THE ECONOMIC ACTIVITIES AND INDUSTRIAL SPATIAL CONCENTRATION IN REGENCIES/CITIES IN CENTRAL JAVA PROVINCE IN 2000-2013

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ABSTRACT

This study aimed to identify the pattern of the industrial spatial concentration and its stability in Central Java between 2000 and 2013. Industrial spatial concentration analysis is conducted in the Provincial Coordination Board (Bakorwil) in Central Java Province. This study employed the industrial concentration ratio and Geographic Information Systems (GIS). The data of employment of the National Labor Force Survey (Sakernas) were used to examine the industrial concentration in the province. This research found that industries in Central Java province concentrated on agriculture and manufacturing. The agricultural industry is a resource-based industry spatially concentrated in regencies. The manufacturing industry is a foot-loose industry, which does not have specific location patterns. In other words, the industry can be located in both regencies and cities. Service industries such as trade, communications, and finance industries are spatially concentrated in the cities because they are market-oriented. Finally, the competitiveness of tobacco manufacturing industry (Code: 160) in Kudus, the industry of wood products, and woven goods from rattan, bamboo and other similar materials (Code: 202) in Kebumen, furniture industry (Code: 361) in Jepara, and mobile retail trading/outside building (Code: 525) in Tegal City sustained in the past ten years.

Keywords: *Industrial Spatial Concentration, Bakorwil in Central Java Province, Geographic Information Systems (GIS)*

1. INTRODUCTION

Regional autonomy gives the region the right, the authority, and the responsibility to regulate and manage government affairs and the concerns of the local community. Local governments, therefore, have the authority to define regional policies to encourage regional economic development.

According to Arsyad (1999), regional economic development is a joint effort between the regional government and the community to manage resources to create new business areas and stimulate regional economic activities. Policy planning that takes into account the potential of the region and its security can improve welfare.

Most countries in the world have transformed their economic structure (Kuncoro, 2002). This is marked by an increase in the portion of the industrial sector compared to the agricultural sector, particularly in terms of the GDP, which is expected to increase (Kuncoro, 2002). Indonesia has experienced a change in the economic structure from an agricultural-based economy to a manufacturing-based economy. A similar thing happened in Central Java Province, as shown in Table 1.

Table 1. Gross Regional Domestic Product (GRDP) at Constant Prices of Agriculture and Manufacturing Industry in Central Java Province in 1999, 2000, and 2013 (in Million Rupiahs)

Year	Agriculture		Manufacturing Industry		Total GRDP of Central Java Province
	GRDP at Constant Price	Percentage	GRDP at Constant Price	Percentage	
(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
1999	8,184.670.67	20.78	12,036,861.58	30.56	93,384,513.74
2000	8,447,654.90	20.63	12,421,426.24	30.39	40,941,667.09
2013	37,513,957.62	16.81	73,092,337.30	32.76	223,099,740.34

Sources: Central Java at 2000, 2001, & 2014 Constant Prices, Central Board of Statistics

As summarized in Table 1, the contribution of the agricultural sector on the GRDP of Central Java Province decreased from 20.78% in 1999 to 16.81% in 2013. On the other hand, the contribution of the manufacturing industry on GRDP of the province increased from 30.56% in 1999 to 32.76% in 2013.

According to the literature, each industry has different characteristics. The resource-based industries, in this case, the agricultural industries, are located close to resources. Meanwhile, the service industry is market-oriented and this type of industry tends to be located in the city. The manufacturing industry is an industry that is located neutral to the market and the raw material (foot-loose industry). Thus, it appears not to have a certain location pattern (can be situated in the city or the regency).

Based on the explanation above, a study of the spatial concentration of industry in regencies/cities in Central Java Province plays a role as a reference in determining regional development policies. The purpose of this study was to analyze the industrial spatial concentration and stability in regencies/cities in Central Java Province in 2000-2013. Thus, identification of the base industry becomes very important, particularly to determine priorities and economic development planning in the region (Rachbini, 2001). Effective regional development planning must be able to define a priority scale based on the capacity of the region's resources. Planning by the regional government is effective because access to complete information is available and there is a closeness between the planner and the object of planning (Kuncoro, 2004). The regional government's planning is fruitful because comprehensive information is accessible and there is a strong relationship between the planner and the object of planning (Kuncoro, 2004).

Location theory is the science of investigating spatial orders of economic activities, or the science of investigating the geographical location of potential sources and their relationship to or influence on the existence of various kinds of other businesses/activities, both economic and social (Tarigan, 2006).

Christaller (1933) in Kuncoro (2012), found a central place theory model, a classic model of a perfectly competitive economy in a geographical context. This theory explains that market-oriented companies consider access to consumers in determining location. Meanwhile, according to O'Sullivan (2003) in Kuncoro (2012), central place theory shows the unification of different industrial location patterns that forms an urban regional system.

Based on Perroux's theory, as mentioned in Arsyad (2010), the pole of growth is the theory that is used as the basis for determining regional industrial development policy strategies that are widely applied in various countries today. According to this theory, growth will not happen in various regions at the same time, because growth will only occur in several places called growth centers with varying intensities. In other words, this theory reviews from the aspect of the location, in which regional economic development is uneven and agglomeration (concentration) takes place in growth concentration areas.

The emergence of the pole of growth is influenced by two aspects (Arsyad, 2010), namely the condition of infrastructure that determines industrial efficiency and the market orientation. According to market orientation, industries are divided into three groups, namely industries that are close to raw materials (resource-based industries), industries that are close to markets (market-oriented industries), and industries that are neutral towards the location of the market and raw materials (foot-loose industry).

Regionalism is a classification method, which is considered effective to describe phenomena, including the relationship between humans and the resources they use in the earth. Thus, spatial classification is an instrument to more easily explain the diversity and various characteristics of phenomena that occur.

The spatial classification used is the regional system according to article 11 letter c of Regional Regulation Number 6 Year 2010 concerning the Regional Spatial Planning (RSP) of Central Java Province in 2009-2029. The guideline contributes to the plan to develop the spatial structure of the Central Java Province using a regional system (Article 11 letter c). The Regional System covers 8 (eight) Regional Coordinating Bodies (*Bakorwil*) of Central Java Province, as follows: 1) *Kedungsepur*, 2) *Wanarakuti*, 3) *Subosukawonosraten*, 4) *Bregasmalang*, 5) *Petanglong* 6) *Barlingmascakeb*, 7) *Purwomanggung*, and 8) *Banglor*.

This study defines the industry based on Law Number 3 Year 2014 concerning Industry. Industry is all forms of economic activity that processes raw materials and/or utilizes industrial resources to produce goods that have added value or more benefits, including industrial services.

Research conducted by Polese and Shearmur (2006) resulted in four industrial spatial patterns. They include (1) heavy industries that are oriented towards small peripheral areas, (2) technology-based

industries that require large spaces and oriented towards locations close to metro areas but located outside metropolitan areas, (3) high-tech industries that are oriented towards large metropolitan areas and relatively concentrate systematically on distance but are inversely proportional to the size of the city, and (4) high-order services that are consistent with central place theory, where the industries are oriented in large metropolitan areas and other urban areas.

Landiyanto's study (2005) showed that the manufacturing industry in Rungkut District tended to specialize in the food, beverage, and tobacco industries. The analysis has shown the role of spatial concentration in the development of the manufacturing industry in the city of Surabaya.

A study by Ferdyansyah and Santoso (2013) confirmed that the activities of the textile, leather goods, and footwear industries were the main drivers of regional economic growth in regencies/cities of East Java Province. The specialization of the industries provided added value and employment in several regencies/cities in the province.

A study by Atmanti (2010) concluded the majority of regencies/cities in Cross Regency/City Development Coordinating Board (*Bakorlin*) I centering in Pati. *Bakorlin* I covered the areas of Blora, Demak, Grobogan, Jepara, Kendal, Kudus, Pati, Rembang, Semarang Regency, Salatiga, and Semarang City. *Bakorlin II* centered in Magelang City and covered the areas of Boyolali, Purworejo, Wonosobo, Karanganyar, Sragen, Magelang, Surakarta, Klaten, Temanggung, Magelang Regency, and Wonogiri that were excellent in the agricultural sector. Meanwhile, agriculture was not dominant in *Bakorlin III*, with the center in Purwokerto. The areas covered Banyumas, Purbalingga, Cilacap, Banjarnegara, Batang, Pekalongan Regency, Pemalang, Tegal, Brebes, Pekalongan City, and Tegal.

Husna, Noor, and Rozikin's (2013) research has proven that the most potential fields to be developed were the manufacturing industries, such as electricity, gas, and clean water; as well as and mining and quarrying industries. However, the government of Gresik Regency prioritized the planning on manufacturing, trade, hotel and restaurant, and agricultural industries.

2. RESEARCH METHOD

The research objects were 29 regencies and six cities in Central Java Province with the classification based on *Bakorwil*. Population aged 15 years and over who worked for a week, main job opportunities and labor force of each regency/city based on the industries were used as the data. Data were obtained from Central Java in 2020-2013, National Labor Force Survey (*Sakernas*) at 2000 & 2013, 2015 Regional Statistics of Central Java Province, and Central Board of Statistics of Central Java.

Industrial spatial concentrations were identified with the following steps. First, the industries among the top five of 183 industries were pinpointed based on the Indonesian Business Field Standard Classification (KBLI), CentralBoard of Statistics (*BPS*), in each regency/city in Central Java Province. The identification was carried out in 2000 and 2013. The second step was categorizing regencies/cities having the same base industry in a particular year into one group. The third step was identifying industries in each regency/city at each particular time (in 2000 and 2013). Thus, there were 25 industrial groups in 2000 and 22 industrial groups in 2013.

The fourth step was identifying the areas in which the industries were located. This was done by finding the areas with the highest employment absorption for each industry. This study weighed each regency/city of the existing industry-based groups. Weighting was carried out for 2000 and 2013, with the following ratio.

$$Labor\ Ratio = \frac{Each\ Labor - Each\ Regency/City\ per\ Industrial\ Group}{Labor\ Force\ of\ each\ Regency/City}$$

The fifth step was ranking the highest to lowest score of each industrial group that had been weighed in the fourth step. The result of the fifth step was the base industry, which had the highest weight, located in a particular regency/city.

The above analyses were followed by the mapping using Geographic Information System (GIS) analysis. According to Martin (1996) in Kuncoro (2012), Geographic Information Systems (GIS) can be used for analyzing, mapping, and modeling to encourage broader implementations to various scientific disciplines, from information technology to socio-economics. In this study, GIS was applied for mapping industrial bases in each regency/city in Central Java Province in 2000 and 2013.

3. RESULTS AND DISCUSSION

This study has shown that industries had particular location selection patterns following their characteristics. Industries that were close to raw materials (resource-based industries) concentrated spatially in regencies while market-oriented industries concentrated spatially in cities. Whereas, industries that were neutral towards the locations of markets or raw materials (foot-loose industry) could focus spatially in regency or city.

This is related to Perroux's growth pole theory in Arsyad (2010: 444). Growth does not appear in various regions at the same time, because growth only occurs in several growth centers with diverse intensities. Growth pole theory is in line with the findings that industries that centered in the regency/city of Central Java Province in 2000-2013 developed in the centers of growth.

The agricultural industry was close to raw materials (resource-based industry). This industry was concentrated in one regency in *Banglor Bakorwil*, namely Rembang Regency. The labor ratio has indicated that the agriculture, plantation, and livestock service industries (Code: 14) and fisheries (Code: 50) in Rembang Regency were higher than those in other regions in Central Java Province.

The manufacturing industry was neutral towards the markets and the raw materials. This industry concentrated in *Wanarakuti Bakorwil*, particularly in Kudus Regency with the tobacco manufacturing industry (Code: 160), Jepara Regency with the clay-manufacturing industry (Code: 263), and Jepara Regency with furniture industry (Code: 361). The manufacturing industry also concentrated on *Petanglong Bakorwil*, Pekalongan Regency with spinning, weaving, textile final manufacturing industries (Code: 171), and apparel made of textiles, except for finished clothes (Code: 181). Whereas, the trade, communication, finance, and service industries were market-oriented industries. The trading industry concentrated on *Kedungsepur Bakorwil* (Semarang City with a retail trade industry specializing in non-food and beverages commodities, (Code: 523)) and *Subosukawonosraten Bakorwil* (Surakarta City with a retail industry of various kinds of goods in a building (Code: 521)). The trade industry also focused on *Purwomanggung Bakorwil* (City of Magelang with the culinary/restaurant bar and food service industries (Code: 552)).

Communication industry centered in *Subosukawonosraten Bakorwil*, particularly the city of Surakarta, with the highway transportation industry (Code: 602). The financial industry concentrated on the *Kedungsepur Bakorwil*, the city of Semarang, with government administration, as well as economic and social policy industries (Code: 751). Meanwhile, the service industry focused on *Kedungsepur Bakorwil* (Semarang City) and *Purwomanggung Bakorwil* (Magelang City) with the industries involving personal services for serving households (Code: 950)).

Referring to Ambardi and Socia (2002), one of the criteria of leading industries is the capacity to survive within a particular period, including birth, growth, peak, and decline. If one leading industry experiences a decline, the other leading industries need to replace it. Thus, analysis of industrial concentration stability is used to determine the industry's capacity to survive in the long term in a particular location (regency/city) in Central Java Province.

The stability of industrial concentration in Central Java Province was analyzed by comparing information on industrial concentration in 2000 and 2013. The discussion on the stability of industrial spatial concentrations used information obtained from the results of the discussion of industrial spatial concentrations in the previous section. The discussion is divided into four sections as follows.

The first discussion is about the stability of industrial concentrations from 2000 to 2013 in the regencies/cities in Central Java Province, as summarized in Table 2.

Table 2 indicates several industries that remained stable, concentrating on certain regencies/cities in Central Java Province from 2000 to 2013. This shows the ability of regencies/cities to maintain industrial competitiveness in their regions. This confirms the capacity of regencies/cities to maintain industrial competitiveness in their regions.

Table 2. Stable industrial spatial concentration from 2000 to 2013

Sector	Industry	Year	
		2000	2013
(1)	*(2)*	*(3)*	*(4)*
Manufacturing	Tobacco manufacturing industry (Code: 160)	Kudus Regency (Labor Ratio: 0.198)	Kudus Regency (Labor Ratio: 0.160)
Manufacturing	Industries of wood products, and woven goods made from rattan, bamboo, and others (Code: 202)	Kebumen Regency (Labor Ratio: 0.134)	Kebumen Regency (Labor Ratio: 0.053)
Manufacturing	Furniture industry (Code: 361)	Jepara Regency (Labor Ratio: 0.300)	Jepara Regency (Labor Ratio: 0.188)
Trade	Mobile retail trading/outside the building (Code:525)	Tegal City (Labor Ratio: 0.193)	Tegal City (Labor Ratio: 0.078)

Sources: National Labor Force Survey (*Sakernas*) at 2000 & 2013, Central Java Province at 2001 & 2014, Central Board of Statistics at 2001 & 2014, Data processed in 2016

The second discussion focuses on the emergence of a new industrial spatial concentration in 2013 in the regencies/cities in Central Java Province. This is exposed by the data of industrial concentration in regencies/cities in Central Java Province in 2000 and 2013. New industries that emerged and concentrated in Purbalingga Regency in 2013 were the jewelry manufacturing industry and others (Code: 369). More detailed information is presented in Table 3.

Table 3. Spatial concentrations of new industries that emerged in 2013

Sector	Industry	Year	
		2000	2013
(1)	*(2)*	*(3)*	*(4)*
Manufacturing	Jewelry manufacturing industries and manufacturing industries of other related products (Code: 369)	-	Purbalingga Regency (Labor Ratio: 0.145)

Sources: National Labor Force Survey (*Sakernas*) at 2000 & 2013, Central Java Province at 2001 &2014, Central Board of Statistics at 2001 & 2014, Data processed in 2016

More complete information is illustrated by using Geographic Information Systems (GIS) in Figures 1 and 2.
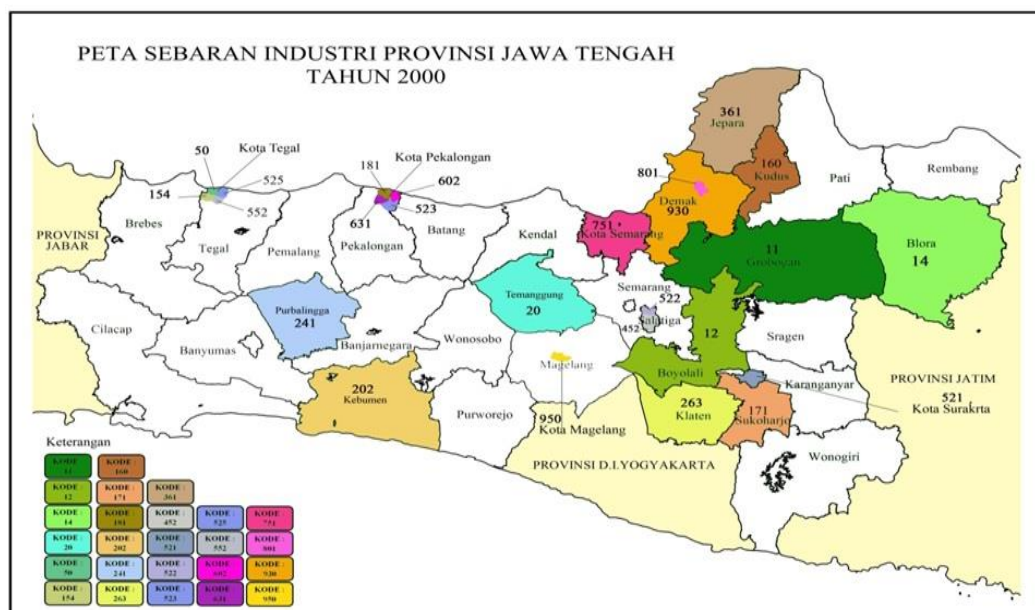
Notes: 11. Agriculture: food crops, estate crops, and horticultural products; 12. Animal Husbandry; 14. Agricultural, plantation and animal husbandry services; 20. Forestry; 50. Fisheries; 154. Other food industries; 160. Tobacco manufacturing industry; 171. Spinning, weaving, textile manufacturing industry; 181. Apparel industry from textiles, except for finished clothing; 202. Industries of wood products and woven products from rattan, bamboo, and others; 241. Basic chemical industry; 263. Clay-manufacturing industry; 361. Furniture industry; 452. Infrastructure and public building construction; 521. Retail industries of various products in a building; 522. Retail industries of food, beverage/imitation commodities; 523. Retail industries of non-food and beverage commodities; 525. Mobile retail trading/outside the building; 552. Restaurant/culinary, bar, and catering services; 602. Public transportation; 631. Logistics industry (loading and unloading goods); 751. Government administration, and economic and social policies; 801. Basic education services; 930. Other services; 950. Individual services to households.

Sources: National Labor Force Survey (*Sakernas*) at 2000, Central Java Province at 2001, Central Board of Statistics at 2001, Data processed in 2016

Figure 1. Map of Industrial Distribution of Central Java Province in 2000
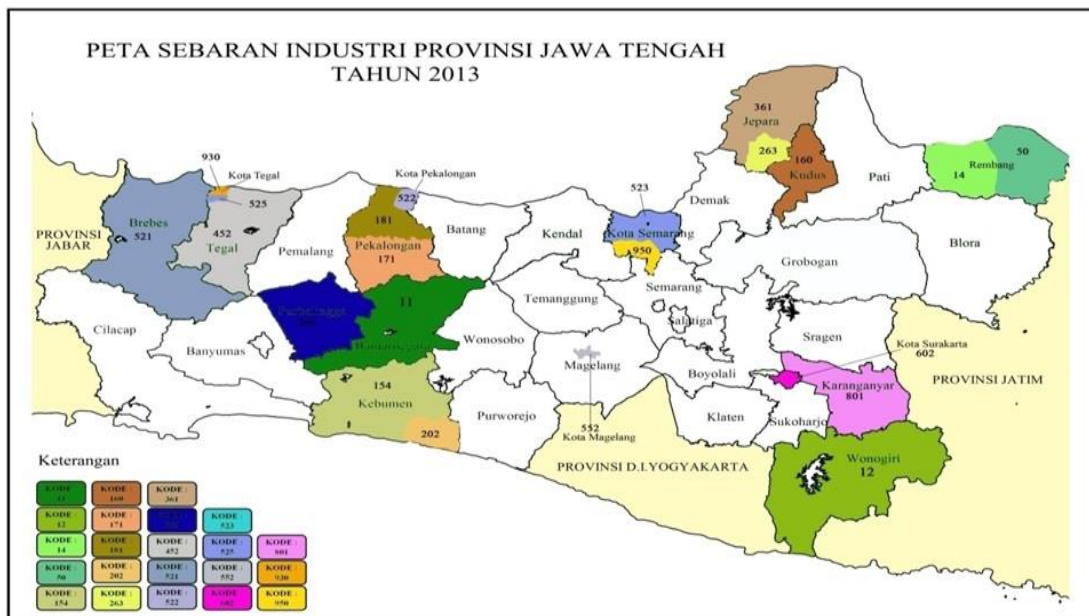
Notes: Agriculture: food crops, estate crops, and horticultural products; 12. Animal Husbandry; 14. Agricultural, plantation and animal husbandry services; 50. Forestry; 50. Fisheries; 154. Other food industries; 160. Tobacco manufacturing industry; 171. Spinning, weaving, textile manufacturing industry; 181. Apparel industry from textiles, except for finished clothing; 202. Industries of wood products and woven products from rattan, bamboo, and others; 263. Clay-manufacturing industry; 361. Furniture industry; 369. Jewelry and other similar product manufacturing industries; 452. Infrastructure and public building construction; 521. Retail industries of various products in a building; 522. Retail industries of food, beverage/imitation commodities; 523. Retail industries of non-food and beverage commodities; 525. Mobile retail trading/outside the building; 552. Restaurant/culinary, bar, and catering services; 602. Public transportation; 801. Basic education services; 930. Other services; 950. Individual services to households.

Sources: National Labor Force Survey (*Sakernas*) at 2013, Central Java Province at 2013, Central Board of Statistics at 2014, Data processed in 2016

Figure 2. Map of Industrial Distribution of Central Java Province in 2013

The third discussion focuses on the loss of industrial spatial concentration in 2013, shown by the comparison of industrial spatial concentrations in 2000 and 2013 in regencies/cities in Central Java Province. Several industries were no longer spatially concentrated in Central Java in 2013. More detailed information about this is presented in Table 4.

Table 4. The spatial concentration of the loss of industries in 2013

Sector	Industry	Year	
		2000	2013
(1)	*(2)*	*(3)*	*(4)*
Agriculture	Forestry (Code: 20)	Temanggung Regency (Labor Ratio: 0.023)	-
Manufacturing	The industry of basic chemicals (Code:241)	Purbalingga Regency (Labor Ratio: 0.077)	-
Communication	Logistics industry (loading and unloading goods) (Code:631)	Pekalongan City (Labor Ratio: 0.209)	-
Finance	Government administration, as well as economic and social policies (Code: 751)	Semarang City (Labor Ratio: 0.080)	-

Sources: National Labor Force Survey (*Sakernas*) at 2000 & 2013, Central Java Province at 2001 & 2014, Central Board of Statistics at 2001 & 2014, Data processed in 2016

The fourth discussion centers on the shift in industrial spatial concentration from 2000 to 2013, presented by comparing information in 2000 and 2013 regarding industrial concentration in regencies/cities in Central Java Province. Data have exposed that compared to 2000, several industries experienced a shift in industrial concentration in 2013. A shift in industrial competitiveness occurred in the regencies/cities in Central Java from 2000 to 2013. More detailed information is shown in Table 5.

Table 5. Shifts in industrial spatial concentration from 2000 to 2013

Sector	Industry	Year	
		2000	2013
(1)	*(2)*	*(3)*	*(4)*
Agriculture	Agriculture: food crops, estate crops and horticultural products (Code:11)	Grobogan Regency (Labor Ratio: 0.805)	Banjarnegara Regency (Labor Ratio: 0.432)
Agriculture	Animal husbandry (Code:12)	Boyolali Regency (Labor Ratio: 0.058)	Wonogiri Regency (Labor Ratio: 0.236)
Agriculture	Agricultural, plantation and animal husbandry services (Code:14)	Blora Regency (Labor Ratio: 0.103)	Rembang Regency (Labor Ratio: 0.144)
Agriculture	Fisheries (Code:50)	Tegal City (Labor Ratio: 0.295)	Rembang Regency (Labor Ratio: 0.089)
Manufacturing	Other types of food industries (Code:154)	Tegal City (Labor Ratio: 0.150	Kebumen Regency (Labor Ratio: 0.203
Manufacturing	Spinning, weaving, and textile manufacturing industries (Code: 171)	Sukoharjo Regency (Labor Ratio: 0.149)	Pekalongan Regency (Labor Ratio: 0.113)
Manufacturing	Apparel industry from textiles, except for finished clothing (Code:181)	Pekalongan City (Labor Ratio: 0.229)	Pekalongan Regency (Labor Ratio: 0.198)
Manufacturing	Clay-manufacturing industry (Code: 263)	Klaten Regency (Labor Ratio: 0.071)	Jepara Regency (Labor Ratio: 0.046)
Construction	Infrastructure and public building construction (Code:452)	Salatiga City (Labor Ratio: 0.145)	Tegal Regency (Labor Ratio: 0.089)
Trading	Retail industries of various products in a building (Code:521)	Surakarta City (Labor Ratio: 0.131)	Brebes Regency (Labor Ratio: 0.096)
Trading	Retail industries of food, beverage/imitation commodities (Code:522)	Salatiga City (Labor Ratio: 0.289)	Pekalongan City (Labor Ratio: 0.059)

Trading	Retail industries of non-food and beverage commodities (Code:523)	Pekalongan City (Labor Ratio: 0.230)	Semarang City (Labor Ratio: 0.094)
Trading	Restaurant/culinary, bar and catering services (Code:552)	Tegal City (Labor Ratio: 0.344)	Magelang City (Labor Ratio: 0.107)
Communication	Public transportation (Code:602)	Pekalongan City (Labor Ratio: 0.210)	Surakarta City (Labor Ratio: 0.082)
Service	Basic education services (Code:801)	Demak City (Labor Ratio: 0.033)	Karanganyar Regency (Labor Ratio 0.040)
Service	Other services (Code:930)	Demak Regency (Labor Ratio: 0.041)	Tegal City (Labor Ratio 0.174)

Sources: National Labor Force Survey (*Sakernas*) at 2000 & 2013, Central Java Province at 2001 & 2014, Central Board of Statistics at 2001 & 2014, Data processed in 2016

4. CONCLUSIONS

Based on the results of the analyses and discussions, this study concludes that (a) The industrial spatial concentrations in various *Bakorwil* in Central Java Province in 2000-2013 were diverse. The agricultural industry was a natural resource-based industry concentrating spatially in regencies; (b) The manufacturing industry, which was neutral towards the location of the market or raw materials, tended to not have a certain location pattern. In other words, it could be located in either regency or city; (c) Market-oriented industry, namely trading, communication, financial, and other service industries spatially concentrated in the city; (d) Several industries were stable, concentrating in certain regencies/cities in 2000-2013, including tobacco manufacturing industry (Code: 160) in Kudus Regency, the industry of wood products, and woven goods from rattan, bamboo, and others (Code: 202) in Kebumen Regency, furniture industry (Code: 361) in Jepara Regency, and mobile retail trading/outside building (Code: 525) in Tegal City. These industries were stable from 2000 to 2013.

The recommendation are, (a) The Government of Central Java Province needs to encourage its regional economy by supporting an increase in employment in the base industries in regencies/cities in Central Java Province, particularly agricultural industry, which is the base industry for most of the regencies in Central Java Province, and a manufacturing industry that can absorb high labor; (b) With the shifting of the economic structure in Central Java from the agricultural industry to the manufacturing industry, the provincial government should be able to encourage an upsurge in productivity in agriculture by applying agricultural intensification and extensification, as well as developing agro-industry and agro-tourism; (c) Central Java provincial government is required to maintain competitiveness in the base industries in the province. The industries include the tobacco manufacturing industry (Code: 160) in Kudus Regency, the industry of wood products, and woven goods from rattan, bamboo, and others (Code: 202) in Kebumen Regency, and furniture industry (Code: 361) in Jepara Regency. The industries have high competitiveness to survive, (in 2000-2013) concentrate, and contribute to the economy of Central Java Province.

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