of the production function. The results of the analysis show that the production function of cabbage in East Lombok Regency using the Cobb-Douglass production function model is as follows:

Y = 0.068X10.016 X20.491X30.360 X4 0.079X50,239e 0.859D1e0.428D2u

Technically, the use of inputs is said to be efficient if the regression coefficient which shows the production elasticity of the inputs is between 0 to 1 (0<Ep<1) or is in the rational area (area two). Meanwhile, if Ep > 1, then the input management is technically not efficient or still lacking (in area one); and if Ep < 0 then the use of production inputs is inefficient or excessive. Because the regression coefficient of each production input in the Cobb-Douglass model regression equation above is between 0 and 1 or the production elasticity is between 0 and 1 (0<Ep<1), it can be said that the use of production inputs in cabbage farming in East Lombok Regency everything included is efficient.

The efficiency of production factors in cabbage farming on the island of Lombok can be determined by calculating the ratio of the NPM of a factor of production to the price of each factor of production. Douglas.

Table 7 Results of calculation of efficiency in the use of production inputs in cabbage farming in East Lombok regency, 2021

Production Input (Xi)	Bix	Xi	Pxi	PMxi	NPMxi	NPM x/ Pxi
Land Area (X1)	0.016	20	591.111	365,94	2.342,016	3,96
Seed (X2)	0.491	400	250	562,494	3.587	14,34
Fertilizer (X3)	0.360	18	3.500	457,429	9.140	2,61
Pesticide (X4)	0.079	233	143	154,948	988.258	6,91
Power K (X5)	0.239	19	66.419	2954	188.406	2,08

Data source: secondary data processed 2021

Based on the results of the analysis in Table 7, it can be explained that price elasticity or elasticity

1.Land Area

Based on Table 7 it is known that the ratio between the marginal product value (NPM) of the production factors of land area is greater than one (3.96). This shows that technically the allocation of land area factors has not been efficient or is in rational area I. Thus, it is clear that if it is possible to increase the allocation of land use for the cabbage business, the cabbage farming business will still get even greater production and profits. These results illustrate that the problem of narrow land use causes cabbage production which can still be added with the number of seeds it is not possible except by renting land, to increase the amount of cabbage production. In accordance with the theory which states (Mubyarto, 1998) land is one of the factors of production which is the factory of agricultural products which has a fairly large contribution to farming. The size of the farm production is influenced, among others, by the narrow and wide area of land used.

2.Seed

The ratio between the value of the marginal product (NPM) of the factor of seed production is greater than one, namely (14.34). This shows that economically the use of seeds has not been efficient or is in area I, rational. Thus, it is clear that if it is still possible to increase the average number of seeds by 400 stems, to an average of 500 stems per acre or by selecting the right seeds to achieve high production, in cabbage farming in East Lombok Regency, in addition to adding the number of seeds used is very important, it is necessary for cabbage farmers to pay attention to the spacing that is carried out, because the value of cabbage production is not only from the many crops produced, but also from each crop capable of providing maximum results, namely 1.5-3 kg per crop produced. Taking into account the number of seeds and spacing, farmers still get higher production and profits from previous yields. The use of seeds in accordance with the rules of increasing return to scale means that it is still possible to increase the number of seeds, from the existing land area.

3.Fertilizer

The ratio between the value of the marginal product (NPM) of the fertilizer production factor is greater than one, which is (2.61). This shows that economically the use of fertilizers is still not efficient or is in rational area I. Thus, it is clear that, if from every fertilization carried out by farmers, the amount of fertilizer can still be increased by 18 kg from the usual use of fertilizers to 20 kg per farmer's arable area, even though it is possible, artificial fertilizers can be added, without being followed up according to the needs of the following elements. Soil PH elements actually make the growth of cabbage plants not optimal, so it is necessary to use fertilizers in combination and according to the needs of N, P and K elements in the soil, of course this is increasingly able to provide maximum production and profit, due to the intensive use of fertilizers. and according to the recommendation of the vegetable research center, the combination of the use of urea fertilizer is 12.5%, ZA 31.25%, TSP 31.25% and KCL 25%. While the combination of fertilizers used on cabbage farmers in East Lombok Regency is 49.4% KCL fertilizer, 31.6% urea fertilizer and 9% ZA fertilizer and 12% TSP fertilizer so that farmers need to use and add fertilizers that used. In the use of fertilizers in accordance with the principle of increasing return to scale, it means that it can still increase the amount of fertilizer, in increasing cabbage production.

4.Pesticide

The ratio between the marginal product value (NPM) of pesticide production factors is greater than one, namely (6.91). This shows that economically the use of fertilizers has not been efficient or is in rational area, this is due to the use of pesticides that are not yet intense in spraying and the use of doses that are not appropriate, thus it is clear that the use of pesticides depends on the size and small dose of the disease being faced. on cabbage plants so that pesticides only allow to prevent diseases, pests on cabbage plants. Therefore, it is necessary to use the right dose and use of pesticides, starting from the experience of farmers in farming cabbage, of course, pests and diseases that attack cabbage plants as much as possible do prevention before pests and diseases attack cabbage plants, because the use of pesticides is a preventive measure before the occurrence of the spread of pests and diseases is increasingly widespread, so that cabbage plants can be handled carefully by farmers. if from every spraying done by farmers by increasing or decreasing the dose of pesticide use, of course this can provide additional production and maximum profit. The use of pesticides is in accordance with the principle of increasing return to scale because the efficiency value is more than 1, meaning it can increase the amount of pesticides, in increasing cabbage production.

5.Labor

From the results of the analysis, it is known that the NPMx/Px of the use of labor is (2.08) where the number is more than 1, so that the use of labor in the research area is not efficient or is in the rational I region. Nicholson (2002:175) says that price efficiency is achieved when the ratio between the marginal productivity value of each input (NPMxi) and the input price (Pxi) is equal to 1. This shows that the use of labor is 1.88 HOK in the farm production process starting from land processing to harvest with the land

area in the study area has not been efficient. In order to optimize the use of labor, it is necessary to increase the use of labor, so as to increase the production and income of cabbage farmers. The use of labor in the study area is the average workforce in the family, from children, cousins, daughters-in-law due to the ability to pay for labor from underprivileged farmers so that the use of labor is not optimal at work. In this case, to maximize the use of labor, capital support is needed from cooperative institutions or KUR to be able to pay for labor as needed, with capital support it is able to increase labor so that the use of labor is in accordance with the rules of increasing return to scale, meaning that the addition of labor does not increase. can increase the number of workers, in increasing the production of cabbage.

From the results of the calculation of technical efficiency and allocative efficiency (price efficiency) economic efficiency in cabbage farming is not yet economically efficient > 1, so it is necessary for all cabbage farmers to review in organizing, all use of production factors in cabbage farming.

Conclusion

Average Cabbage Production in East Lombok Regency is 19 tons per hectare or 27% of the cabbage production capacity of 40 tons per hectare. The highest productivity is produced in the highlands at 34 tons per hectare, then in the medium plains at 17.5 tons per hectare and the lowest in the lowlands at 16 tons per hectare. Production in the lowlands, medium plains and highlands in East Lombok Regency was significantly different. Factors that have a positive and significant effect on cabbage production in East Lombok Regency are seeds and fertilizers, while cabbage production factors that have a positive but not significant effect are land area, pesticides, and labor. The use of production factors of land area, seeds, fertilizers, pesticides and labor in cabbage farming in East Lombok Regency is technically efficient (0 < EP < 1); while allocatively not all of them are efficient. Therefore, the use of these production inputs from the economic aspect has not been efficient.

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