ANALYSIS OF THE EFFECT OF CONVERSION OF RICE FIELDS ON AGRICULTURAL PRODUCTIVITY IN EAST NUSA TENGGARA

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Abstract

The centrality of agriculture as one of the large sectors that sustain Indonesia's GDP does not make this sector free from various problems. The transfer of the function or conversion of agricultural land to nonfarm is a serious problem that occurs in Indonesia, especially in East Nusa Tenggara. The explosion of population growth and the shift of the economy to the manufacturing sector are the strongest reasons for the narrowing of agricultural land. The productivity of agricultural products is something that needs to be considered. This study uses descriptive analysis techniques and supported data from BPS. The results of this study showed no relationship between the phenomenon of transfer of agricultural land functions and agricultural productivity in East Nusa Tenggara.

Keywords: *land, productivity, agriculture*

PRELIMINARY

Indonesia is an agrarian country where the main occupation of the population is in the agricultural sector or national products derived from agriculture (Mubyarto, 1989). The agricultural sector is a sector that has an important role in the Indonesian economy. The economic sector also plays a role in national development with the aim of achieving a sustainable economy that can contribute around 2.9 percent of government revenue (Ackerman & Santon, 2013). The role of the agricultural sector in Indonesia, apart from being a source of food, is also a source of the community's economy, as in developing countries, especially Indonesia, agriculture is a source of income with an estimated contribution of around 60-70 percent. Excess food supply for the population, increasing demand for industrial products that can expand the secondary sector. and tertiary, (Nguyen, Janet, & Andrew, 2015); (Dewi & Rudianto, 2013); (Jhingan, 2007).

Infrastructure development which is currently being focused on by the government has had a considerable impact in terms of land acquisition, many agricultural lands have been converted into infrastructure such as: roads, construction of public facilities and others. In addition to infrastructure development, agricultural land has been converted into factories and residential areas due to changes in economic orientation and soaring population growth. The conversion of agricultural land causes economic marginalization due to the unpreparedness of human resources from working in the agricultural sector to the manufacturing sector (Hatu, 2018). The reduced area of agricultural land due to land conversion will have an impact on several aspects, one of which is the food aspect, namely a decrease in agricultural production where rice is a primary need because it is a staple food and a source of calories for most people in Indonesia (Zaeroni & Rustayuni, 2016). The food needs of the Indonesian population of 96.09 percent come from rice consumption. Rice has a strategic role in household food consumption, this can be seen from the participation rate of rice consumption in cities and villages which shows a percentage of 97-100 percent or only three percent of households that do not eat rice. In 2015, rice production in East Nusa Tenggara Province was 112,100 tons of milled dry rice. This number has decreased from production in 2014 of 3. 520 tons or around 3.04% (Central Bureau of Statistics, 2015). This shows that there is a positive relationship between population, land conversion and agricultural production. Based on these conditions, whether the production of rice that will become rice can affect national food security. To maintain food security, several efforts can be made, including controlling the conversion of agricultural land, creating new agricultural land, intensifying agricultural systems by applying technology that can increase agricultural

production and maintain environmental quality (Mulyani & Agus, Potensi Lahan Mendukung Revitalisasi Pertanian, 2006). whether the production of rice which will become rice can affect national food security. To maintain food security, several efforts can be made, including controlling the conversion of agricultural land, creating new agricultural land, intensifying agricultural systems by applying technology that can increase agricultural production and maintain environmental quality (Mulyani & Agus, Potensi Lahan Mendukung Revitalisasi Pertanian, 2006). Whether the production of rice which will become rice can affect national food security. To maintain food security, several efforts can be made, including controlling the conversion of agricultural land, creating new agricultural land, intensifying agricultural systems by applying technology that can increase agricultural production and maintain environmental quality (Mulyani & Agus, Potensi Lahan Mendukung Revitalisasi Pertanian, 2006).

According to research conducted (Zuhdi, 2021) From report (Kementerian Pertanian, 2020), in 2017 rice and corn became the largest contributors to the agricultural sector in NTT with a total production of 1,900,651 tons. Changes in land use in East Nusa Tenggara occurred due to high population growth and resulted in an increase in settlements that were previously productive agricultural land (Angin & Sunimbar, 2021). The important role of the agricultural sector in Indonesia does not directly free the sector from various problems, one of which is the conversion of agricultural land to non-agricultural land. Land conversion that occurs in developing countries such as Indonesia is caused by structural and demographic transformations of the economy. The structural transformation of the economy occurs on the basis of more advanced agriculture, while the demographic transformation occurs on the basis of rapid population growth (Kustiawan, 1997) . According to agricultural land statistics in 2015 released by the Center for Agricultural Data and Information Systems, Secretariat General of the Ministry of Agriculture, this shows that the growth of rice fields in Indonesia is -0.17 percent, which means there is a decrease in the area of agricultural land. (Kementerian Pertanian, 2020). This is reinforced by research conducted by Mulyani and her colleagues in rice production centers in Indonesia which shows the conversion of paddy fields covering an area of 96,512 ha/year. The conversion of agricultural land covering an area of 100,000 hectares/year that occurs in Indonesia at this time can only be balanced with the opening of rice fields covering an area of 40,000 hectares every year. there is a conversion of paddy fields covering an area of 96,512 ha/year. The conversion of agricultural land covering an area of 100,000 hectares/year that occurs in Indonesia at this time can only be balanced with the opening of rice fields covering an area of 40,000 hectares every year. there is a conversion of paddy fields covering an area of 96,512 ha/year (Mulyani, Nursyamsi, & Syakir, 2020). The conversion of agricultural land covering an area of 100,000 hectares/year that occurs in Indonesia today can only be balanced with the opening of 40 rice fields.

Based on research conducted by (Harini, Ariani, Supriyati, & Satriagasa, 2019) Changes in agricultural productive land that are increasingly widespread have an impact on decreasing agricultural production, especially rice. (Putra & Ismail, 2017)His research shows that building houses, saving, buying houses and working capital are factors that cause the conversion of agricultural land under 0.5 hectares and is a serious threat to national food security. Study (Sasongko, Safari, & Sari, 2017)adding the strong influence of the private sector in the decision of farmers to release their land to be used as factories. In research conducted by (Gumilang & Kuspriyanto, 2017) factors that cause farmers to change functions are the level of education, price and land area.

The research was conducted in East Nusa Tenggara. The issue of border areas is very interesting, especially if it is associated with the conversion of agricultural land to the value of agricultural production, which will affect the economic development of the region. This research was conducted using quantitative methods based on published secondary data. Secondary data was obtained from the Central Statistics Agency of East Nusa Tenggara Province. The secondary data used in this study include: data on the area of agricultural land, the amount of corn production, the amount of soybean production and also data on the amount of rice production from 2012 to 2015. The data collection of this research was carried out by studying the literature. The analytical model used to determine changes in agricultural land and rice production is trend analysis. Linear regression analysis was conducted between agricultural land area and agricultural production to determine the effect of agricultural land area on agricultural production.

Regression is done using the E-views program. In this case, the amount of agricultural production is the affected variable, while the area of agricultural land is the affected variable.

Aim :

1. Analyzing the effect of paddy field area on agricultural production

2. Analyzing the effect of agricultural productivity on economic growth in NTT

Benefit :

1. Provide knowledge and information about agricultural production and its effect on economic growth

2. As a material for consideration and additional literature studies for the government in making policies, especially in the field of agriculture

RESEARCH METHODOLOGY

A. Data Types and Sources

1. Data Type

The data used in this study used secondary data. according to (Sugiyono, 2013)What is meant by secondary data sources are sources that do not directly provide data to data collectors, for example through other people or through previous documents that are taken from reports, research journals, magazines and other supporting library materials.

2. Data source

Sources of research data obtained indirectly through intermediary media, for example from the Central Bureau of Statistics, magazines, information or other publications. The data can be in the form of information from the Central Statistics Agency (East Nusa Tenggara), newspapers related to agricultural data and conversion of paddy fields. The data collected include: the area of rice fields, the amount of corn production, the amount of rice production, and the amount of soybean production.

B. Data analysis technique

This study uses statistical methods for estimation purposes. In the statistical method, the analytical tool that can be used is regression analysis using panel data. Regression analysis is a study of the dependence of a variable with other variables, with the aim of estimating / predicting population values based on certain values of known variables. (Gujarati, 2003)This research will use multiple linear regression equation with the model:

$$Y = f\left(X_1{}^{\beta_1}, X_2{}^{\beta_2}, X_3{}^{\beta_3}\right) + \varepsilon_i \quad (1)$$
$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon_i \quad (2)$$

Where:

Y	= Area of Agricultural Land in East Nusa Tenggara
X_1	= Total Rice Production in East Nusa Tenggara
X_2	= Total Corn Production in East Nusa Tenggara
X_3	= Total Soybean Production in East Nusa Tenggara
$\beta_1, \beta_2, \beta_3$	= Coefficient of each Variable
α	= Constant
ε_i	= Residue

To support this model, we also carry out several additional types of testing, namely:

1. Test chow

The specification test aims to determine the panel data analysis model to be used. The Chow test is used to choose between the fixed effect model or the common effect model that should be used. If the results of this specification test show a Chi-square probability of more than 0.05, the model chosen is the common effect. On the other hand, if the Chi-square probability is less than 0.05, the model that should be used is the fixed effect. When the selected model is fixed effect, it is necessary to do another test, namely the Hausmann test to find out whether it is better to use the fixed effect model (FEM) or the random effect model (REM).

2. Hausman test

This test aims to determine which model should be used, namely the fixed effect model (FEM) or the random effect model (REM). In FEM each object has a different intercept, but the intercept of each object does not change over time. This is called time-invariant. Whereas in REM, the intercept (together) represents the average value of all intercepts (cross sections) and components■represents the (random) deviation of the individual intercepts from the mean value (Gujarati, 2003).

3. Classic assumption test

The classic test that we will do consists of:

a. Normality test

The normality test aims to test whether in the regression model, the dependent variable and the independent variable are both normally distributed or not. Decision making with Jargue-Bera test or JB test, that is, if the probability is >5%, then the variables are normally distributed. If this assumption is violated, the statistical test becomes invalid for a small sample size. There are two ways to detect whether the residuals are normally distributed or not, namely by graphical and statistical analysis. The residual is normally distributed if it has a significance value > 0.05 and is not normally distributed if it has a significance value < 0.05.

b. Heteroscedasticity test

The heteroscedasticity test aims to test whether in the regression model there is an inequality of variance from the residual of one observation to another observation. Heteroscedasticity is a condition where the variance inequality of the residuals in the regression model. A good regression model requires the absence of heteroscedasticity problems. Heteroscedasticity causes the estimator or estimator to be inefficient and the value of the coefficient of determination will be very high. To detect the presence or absence of heteroscedasticity by ooking at the pattern of dots on the regression scatterplots. If the points spread with an unclear pattern above and below the number 0 on the Y axis, there is no heteroscedasticity problem (Priyatno, 2013). If the variance of the residual value between observations remains, then this condition is called homoscedastic. However, if they are different, it is called heteroscedasticity. A good regression model is a model that is homoscedastic. It is said that heteroscedasticity occurs if the probability value of OBS*R-square on the results of the heteroscedasticity test is ess than 5% or 0.05.

c. Multicollinearity test

The multicollinearity test aims to test whether the regression model has a correlation between the independent variables or not. A good regression model should not have a correlation between the independent variables. If the independent variables are correlated with each other, then the variables are not ortugal. Unortugal variables are independent variables whose correlation value between independent variables is equal to zero. According to (Gujarati, 2003), if the correlation coefficient between independent variables is more than 0.8, it can be concluded that the model has multicollinearity problems. On the other hand, if the correlation coefficient is ess than 0.8, the model is free from multicollinearity. Multicollinearity itself is a condition where between two or more independent variables in the regression model there is a perfect or near perfect inear relationship. (Priyatno, 2013).

To detect the presence or absence of multicollinearity by ooking at the Tolerance and VIF values. The smaller the Tolerance value and the greater the VIF, the closer to the multicollinearity problem. In most studies, it is stated that if the tolerance is more than 0.1 and the VIF is ess than 10, it can be concluded that in the regression model there is no multicollinearity problem. (Priyatno, 2013)

d. Autocorrelation test

Autocorrelation is a condition where there is a correlation of residuals for one observation with another observation which is arranged according to a time series. A good regression model requires no autocorrelation problems. The impact caused by the presence of autocorrelation is that the sample variance cannot describe the population (Priyatno, 2013).

Autocorrelation can be defined as the correlation between members of a series of observations ordered by time (for times series data) or space (cross-section data). The autocorrelation test aims to test whether in the inear regression model there is a correlation between the confounding error in the time or

space period with the confounding error in the previous time or space. To detect this problem, the Durbin-Watson (DW) test can be used. The criteria for the DW test are as follows:

Table 1 Durbin Watson (DW) Testing Criteria

Zero Hypothesis	Decision	Criteria
There is a positive autocorrelation	reject	$0 < d < dl$
There is no positive autocorrelation	No decision	$dl < d < du$
There is a negative autocorrelation	reject	$4-dl < d < 4$
There is no negative autocorrelation	No decision	$4-du < d < 4dl$
No autocorrelation	Don't refuse	$du < d < 4-du$

Source: Damodar Gujarati, Basic Economertics

4. T Uji test

The test of the value of the t statistic is a test of the significance of the individual parameters. The statistical value of t shows how far the influence of the independent variables individually on the dependent variable. The test of the t statistical value is also called a partial test in the form of a regression coefficient (Purwanto and Dyah, 2017).

Ho : 1, 2, 3 = 0

Ha : 1, 2, 3 0

The t statistic is calculated from the following formula:

t test : $t = \dfrac{\beta 1}{se(\beta_1)}$

Where :

1= parameter coefficient

se $(\beta 1)$ = standard error coefficient parameter

The t-test method is to compare the t-count with the table. If the t-count value > the t-table value, then Ho is rejected, which means that the independent variable (X) affects the dependent variable (Y), is the evel of significance and (nk) the degrees of freedom, namely the number of n observations minus the number of independent variables in the model (Ghozali, 2018).

The test used to test the hypothesis of each independent variable owned. The nature of the researcher is to reject h0 and accept ha. What is seen is the value of t-statistics and probability values from the results of the regression test. It is said that the variable is significant if the prob t-statistic value of the regression test results is ess than (alpha)

5. F Uji test

This test is to see the significance of the model owned. What is seen is the value of F-Statistics and prob (F-Statistics) on the results of the regression test. The F test has 2 ways of reading:

a. Goodness of fit (feasibility of the model): the model is said to be feasible if the prob value (F-Statistics) in the regression test results is ess than (alpha) 1%, 5%, 10%

Simultaneous: if the results of goodness of fit are significant, then the independent variables jointly affect the dependent variable that we have (declaration).

The F statistical test basically shows whether all the independent variables included in the model have a joint or simultaneous effect on the dependent variable. H0 is the joint hypothesis that:

1,β2, 3.......βk is simultaneously zero. Decision making:

Ho :β1,β2, 3 , .. = 0 , all coefficients are simultaneously equal to zero.

Ha :β1, 2, 3, .. 0 , all coefficients are simultaneously not equal to zero.

Hypothesis testing is often called testing the overall significance of the regression ine which wants to test whether Y is inearly related to X1, X2, X3. The joint hypothesis can be tested using the analysis of variance (ANOVA) technique.

F statistics can be calculated by the formula:

Fh $= \dfrac{R^2 / k}{}$

$(1-R_2)/(n-k-1)$

If the calculated F value > F table then HO is rejected and H1 is accepted, meaning that there is an effect of the independent variables together on the dependent variable. On the other hand, if F count < F table, then HO is accepted and H1 is rejected, meaning that there is no effect of the independent variables together on the dependent variable. The statistical F test that measures the overall significance of the regression ine can also be used to test the significance of R^2, in other words the F-statistical test is the same as testing R^2 (Ghozali, 2018).

6. Coefficient of Determination (R^2)

The coefficient of determination or goodness of fit is used to determine how far the model's ability to explain the variation of the dependent variable is. The value of R^2 is in the range 0-1. The higher the number, the better the model is made and vice versa. The coefficient of determination essentially measures how far the model's ability to explain variations in the dependent variable is. The value of the coefficient of determination is between zero and one. A small value means the ability of the independent variables in explaining the variation of the dependent variable is very imited. A value close to one means that the independent variables provide almost all the information needed to predict the variation of the dependent variable (Ghozali, 2018).

RESULTS AND DISCUSSION

East Nusa Tenggara has 22 districts/cities. The 22 regencies/cities owned are often grouped into their respective regions and regions to find out trends in and development and the amount of agricultural production in each region, which I present in the following table.
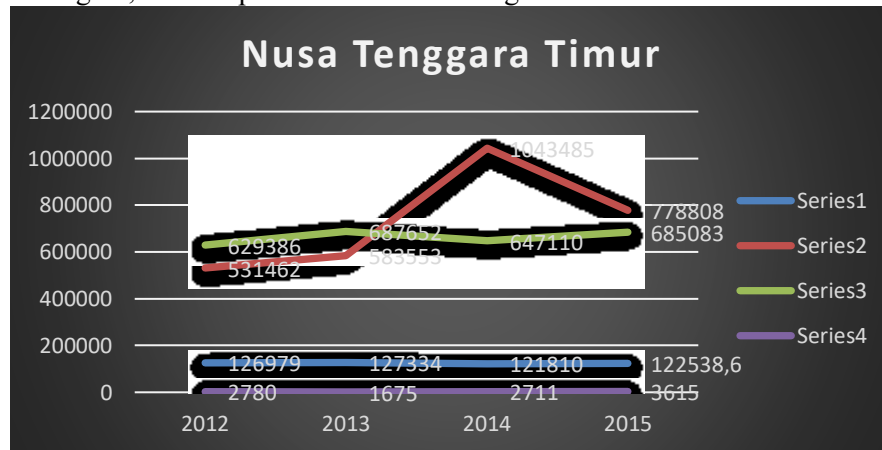

Figure 1. Graph of and Area and Total Agricultural Production in West Nusa Tenggara for the 2012-2015 period

Information :
    a. Series 1 = Agricultural and Area
    b. Series 2 = Total Rice Production
    c. Series 3 = Total Corn Production
    d. Series 4 = Total Soybean Production

Based on these data, the area of agricultural and fluctuates due to the conversion of agricultural and to non-agriculture. This and conversion resulted in unstable production in the agricultural sector

Test Model
Table 2. Model Test

Name Test	Value Probability
Test Chow	0.0000
Test Haussman	0.0000
Classic assumption test	
Normality test	0.000000
Test T	0.2921
Test F	0.000000
Coefficient Determination	0.940762

Source: data processed 2021

Information:

a. Based on the results of the Chow test, the fix effect model is better than the common effect model.
b. The results of the haussman test show that the fixed effect model is better than the random effect model.
c. The normality test showed that the data were not normally distributed and the heteroscedasticity test, multicollinearity test and autocollinearity test could not be displayed.

Panel Data Analysis

Based on the results of the model test, below we present the results of the regression using the fixed effect model. In the previous test, the model has not passed the classical assumption test, so the estimation results are not consistent and can be said to be biased:

Table 3. Panel Data Analysis

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5791.904	430.1681	13.46428	0.0000
PADI	-0.009759	0.009185	-1.062461	0.2921
JAGUNG	0.001128	0.010541	0.107039	0.9151
KEDELAI	1.358808	0.830167	1.636788	0.1067

Source: data processed 2021

Based on the probability value then:

- Variable X1 rice production has a value of 0.2921> 0.05, so it can be concluded that this variable is not significant to variable Y (rice field area).
- Variable X2 corn production has a value of 0.9151> 0.05, so it can be concluded that this variable is not significant to the Y variable (rice field area).
- Variable X3 soybean production has a value of 0.1067>0.05, it can be concluded that this variable is not significant to the Y variable (rice field area).
2. T Test (Partial)
   The results of the partial test analysis show that each independent variable individually does not significantly affect the dependent variable. Here we describe each of the independent variables:
- Rice Production

The effect of rice production on the area of paddy fields showed insignificant results. This can be seen from the t-count value of -1.062461 and the probability of 0.2921 in the 5% significance evel.

- Corn Production

The effect of corn production on paddy field area showed insignificant results. This can be seen from the t-count value of 0.107039 and the probability of 0.9151 in the 5% significance evel.

- Soybean Production

The effect of soybean production on the area of rice fields showed insignificant results. This can be seen from the t-count value of 1.636788 and the probability of 0.1067 in the 5% significance evel.

3. F Test (Simultaneous)

Based on the results of the analysis using Eviews 10 software, the F-count value is 41.68806 and the F probability is 0.000000. In the 5% significance evel, the F test is significant. So it can be concluded that all independent variables together have a significant effect on the dependent variable. Variables of rice production, corn production, and soybean production together have a significant effect on changes in and area. And the model has also fulfilled the goodness of fit.

4. Coefficient of Determination

The influence of the independent variable on the dependent variable is 94.07% indicated by the goodness of fit value or the coefficient of determination of 0.940762 and 5.93% is explained by other variables outside the model.

CONCLUSION

If we write the final equation of the research model that I have done, it will become:
LAND_AREA = 5791.9042536 - 0.00975876185367*RICE + 0.00112832894347*CORN + 1.35880817463*SOYBEAN + [CX=F]
Information :
Y = Area of paddy field
X1 = Rice production
X2 = Corn production
X3 = Soybean production
ε/CX=F = Error

Variables of rice production, corn production and soybean production which do not significantly affect the area of land I assume because productivity does not affect the conversion of agricultural and, therefore these variables cannot affect the area of rice fields.

I am aware that my research did not pass the classical assumption test, therefore our research has a model that is not BLUE (Best inear Unbiased Estimator). And even this research still has shortcomings in many aspects. I hope that the next researcher can improve the research that I do.

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