Decrease of agricultural land and industry growth in Special Region of Yogyakarta

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Abstract. Economic development can affect many factors, such as agriculture and industry. These two sectors can significantly affect the economic health. Population growth encourages the employment opportunities to be increased. Industry becomes an area that can provide many job vacancies, but extend the industry is not easy because the side effect often takes agricultural land for operation. Industry in Special Region of Yogyakarta (DIY) is also growing like in other places. The land is changing from agricultural land to other functions. This phenomenon is gradually increasing year by year. This study aims to analyze the correlation between the industry growth and the decrease of agricultural land. The data from 2001 to 2016 were analyzed to know the correlation. The results illustrate that there are significant correlations between industry growth and the decrease of agricultural land in Kulonprogo District, Bantul District, Sleman District, and Gunung Kidul District which are known as food production centers in DIY. Yogyakarta City does not have many agricultural lands, therefore there is no correlation between the industry growth and the decrease of agricultural land area. Therefore, develeope the industry must consider the land that is used for expansion.

1. Introduction
Population growing encourages people to create more employment opportunities; trade, service, industry etc. Commonly, people focus on industrial expansion because it has direct effect in providing employment. Indonesia as a country which has 4th biggest population in the world faces the same issue in providing jobs. In order to able to provide many jobs, government opens the opportunity for investment from local and foreign investors. The promising sector is industry since the Indonesian wage rate is lower than developed countries. However, the problem that emerges when industrial areas are expanded is the agricultural land area decreases. Directly or indirectly the extended industrial area has effect toward the decrease of agricultural land area in Indonesia.

Indonesia as the 4th largest population in the world with continuous growing, settlements and industries are growing too. Those drive the changing of agricultural land to settlements and industries area [1]. In Indonesia the land changing trend is increasing. Changing agricultural land to non-agricultural land can weak the food security due to the decrease of food production [2]. Food self-sufficiency will be more difficult to be realized if the agriculture land area is decreasing. To increase the food production by extensification is difficult in this situation. Intensification is also not easy because the farmers in Indonesia are dominated by old people and technology utilization for increasing food production is not easy for old people. If the agriculture land area cannot be, keeping the remaining land area is important to keep food production continuous. Economic development affects many factors such as agriculture and industry. These two sectors can significantly influence economic
health. Gross domestic product (GDP) usually is used to measure the economic health. In Serbia, agriculture sector plays important role in the GDP, it means agriculture can support the economic health [3].

The growth in agriculture is belief makes benefits to the manufacturing sector by improving its domestic terms of business, by increasing the share of investment and saving in GDP, and by increasing the capacity to import industrial inputs. These findings give support to the image that agriculture plays key macroeconomic roles in the industrialization of developing countries by relieving saving, aggregate demand, fiscal, and foreign exchange constraints on the industrial sector [4].

Factors that affect the land use change are divided into 3 factors: internal, external and policy. Internal factors include farmers’ characteristics, the number of family member, the number of owned land and the environment dependency. The external factors include city movement (the higher the density means the city will expand the area to surrounding area), demographics (the increase of population lead the land need to increase) and economic (the land need for economic activity is increase). The last factor is policy regarding the land use change by government [1].

Another research says that the fragmentation of agricultural land is influenced by political, economic, social, ecological and environmental factors, which affect its dynamics, patterns, structures, and functions. Land fragmentation will increase in the future and should be considered [5]. Economic factors that generate land use change from activities of rice farming is the middle low income, land owners working in other sectors, the selling price of land, and the presence of non-agricultural business activities. Social factor that boost land conversion activities are adat (local unique tradition or culture) and religious activities which require large financial sources and the desire to follow the behavior of the surrounding environment. Institutional factors that increase land change activities are also concerned with institutional weaknesses and weak implementation of the governance of urban space [6].

Young generation commonly do not want to work in agriculture, because agriculture is believed to be not so profitable. This phenomenon encourages young people to work in industry, service or other sectors. And many of them migrate to the city to work. It leaves the agriculture more vulnerable by the effect of industrial growing [7].

Special Region of Yogyakarta called Daerah Istimewa Yogyakarta (DIY) as a region that has rural and city area, faces the same problem in agriculture land area in which the agricultural land changes into industrial area. Therefore, this paper aims to analyze the correlation between the decrease of agriculture land area and industry growth in DIY.

2. Materials and Methods
DIY consists of four districts, they are Bantul, Kulonprogo, Sleman and Gunungkidul, and one city which is Yogyakarta. Descriptive method is used for research method with quantitative approach. Secondary data about agriculture land area and industrial growth in Yogyakarta from 2001 to 2016 were used in the analysis. Descriptive analysis was used to describe the data.

Data analysis which are used in this research are below:
2.1. Trend analysis
This analysis collects information and tries to know a pattern. Trend analysis usually refers to techniques for understanding a pattern of behavior in a time series which would otherwise be partly or nearly completely hidden by noise. If the trend can be assumed to be linear, trend analysis can be managed within a normal regression analysis. If the trends have other patterns than linear, trend testing can be conducted by non-parametric methods.

2.2. Correlation analysis
This analysis is a method of statistical evaluation used to study the strength of a relationship between the decrease of agriculture land area and the increase of industrial area. The analysis method that was used here is Pearson Analysis.
3. Results and Discussion
DIY is a province which is famous as education and tourism center because it has so many education institutions in higher level. As a small province in the view of the size of area, Yogyakarta needs to grow in all areas to support the life of the people life. Population growth and the number of migrant form all around area in Indonesia who come to DIY make the settlements and employment opportunities increase. Agriculture is a field that is still kept by many people in DIY, however this is not today’s trend.

Figure 1. Trend of agricultural land
Employment problem especially in Indonesia consists of several aspects: unemployment, quality, wage, social insurance, etc. [8] states that agriculture sector has strategic role in employment problem in Indonesia. In this country, employees still concentrated as farmers, but conducive policies to support agriculture sector in absorbing employees are still not much. Farmers and agriculture have small role in economic and social strata. Then the government make worse by importing food commodity that can strongly influence the food commodity price.

![Graphs showing industrial growth](image)

**Figure 2.** Trend of industrial growth

Other problem in agriculture employment is the demographic changing in which people who works as farmers tend to be from older generation getting old, which commonly are more than 40 years old.
Otherwise the young farmers is not significantly increase but tend to decrease in range year 2003 to 2013. And young people who work in outside agriculture in increasing [9] The main reason of this phenomenon is the perception that agriculture sector doesn’t have good income and prestige.

The decreasing of young laborer and the increasing number of old laborer in agriculture show that the dream job and the job availability do not match. Other than that dream job and the ability which shown by the education background is still low. As long as agriculture sector cannot improve its image a promising field that can generate good income and prestige, this sector will be left by modern young people. Some modern young people choose to be unemployed rather than working in agriculture field.

| Table 1. Pearson Correlation Analysis Result |
|---------------------------------------------|
| KPWL | -0.714(**), 0.002 |
| KPDL | -0.676(**), -0.664(**), 0.005 |
| BTWL | -0.871(**), 0.003, 0.01 |
| BTDL | -0.686(**), -0.622(*) |
| GKWL | 0.541(*), 0.03, 0.031 |
| GKDL | 0.104, 0.103 |
| SLWL | 0.702, 0.705 |
| SLDL | -0.809(**), -0.733(**), 0.013, 0.059 |
| KYWL | -0.41, 0.114, 0.139 |
| KYDL | -0.36, 0.234 |

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Where:
KPWL: Kulonprogo Wetland, KPDL: Kulonprogo Dryland, BTWL: Bantul Wetland, BTDL: Bantul Dryland, GKWL: Gunungkidul Wetland, GKDL: Gunungkidul Dryland, SLWL: Sleman Wetland, SLDL: Sleman Dryland, KYWL: Yogyakarta City Wetland and KYDL: Yogyakarta City Dryland, KPIN: Kulonprogo Industry, KPLA: Kulonprogo Labor, BTIN: Bantul Industry, BTLA: Bantul Labor, GKIN: Gunungkidul Industry, GKLA: Gunungkidul Labor, SLIN: Sleman Industry, SLLA: Sleman Labor, KYIN: Yogyakarta City Industry, KYLA: Yogyakarta City Labor

High unemployment can be caused by some factors such as imbalance between the number of job seekers and employment. Today’s generation think that industry sector is safer and wealthier than agriculture sector. Also, the government thinks that industry can support regional economy well, as well as provide many employment opportunities. Therefore, industry in Yogyakarta is growing. Building industry needs land, unfortunately, industry is built in the agriculture land. It is shown by the trend of the decrease of agricultural land.
In Kulonprogo District, as shown in Fig. 1, wetland decrease with R^2 0.65 and dryland decrease with trend line in R^2 0.35. In Gunungkidul, wetland also decrease with decreasing trend line in R^2 0.56, but dryland has not significantly decrease with R^2 0.0053. Bantul shows the same trend which is decrease in wetland and dryland area with R^2 0.96 and 0.70 respectively. Sleman as food production center in Yogyakarta also experience the decrease in wetland and dryland of agricultural land, with R^2 0.87 and 0.56 respectively. And Yogyakarta City, as the center of DIY has high R^2 in the decrease of agricultural land which is 0.92 for wetland and 0.75 for dryland.

Meanwhile the industry sector which people believe as a sector that can provide many employment can be shown in Fig. 2 for the trend. All districts show the increase of industries and employment provided by those industries. Laborers who work in industrial sectors in Kulonprogo District, Bantul District, Gunungkidul District, Sleman District and Yogyakarta City significantly increase with R^2 0.81, 0.72, 0.77, 0.59 and 0.2 respectively. The lowest R^2 belongs to Yogyakarta City, it is because the land in Yogyakarta City is limited and full of buildings and settlements, there is no more space for the industrial expansion so the increasing number of laborers in Yogyakarta City might be caused by other sector such as service sector, even quite significant. Meanwhile the industry increases with R^2 0.79, 0.79, 0.76, 0.77 and 0.33 respectively.

The correlation between the decrease of agriculture land area and the increase of industries can be seen in Table 1. Both Kulonprogo and Bantul District show significant correlation between the decrease of both wetland and dryland of agricultural land and the increase of industry and laborer in industry. When the industry growing, the agriculture land area is decreasing. It shows that industrial growth is effecting the decrease of agricultural land in Kulonprogo District. As the area that quite hilly, Gunungkidul District shows significant correlation between wetland and industry and laborr in industry. Because the value is minus, so when the industry or laborer in industry is increase, the wetland is decrease. Meanwhile the correlation between dryland and industry and laborer in industry are not significant.

Sleman District as the area in Yogyakarta that produces food commodities more than other area, has significant correlation between wetland and dryland with industry, but labor in industry only has significant correlation with wetland, all are in negative value. These show that industrial growth also effecting the agriculture area especially wetland area. Yogyakarta City does not have significant correlation, it is because there are no significant in the increase or decrease both agriculture land and industry.

4. Conclusion
Industrial growth has positive and negative effects in the human life. The positive effect is that industry can provide many employment opportunities for all people elements. The negative effect is that industrial growth needs area for its operation and the strategic area is usually agriculture area. Many agriculture lands are decreasing, one of the causes is that the agricultural land are changing into industrial areas. The result of this research indicates that in DIY, only Yogyakarta City that doesn’t have correlation between agricultural land and industrial area. Other regions such as Kulonprogo District, Bantul District, Gunungkidul District and Sleman District have correlation between the agriculture land area and industrial growing. When industry is increasing, the agricultural area decreases. Therefore, even though the industrial sector has benefit in supporting the economy, but it must be considered that it should affect to agriculture sector that provides food for human life.

5. References
[1] Nuryaman H 2017 Tren Alih Fungsi Lahan Pertanian ke Non Pertanian: Faktor dan Alternatif Kebijakan Seminar Nasional Hasil Penelitian Agrisbisnis, 1 April 2017. Ciamis, Indonesia: Universitas Galuh.
[2] Kaputra I 2013 Strukturisasi 1 1 25-39.
[3] Doci A and Jovic S 2017. Physica A 479 396-399.
[4] Souza J P 2015 Struc. Chan. Econ. Dyn. 34 1-18.
[5] Gommes E, Banos A, Abrantes P, Rocha J, Kristense S B and Busck A 2019 *Econ. Indic.* 97 380-388.

[6] Dewi I A and Sarjana I M 2015 *Jurnal Manajemen Agribisnis* 3 163-171.

[7] Xia W and Zhao G 2018 *Land Use Policy* 74 142-150.

[8] Setiawan I 2009 *Jurnal Geografi Gea*, 6 1-6.

[9] Susilowati S H 2016 *Forum Penelitian Agro Ekonomi* 34 35-55.