

## **AGRICULTURAL LAND CONVERSION: DETERMINANTS AND IMPACT FOR FOOD SUFFICIENCY IN SLEMAN REGENCY**

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### **ABSTRACT**

*The research was conducted in Sleman Regency with 3 study area based on the extent of agricultural land conversion. The purpose of this research is to examine the determinants of agricultural conversion internally and externally, as well as the impact on the availability of food, especially rice. The research was conducted by survey method and statistical analysis regression Ordinary Least Square. The results of this research showed that the internal factors which significantly affect land conversion is the price of land and land location in all areas of study. External factors have significantly positive are variable population, land conversion rules and land location, while the variable GDP in the agricultural sector negatively. Availability of rice in Sleman Regency zone 1 indicates the region from 1983 to 2025 for the population minus the rice sufficiency. In zone 2 region between 1983 and 2005 but it is still a surplus between 2006 and 2025 minus. In the area of zone 3 is projected through 2025 the availability of rice is sufficient*

**Keywords:** internal and external determinants, agricultural land conversion, food sufficiency

### **ABSTRAK**

*Penelitian ini dilakukan di Kabupaten Sleman dengan 3 wilayah kajian berdasarkan luasan konversi lahan pertanian. Tujuan penelitian ini adalah mengkaji faktor penentu konversi lahan pertanian secara internal dan eksternal, serta dampak yang ditimbulkan terhadap ketersediaan pangan terutama beras. Penelitian dilakukan dengan metode survei dan analisis statistik regresi Ordinary Least Square. Hasil penelitian menunjukkan bahwa faktor internal yang berpengaruh secara signifikan terhadap konversi lahan adalah harga lahan dan lokasi lahan pada semua wilayah kajian. Faktor eksternal yang berpengaruh secara signifikan positif adalah variabel jumlah penduduk, peraturan konversi lahan dan lokasi lahan, sedangkan variabel PDRB di sektor pertanian berpengaruh negatif. Ketersediaan beras di Kabupaten Sleman menunjukkan pada wilayah zone 1 mulai tahun 1983 sampai tahun 2025 kecukupan beras bagi penduduk minus. Pada wilayah zone 2 antara*

*tahun 1983 sampai 2005 masih surplus akan tetapi antara tahun 2006 sampai 2025 minus. Pada wilayah zone 3 diproyeksikan sampai tahun 2025 ketersediaan beras masih mencukupi.*

**Kata kunci** : faktor internal dan ekstrnal, konversi lahan pertanian, ketersediaan pangan

## INTRODUCTION

Conversion of agricultural land is not just happening in the rural areas of urban land conversion occurred, especially too much on villages that have high connectivity to the city centre. Location factors determine the shape of the land conversion form a person will also make use of land belonging to the appropriate underlying interests. Conversion of agricultural land is directly or indirectly will affect the condition of the physical, social and economic issues for the residents and the environment. Studies conducted in this study highlighted from the perspective of internal and external. Internal factors to be examined is the age, level of education, the number of household members, employment outside agriculture, income in the agricultural sector, income outside of agriculture, while working in the agricultural sector. Other factors examined related to the activities of farming are the price of agricultural land and the location of agricultural land External perspective is factored out farmers and agricultural business outside. In the present study examined is the political conditions (conversion of land laws), economic (*GDP* agriculture), social (amount and population growth, as well as the development of accessibility and land awakened, physical condition of land itself).

Land conversion phenomenon occurs as a result of rising need for space for housing and life fulfillment. Based on the necessities of life, people will tend to utilize land that has high economic value. Location factors of course would be a consideration for anyone in utilizing land. In general the location can be a decisive factor in the economic development of a region. In an area of zone-zone land use will appear, in the downtown area will vary with the suburban areas or there is a

real difference in land use between rural and urban areas [Yunus, 2004]. Conversion of agricultural land in developing countries occurs due to structural transformation of the economy and demographics. Structural transformations in the economy took place of which was originally based on agriculture to a more industrial direction. While the demographic, rapid urban population growth resulted in conversion of agricultural use to use non remarkable farm [Kustiwan, 1997].

Conversion of agricultural land affected by external and internal factors and Government policy too [Kustiwan, 1997]. External factors include factors dynamics of urban growth, both in spatial, demographic or economic spur or encourage the conversion of agricultural land. These external factors associated with the development of the region was awakened, population growth and urban growth of *GDP*. Internal factors are socio-economic conditions of farm household in land use that encourages them of their land ownership or use of its land. The policy is a policy factor which spurred the one hand the conversion of agricultural land and other parties to prevent the conversion of agricultural land. Impact directly from the conversion of agricultural land utilization form is dwindling farmland that directly affects a decrease in agricultural production. During the last 10 years on the outskirts of Yogyakarta is located in the southern part of the land of paddy fields recorded a reduction in 6.25 hectares/year, in the northern part of 4.95 acre/year and the western part of 4.86 hectare/year and the other part is relatively slow [Yunus, 2004]. Land area decrease occurred in paddy field predicted villages bordering Yogyakarta city, so the local government need to intervene to prevent or reduce the occurrence of conversion of agricultural land.

Theoretically the conversion of agricultural land could pose a negative impact that the loss of productive land as food producers, but conversion also benefit economically in the form of income from activities outside agriculture. Thus, it is indeed not easy to make a calculation about the benefits and disadvantages resulting from the conversion of farm fields, let alone pretty much as well as the benefits and losses to its intangible (unable to race directly). Negative effects (loss) due to land conversion are mainly on the loss of the "opportunity" to produce agricultural products on converted wetland, which is directly proportional to the size of its land area. Types of losses include agricultural production and its value, income, and employment on the farm, the loss of income and employment opportunities in economic activity that was created directly or indirectly from the forward linkage and backward linkage of farming activities, such as rice milling and tractor business [Sumaryanto, *et al.* 1995]. Maxwell and Frankenberger [1992] in Maleha and Adi, S. [2006] expressed attainment of food security can be measured from the process indicators and impact indicators. Process indicator is the food situation addressed by the availability and access to food. The availability of food is related to agricultural production, access to natural resources, climate, land management and markets. Food access includes the source of income, access to capital and household strategy to meet food shortages. Direct impact indicator is consumption and food frequency, whereas the indirect impact indicators covering the storage of food and nutritional status. In this research the food security linked to the availability and adequacy of food. Food security will be realized if food needs can be sure, that will be taken into account up to the year 2025.

The purpose of this research to determine (1) the distribution of the conversion of agricultural lands between 1992 and 2009 in Sleman Regency, (2) the factors that determine the conversion of agricultural

land both in internal and external and (3) the impact of agricultural land conversion to food sufficient know in Sleman Regency.

The phenomenon of conversion of agricultural land, particularly land rice fields around major cities shows that the dynamics of changes of the land conversion is becoming increasingly intensive with the growing economy of the region. Issue of land conversion cannot be separated from the process of transformation of economic structure based the primary sector (agriculture) to the secondary and tertiary sectors (industry, services and trade). It is a reasonable thing to be one of the consequences of development. Economic activity is growing along with the population growth is required for housing, land and infrastructure industry supporting more. Competition to land use for farming and non farming will be hard to avoid.

The process of converting the land according to Irawan *et al* [2000] and Sumaryanta [1997] are generally preceded by the process of land control status. Mastery of agricultural land by farmers suggests that peasant (< 0.5 ha) tend to experience a decrease of 0.26 ha be 0.28 ha. Structure control of farmland showed very lame, as many as 70% of the total number of farm households occupying less than 0.5 ha that most (43%) is a group of homeless that have of land less than 0,1 ha. Behind the existence of the land conversion defection occurred in land control status of an asymmetrical will impact the social jealousy is very profound. Furthermore losing ground as the main production asset for rural communities, while minority groups who ruled the grounds do not want to utilize land productively for agriculture that occurs is the conversion to non-agricultural use.

Some of the factors that affect the conversion of agricultural land are the consumption of land that is the

manifestation of the power of demographic and economic forces [Rusastra et al. 1997]. Conceptually there are 7 variables, namely: (1) change of population, (2) the function of the dominant economy, (3) the size of the town, (4) the average land value residential, (5) population density, (6) and (7) geographical capabilities of land for agriculture. High economic growth led to some sectors of the economy is growing quickly. If the agricultural land location adjacent to urban areas such as economic growth, there will be a shift in the use of agricultural land to non-agricultural.

Research results *Pakpahan* and *Azhari* [2003] in West Sumatra, South Sulawesi and conversion of land to mention that both of these rice terraces in the province are affected by economic growth (*GDP*). The population was positively impact on the proportion of farm fields. An increasing number of people alleged to be influential to increased food needs, which means it, require additional land rice fields. Meanwhile the judge 1989) based on research conducted in West Java posited that the factors that affect the conversion of farmland to non-agricultural economic growth sector non agricultural (based on *GDP* comparisons against food crops in total *GDP*), population, and the location of the land against activities Center (Central Business District/*CBD*), getting close to land, then the rate of conversion of the *CBD*.

Other factors affecting the rate of conversion of agricultural land is the implementation of laws that are weak, unclear ownership status, a small area of land ownership and high taxes.

*Fauzi* [2006] suggests that the conversion of agricultural land affected by population growth, the number of non-farm households, the influence of the nearby land location and distance from the industrial area. Occurrence of rice paddy land conversion to non rice fields in East Java province as expressed *Pakpahan*

[1995] caused by overcrowding, the farmers exchange rate low, and *GDP* per capita. The population density was somewhere (especially in urban areas) that also reflects the man land ratio will encourage residents looking for other places to build settlements outside the town (rural). The impact of such activities posed a lot of land was originally used for agricultural activity experienced a conversion into residential areas.

The research results of *Rahmanto* [2006] showed that the conversion of agricultural land in Central Java and Yogyakarta Special Province is influenced by *GDP* (economic growth) and population growth. *GDP* increased by 1% would result in a decrease in agricultural land amounting to 0.5% and the contribution of the agricultural sector also decreased due to a decline in agricultural land. Meanwhile, the research results of *Yunus* [2001] showed that there is acceleration conversion of agricultural land that is in line with the process of desocialisation and land market prices. Reduce of agricultural land will cause a decline in earnings from the agricultural sector so that farmers find new substitution on activities outside agriculture.

Land use conversion from agriculture to non-agriculture will give an impact on agricultural production and productivity and the balance of the environment. Efforts to control the conversion of agricultural land productive and unproductive land use needs to be done. Optimization of utilization of resources as is available, with or without damaging the existing resources [*Bintarto*, 1986]. An impact (losses) directly from the conversion of agricultural land utilization form is dwindling farmland that directly affects a decrease in agricultural production. Food security is a condition in which food for the household in terms of the amount awarded, quality, and guarantee security to access both in terms of physical or economic and equitable

distribution. *FAO* [2010] posited when someone does not have access too physically, socially or economically enough to eat it says someone has no food security. Based on the definition of food security is linked to three main factors: (1) the adequacy (availability of) food security, (2) the economic stability of (3) food and physical or economic access for individuals to get food. Act No. 7 of 1996 about food followed up with government regulation Number 68 in 2002 about food security. According to the Act and the regulation thickness, food has a very basic development perspective because:

Access to food with balanced nutrition for all the people of Indonesia is right that most for humans right

1. success in the development of quality human resources is determined by the success of the fulfillment of the requirement and consumption of food and nutrition
2. Food security is the main base in realizing economic resilience and sustainable national security [Maleha and Adi, S. 2006].

Food security can be realized if (1) satisfy the condition with food availability. Availability in the broad sense including food from crops, livestock and fish to replenish the carbohydrates, proteins, fats, vitamins and minerals that are beneficial to human health. (2) Satisfy the conditions in the food secure, which is free from pollution of biological, chemical and other items interfere with, harm and harm human health and safe from religious rule. (3) Satisfy the condition with food that is evenly distributed food available at all times and evenly all over the motherland and (4) satisfy the condition with affordable food that is easy to obtain and affordable prices.

In this research the food security linked to the availability and adequacy of food. Food security will be realized if food needs can be sure, that will be taken into account up to the year 2025. The availability of food (rice) in the concept of food security is available in a sufficient

amount of safe and nutritious for everyone in a country both from own production, imports, food aid and food reserves.

## THE METHODS

This research is a survey of the research by taking a sample of a population and use the questionnaire as a means of collecting data. This research is research that develops quantitative analysis through statistical tests. In addition to the primary data gleaned from interviews with respondents also used a secondary data in the form of data on population, economy, land use, physical conditions and areas of Government policy regarding the conversion of agricultural land. To find out which extents or conversion of land use data quantity change in land use from the image of the Regency of Sleman, ETM + Landsat TM Imagery and Alos in 1992, 2001 and 2009.

The selection of respondents in research based on a converted agricultural land was divided into three zone areas. The number of respondents is determined by estimating the proportions on the population *Yamane* [1967] in *Sukandarrumidi*, [2002] with formulations:

$$n = \frac{N}{Nd^2 + 1}$$

n = Number of sample

N = Population

d = Precision

Based on the known number of formulations that can be sampled in this study i.e. 393 respondents. Great precision specified is 5% (with a 95% level of confidence, the value of  $z = 1.96$ ) of the total population of 24.594 people. This research analyzed by descriptive data from the results of land use change in Sleman Regency in 1992 and in 2009. Econometric analysis of Ordinary Least Square regression model with linear compounds used to knowing the determinants of land conversion in every area of study in Sleman Regency.

To find out which external factors which affect the land conversion, a regression model estimated:

$$\text{Land Area Converted}_t = b_0 + b_1 \text{Jml-pddk}_t + b_2 \text{PDRB}_t + b_3 \text{Lhn-trb}_t + b_4 \text{Pjn-jl}_t + b_5 \text{-Keb Pem} + b_6 \text{-Kds Fsk} + u$$

Description:

Area<sub>t</sub> = area of extensive farmland in year (ha)

b<sub>0</sub> = intersept

Jml- pddk<sub>t</sub> = population in the – t (jiwa)

PDRB<sub>t</sub> = gross regional domestic product in year – t (Rp)

Lhn- trb<sub>t</sub> = vast land awoke in year –t (ha)

Pjn- jl<sub>t</sub> = long way total in year t (ha)

b<sub>5</sub>-Keb Pem = government policy on land conversion (in applicable)

b<sub>6</sub>-Kds Fsk = climate, rainfall and soil

u = disturbance term (disturb factor)

The internal factors that affect the conversion of agricultural land used econometric analysis of Ordinary Least Square regression model with linear compounds.

Internal factors:

$$Y = b_0 + b_1$$

$$X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + b_6 X_6 + b_7 X_7 + b_8 X_8 + b_9 X_9 + b_{10} X_{10} + u$$

Description:

Y = land area converted

b<sub>0</sub> = intercept

X<sub>1</sub> = minor (th)

X<sub>2</sub> = the level of education

X<sub>3</sub> = the number of family members

X<sub>4</sub> = the broad land use studies

X<sub>5</sub> = dummy Job outside agriculture (1 = trying to own, 0 = working)

X<sub>6</sub> = income in the agricultural sector

X<sub>7</sub> = Income outside of the agricultural sector

X<sub>8</sub> = dummy land location (1 = near the main road, 0 = far away from the main road)

X<sub>9</sub> = price of land

X<sub>10</sub> = long efforts in the agricultural sector

u = disturbance term

To find out the level of food security in their respective areas of Sleman Regency made an analysis of the level of need and the availability of food resources. Food resources in this research are especially rice. The calculation of availability of this food was later converted from rice to rice. The basic data use to analysis of the Central Board of Statistics of Sleman Regency in time series from 1983 to 2010. The Data used is the data population data and production of rice per sub-district. The calculation of availability is calculated from the conversion of rice dry milled rice. According to the United Nation in 2004 in every 100 Kg of dry rice became 63, 2 Kg of rice. Determination of the amount of rice in the net is determined by the formula as follows:

$$\text{Net} = P \times P [1 - (B + Pk + T)]$$

$$\text{Net production of rice production} = P = P \times C \text{ NET}$$

Description:

B = seeds (0, 0088)

Pk = Woof (0.02)

T = Scattered (0,054)

C = Conversion of rice to rice (0.809%)

The availability of rice in 1983 until 2010 based on data from the Central Bureau of Statistics regarding production of paddy Sleman Regency. To find out the availability of rice in 2011 until 2025 is calculated by means of the projection of population growth and the growth of rice production growth with the formula as follows:

$$P_t = P_o (1 + r)^t$$

Description:

P<sub>t</sub> = growth of year t

P<sub>o</sub> = growth in the beginning year

r = growth rate

t = time period



## RESULT AND DISCUSSION

### The Conversion of Land Agricultural in Sleman Regency between 1992 and 2009

The conversion of agricultural lands to the highest growth occurred in the Village of Kalasan, then Sub and Sub Pakem Ngaglik. The Sub-district of Depok which is an area with a high rate of conversion of agricultural land, if the growth rate of conversion is only viewed 0.09%. The conversion of the growth occurred in Depok sub-district this happens because the agricultural land is so slightly conversion has low growth. As the capital of the Regency, on sub-district Sleman the growth of conversion of agricultural land is high enough that 0.12%. Land conversion is used in addition to done construction of office building of local government as well as for construction of residential and commercial activity. Land use conversion that occurs outside the suburb occurred due to increase in population led to increased economic activity, and social services.

Figure 1. Difference in the conversion of agricultural land between the years 1992-2001, 2001-2009 and 1992-2009. The conversion of agricultural land between the years 1992 and 2001 in the Gamping, Depok, Mlati and Berbah sub-district is high (more than 200 Ha), while in the sub district Moyudan and Cangkringan is low at less than 50 Ha. Different for land conversions that occur in Sleman Regency between 2001 and 2009 in Berbah and Gamping sub district less than 100 Ha, while Depok and Mlati higher amounting to about 200 Ha. Conversion of agricultural land between 2001 and 2009 is high in Godean, Kalasan and Ngaglik sub-district (more than 200 Ha) and the low is Seyegan sub-district (50 Ha). Conversion of agricultural land during the span of 17 years (1992-2009) high is in the Town of Depok, is Godean, Gamping and Mlati (more than 400 Ha) and the low is Sleman and Seyegan sub district(180 Ha).

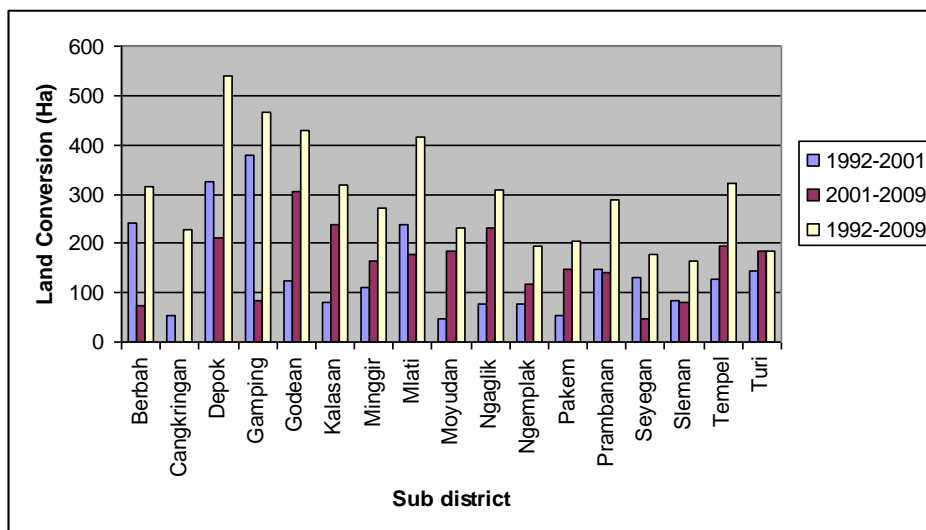


Figure 1. Graphs the Land Agricultural Conversion in Sleman Regency 1992-2009

For spatial analysis in this study of 17 sub districts in Sleman Regency will be divided based on the converted land. In the area of zone 1, which is an area with a high conversion rate consists of 4 districts; consist of Depok, Gamping, and Mlati and Godean sub district. Zone 2 is the area

with the conversion rate is intermediate composed of Sub Berbah, Tempel, Ngaglik and Kalasan sub district. Converted at the low, consist of 9 sub district includes Pakem, Ngemplak, Prambanan, Cangkringan, Seyegan, Minggir, Moyudan, Turi and Sleman.

**Determinants of Agricultural Land Conversion in Farmers Level**

Conversion of farmland occurs as a result of population growth. Consequences of increasing the number of residents are the need for the improvement of land to meet the needs of good life housing as well as for economic and social activities. In the macro aspects of the conversion of agricultural land due to the structural transformation and demographic issues [Anwar, 1989; Kustiwan, 1997]. In developing countries the economic growth of developing by leaps and bounds, this led to a shift in the structure of the economy from agriculture to non-agriculture. The shift in economic structure caused the conversion of agricultural land to non agricultural for the construction of industrial zones as well as the trade. The development of industrial zones and trade will be affect the growth of buildings for housing and other economic sector supporting the industrial and trade (restaurants, shops).

In micro aspects, conversion of agricultural land is not always driven by the narrowness of agricultural land owned by farmers. Farmers will sell agricultural land which are then by investors in the conversion to the use of non-farming. Results of sales of land by farmers then

used to buy farmland in other locations as well as investments to non agricultural activities [Sumaryanto *et al.* 1995; Irawan *et al.* 2000]. It shows that the price of land is a major factor that encourages farmers to sell agricultural land further the conversion, but due to high land prices. Economic or business factors into consideration farmers in converting agricultural land they own.

In the present study examined some of the factors that are thought to affect the conversion of agricultural land in the Regency of Sleman on each zone area of research. Factors thought to affect land conversion from two aspects, namely reviewed aspects of internal and external. Internal aspects include the age, level of education, the number of family members, extensive land use studies, employment outside agriculture, and income in the agricultural sector, location of land and land prices as well as long time efforts in agriculture. The Data obtained from the results of interviews with the respondents determined in this study. Variables are age, education level, number of family members and income levels are already discussed in the previous chapter. Table 1. Shows Results of Regression Determinants of Agricultural Land at the rate of Conversion of Farmers.

Table 1. Results of Regression Determinants of Agricultural Land at the rate of Conversion of Farmers

Variable	Zone 1		Zone 2		Zone 3	
	B	Sig	B	Sig	B	Sig
1. Age	10.164	.533	.264	.667	-.527	.198
2. Education	-4.884	.054***	-.918	.597	-2.308	.023
3. the number of family	11.104	.036**	-15.220	.258	4.772	.191
4. a broad land	-.001	.744	-.002	.540	-.001	.829
5. Dummy non agricuylture activity	8.970	.045**	-6.986	.066***	.393	.036**
6. Farm Income	.002	.000*	.000	.011**	.000	.017**
7. Non Farm Income	.000	.004*	.000	.000*	.000	.001*
8. <i>Dummy</i> Location Land	3.567	.003*	.574	.005**	6.957	.064**
9. Land Prices	.000	.000*	.001	.000*	.003	.000*
10. Old Farming	-2.829	.029**	-6.182	.040**	2.691	.000*
Constant	-189.939	.004*	352.864	.022**	-325.853	.000*
R <sup>2</sup>	0.98		0.970		0.96	

Description = \* sig 1%, \*\* sig 5%, \*\*\* sig 10%

Source: Imaging primary data



Based on table 1 shows that out of 10 variables used to analyze land use conversion factor is only about 3 variables (age, education level, number of household members and extensive agricultural land) are significantly less influential on either the territory of zone 1, 2 or 3. Land prices significantly affect the conversion of agricultural land in all areas of study. This shows that with the price of land that farmers are predisposed to high will convert agricultural land they had. Location of land will affect the conversion of agricultural land. In all zones the location of land significantly affects land conversion. However, the zone 1 is high significance, then to zone 2 and the lowest on the area of zone 3. It is in accordance with the 'location theory' of Alonso that the location of land is directly related to the price of land will be and will affect the attitude of farmers in maintaining agricultural land.

**Determinants of Agricultural Land Conversion in Regional Level**

Conversion factors at the regional level, it is meant to external factors outside of farmers. In the analysis of the level of the factors that affect the conversion of agricultural land by using secondary data as the data base. Secondary data used in the form of time series data on population, Gross Regional Domestic Product, built up area, main road long, Regulation of Agricultural land Conversion, and climatic conditions (rainfall).

Based on the results of the regression test model *OLS* (Ordinary Least Square) is only 4 variables can be tested. It is because the data retrieved less support in this

research. The Data length of the main street of less significant changes from year to year on each zone area, as well as to the data area of the data could not be awakened land obtained for continue per year. Rainfall data for each zone changes are also not so significant, so for testing the regression is not included. In this research program conducted through model testing Zhazam Version 6.2. After the tested requirements analysis regression model *OLS* (homoskedastisitas, multicollinearity and autocorrelation) turned out not to be fulfilled, on this model, so the model heteroscedasticity is formed is a regression model of heteroscedasticity.

Table 2 shows that the population is significantly positive effect of land conversion. Each case the addition of one percent of the population will increase conversions of land 0,026 percent. Likewise for a variable conversion rules enacted by the Government land, significantly affect the existence of land conversion, however, his influence was negative. Each case the addition rule of one percent will lower conversion of land amounting to 6,185. This is especially productive land conversion rules (rice fields), the Government created the stricter rules to prevent excessive land conversion. As with any conversion rule variable, the variable fields in the agricultural sector in *GDP* of significance by 10% conversion to agricultural land with influences that is negative. If an increase in *GDP* in the agricultural sector by one percentage it will decline conversion of 0, 06896.

Table 2. Estimated Regression Function Heteroscedasticity Model

Variabel	Coefficient Mean Equation	P-Value
1.Population	0,026797	0,000*
2.Regulation	-6,1859	0,000*
3.GDP	-0,068963	0,074**
4.Dummy Zone 1	7,6959	0,014*
5.Dummy Zone 2	8,3679	0,000*
6.Constanta	-0,0006569	0,011*

Source : secondary data processing

The location of the research in this Zone 1, 2 and 3 in this analysis with dummy variables are created as zone 3 as a reference. Dummy variables affect the location of positive conversion of agricultural land. Test results showed that in zone 1 when compared to zone 3 influence conversion of land relatively higher. Similarly to zone 2 zone 3 influences compared to the conversion of agricultural land is also higher. A positive value for coefficient of dummy variable location (zone) demonstrated that high low location affect the land conversion. On location nearby city tends to land conversion is higher compared to far from the city.

In the area adjacent to the downtown land prices would tend to be higher than on the far to the city centre. This indicates that the location is a factor affecting the level of land prices. Besides, the region located near the city center will save transport costs (a theory Von Thunnen). The farmer who owns the land close to the city centre will tend to convert the land owned in order to obtain a more favorable outcome. The conversion can be done directly or by indirect like by selling land belonging to other parties. Proceeds used to venture outside the farm or buy farmland far from urban with a cheaper price.

#### **Adequacy of Food in Sleman Regency**

In this research the needs of the food in question is to satisfy the needs of the rice in the Regency of Sleman. To find out the amount of rice as food needs have to be taken into account and note the number of average per capita average needs per day from residents. Based on data from Central Bureau Statistic in 2010 concerning the socioeconomic Indicators, an average consumption of calories (kcal) per capita per day according to province and region types to indicate that the area of the province of Yogyakarta Special Province-type villages and towns it amounted to 1852,05 kcal. If taken into account the

needs of the community in the province's rice in Yogyakarta Special Province then equal to 0,463013 kilograms per day, so one year everyone needed 168.9997 kilograms. To find out the needs of rice for a year in a region then the population in the region in the multiply by 168.9997 kilograms.

In the determination of food availability and food needs, the research is also done in geometric projection =  $P_t = P_o (1 + r)^t$  in the basis used to calculate the growth rate is the average rice production growth and average population growth in 1983 up to the year 2010. Needs of rice every year on each zone indicates increased, as a result of the increasing number of populations that the need for food is increasing as well. Rice needs in areas of zone 3 from 1983 to 2003, most high, but after the year 2004 till 2025's most high in the zone 1. The zone 2 from 1983 until 2015 rice needs least. In the area of zone 1, which tends to increase rice needs level indicates that the level of development of the population compared the zone 2 and 3 is highest. Zone 1 region is area closest to the city centre so that the development of this area is faster compare with areas zone 2 and 3.

Adequacy of food referred to in this research is the amount of inventory is reduced by the amount of rice needs. The adequacy of the level of rice can constitute an indicator of a region can be one indicator of the success of food self-sufficiency. The achievement of food self-sufficiency in a region is a part of food security. Food security exists in the one reflected from the availability of sufficient food. In this research the food security is meant is focused on the provision of food primarily from its own production by means of allocating resources nature (agricultural land). The adequacy of the rice according to the zone area of research in Sleman Regency can be seen in Table 3. And spatial can be seen in Figure 2.

Table 3. Adequacy of Sleman Regency Rice According to the Zone (tons/year)

Years	zone 1		zone 2		zone 3	
1983	-370.565	Minus	11799.68	surplus	46731.92	surplus
1985	-1671.64	Minus	6465.703	surplus	35831.09	surplus
1990	-10192.4	Minus	11302.82	surplus	45520.27	surplus
1995	-16118.5	Minus	3236.86	surplus	36636.4	surplus
2000	-20795.2	Minus	5259.753	surplus	23790.62	surplus
2005	-27799.7	Minus	1194.395	surplus	13334.42	surplus
2006	-43035.9	Minus	-3648.56	minus	18342.03	surplus
2010	-48646.2	Minus	-10650.9	minus	14367.29	surplus
2015	-51190	Minus	-11657.7	minus	12967.93	surplus
2020	-53785.7	Minus	-12681	minus	11577.32	surplus
2025	-56434.9	Minus	-13721.1	minus	10195.29	surplus

Source : data processing

Table 3 shows that in the area of zone 1 beginning in 1983 until 2025 rice sufficiency for minus. This means these regions cannot yet self-sufficient food independently. To sufficient the needs of food (rice) depends on other areas. In addition due to the high population of broad factor to harvest rice crops also became a factor that led to the availability of rice in order to sufficient the needs of community life in the zone 1 is a minus. In the area of zone 2 between 1983 and 2005 are still surplus, however, the years 2006 to 2025 minus. This means the area of

zone 2 was harvested area rice crops has decreased but there was an increase in population. The development of the economic sector in the area of agriculture led to the conversion of non agricultural lands happen and indirectly will affect rice production decline in zone 2. Rice production and food sufficiency level in the zone 3 starting in 1983 and predicted up to 2025 was a surplus. Based on the analysis of food sufficiency level in Sleman Regency could be said not all regions experiencing food shortages due to the conversion of agricultural land.

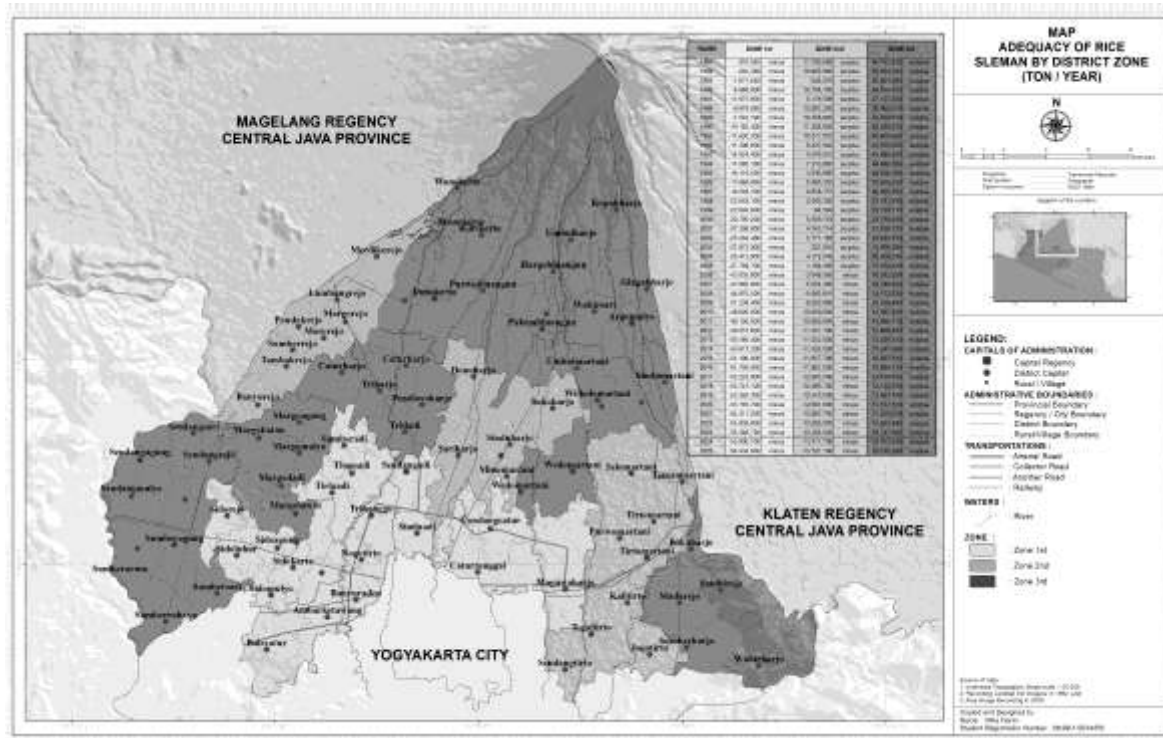


Figure 2. Spatial Distribution Adequacy of rice in Sleman Regency

## CONCLUSION

Conversion of agricultural land between 1992 and 2009 in the area shows that there is variation in the Sleman Regency conversion of agricultural land. Of the 17 districts there are 4 sub districts that are included in zone 1 that areas of high level of agricultural land conversion and 4 sub districts in the region including the area zone 2, is the region with intermediate levels of conversion of agricultural land. There are 9 sub region zones 3 which is a region with a low conversion rate. Internally at the level of farmers deciding factor in conversion of agricultural lands in areas of zone 1 is a variable number of household members, nonfarm jobs, location of land, income in the agricultural sector, non farm income, the price of land, old farming and level of education. Determinants of land conversion in the zone 2 are a variable income for agriculture and non-agricultural land, the location, the price of land, old farming and nonfarm jobs. There are 7 variables which determine the conversion of agricultural land on the territory of zone 3. That is the job of the seventh variables outside of agricultural, agricultural income, income, location of land, agricultural land price in none and old farming.

External factors that define of conversion of agricultural lands are a variable population, location and land use conversion rules significantly positive effect of land conversion. *GDP* effect on the conversion of agricultural land in the negative. Means that if there is an increase in *GDP* in the agricultural sector there will be a decrease in the conversion of agricultural land. Test results showed that in zone 1 when compared to zone 3 influence conversion of land relatively higher. Likewise for zone 2 zone 3 influences compared to the conversion of agricultural land is also higher.

The impact of agricultural land conversion to adequate food is different between zones 1, 2 and 3. In the zone indicates that

the zone 1 between 1983 to 2025 minus. In zone 2 surplus food sufficiencies only until 2005. In contrast to zone 1 and zone 2, zone 3 on the adequacy of food from 1983 to 2025 is met means the availability of food in the region surplus

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