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Transfer of Agricultural Land Function and Its Impact on the Community Food Security Index in the Wajo Regency

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Abstract This study aims to determine the rate of conversion of paddy fields in the Wajo Regency, the factors affecting the conversion of agricultural land, and its impact on food security in the Wajo Regency. The basic method of this research is descriptive and quantitative analysis method. The type of data used is secondary data in the form of time series for the last twenty years starting from 2000-2019. The method of determining the location in this research is a purposive method, namely in the Wajo Regency. The quantitative analysis method used is partial land conversion, rate calculating influencing factor analysis using OLS (Ordinary Least Square) based multiple linear regression analysis, and food surplus analysis. The results show that the conversion rate of paddy fields in the Wajo Regency fluctuates at an average of 0.13% per year. The results of the multiple linear regression analysis show a confidence level of 95%, namely that there is a significant influence between the dependent variable area of paddy field land and the independent variable the amount of Gross Regional Domestic Product (GRDP), population, industry, building area and courtyards, and number of schools. The independent variables that affect the dependent variable individually are the Gross Regional Domestic Product (GRDP), population, and number of schools. The impact of the conversion of paddy agricultural land was the loss of rice production of 6,147.40 tonnes during 2000-2019. However, the food security of the population in Wajo Regency according to the results of the food surplus-deficit analysis is a surplus, which means it is resistant in spite of the changing function of the rice fields.

Keywords Land Function Change, Food Security, Agricultural Land

1. Introduction

Land is one of the elements necessary to meet basic human needs in terms of food, clothing and shelter. Land can be divided into two types according to its use, namely agricultural land and non-agricultural land. Agricultural lands are also distinguished as rice fields and non rice fields. Paddy fields include rice fields with irrigation, rainfed, tidal irrigation, and so on. Non-paddy fields include dry land/gardens, fields/huma, plantations, community forests, grazing/grass, temporarily uncultivated/idle land, and so on. Non-agricultural land consists of houses, buildings and surrounding yards, state forests, swamps (not planted), roads, rivers, lakes, barren land, and so on [1].

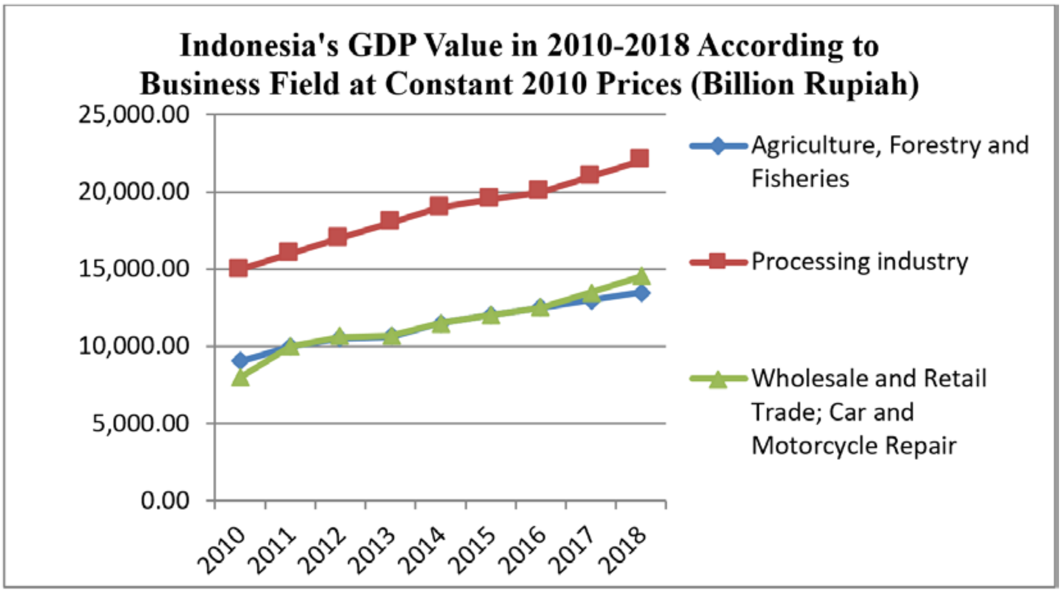
The importance of land to meet human needs as well as a means of physical development in both the agricultural and non-agricultural sectors is increasing. Meanwhile, land availability and land area are basically the same (not increasing). Increasing the need for land to meet one interest will reduce the availability of land for other interests. This encourages changes in land use [2], such as changes in land use of either part or all of the land that previously served as a place to grow rice to other functions [3].

Land use change is not a new phenomenon in human life. This phenomenon has been going on for a long time with human civilization. Initially, land conversion was carried out because it was needed, such as the example of clearing land from a forest area to become a residential area. However, the increasingly widespread activity of land conversion is considered to be a problem because it results in environmental damage. This further complicates problems due to explosive population growth, the invention and use of technology, and development dynamics [4].

Development in Indonesia itself emphasizes economic growth so that the sectors with the greatest impact are advancing rapidly. In order to assess the impact of this sector on Gross Domestic Product (GDP), we shall take into account its contribution to GDP. Gross Domestic Product (GDP) describes the economic growth of a region or country. The sector that occupies the first place in the contribution to GDP in Indonesia is the manufacturing sector, the second sector is the trade sector, while the agriculture, forestry and fisheries sector rank third as can be seen from Figure 1. This condition shows that non agriculture land use provides economic benefits with a greater contribution to GDP than agriculture land use. This encourages the conversion of agricultural land to other, more profitable interests. According to Hasibuan [5], land use is prioritized on uses with the greatest GDP contribution value.

The problem is further complicated by the population growth which is increasing every year. Population growth and a rise in land needed for different types of non agricultural activity are preceded by this increase. For example, for settlement needs, there are changes in the economic structure, and regional development such as the construction of transportation facilities. On the other hand, an increase in population means that there is an increase in basic needs, especially food, which must be met from agricultural products [6]. The gap between non-agricultural and agricultural needs will be examined in this study. In this study, the focus was on seeing the conversion of paddy fields which could have an impact on food security due to a decrease in food production, especially rice.

South Sulawesi Province is a province on Sulawesi Island which has a function as a national food buffer zone [7]. One of the areas in South Sulawesi Province that is experiencing problems with the conversion of paddy fields is Wajo Regency. Wajo Regency is one of the food stocks for South Sulawesi Province by ranking second in rice and rice production in South Sulawesi in 2019. The rice production data are shown in Table 1.



Source: Central Bureau of Statistics 2019 (processed)

Figure 1. Indonesia's GDP Value in 2010-2018 According to Business Field at 2010 Constant Prices (Billion Rupiah)

Table 1. The Most Rice Production According to 10 Regencies in South Sulawesi in 2019

No.	South Sulawesi Region	Rice Production (Tons)
1	Bone Regency	772,521.47
2	Wajo Regency	766,012.30
3	Pinrang Regency	699,964.69
4	Sidrap Regency	666,141.30
5	Luwu Regency	592,099.74
6	Sopeng Regency	531,612.56
7	Gowa Regency	427,165.28
8	East Luwu Regency	416,313.45
9	Maros Regency	406,556.50
10	North Luwu Regency	358,638.05

Source: Central Bureau of Statistics for South Sulawesi Province, 2020

Even though Wajo Regency is a food storage area, it cannot be denied that there is still a change in the function of paddy fields in Wajo Regency. The Wajo Regency Region will be developing a Regional Spatial Structure, as an arrangement of settlement sites and network infrastructure and facilities, in accordance with the Wajo Regional Urbanship plan for 2011 to 2031. Besides, regional development is carried out such as the construction of roads, electricity infrastructure, irrigation and transportation systems.

Table 2. Changes in Paddy Field Area in Wajo Regency in 2009 – 2019

Year	Paddy Field (Ha)	Paddy Field Change (Ha)
2009	40127.45	00.00
2010	40127.45	00.00
2011	40127.45	00.00
2012	40,182.00	54.55
2013	40,182.00	00.00
2014	40,121.00	-61.00
2015	39,835.00	-286.00
2016	39,799.40	-35.60
2017	39,768.96	-30,44
2018	39,748.92	-20.04
2019	39,730.93	-17.99

Source: Wajo Regency in Figures, 2010-2020 (processed)

Development is also supported by the strategic location of Wajo Regency between the Provinces of South Sulawesi and Southeast Sulawesi with economic growth of 5.9% higher than the national 5.02% [8]. Development activities require land which can be a problem if the land used is paddy farming land. Wajo Regency has experienced a decrease in paddy fields covering an area of 396.52 hectares in a period of 10 years. In 2009, paddy fields in Wajo Regency were 40,127.45 hectares and became 39,730.93 hectares in 2019 [9]. The decline in the conversion of paddy fields has occurred in the last 6 years. The highest decrease in paddy field farming occurred in 2015, namely there was a decrease of 286.00 hectares which can be seen in Table 2.

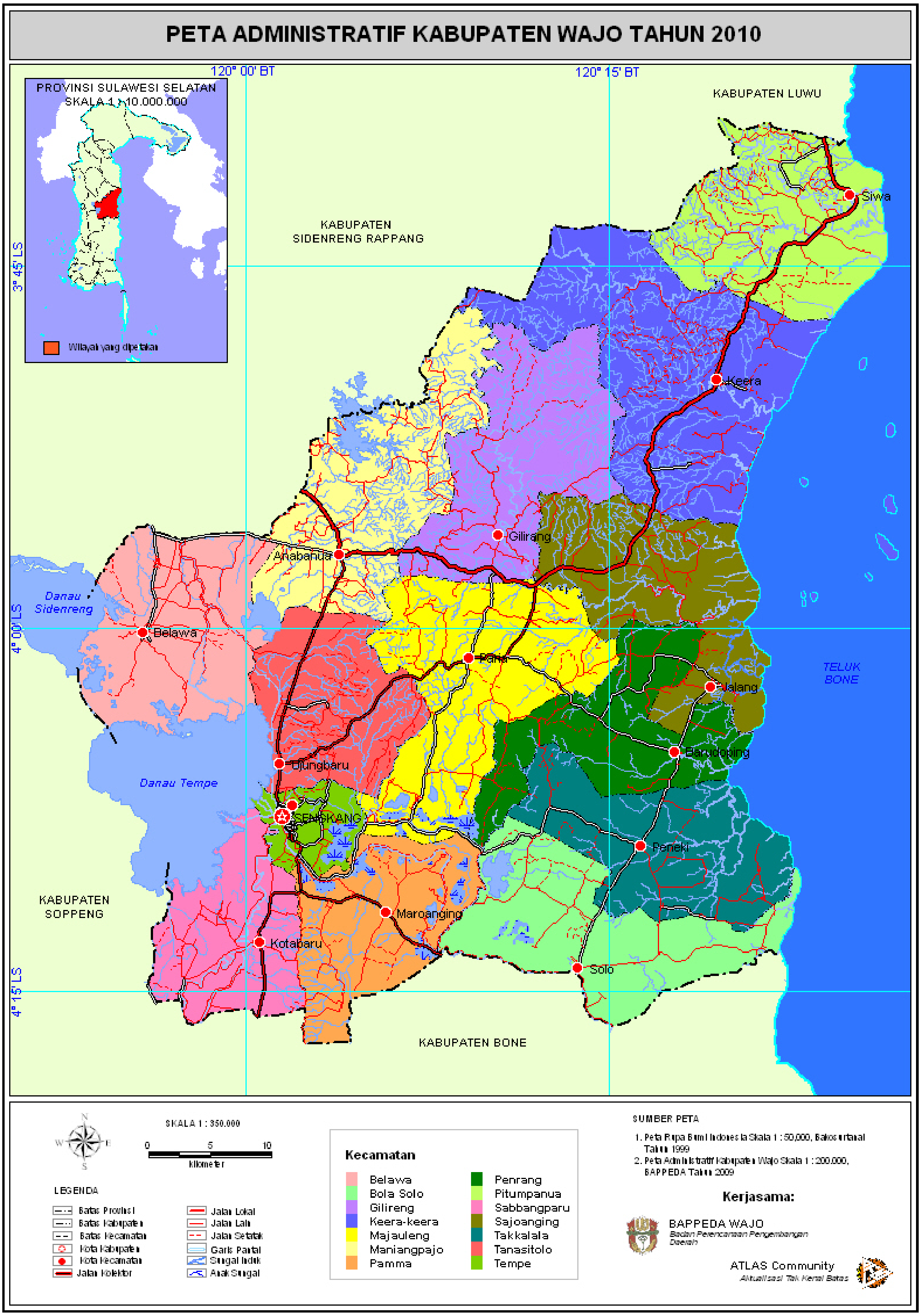
Production of paddy rice was also reduced due to a reduction in the area covered by those fields. This reduction may have a negative effect on rice availability to the population. The threat of food insecurity at the Wajo Regency would be feared if this continued to occur in the long term. From the declining production of paddy rice to the production of rice that can be consumed by the public, it goes through several long processes. This is because rice production is not only for food consumption but also for various needs. Rice production is for seed, feed, non-food industries, as well as scattered rice. Furthermore, the remaining paddy is converted into rice. The resulting rice production is also reduced by rice for feed needs, non-food industries, as well as scattered rice, only after that is the availability of rice for public consumption [10].

Using the surplus or deficit method, an estimate of food security in a region can be made. Food surplus or deficit can be calculated by comparing the available food with the food required which can be reflected in the difference between total rice consumption and total rice production. This comparison can show whether a region has a surplus or a deficit in rice production [11]. Regions experiencing a deficit in rice production are food unsafe and conversely areas with a surplus are food unsafe. A deficit region can cause a region to be unable to meet its own food needs and must be imported from other regions. This of course will be a burden to society and detrimental to society [12].

2. Research Methods

2.1. Location and Time of Research

This research was conducted in the Wajo Regency, 242 kilometers from the provincial capital of South Sulawesi, Makassar City. It has an area of 2,506.19 km^2 or 4.01% of the area of South Sulawesi Province, located between 3°39' → 4°16' South Latitude and 119°53' → 120°27' East Longitude. The research lasted from August 2020 until February 2021 and covered seven months which included data collection activities, data processing, analysis, until reports were produced. The location of this research is shown on the following map.



Source: http://komunitas-atlas.blogspot.com/2011/01/kabupaten-wajo.html

Figure 2. Map of the Administrative Region of Wajo Regency

2.2. Basic Research Methods

Two methods of data analysis have been used in this study, namely Descriptive and Quantitative Analysis. In order to provide an explanation and interpretation of the data, a descriptive analysis method shall be used. It is intended that the rate of land conversion shall be determined using a qualitative analysis method, factors having an effect on it and its impact. Calculation of the rate at which land is converted, multiple regression analysis and calculation of food surplus or deficit are used as a quantitative analysis method.

2.3. Data Types and Sources

Secondary data are the type of data to use in this study. Time series data, which are collected every now and then, shall be used as secondary data. Secondary data are data that were previously collected and reported by someone outside of the investigator himself, even though what is actually collected is original data [13]. Secondary data are data obtained from related institutions or agencies, journals, theses, publications, and other literature related and relevant to this research. Data on the area of paddy fields, crop productivity, Gross Regional Domestic Product per hectare in Wajo Regency, population, industry, building and courtyard areas as well as number of schools are a secondary data that have been taken into account for this study. The secondary data used come from the Wajo Regency Central Statistics Agency, the National Land Agency, the Regional Development Planning Agency, the Industry and Trade Service, the Agriculture and Food Security Service.

2.4. Analysis Method

2.4.1. Analysis of the Rate of Transfer of Land Functions

Astuti [14] explains that the land conversion rate can be determined by calculating the partial conversion rate. Partial land conversion rates can be explained as follows:

$$V = (Lt - Lt - 1) : (Lt - 1) \times 100\% \qquad \text{(i)}$$

Where:
V = Rate of land conversion (%)
Lt = Land area in year t (Ha)
Lt-1 = Land area the year before t (Ha)

The rate of land conversion (%) can be determined by the difference between the land area in year t and the previous year's land area, divided by the previous year's land area, then multiplied by 100%. This may be accomplished in future years with a view to obtaining the conversion rate results for each year.

2.4.2. Analysis of the Factors Influencing the Function Transfer of Paddy Agricultural Land

The multilinear regression analysis of CobbDouglas' production function model is used. The purpose of this regression analysis is to evaluate the effects of two or more independent variables on a dependency variable. In order to estimate the factors influencing the conversion of agricultural land functions at a macro level, where the area of paddy fields is a dependent variable, this method has been chosen by researchers. Free factors incorporate GRDP, adding up to populace, number of businesses, building and yard zone, and number of schools.

The multiple linear regression model assumes that there is a one straight line/linear relationship between the dependent variable and each predictor. This relationship is conveyed in a formula, and the formula to find out the factors that influence land conversion is as follows:

$$Y = a + b1X1 + b2X2 + b3X3 + b4X4 + b5X5 + e \qquad \text{(ii)}$$

Where:
Y= Paddy field area (ha)
a = Constant
b = Regression coefficient
X1 = GRDP (millions of rupiah)
X2 = Number of Population (people)
X3 = Number of Industries (units)
X4 = Area of building and yard (ha)
X5 = Number of Schools (units)
e = errors

The function model is transformed into a linear logarithmic form to become a multiple linear regression model to facilitate analysis. Data analysis uses SPSS Statistics 26.0 software. Mathematically it can be written as follows:

$$\text{Log } Y = \log a + b1 \log X1 + b2 \log X2 + b3 \log X3 + b4 \log X4 + b5 \log X5 + e$$

A multiple linear regression model uses OLS Ordinary Least Square method. For the Multiple linear regression model to be named "BEST Linear Unbiased Estimation", this method requires a number of requirements. Standard assumption tests, such as normality, multicollinearity, heteroscedasticity, and autocorrelation, are the part of the requirements [15].

a. Normality Test

In order to determine whether the data we process for each variable and all linear combinations of variables are normally distributed, the normality test shall be used. The residual values of the analysis shall also normally be divided when this assumption is fulfilled. Normality testing using the KolmrovnikovovSKK Statistics test can be carried out. In testing the following hypothesis can be put forward:
H0 = data not normally distributed
Hi = data normally distributed

If the significance probability is more than α (0.05), it means that H_0 is rejected and H_i is accepted. This shows that the data have no difference with the average (mean), so the data are said to be normal [16].

b. Multicollinearity Test

Multicollinearity testing is intended to verify that the model of regression has a correlation with independent variables. Multicollinearity is a violation of the OLS (Ordinary Least Square) assumption where there is a significant relationship between the independent variables in a system of structural equations. If the Variance Inflation Factor Value and Tolerance for each independent variable are taken into account, it is possible to detect multicollaterality in a model. If the VIF value is 0.1, then the model does not have the Sugiono multicollinearity problem in [17].

c. Heteroscedasticity Test

Heteroscedasticity is a violation of OLS assumptions which causes the parameters we estimate to be inefficient because the variance is always changing. Heteroscedasticity can be detected using the Glejser test, namely by looking at the distribution of residual values to the predicted values. If the residual value is higher than α (0.05) it means that the model meets the assumption of homoscedasticity [17].

d. Autocorrelation Test

The autocorrelation test is a test of the linear regression model to detect whether or not there is a correlation between residual values (errors). Violation of this OLS assumption will cause parameters that we suspect to be inefficient. To detect the presence or absence of autocorrelation in a model, a run test can be carried out. In order to determine whether there is a random or systematic occurrence of remaining data, the running test shall be used. The results of the run test stated that there was no autocorrelation if the significance value was more than α (0.05) [17].

After testing the classical assumptions, if the classical assumptions test requirements are met, then statistical tests can be carried out to determine the effect of production factors on the amount of tobacco production. Statistical testing includes a simultaneous test (F test), partial test (t test), and the coefficient of determination test (R^2).

a. Simultaneous Test (Test F)

In essence, the F test demonstrated that all individual variables included in the model are associated with a shared effect for an interdependent variable. The F test uses a significance level (α) of 5%. A null hypothesis and an alternative hypothesis shall be determined by the F test procedure as follows:

Ho = bi = 0

Hi = at least one bi ≠ 0

Decision making criteria:

1) If the sig in the ANOVA table < α: Ho is rejected and Hi is accepted, thus indicating that the different variables have a significant influence on the dependency variable.
2) If the sig in the ANOVA table > α: Ho is accepted and Hi is rejected, thus indicating that the different variables have no significant influence on the independent variables.

b. Partial Test (t test)

According to Ghozali [18], a partial test consists of determining whether one independent variable has an impact on a dependent variable by assuming that the other independent variables are constant. Hypothesis testing will be carried out using a significance level (α) of 5%. The procedure for this t test is to determine the null hypothesis and the alternative hypothesis, as follows:

Ho: bi = 0

Hi: bi ≠ 0

Decision making criteria:

1) If the sig in the coefficients table < α: Ho is rejected and Hi is accepted, it means that the independent variables tested have a significant individual effect on the dependent variable.
2) If the sig in the coefficients table > α: Ho is accepted and Hi is rejected, it means that the independent variables tested have no significant effect individually on the dependent variable.
3) Determination Coefficient Test (R^2)

Ghozali [18] stated that the coefficient of determination is calculated in order to determine whether or not a model can explain an underlying variable's change. The coefficient of determination is in the range of 0 to 1. In the case of R^2 which is less than one, almost all information needed to predict changes in a dependent variable and its counterpart shall be provided by independent variables.

2.4.3. Analysis of the Impact of Conversion of Paddy Field Agricultural Land on Food Security

The impact of conversion of paddy fields to food security is measured by comparing the total consumption and total production of paddy rice. This comparison can show whether an area has a surplus or a deficit in rice production [11]. Regions that experience a deficit in rice production mean they have low food security. Low food security can cause an area to be unable to meet its own food needs and must import from other regions.

Using a food surplus or deficit method, which is defined as the difference in access to and need for foodstuffs, the level of food security between 2000 and 2019 has been analysed [2].

The surplus or deficit method is calculated by:

Surplus or Deficit = Food Availability - Food Needs

Information:

Food Availability = Rice Production (tons)

Food Needs = Consumption of rice (tons)

The categories of surplus or deficit are as follows:

Surplus = available food ≥ food needs (food security)

Deficit = food available < food needs (food insecurity)

Available food can be calculated in the following way:

Available food = Rice production- rice conversion factor

The conversion factor for the availability of rice includes rice for the needs of seeds or seeds by 0.90%, animal feed by 0.40%, raw materials for non-food industries by 0.60%, and shrinkage or spillage by 5.40%. The paddy production value is then converted with a conversion rate of paddy to rice of 64.02% to get rice production [19]. The availability of rice is calculated by multiplying rice production and the correction factor for rice availability, namely 0.17% for feed rice, 0.66% for non-food industrial rice, and 2.50% for scattered rice.

The total need for rice can be calculated using the figure for the total national rice need of 111.58 kg/cap/year [19]. The total need for rice includes the consumption of rice by the Wajo people. Use the following formula to calculate the total need for rice [2]:

Total Needs = (Rice demand x Population): 1000

Information:
Total Needs = Total in one year (tonnes/year)
Rice Needs Figures = 111.58 (kg/capita/year)
Total Population = Total Population of Wajo Regency (people)

3. Results and Discussion

Wajo Regency has a total area of 941.55 Km^2. The area is divided into 42.29% paddy fields, 30.89% non-paddy fields, and 26.82% non-agricultural land [20]. That is, most of the land use in the Wajo Regency is for paddy fields. The land changes highlighted in this study began from 2000 to 2019. In the research process it was discovered that there were land changes that occurred in paddy fields.

In connection with the problems above, there are three recommended approaches according to Pearce [21], namely regulation, acquisition and management, as well as incentives and sanctions. For regulations, the Wajo Regency Government has a policy in the form of the Wajo Regency Regional Regulation Number 11 of 2011. Specifically for controlling the conversion of productive land functions, it is regulated in Market 3 paragraph (2) letter c. However, implementation in the field was not carried out entirely in accordance with these regulations. According to Subarkah [22], land conversion still occurs even though the Wajo Regency Government has issued regulations regarding this matter.

3.1. Results of Analysis of the Rate of Conversion of Paddy Field Agricultural Land in the Wajo Regency

Based on the data obtained by converting of paddy fields during 2000-2019 in Wajo Regency, it has fluctuated from year to year. The paddy agricultural land changed into non-paddy fields and/or non-agricultural land such as industry, settlements, highways, and others. The rate of conversion of paddy fields can then be seen in Table 3.

Table 3. Area and Rate of Conversion of Paddy Fields in Luwu Wajo Regency in 2000-2019

Year	Paddy Field Area (Ha)	Paddy Field Conversion Area (Ha)	Paddy Field Conversion Rate (%)
2000	40133.93	-	0.000
2001	40039.29	94.64	0.236
2002	40037.93	1.36	0.003
2003	40037.93	0.00	0.000
2004	40037.93	0.00	0.000
2005	39,759.00	278.93	0.702
2006	39,759.00	0.00	0.000
2007	40,339.00	0.00	0.000
2008	40,339.00	0.00	0.000
2009	40127.45	211.55	0.527
2010	40127.45	0.00	0.000
2011	40127.45	0.00	0.000
2012	40,182.00	0.00	0.000
2013	40,182.00	0.00	0.000
2014	40,121.00	61.00	0.152
2015	39,835.00	286.00	0.718
2016	39,799.40	35,60	0.089
2017	39,768.96	30,44	0.077
2018	39,748.92	20.04	0.050
2019	39,730.93	17.99	0.045
Total		1037.55	2,600
Average		51.88	0.13

Source: Results of Secondary Data Analysis

Based on Table 3, the rate of conversion of paddy fields has a negative sign indicating a reduction in paddy fields. The area of paddy fields has decreased over the last twenty years in Wajo Regencywith a total of 2.6 percent or 1,037.55 hectares. Wajo Regency experienced a fluctuating rate of conversion of paddy fields from 2000 to 2019, with an average paddy field conversion rate of 51.88 hectares, averaging 0.13% per year.

The rate of conversion of paddy fields in Wajo has tended to occur in the last few years from 2014 to 2019. Previously there were fluctuating changes in paddy fields, namely several years with a relatively high number of land conversions, for example in 2005 and 2009 of 278.93 and 211.55 hectare. A depiction of the rate of conversion of paddy agricultural land can be seen in Figure 3.

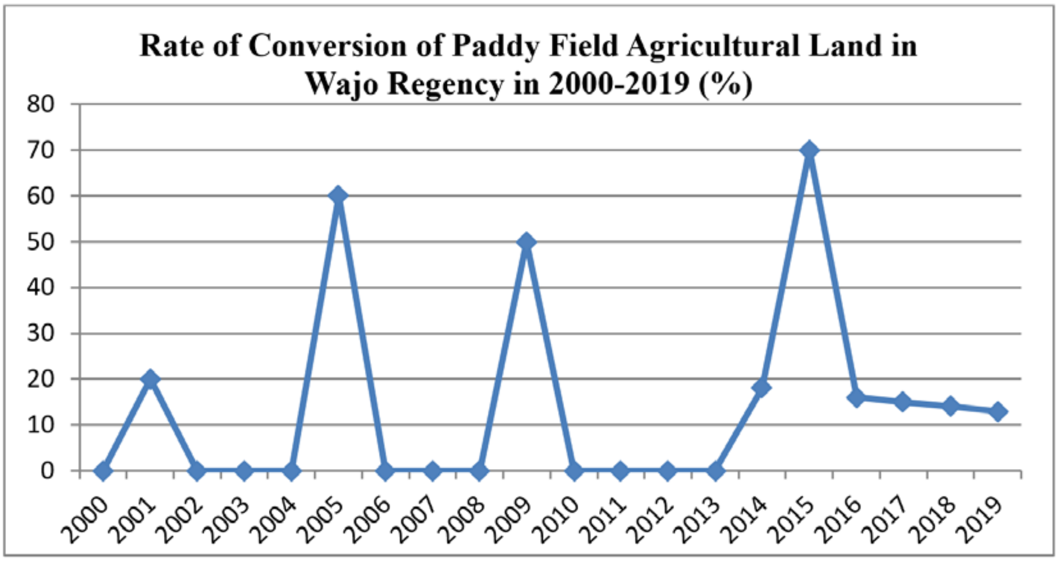


Figure 3. The rate of conversion of paddy fields in Wajo in 2000-2019 (%)

Figure 3 shows the rate of conversion of paddy fields, which tends to increase only in a few years, while the rest is 0. The rate of land conversion has started since 2001, when 94.64 hectares of land underwent a conversion. After 2001, land conversion did not occur every year, but the area of land conversion was very high compared to that which occurred in 2001. Several years that experienced high land conversion of up to hundreds of hectares were 2005, 2009 and 2015.

In 2005 and 2009 land was acquired for development in phases one and two of the Wajo Regency. The government's subsidy programme for subsidised housing was launched in 2015 and included the construction of residential buildings to low income communities. This change in land use is termed systematic, according to Budiono, systematic land conversion, in general, refers to a generally large and integrated area, whereas the sporadic pattern covers small and scattered areas [23].

3.2. Results of the Analysis of the Factors Influencing the Function Transfer of Paddy Field Farming Land in Wajo Regency

Analysis in determining the factors that influence the conversion of paddy fields at the regional level uses multiple linear regression analysis. Factors that are thought to influence the conversion of paddy fields on a macro scale or regional level are the total GRDP of Wajo Regency, total population, number of industries, building area and courtyards, and number of schools. The data used to define the model is time series data with a period of 20 years from 2000 to 2019. The research uses the OLS (Ordinary Least Square) model. The following are the results of research using *Statistical Product and Service Solution* (SPSS) version 26.00:

1. Classic Assumption Test

a. Normality Test

The results of the Kolmogorov vs Smmirnov test calculations performed with Asymp are shown in Table 4. Sig. (2-tailed) of 0.2. This shows that Asymp. Sig. (2-tailed) has a higher value than α (0.05), which means the data is normally distributed. It is then possible to conclude that the data meets the normalisation test, which should allow use of a regression model.

Table 4. Kolmogorov-Smirnov Test Results

Unstandardized Residuals		
N	20	
Normal Parameters[a,b]	Means	0.0000000
	std. Deviation	3.44920655
Most Extreme Differences	Absolute	0.152
	Positive	0.152
	Negative	-0.107
Test Statistics	0.152	
asymp. Sig. (2-tailed)	0.200c,d	

Source: Secondary Data Analysis, 2020

b. Multicollinearity Test

The result of multicollinearity test shows that all variables free have a tolerance value of more than 0.1 (Table 5). The result of the value calculationVIF (*Variance Inflation Factors*) also shows a low value from 10. Matter This shows that data experience no multicollinearity between independent variables.

c. Heteroscedasticity Test

Based on the results in Table 6, it shows that there is no independent variable with a probability of significance less than α (0.05). These results mean that the regression model does not contain heteroscedasticity. Thus, there is no similarity of variance and residuals from one observation to another.

Table 5. Multicollinearity Test Results

Model	Collineary Statistics	
	Tolerance	VIF
(Constant)		
Amount GRDP (X1)	0.153	6,522
Amount Resident (X2)	0.372	2,687
Amount Industry (X3)	0.278	3,591
Wide Building and Page (X4)	0.297	3,371
Amount School (X5)	0.443	2,257

Source: Analysis Data Secondary, 2020

Table 6. Glejser Test Results

Model	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	std. Error	Betas	
(Constant)	16,097	634,725		0.980
GRDP Total (X1)	-4,440	4,027	-0.647	0.289
Amount Resident (X2)	-2,228	48,956	-0.017	0.964
Amount Industry (X3)	9,251	10,211	0.394	0.380
Building Size and Page (X4)	-12,843	16,676	-0.325	0.454
Amount School (X5)	18.013	18,351	0.339	0.343

Source: Secondary Data Analysis, 2020

d. Autocorrelation Test

If there is a correlation between residuals, the run test shall show whether it exists or not. The Asymp is shown in Table 7. Sig. (2-tailed) of 0.818. This means that the significance value is greater than α (0.05). For these reasons, the residual must be determined to be random or Autocorrelation is not in the model.

Table 7. Run Test Results

	Unstandardized residual
test Value [a]	-0.29084
Cases < test Value	10
Cases >= test Value	10
Total Cases	20
number of Runs	10
Z	0.230
asymp. Sig. (2-tailed)	0.818

Source: Secondary Data Analysis, 2020

2. Statistic Test

a. Determination Coefficient Test (R^2)

The results of the coefficient of determination (R^2) test of 0.529 (52.9%) in Table 8 mean that 52.9% of the variation in the independent variables consists of the amount of GRDP (X1), the number of residents (X2), the number of industries (X3), the area of buildings and courtyards (X4), and the number of schools (X5) can explain the dependent variable, namely the area of paddy fields (Y1). Meanwhile, 47.1% was explained by other variables not observed in the observations, for example the length of the road, the number of health facilities, the number of storage warehouses, the selling price of paddy fields, government policies and others.

Table 8. Test Results for the Coefficient of Determination (R^2)

R	R Square	adjusted R Square	std. Error of the Estimates
0.727[a]	0.529	0.361	4.01820

Source: Secondary Data Analysis, 2020

b. Simultaneous Test (Test F)

The results of the simultaneous test (F test) in Table 9 show the significance level of the independent variables, namely the number of GRDP (X1), the number of residents (X2), the number of industries (X3), the area of buildings and yards (X4), and the number of schools (X5) to the variable bound is the area of paddy fields (Y). The significance value is 0.041 which is smaller than α (0.05). As a result, dependent variables have a significant impact on an interdependent variable.

Table 9. Simultaneous Test Results (Test F)

sum of Squares		Df	Means Square	F	Sig.
Regression	253,898	5	50,780	3,145	0.041b
residual	226,043	14	16,146		
Total	479,941	19			

Source: Secondary Data Analysis, 2020

c. Partial Test (t test)

Table 10. Partial Test (t test)

	Unstandardize Coefficients	t	Sig.
	B		
(Constant)	28.63042	2,520	0.025
Amount GRDP (X1)	20,788**	2,884	0.012
Amount Resident (X2)	-190,566**	-2.175	0.047
Amount Industry (X3)	1,594ns	0.087	0.932
Wide Building and Page (X4)	-16.945ns	-0.568	0.579
Amount School (X5)	-61,759*	-1,880	0.081

Source: Secondary Data Analysis, 2020
ns: not significant
*: significantly less than α= 10%
**: significantly less than α= 5%

In Table 10, results of the partial test (t test) above show variables with a significance level of less than α = 5% (0.05) including the GRDP variables (X1) and population (X2). In addition, there is also a smaller variable than α=10% (0.1), namely the variable number of schools (X5). Based on the results of statistical tests, the multiple linear regression equation model with the transformation of the model obtained from the results of the Ln (natural logarithm) regression analysis is as follows:

$$LnY= a+b1\ LnX1+b2\ LnX2+b3\ LnX3+b4\ LnX4+b5\ logX5+e$$

$$LnY= 28.63042+20.788\ LnX1-190.566\ LnX2 + 1.594\ LnX3-16.945\ LnX4-61.759\ LnX5+e$$

The regression model above can be interpreted as follows:

1) Constant a

The value of the coefficient a is 28.63042. This number indicates that all independent variables, namely the amount of GRDP (X1), the number of residents (X2), the number of industries (X3), the area of buildings and yards (X4), and the number of schools (X5) are worth 0 or a constant effect. It allows for a decrease in paddy field area of 28.63042 hectares per year.

2) X1 variable

Based on the results of the t test, the amount of GRDP has a significant effect on the conversion of paddy fields with a significance level of 0.012, less than α = 5% (0.05). The coefficient value of X1 (total GRDP) is 20.788. It shows that the area of paddy fields will increase by 20,788 hectares for each addition to the amount of the GRDP by one unit, namely 1 million rupiah.

The economic development of the peoples in Wajo Regency can be attributed to the amount of PDRB which increases year on year. The development of public infrastructures as well as infrastructure will be supported by economic growth. According to the research in Habibatussolikhah et al. [24], the increase in GRDP can be said to have a positive impact on the area of paddy fields. This is possible, given that the main economic support for the Region of Wajo Regency still comes from agriculture. The agricultural sector is one of the largest sectors in Wajo Regency and therefore, with a view to improving the social status of the population, it will still be necessary to optimise its development.

3) X2 variable

Based on the results of the t test, the population has a significant effect on the area of paddy fields with a significance level of 0.047, less than α = 5% (0.05). The X2 (population) coefficient is -190,566. The dependent variable has been negatively affected by the population factor. This shows that the area of paddy fields will fall by 190.566 hectares for each population increase in one unit, which is to say one person.

The population increases every year inversely with the availability of land which remains so that the population variable has a significant effect on the reduction in the area of paddy fields [25]. This is in accordance with research from Karini [26], where in this study the population also had a significant effect. The increase in the number of people is making it necessary to develop an economy and provide services. Health and education services, infrastructure like roads, supermarkets or shopping centres are some areas of improvement that need to be addressed in the wake of population growth. There is certainly a need for land for the construction of these services. The limitation of land is an obstacle to overcoming this problem and converting a large number of paddy fields. Growth in the population is stimulating land conversion and reducing possibilities for per capita food production [27].

4) X3 variable

X3 variable (number of industries) is the number of industries in Wajo Regency. Industry in Wajo Regency is divided into large industry and small and medium industries. The variable number of industries individually has no significant effect on the conversion of paddy fields with a significance of 0.932. The results of the Puspasari research shall be inversely proportionate to this. The results showed that the more the number of industries resulted in the reduction of paddy fields [28].

The variable number of industries in Wajo Regency has no significant effect on an individual basis. It can be interpreted that the number of industries in Wajo Regency does not necessarily require large areas of land to convert paddy farming land. The data obtained are that industries that increase drastically every year are small and medium industries while large industries from 2000 totaled 11 units and in 2019 totaled 19 units.

5) X4 variable

Variables X4 (building area and yard) are all types of buildings with various functions including courtyards that are part of the building even though no buildings are built on it. This means that residential buildings are included in the area of the building and yard. The variable area of the building and yard individually has no significant effect on the conversion of paddy fields with a significance of 0.579. This is inversely proportional to the results of research conducted by [29]. The results showed that the more area of buildings and yards resulted in a decrease in paddy fields. The area of buildings and yards in Wajo Regency has increased from year to year, but in this study it is said that it has no individual effect on the area of conversion of paddy fields.

6) X5 variable

Based on the results of the t test, the number of schools has a significant effect on the conversion of paddy fields with a significance level of 0.081, less than α=10% (0.1). The coefficient value of X5 (number of schools) is -61.759. The increase in the number of schools has a negative influence on an independent factor. This shows that by adding one unit to the total number of schools, there will be an area reduction for paddy fields amounting to 61.759 hectares in this case.

3.3. Results of Impact Analysis of Paddy Field Agricultural Land Conversion on Food Security in Wajo Regency

The impact of the conversion of paddy agricultural land will have an impact on the rice production produced by the region. The decrease in the area of paddy fields caused by land conversion will lead to a decrease in production yields if it is not matched by efforts to increase other factors that support the production process. Calculations regarding lost rice production and food security calculations can be seen in the following sub-chapter.

1. The Impact of Wetland Land Conversion on the Loss of Rice Production

Lost paddy fields means that there is potential for losing rice production. From the data on the conversion of paddy fields in Wajo Regency, it can be seen that there has been a loss of agricultural area in the last 20 years. Data on the development of rice production that was lost due to the conversion of paddy fields can be seen in Table 11.

There was a loss totalling 1,037.55 acres of paddy land, based on the data obtained with regard to crop conversion. The level of rice field area was converted and the high productivity of rice in that year affected the amount of rice production lost. The increase in the conversion of paddy fields every year has been shown to lead to higher rice production losses, based on Table 11. In the period between 2000 and 2019, Paddy production fell by 6,147.40 tonnes, on an annual average of 307.37 tonnes because of a conversion to paddy fields.

Table 11. Impact of Wetland Land Conversion on Lost Rice Production (2000-2020)

Year	Productivity (tonnes/ha)	Area of Land Function Transfer Ricefield (Ha)	Rice Production WhichLost (tonnes)
2000	5,29	-	-
2001	5,19	94.64	491.03
2002	5,47	1.36	7,44
2003	5.53	0.00	0.00
2004	5,33	0.00	0.00
2005	5,43	278.93	1514.31
2006	5,40	0.00	0.00
2007	5,42	0.00	0.00
2008	5,72	0.00	0.00
2009	5.86	211.55	1238,66
2010	5.75	0.00	0.00
2011	5.94	0.00	0.00
2012	6,11	0.00	0.00
2013	6.06	0.00	0.00
2014	5.89	61.00	359,47
2015	6,51	286.00	1861.29
2016	6,48	35,60	230.72
2017	6,37	30,44	193.81
2018	6,34	20.04	127,14
2019	6,87	17.99	123.52
Total		1037.55	6,147.40
Average	5.85	51.88	307,37

Source: Secondary Data Analysis. 2020

2. Development of Rice Availability

Available rice is rice that is available and can be consumed by the community. Available rice can be calculated using the rice availability conversion factor obtained from rice production data. The calculation of rice production is obtained from the production of dry milled grain (GKG) minus the use of GKG for seeds, feed, non-food industries, and scattered [19]. Furthermore, rice production is calculated from GKG production which has been calculated multiplied by the conversion rate of unhusked rice into rice of 64.02% [20]. Production of rice ready for consumption is calculated by reducing the use of non-food rice.

The following rice calculations are available from calculations of dry milled grain production (GKG) obtained from the Central Bureau of Statistics for Wajo Regency. The production of milled dry unhusked rice (GKG) was reduced by the use of GKG by 7.3%. Usage is divided into 0.90% for seeds, 0.40% for feed, 5.40% for scattered/shrink rice, and 0.60% for non-food industries [19]. A complete calculation of rice availability can be seen in Table 12 below.

Based on Table 12, it can be seen that rice production in Wajo Regency has fluctuated since the last 20 years. From the value of rice production, the value of rice availability in Wajo Regency was obtained, which averaged of 216,862.00 tons. Furthermore, the value of paddy availability can be converted into a form of rice production using the GKG to rice conversion rate of 64.02%. This figure was obtained from the results of the Central Bureau of Statistics Grain to Rice Conversion Survey (GRCS) in 2018.

Table 12. Amount of Rice Available in Wajo Regency in 2000-2019

Factor Conversion Availability Paddy						
Year	Production MPD (tonnes)	need-and Seeds (0.90%)	Paddy Feed (0.40%)	Paddy scattered (5.40%)	Paddy Industry Nonfood (0.60%)	AvailabilityMPD (tonnes)
2000	212,447.54	1912.03	849,79	11472.17	1274.69	196,938.87
2001	207,741.30	1,869.67	830.97	11218.03	1246.45	192,576.18
2002	219,109.59	1971.99	876.44	11831.92	1314.66	203,114.59
2003	221,494.71	1993.45	885.98	11960.71	1,328.97	205,325.60
2004	213,550.65	1921.96	854,20	11531.73	1281.30	197,961.45
2005	215,851.11	1942.66	863,40	11655.96	1295,11	200,093.98
2006	214,817.21	1933.35	859,27	11,600.13	1,288.90	199,135.56
2007	218,436.87	1965.93	873.75	11,795.59	1310.62	202,490.98
2008	230,931.85	2078.39	923.73	12,470.32	1385.59	214,073.83
2009	234,952.58	2114.57	939.81	12,687.44	1,409.72	217,801.04
2010	230,732.84	2076.60	922,93	12,459.57	1,384.40	213,889.34
2011	238,196.54	2,143.77	952.79	12,862.61	1429,18	220,808.20
2012	245,351.29	2208,16	981.41	13,248.97	1472,11	227,440.65
2013	243,382.37	2190.44	973.53	13142.65	1460.29	225,615.46
2014	236,433.05	2,127.90	945.73	12,767.38	1,418.60	219,173.44
2015	259,246.18	2333,22	1036.98	13,999.29	1555.48	240,321.21
2016	257,940.53	2,321.46	1031.76	13,928.79	1547.64	239,110.87
2017	253,208.97	2,278.88	1012.84	13,673.28	1519.25	234,724.71
2018	252,174.01	2,269.57	1008.70	13,617.40	1513.04	233,765.31
2019	272,792.57	2,455.13	1091.17	14,730.80	1636.76	252,878.71
Average	233,939.59	2105.46	935.76	12,632.74	1,403.64	216,862.00

Source: Secondary Data Analysis. 2020

Table 13. Rice Production in Wajo Regency in 2000-2019

Year	Availability MPD(tonnes)	Factor ConversionMPD to rice (%)	Rice Production(tonnes)
2000	196,938.87	64.02	126080.27
2001	192,576.18	64.02	123,287.27
2002	203,114.59	64.02	130,033.96
2003	205,325.60	64.02	131,449.45
2004	197,961.45	64.02	126,734.92
2005	200,093.98	64.02	128,100.17
2006	199,135.56	64.02	127,486.58
2007	202,490.98	64.02	129,634.73
2008	214,073.83	64.02	137050.07
2009	217,801.04	64.02	139,436.23
2010	213,889.34	64.02	136,931.96
2011	220,808.20	64.02	141,361.41
2012	227,440.65	64.02	145,607.50
2013	225,615.46	64.02	144,439.02
2014	219,173.44	64.02	140,314.84
2015	240,321.21	64.02	153,853.64
2016	239,110.87	64.02	153,078.78
2017	234,724.71	64.02	150,270.76
2018	233,765.31	64.02	149,656.55
2019	252,878.71	64.02	161,892.95
Average	216,862.00	64.02	138,835.05

Source: Secondary Data Analysis. 2020

Table 14. Availability Rice in Wajo RegencyYear 2000-2019

Factor Correct Rice Availability					
Year	Production Rice (tonnes)	Rice Feed (0.17%)	Rice toindustry Non Food (0.66%)	Rice Scattered (2.5%)	AvailabilityRice (Tons)
2000	126080.27	214,34	832,13	3152.01	121,881.79
2001	123,287.27	209.59	813.70	3082.18	119,181.81
2002	130,033.96	221.06	858,22	3250.85	125,703.83
2003	131,449.45	223.46	867.57	3,286.24	127072.18
2004	126,734.92	215.45	836.45	3,168.37	122,514.65
2005	128,100.17	217.77	845,46	3,202.50	123,834.43
2006	127,486.58	216.73	841.41	3187,16	123,241.28
2007	129,634.73	220.38	855.59	3,240.87	125,317.89
2008	137050.07	232.99	904.53	3,426.25	132,486.30
2009	139,436.23	237.04	920.28	3,485.91	134,793.00
2010	136,931.96	232.78	903.75	3,423.30	132,372.12
2011	141,361.41	240.31	932.99	3534.04	136654.07
2012	145,607.50	247.53	961.01	3,640.19	140,758.77
2013	144,439.02	245.55	953.30	3,610.98	139,629.20
2014	140,314.84	238.54	926.08	3,507.87	135,642.35
2015	153,853.64	261.55	1015.43	3,846.34	148,730.31
2016	153,078.78	260,23	1010.32	3,826.97	147,981.26
2017	150,270.76	255,46	991.79	3,756.77	145,266.75
2018	149,656.55	254,42	987.73	3,741.41	144,672.99
2019	161,892.95	275,22	1068.49	4047.32	156,501.91
Avarage	138,835.05	236.02	916.31	3,470.88	134,211.84

Source: Secondary Data Analysis. 2020

Table 13 shows that the average rice production in the Wajo Regency from 2000 to 2019 was 138,835.05 tons. The result of this rice production is the gross rice production that can be produced by Wajo Regency. This rice production does not include rice production that is ready for consumption by the public. To find out the production of ready-to-consume rice, it can be calculated by reducing rice production by using non-food rice. The use of non-food rice is with a total of 3.3 percent. For feed 0.17%, there are non-food industrial rice 0.66%, and scattered rice 2.5% [19]. Calculation of ready-to-consume rice production or availability of rice is as follows.

Based on Table 14, it can be seen that Wajo Regency was able to produce rice from 2000 to 2019 with an average of 302,327.18 tons. The availability of rice in Wajo Regency tends to fluctuate, even though there has been a change in the function of paddy fields. In 2019, there was an increase in the availability of rice, namely 439,463.56 tons. This is because land productivity in 2019 has increased compared to 2018. Rice productivity significantly influences rice production in an area [31].

The calculation of per capita need for rice by residents of the Wajo Regency from 2000 to 2019 uses the conversion rate from the 2018 BPS, which is 111.58 kg/cap/year. This figure was obtained from the national rice demand figure. From the calculation results, the data are as shown in Table 15.

Based on Table 15, it is known that the average need for rice from 2000 to 2019 is 97,646.18 tons per year. The rice needs of the people of Wajo Regency tend to fluctuate in the range of 95,000 tons to 99,000 tons. The need for rice is in line with the rate of population growth. The population of Wajo Regency is also fluctuating.

After knowing the rice needs of the population in Wajo Regency, we can determine the food security in Wajo Regency. Food security is said to be resistant if the available food is greater than or equal to the amount of food the community needs. Food security that is resistant in this study is called a surplus and if it is deficient it is called a deficit. To find out food security in Wajo Regency from 2000 to 2019 is in Table 16. Based on Table 16 it is known that food security in Wajo Regency is surplus.

Table 15. Per Capita Rice Needs of Population in Wajo Regency 2000-2019

Year	Amount Resident (soul)	Number Conversion Consumption Rice (Kg/cap/year)	Total Need Rice (kg/year)	Total Need Rice (tonne/year)
2000	892,362	111.58	99,569,751.96	99,569.75
2001	849,441	111.58	94,780,626.78	94,780.63
2002	851583	111.58	95,019,631.14	95019.63
2003	855244	111.58	95,428,125.52	95,428.13
2004	855244	111.58	95,428,125.52	95,428.13
2005	858,266	111.58	95,765,320.28	95,765.32
2006	863,914	111.58	96,395,524.12	96395.52
2007	867,572	111.58	96,803,683.76	96803.68
2008	871,951	111.58	97,292,292.58	97,292.29
2009	877,402	111.58	97,900,515.16	97,900.52
2010	883,464	111.58	98,576,913.12	98,576.91
2011	887,715	111.58	99,051,239.70	99051.24
2012	891,832	111.58	99,510,614.56	99,510.61
2013	896,201	111.58	99,998,107.58	99,998.11
2014	875615	111.58	97,701,121.70	97701.12
2015	879027	111.58	98,081,832.66	98081.83
2016	882,090	111.58	98,423,602.20	98,423.60
2017	885122	111.58	98,761,912.76	98,761.91
2018	887,889	111.58	99,070,654.62	99070.65
2019	890,518	111.58	99,363,998.44	99,364.00
			Average	97646.18

Source: Secondary Data Analysis. 2020

Table 16. Population Food Security in Wajo Regency 2000-2019

Year	AvailabilityRice (Tons)	Total Rice Needs (tonne/year)	Difference (tonnes)	Information
2000	121,881.79	99,569.75	22312.04	surplus
2001	119,181.81	94,780.63	24,401.18	surplus
2002	125,703.83	95019.63	30,684.20	surplus
2003	127072.18	95,428.13	31644.06	surplus
2004	122,514.65	95,428.13	27,086.52	surplus
2005	123,834.43	95,765.32	28069.11	surplus
2006	123,241.28	96395.52	26,845.76	surplus
2007	125,317.89	96803.68	28,514.21	surplus
2008	132,486.30	97,292.29	35,194.01	surplus
2009	134,793.00	97,900.52	36,892.49	surplus
2010	132,372.12	98,576.91	33,795.21	surplus
2011	136654.07	99051.24	37,602.83	surplus
2012	140,758.77	99,510.61	41248.16	surplus
2013	139,629.20	99,998.11	39,631.09	surplus
2014	135,642.35	97701.12	37,941.23	surplus
2015	148,730.31	98081.83	50,648.48	surplus
2016	147,981.26	98,423.60	49,557.65	surplus
2017	145,266.75	98,761.91	46,504.83	surplus
2018	144,672.99	99070.65	45,602.33	surplus
2019	156,501.91	99,364.00	57137.92	surplus
Average	134,211.84	97646.18	36565.66	

Source: Secondary Data Analysis. 2020

The food security of the population is basically said to be stable if the fulfillment of food for the community reaches the individual which is reflected in the availability of sufficiently good food. Good food security can build healthy, active and productive human resources in a sustainable manner [32]. According to Table 16, Wajo Regency had food security which was resilient or surplus during the period from 2000 to 2019. The average surplus is 36,565.66 tonnes of food. It shows that rice production can continue to be produced in the region of Wajo Regency while paddy fields function differently. However, rice production can provide a good food supply to the population. Despite the fact that there is a loss in paddy fields due to conversion of farms which have occurred, food security levels are actually increasing year by year.

Due to the increase in paddy productivity, these results may be obtained from this analysis. The productivity rate continues to change year after year, as shown in Table 16. This could be due to a good farming intensification programme at the Wajo Regency. In addition, the cultivation of alsintanplants equipment and machines which have been set up in the Agriculture Service is used for increased productivity by means of proven superior seed varieties, use of ecological fertilisers and biofertilizers as well as optimisation of their use [20].

Currently, the area of paddy fields in Wajo Regency is still larger than the area of non-paddy fields and non-agriculture fields, so that the food needs of the population can still be met from within the Wajo Regency area itself. The paddy fields used to produce food for the population are likely to decrease as a result of the gradual land change taking place at Wajo Regency in the long term. The impact of a reduction in paddy field land accompanied by a decrease in rice production in Wajo Regency is that it can be detrimental to the people of Wajo Regency itself and not only that there will also be a reduction in the amount of rice they can export to other areas in South Sulawesi. In the long term, Wajo Regency, which is the food center for South Sulawesi Province, will experience a decrease in rice exports to other regions and the people of Wajo Regency will later experience food shortages or food deficits if land conversion continues without any government efforts to control it.

4. Conclusions

Based on the results of research on the transfer of agricultural land function and its impact on the community food security index in the wajo Regency, conclusions can be drawn, including:

The rate of land use change has fluctuated from year to year with an average of 0.13% from 2000 to 2019. The macro factors (region) that influence the conversion of paddy fields in the Wajo Regency are the total Gross Regional Domestic Product (GRDP) of Wajo Regency, population, and number of schools. The loss of paddy and rice production in Wajo Regency is estimated at 6,147.40 tonnes, as a result of the conversion of crop yields to food security. According to the results of this study, Wajo Regency has lost an average of 307.37 tonnes per year in rice production as a result of the land conversion that took place. If the conversion of paddy fields continues, this figure can be increased. The figure can be used in fact for the Wajo people's consumption or export to other areas of the country, although that is not possible. In this connection, clear laws and regulations along with the need to supervise fields must be applied in a proper way for paddy farming land. The licensing mechanism which involves all interested parties in the process of land conversion needs to be clearly and transparently established.

REFERENCES

[1] C. B. of Statistics, “Employment Conditions August 2012,” *Central Bureau of Statistics.*, vol. 74, no. 11, 2012.

[2] I. M. Y. Prasada dan T. A. Rosa, “The impact of the conversion of paddy fields to food security in the Special Region of Yogyakarta,” *J. Soc. Econ. Agric.*, vol. 14, no. 3, p. 210, 2018.

[3] Y. Guan, S. Luo, S. Liu, B. Xiao, dan L. Cai, “Steam catalytic gasification of municipal solid waste for producing tar-free fuel gas,” Int. *J. Hydrogen Energy*, vol. 34, no. 23, p. 9341–9346, 2009.

[4] I. Kaputra, “The Impact of Regional Autonomy in Indonesia,” *Jakarta Indonesian Torch Library Foundation.*, 2013.

[5] C. S. Hasibuan, “Analysis of Converting Rubber Land to Oil Palm Land in the Soapgan Village, Sungai Kanan District, South Lubahan Batu Regency.” UNIMED, 2013.

[6] R. B. Prihatin, “Land conversion in urban areas (Case studies in the cities of Bandung and Yogyakarta), ” *J. Aspir.*, vol. 6, no. 2, p. 105–118, 2015.

[7] C. B. of Statistics, “Production of rice, corn and soybeans (Forecast Figures I in 2014),” *Ber. Official Stat.*, no. 50/07, 2014.

[8] H. Rizkiani dan S. Sudrajat, “Relationship of the Transfer of Functions of Paddy Field Farming with Food Availability in Sleman and Bantul Regencies, Special Region of YOGYAKARTA,” *J. Bumi Indones.*, vol. 4, no. 3, p. 222934, 2015.

[9] C. B. of Statistics, “Central Bureau of Statistics of South Sulawesi,” *Number of Population.*, vol. 2022, p. 2020, 2020.

[10] S. Darma dan F. Fahrunsyah, “Effect of Soil Damage on Carrying Capacity of Biomass Production: A Lesson from Tanjung Selor District - Tanjung Redeb, Indonesia,” *Univers. J. Agric. Res.*, vol. 10, no. 6, hal. 682–690, 2022.

[11] R. H. Akuba dan A. M. A. Mutsyahidan, “Map of Gorontalo Province Food Security and Vulnerability in 2015,” *J. Technopreneur*, vol. 5, no. 2, p. 67–83, 2017.

[12] Maroeto, A. Fauzi, W. Santoso, Siswanto, M. Idhom, dan R. Priyadharsini, “Assessment of Land Suitability Evaluation for Plantation Crops Using AHP-GIS Integration in the Wonosalam Forest Area, East Java,” *Univers. J. Agric. Res.*, vol. 10, no. 5, hal. 569–586, 2022.

[13] S. Winarno, “Introduction to Scientific Research, Fundamentals, Methods, and Techniques,” *Bandung: Tarsito*, vol. 97, 2004.

[14] D. I. Astuti, “The link between land prices and the conversion rate of agricultural land in the upper reaches of the Ciliwung River, Bogor Regency,” 2011.

[15] D. N. A. Janie, “Descriptive statistics & multiple linear regression with SPSS,” *Journal, April*, vol. 52, 2012.

[16] F. M. Purnawijaya, “The Influence of Work Discipline and Work Facilities on Employee Performance at Store 27 in Surabaya,” *Agora* , vol. 7, no. 1, 2019.

[17] C. Mahmut, F. Fatmawati, dan A. I. Anwar, “Analysis of Community Welfare in South Sulawesi Province,” *SEIKO J. Manag. buses.*, vol. 5, no. 2, p. 452–461, 2022.

[18] R. Syauqoti dan M. Ghozali, “System analysis of Islamic financial institutions and conventional financial institutions,” *J. Iqtishaduna*, vol. 14, no. 1, p. 19–21, 2018.

[19] C. B. of Statistics, “Indonesia Quarterly Gross Domestic Product,” *BPS-Statistics Indones. Jakarta*, 2018.

[20] C. B. of Statistics, “Wajo in Figures,” *Wajo District. ISSN*, p. 215–6822, 2021.

[21] R. K. Turner dan D. W. Pearce, *The ethical foundations of sustainable economic development*. International Institute for Environment and Development London, UK, 1990.

[22] M. R. Subarkah dan I. Abbas, “Legal Protection of Agricultural Land Due to Land Function Change: Study of Luwu Regency,” *J. Lex Gen.*, vol. 2, no. 9, p. 2329–2346, 2021.

[23] A. Budiono, “Theory of utilitarianism and legal protection of agricultural land from conversion,” *J. Jurisprud.*, vol. 9, no. 1, p. 102–116, 2019.

[24] A. T. Habibatussolikhah, D. Darsono, dan S. W. Ani, “Analysis of Factors Influencing the Functional Transfer of Paddy Fields to Non Paddy Fields in Sleman Regency, Special Region of Yogyakarta,” *SEPA J. Sos. Econ. Question. and Agribusiness*, vol. 13, no. 1, p. 22–27, 2017.

[25] I. K. Suratha, “The impact of conversion of agricultural land on food security,” *Media Commun. geogr.*, vol. 15, no. 2, 2014.

[26] D. M. Karini, “The Impact of Paddy Field Transfer on Rice Production in the Context of Food Security (Case Study in Tangerang Regency),” *J. Resilience Nas.*, vol. 19, no. 1, 2013.

[27] J. E. Overland, J. A. Francis, E. Hanna, dan M. Wang, “The

recent shift in early summer Arctic atmospheric circulation," *Geophys. Res. Lett.*, vol. 39, no. 19, 2012.

[28] A. Puspasari, "Factors influencing the conversion of agricultural land and their impact on farmers' income," *Thesis., Dep. Econ. Resources and Environment. Bogor Faculty. Econ. and Management. Inst. Question. Bogor*, 2012.

[29] S. Suharyanto, K. Mahaputra, N. N. Arya, dan J. Rinaldi, "Determining factors for the conversion of paddy fields at the household and regional level in the province of Bali," *J. Pengkaj. and Developer. Technol. Question.* , vol. 19, no. 1, p. 124985, 2016.

[30] C. B. of Statistics South Sulawesi Province, "South Sulawesi Human Development Index," no. 66, p. 1–10, 2020.

[31] S. H. Puarada, R. N. S. Gurning, dan W. U. Harahap, "Technical efficiency of the corn supply chain at farmer and collector levels using the data envelopment analysis (DEA) method, Batang Kuis District, Deli Serdang, North Sumatra," Agro Bali Agric. *J.*, vol. 3, no. 2, p. 234–245, 2020.

[32] R. Z. Raihan, R. Kastaman, dan T. Tensiska, "Determining West Java Region IV Food Security Conditions Using Food Security Quotient (FSQ)," *J. Ekon. Question. and Agribusiness*, vol. 4, no. 1, p. 68–76, 2020.