Analysis of the Factors Affecting the Transfer of Rice Fields to Non-Paddy Lands in the City of Mataram

Abstract

This study aims to analyze the factors that influence the conversion of paddy fields to non-rice fields on rice production in Mataram City. In particular, the purpose of this study is to look at the factors that influence the conversion of paddy fields to non-rice fields. This study looks at the effect of annual household growth, GRDP, development of standard rice fields, the ratio of rice and non-rice fields prices, the ratio of agricultural and non-agricultural production values. To see what affects rice production in particular, namely land conversion, area of harvested land, the ratio of rice and non-rice fields prices and the ratio of agricultural and non-agricultural production values. This study uses secondary data obtained from the BPS (Central Bureau of Statistics) Mataram City office. The data is then analyzed using the multiple linear regression analysis method. The results showed that there were only 3 factors that were influential or significant, namely 1) the number of households with a coefficient value of 100.301 with a sig value of 0.022 percent, 2) GRDP coefficient value of 7.396E-8 with a sig value of 0.006 percent, 3) Standard rice field area with a coefficient value of - 1.527 with a sig value of 0.030 percent, although of the three factors there is one factor that has a negative or inversely effect. As for the factors that affect the conversion of paddy fields to non-rice fields on rice production, there is only one factor that has a real or significant effect on rice production, namely the area of rice harvested land (HA) by obtaining a coefficient value of 7.958 (sig 0.038 percent) which This means that the area of rice harvested land (HA) greatly affects the yield of rice production in the city of Mataram.

***Keywords*: Analysis, conversion of rice fields, non-rice fields.**

INTRODUCTION

Land is a strategic natural resource for development, and almost all physical development sectors require land s, such as agriculture, forestry, housing, industry, mining, and transportation in agriculturel. The land is a very important resource, both for farmers and agricultural development. This is based on the fact that agricultural activities still rely on agricultural land (Purwanto, et al., 2010).

In the Strategic Plan of the Directorate General of Food Crops 2015-2019 (Sudarma, et al., 2015), the challenges of meeting the needs of human life will be increasingly complex and dynamic. Each country is obliged to secure the availability of these needs, especially food and energy needs. Food crops as one of the agricultural sub-sectors have a strategic position in providing food needs, Gross Domestic Product (GDP), sources of employment and income, and sources of foreign exchange.

On the other hand, lately, in line with the increasing standard of living and the opening of opportunities to create job opportunities marked by the large number of investors or the community and the government in carrying out development, the demand for land has increased. The increase in land demand is also driven by an increase in population, while the availability and area of land remain constant. This results in changes in land use from less profitable activities to more profitable activities. Land use activities that are always threatened are mainly agricultural activities because the agricultural sector in economic development in Indonesia tends to be considered less profitable than other economic activities, including in the city of Mataram (Hidayat, 2008).

The city of Mataram as the center of government has a strategic role in developing and growing other cities in the Province of NTB. One of the impacts is an increase in the community's need for housing (boards). This is due to the increasing population growth and community income, so that the need for housing is also increasing because the need for housing is a basic need after food and clothing (Prasetyo dan Suriadikarta, 2006).

Based on data on the population of Mataram City in 2018, there were 477,476 people. There was an increase of 8,967 people or around 3.01% of the total population in 2017. The largest population is in Ampenan sub-district with 92,714 people (BPS Mataram). This is because the Ampenan sub-district is a regional trade area as well as the oldest sub-district in Mataram City. This increase in population impacts the conversion of agricultural land into non-agricultural land in Mataram City.

In the last 15 years, from 2007to 2019, the conversion of land from agricultural land to non-agricultural land has been quite high, covering an area of 1,774.9 hectares (BPS Mataram,

2018). The most significant occurrence of land-use change is in the Ampenan sub-district, which is 1,542.5 ha with use as a city infrastructure development area, educational area, industry, road expansion, and housing.

From Table 1, it can be seen that in 13 years (2007-2019), the average agricultural land converted is 76.57 ha per year or 4.21% per year. Most of the conversion of paddy fields was in the 2007-2007 period, from 3,598 ha in 2006 to 1,678.67 ha in 2007 or 53.34% of the function was converted.

Table 1. Development of rice field land conversion in Mataram City, 2006-2020

No.	Year	Rice Field Area (ha)	Switch Function (ha)	Percentage (%)
1	2006	3.598,00	-	
2	2007	1.678,67	-1.919,33	-53,34
3	2008	1.849,38	170,71	10,17
4	2009	1.966,14	116,76	6,31
5	2010	2.348,35	382,21	19,44
6	2011	2.084,88	-263,47	-11,22
7	2012	2.050,46	-34,42	-1,65
8	2013	1.963,42	-87,04	-4,24
9	2014	1.955,75	-7,67	-0,39
10	2015	1.888,94	-66,81	-3,42
11	2016	1.867,44	-21,50	-1,14
12	2017	1.857,07	-10,37	-0,56
13	2018	1.823,10	-33,97	-1,83
14	2019	1.513,00	-310,10	-17,01
15	2020	1.513,00	0	0,00
Average			-76,57	-4,21

Source: BPS Mataram (2021, processed)

Changes in land use are also influenced by community income. The income represented by GRDP has an important role in land conversion. Based on Mataram City GRDP data in 2018 of Rp. 17,955,994, - an increase of Rp. 17,738,851.17 - from 2015, In addition, the growth in the number of industries which is marked by the increasing number of trading companies has resulted in the conversion of agricultural land whose development is very dependent on the availability of land. The purpose of this study was to analyze the development of conversion of paddy fields to non-rice fields and rice production in the period 2007-2019 in the city of Mataram, to analyze the factors that influence the conversion of rice fields to non-rice fields in the city of Mataram and to analyze the effect of conversion rice fields to non-rice fields on rice production in Mataram City.

METHOD

The research method used in this research is associative research which is associative research. This research was conducted in Mataram City, NTB Province, measured in hectares (Ha) according to the largest to the smallest area. This research was conducted in 2019 using time series data for the variable area of agricultural land conversion from 2006 to 2020.

Research variable

The dependent variable is the rate of conversion of paddy fields in Mataram City, while the independent variables are (X1) Household growth per year (RT/year), (X2) Mataram City GDP (Rp/year), (X3) Development of Baku Rice Fields (X3) ha), (X4) Price Ratio of Paddy and Non-Paddy Fields, (X5) Ratio of Value of Agricultural and Non-Agricultural Production in the last fifteen years, from 2006 to 2020. This multiple linear regression analysis uses SPSS software version 16. Model specifications that will be used econometrically in this research are:

$$Y_i = \beta_0 + \beta_1 Xi \text{ ....(1)}$$

Information:

Y = Trend of land conversion and rice production in Mataram City (ton/th).

β_0 = Constant.

β_1 = Parameter trend (Conversion of paddy fields to non-rice fields and rice production)

Xi = Rice production in base year (ton)

$Y_1 = \beta_0 + \alpha_1 Y_2 + \alpha_2 HA + \alpha_3 X_4 + \alpha_4 X_5 + u_i$ .....(2)

$Y_2 = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + u_i$ .....(3)

Information:

Y_1 = Rice production (ton).

Y_2 = The endogenous variable value of the estimated area of rice paddy fields is converted to function (ha).

HA = Rice harvest area (ha)

X_1 = Household growth per year (RT/th)

X_2 = PDRB Mataram City (Rp)

X_3 = Development of raw rice field area (ha)

X_4 = Price ratio of paddy fields and non-rice fields

X_5 = Ratio of the value of agricultural production of food and non-agricultural crops

β_0 = intercept ;β_1.....β_7 = regression coefficient

u_i = *disturbance term*

RESULTS AND DISCUSSION

Factors Affecting the Transfer of Rice Fields

Analysis of the Factors Affecting the Transfer of Rice Fields

The results of the analysis of factors affecting the conversion of paddy fields in Mataram City are presented in Table 2.

Table 2. Results of the Analysis of Factors Affecting the Transfer of Rice Fields in the City of Mataram, 2021.

Model	*B*	*Standard Error*	*t Stat*	*Sig*
Constant	2882,014	2129,802	1,353	0,218
X1 (RT Pertumbuhan growth)	100,301	34,266	2,927	0,022
X2 (PDRB)	7,396E-8	0,000	3,875	0,006
X3 (Swh Baku)	-1,527	0,563	-2,711	0,030
X4 (RASIO HLS:HLNS)	1218,635	788,196	1,546	0,166
X5 (RASIO NPP:NPNP)	20637,666	27752,970	0,744	0,481
Koefisien Det (R2)	0,932			

F-test (0,05)	19,121
Sig-F	0,001

Source: Appendix 10.

It appears that in the model variable, the results of the regression estimation of the factors that influence the conversion of paddy fields to non-rice fields in Mataram City can be used as a model because the Sig-F is < 0.000 or 0.0000. The regression model is as follows:

Y= 2882,014+100,301X1+7,396E-8X2-1,527X3+1218,635X4+20637,666X5

Based on the analysis results of the factors that affect the conversion of paddy fields in the city of Mataram (Table 3), the increase in the household, GRDP, standard rice fields, has a significant effect on the conversion of paddy fields. In contrast, the ratio of prices for paddy fields and non-rice fields, the value ratio of agricultural and non-agricultural production have a non-significant effect on the conversion of paddy fields.

Household Growth (X1). From the analysis results, the regression coefficient value for Household Growth (X1) is 100.301.

The regression model results prove that the household has a significant effect with a sig value of 0.022 and is positive for the amount of land-use change in the city of Mataram. The magnitude of the coefficient value of the household growth parameter is 100.301. This means that every time there is an increase of 1 household unit, there will be an increase in the conversion of agricultural land to 100.301 ha with the assumption that other variables are constant.

The number of households in Mataram City every year always increases with an average growth rate of 7.7% in the last 13 years (2007-2019). This can be seen in Table 3.

With the number of households that are always experiencing additions, it is in dire need of residential houses or new settlements for residence.

Table 3. The number of households in Mataram City in 2007-2019.

No	Year	Amount RT	increment RT/th	% increment RT/th
1	2007	89.035	-	-
2	2008	91.318	2.283	5,4
3	2009	104.443	13.125	31,0
4	2010	111.436	6.993	16,5
5	2011	113.123	1.687	4,0
6	2012	115.599	2.476	5,8
7	2013	118.116	2.517	5,9
8	2014	120.629	2.513	5,9
9	2015	123.134	2.505	5,9
10	2016	125.620	2.486	5,9
11	2017	128.135	2.515	5,9
12	2018	130.587	2.452	5,8
13	2019	131.439	852	2,0
Total			42.404	
Average				7,7

This is in line with Syaifuddin et al (2013) research that the increasing number of households causes physical development activities to move very rapidly. However, the speed of physical development is not accompanied by adequate land carrying capacity, soland use is often inappropriate.

Total GRDP (X2). From the analysis results, the regression coefficient value for Total GRDP (X2) is 7.396E-8.

The regression model results prove that the amount of GRDP has a significant effect with a sig value of 0.006 and is positive for the amount of land conversion in Mataram City. The value of the parameter coefficient of the amount of GRDP is 7.396E-8, this means that

every 1 unit increase in the amount of GRDP, there will be an additional conversion of agricultural land of 7.396E-8 Ha with the assumption that other variables are constant.

Gross regional domestic product (GRDP) income is regional income originating from various existing sectors. One of the important indicators to determine the economic condition of a region/province in a certain period is the Gross Regional Domestic Product data. The increase in GRDP will directly benefit the community to improve their quality of life. This is because the main source of GRDP in Mataram City comes from the service sector which requires a large area of land or new land.

The increase in the value of GRDP in the city of Mataram also indicates that the level of community welfare in the area has increased, if the welfare of the community increases then the community will tend to improve the quality of their residence, often this need requires additional land or new land to build it.

Standard Rice Field Area (X3). From the results of the analysis, the regression coefficient value for the standard rice field area (X3) is -1.527.

The regression model results prove that the area of raw rice fields has a significant effect with a sig value of 0.030 and is negative on the amount of land conversion in Mataram City. The value of the parameter coefficient for the area of raw rice fields is -1.527. This means that every time there is an increase of 1 unit of standard rice fields, there will be a decrease in the conversion of agricultural land by 1.527 hectares with the assumption that other variables are constant.

The average land use change in Mataram from 2007 to 2019 was 7.69% or an annual average of 286.64 Ha. This can be seen in table 4.11 The area of raw rice fields is a natural resource that has a very broad function in meeting various human needs.

The Ratio of Paddy and Non Paddy Land Prices (X4). From the analysis results, the regression coefficient value for the Ratio of Rice and Non-Paddy Land Prices (X4) is 1218,635.

The regression model results prove that the Ratio of Paddy and Non Paddy Land Prices has no significant effect with a sig value of 0.166 and is positive on the amount of land use change in Mataram City. The value of the parameter coefficient of the Rice and Non-Paddy Land Price Ratio is 1218.635, this means that for every 1 unit increase in the Paddy and Non-Paddy Land Price Ratio, there will be an increase in the conversion of agricultural land to 1218.635 Ha with the assumption that the other variables are constant.

The average Paddy and Non-Paddy Land Price Ratio in the city of Mataram from 2007 to 2019 is 7.7% or the average annual ratio is 0.49 rupiah/year. This can be seen in table 4.16. Whereas the ratio of the price of paddy fields and non-rice fields which has the highest ratio value is in 2009 of 0.90 rupiah/year or 14.16 percent/year, while the lowest ratio value is in 2012 of 0.22 rupiah/year or 3. 50 percent / year.

Table 4. The rice and non-rice fields prices ratio in Mataram City, 2007-2019.

No.	Year	HLS	HLNS	RASIO HLS:HLNS	Persentase (%)
1	2007	20.000.000	35.000.000	0,57	8,99
2	2008	35.000.000	80.000.000	0,44	6,89
3	2009	90.000.000	100.000.000	0,90	14,16
4	2010	65.000.000	100.000.000	0,65	10,23
5	2011	90.000.000	250.000.000	0,36	5,67
6	2012	100.000.000	450.000.000	0,22	3,50
7	2013	250.000.000	550.000.000	0,45	7,15
8	2014	300.000.000	650.000.000	0,46	7,26
9	2015	400.000.000	800.000.000	0,50	7,87
10	2016	450.000.000	950.000.000	0,47	7,45
11	2017	500.000.000	1.100.000.000	0,45	7,15
12	2018	550.000.000	1.250.000.000	0,44	6,92
13	2019	600.000.000	1.400.000.000	0,43	6,74

Amount	2.850.000.000	6.315.000.000	6,35	100,00
Average	265.384.615	593.461.538	0,49	7,7

This is due to the land rent obtained by non-agricultural sector activities compared to the agricultural sector, this is because agricultural land owners only depend on their agricultural business for their lives and are difficult to separate from their agricultural land.

According to Ilham et al., (2005), it is explained that farmers do not dare to take the risk of the uncertainty of their livelihood after their agricultural land is transferred to someone else. In addition, from the social status of the population there are still links between the area of land ownership and the prestige that is carried in the community. The more land they have, the more people feel they have a high social status. So that people don't sell their land, they even prefer to increase their land area.

Ratio of Agricultural and Non-Agricultural Production Values (X5). From the analysis results, the regression coefficient value for the total agricultural and non-agricultural production values (X5) is 20637,666. The regression model results prove that the ratio of agricultural and non-agricultural production values does not have a significant effect with a sig value of 0.481 and is positive on the amount of land use change in Mataram City. The magnitude of the parameter coefficient value of the ratio of agricultural and non-agricultural production values is 20637.666, this means that every 1 unit increase in the ratio of agricultural and non-agricultural production values, there will be an increase in agricultural land conversion of 20637.666 Ha with the assumption that other variables remain constant.

The average ratio of agricultural and non-agricultural production values in the city of Mataram from 2007 to 2019 is 7.7% or the average annual ratio is 0.04 rupiah/year. This can be seen in table 4.17. Where the ratio of the value of agricultural and non-agricultural production which has the highest ratio is in 2007 of 0.0508 rupiah/year or 9.53% per year, while the ratio of agricultural and non-agricultural production value which has the lowest value is in 2013 of 0, 0356 rupiah/year or 6.68% per year. So we can conclude that the ratio of the value of agricultural and non-agricultural production in the city of Mataram has an ups and downs in the value of the ratio every year.

Table 5. The ratio of agricultural and non-agricultural production values in Mataram City, 2007-2019

No.	Year	NPP	NPNP	RATIO NPP:NPNP	(%)
1	2007	148881,60	2929312,93	0,0508	9,53
2	2008	164891,30	3459446,50	0,0477	8,93
3	2009	173741,50	3966404,92	0,0438	8,21
4	2010	186728,20	4642505,56	0,0402	7,54
5	2011	204447,00	5290650,07	0,0386	7,24
6	2012	218470,00	5874459,10	0,0372	6,97
7	2013	241666,00	6780710,53	0,0356	6,68
8	2014	473150,00	11160895,00	0,0424	7,95
9	2015	525185,00	12694082,00	0,0414	7,75
10	2016	548562,00	14219992,00	0,0386	7,23
11	2017	629396,00	15892324,00	0,0396	7,42
12	2018	674446,00	17281548,00	0,0390	7,32

13	2019	719496,00	18670772,00	0,0385	7,22
Amount		4909060,60	122863102,61	0,5335	100,00
Average		377620,05	9451007,89	0,0410	7,7

The Effect of Change in the Function of Rice Fields on Rice Production

The conversion of paddy fields to non-rice fields certainly has an impact on the total production of food crops, especially rice. The results of the analysis of the effect of land conversion on rice production can be seen in Table 6.

Table 6. Results of the Analysis of the Effect of Rice Field Land Function Change on Rice Production in the City of Mataram, 2021.

Model	*Coefficients*	*Standard Error*	*t Stat*	*Sig*	*Description*
	B				
Constant	-25263,659	29549,423	-0,855	0,417	
Y2	-3,966	3,996	-0,993	0,350	Non-Sig
HA	7,958	3,210	2,479	0,038	Sig
X4	-403,193	7587,345	-0,053	0,959	Non-Sig
X5	398186,272	519905,070	0,766	0,466	Non-Sig
Koefisien Det (R2)		0,81			
F-test (0,05)		8,55			
Sig-F		0,0055			

Source: Appendix 11

From Table 6, it appears that in the model variable the results of the regression estimation of the factors that affect the conversion of paddy fields to non-rice fields on rice production in Mataram City can be used as a model because the Sig-F is < 0.05 or 0.0055. The regression model is as follows:

$$Y = -25263{,}659 - 3.966Y2 + 7{,}958HA - 403{,}193X4 + 398186{,}272X5$$

Paddy Fields Changed Function (Y2). From the results of the analysis, the regression coefficient value for converted rice paddy fields (Y2) is -3.966. The results of the regression model prove that the function of rice paddy fields has a non-significant effect with a sig value of 0.350 and negative on the amount of rice production in Mataram City. The magnitude of the coefficient value of the land use conversion parameter is -3.966, this means that every time there is an increase of 1 unit of Converted Rice Field Land, there will be a decrease in rice production of 3.966 tons with the assumption that other variables are constant.

Agricultural land is a determinant of the influence of agricultural commodities (rice). In general, it is said the wider the area cultivated or planted, the greater the number of products produced by the land (Rahim, 2007: 36). On the other hand, low growth in harvested areas can be caused by changes in the standard area of rice fields and cropping intensity. The availability of paddy fields has a very important role in the dynamics of lowland rice production. This is because the available rice fields are reduced due to conversion to non-agricultural uses such as road construction, housing complexes, industrial areas, etc. The converted paddy fields never turned back into paddy fields (Irawan et al., 2003).

Rice Harvest Area (HA). From the analysis result, the regression coefficient value for rice harvested area (HA) is 7,958.

The regression model results prove that the rice harvested area has a significant effect with a sig value of 0.038 and is positive for the amount of rice production in Mataram City. The value of the parameter coefficient of rice harvested area is 7.958, this means that every time there is an increase of 1 unit of harvested area, there will be an increase in rice production of 7.9586 tons with the assumption that other variables are constant.

The influence of land area is not only on the level of efficiency of farming but also impacts efforts to apply technology in agricultural development. Maulana (2004), the application of new technology can obtain maximum results supported by land quality, good use of inputs and cultivation, and conducive output prices.

According to Mutawali (2017), the high rice production at the farmer level in Mataram City is because farmers always adopt the latest farming technology such as intensifying superior seed selection and balanced fertilization. Strict supervision of farmers from planting to harvesting by Agricultural Extension Officers is also one of the keys to high rice production in Mataram city because the distance of agricultural land in Mataram City is not too far away. This is in accordance with the results of research (Daniel, 2004: 58), although the rice harvest area is getting narrower, it does not affect rice production due to increasingly sophisticated agricultural technology.

Price Ratio of Paddy and Non-Rice Fields (X4). From the analysis results, the regression coefficient value for the ratio of rice and non-rice land prices (X4) is -403.193.

The regression model results prove that the ratio of the price of paddy fields and non-rice fields has no non-significant effect with a sig value of 0.959 and is negative on the amount of rice production in Mataram City. The magnitude of the parameter coefficient value of the rice field and non-rice field price ratio is -403.193, this means that every 1 unit increase in the ratio of rice and non-rice land prices, there will be a decrease in rice production of 403.193 tons with the assumption that other variables are constant.

In line with the description above, efforts to increase rice production in the city of Mataram are not possible because in addition to the increasing demand for agricultural products due to population growth, consumer demands for higher quality are also increasingly limited for fertile land for food crop cultivation due to land conversion.

Ratio of Agricultural and Non-Agricultural Production Values (X5). From the analysis results, the regression coefficient value for the ratio of agricultural and non-agricultural production values (X5) is 398186,272.

The regression model results prove that the ratio of agricultural and non-agricultural production values has a non-significant effect with a sig value of 0.466 and is positive for the amount of rice production in Mataram City. The value of the parameter coefficient of the ratio of agricultural and non-agricultural production values is 398186,272, this means that every 1 unit increase in the ratio of agricultural and non-agricultural production values, there will be an increase in rice production of 398186,272 tons with the assumption that other variables are constant.

The value of rice production greatly influences economic life (Setyawan, 2010). If the value of rice production is too low, farmers' income will decrease, and they become victims in the economy; otherwise, if the production value is too high, then consumers will become victims (Hermanto, 2012). In addition, if the price paid by farmers is lower than this optimal, the consumer gains profit, which is usually called consumer surplus (Mubyarto, 1994).

CONCLUSION

Based on the results of research and discussion, it can be concluded as follows:

a. That the factors that influence the conversion of paddy fields to non-rice fields are uncertain patterns, meaning that the conversion of paddy fields is highly dependent on many factors which in my research examined 5 variables, namely the number of households, GRDP, Raw Rice, land price ratio non-rice fields and the ratio of the value of non-agricultural agricultural production, but from these 5 factors there are only 3 factors that are influential or significant, namely 1) the number of households the coefficient value is 100.301 with a sig value of 0.022 percent, 2) GRDP coefficient value is 7.396E-8 with a value of sig 0.006 percent, 3) The area of standard rice fields with a coefficient value of -1.527 with a sig value of 0.030 percent, although from these three factors there is 1 factor that has a negative or inversely effect. Two factors are not significant or have no significant effect on the conversion of rice fields to non-rice fields, namely the ratio of prices for non-rice fields with a coefficient value of 1218,635 (sig 16%) and the ratio of the value of non-agricultural agricultural production with a coefficient value of 20637,666 (sig 48%).
b. The factors that affect the conversion of rice fields to non-rice fields on rice production, there is only one factor that has a real or significant effect on rice production, namely the area of rice harvested land (HA) by obtaining a coefficient value of 7.958 (sig 0.038 percent) which This means that the area of rice harvested area (HA) greatly affects the yield of rice production in the city of Mataram.

Recommendation

The mechanism for protecting food agricultural land in Mataram City through the establishment of PLP2B policies must consider the economic conditions and policies in the area. Protection of food agricultural land through the establishment of rural areas based on local business development can be an alternative. The great potential of food agriculture can be developed into a community business that can improve people's welfare. Thus, this can hamper the rate of conversion of agricultural land functions. This rural area institution can also manage LP2B incentives that will be received by farmers. Several types of incentives expected by farmers in Mataram City are capital assistance, support for repairing irrigation facilities and water sources, assistance for agricultural crops and fertilizers, as well as repairing production roads.

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