



The Effect of Shifting Large and Medium-Sized Industry Agglomeration on the Economic Development in Kanti Region in 2003-2018

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Abstract. The development of real Gross Domestic Regional Product (GDRP) 2010 of all cities in Kanti region increased during 2003-2018. However, when viewed the growth rate in aggregate, it slowed during the period 2010-2018. One of the causes is the shift of large and medium-size industry (LMI) agglomeration from Kanti region to Kangga region. This study aims to find out the location and the dynamics of the shift of LMI agglomeration using the Hoover-Balassa index that is presented through thematic maps. In addition, the study also analyses the effect of the shift of LMI agglomeration and other factors on economic growth in Kanti region using the regression analysis of panel data. The individual units used are five administrative cities in the Kanti region with annual units from 2003 to 2018. Fixed effect model with seemingly unrelated regression (FEM-SUR) is used to estimate the parameters of the economic growth model in Kanti region. The results showed that Kanti region was agglomerated in North Jakarta and East Jakarta. Labor-intensive potential factor has a negative and significant effect, while the labor productivity of LMI and domestic investment has a positive and significant effect on economic growth in Kanti region. North Jakarta is an area that despite the shift of LMI agglomeration but still able to increase its economic growth, while East Jakarta has decreased. So, the Provincial Government of Jakarta need to adapt the implementation of LMI agglomeration in North Jakarta to encourage economic growth in East Jakarta and West Jakarta in accordance with regional spatial planning for industry.

1. Introduction

The direction of Indonesia's development has undergone a transformation of the economic structure that initially depended on the agricultural sector and then replaced by the manufacturing industry sector. This is evidenced by the contribution of the manufacturing industry sector to Gross Domestic Product (GDP) which has exceeded the contribution of the agricultural sector. Based on the current years, detailed portraits from 2010 to 2018 of the five sectors with the highest GDP value by business field (sectoral) are presented in Figure 1 (Statistics Indonesia, 2020).

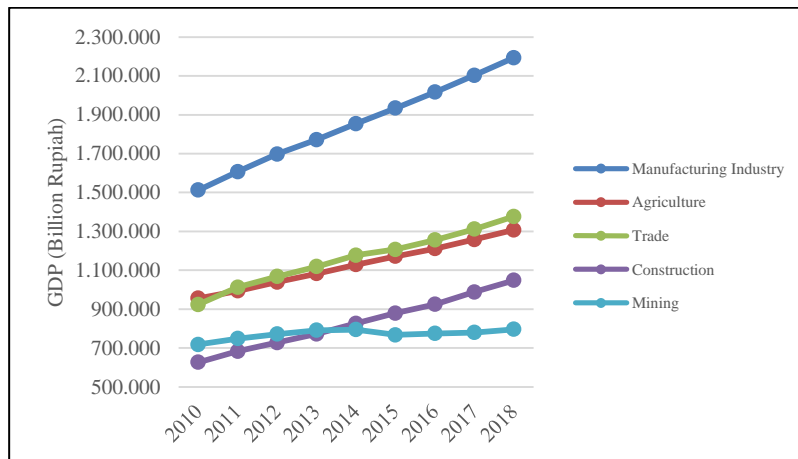


Figure 1. The Real GDP 2010 by Sectoral, 2010-2018.

Based on Figure 1, it can be seen that during the period 2010-2018 the manufacturing industry sector contributed the most to GDP. While the agriculture sector is below it and became the third highest sector in its contribution to GDP. Arsyad in [1] explained that the manufacturing industry sector has a very important role in an economy and is believed to be able to be a leader for other sectors. This is seen in Figure 1, the development of the manufacturing industry sector can lift the development of other sectors such as the trade sector (code G), agriculture sector (code A) and construction sector (code F). As an implication, these three sectors have a tendency to use more output of the manufacturing industry sector as a supply of raw materials in their production activities.

The problem of industrialization process raises spatial concentration in certain areas only, especially in economic activities and labor absorption. Sulastrin in [2] found that the level of industrial concentration in the Western Region of Indonesia (*Kawasan Barat Indonesia – KBI*) is higher than in the Eastern Region of Indonesia (*Kawasan Timur Indonesia – KTI*). This research also led to the focus of industrial activities in Indonesia concentrated in Java Island. Then based on Kuncoro in [3], the concentration of industry in Java Island is divided into two, namely the west pole; which is located in Capital Region of Jakarta, West Java, and Banten which is focused on Jakarta, Bogor, Tangerang, Bekasi (Jabotabek) and Bandung, and the east pole; which is located in East Java which is focused on Surabaya.

This research focuses on the concentration of Java Island industry in the west pole which includes Jakarta, West Java, and Banten. These were chosen based on the concentration of industries that are close to each other when compared to East Java. Kuncoro in [4] explained that the nation's capital has a dominant role in the establishment of industrial concentrations in developing countries. The beginning of industrial companies will stand and conduct economic activities within the scope of the capital so as to achieve agglomeration. Nevertheless, it is not possible that the surrounding area as a buffer of the capital will also form industrial concentrations due to the effects of spill over. Researchers then designated the economic area in Jakarta except Kepulauan Seribu as the Core Region (*Kawasan Inti – Kanti*) and the economic area in West Java and Banten as a Buffer Region (*Kawasan Penyangga – Kangga*).

The process of industrialization in Kanti and Kangga regions has undergone a shift in industrial agglomeration. Based on Figure 2, the percentage of large and medium-sized industrial (LMI) companies in the Kanti region tends to decrease which is also followed by a decrease in labor absorption and value added as showed by Table 1. On the contrary, the percentage of LMI companies in the Kangga region tends to increase which is also followed by increased in labor absorption and value added (Statistics Indonesia, 2020). Whereas the industrial activity shown by the number of companies, the number of workers, and the value added of LMI should be more concentrated in the core region than in the buffer area.

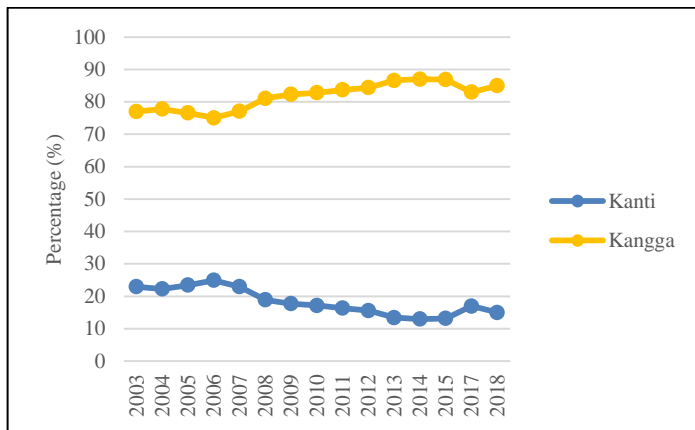


Figure 2. Percentage of Large and Medium-Sized Industrial Companies in Kanti and Kangga Region, 2003-2018.

Table 1. The Labor market and value added of LMI in Kanti and Kangga Regions in 2003-2018, (%)

Region	Workers			Value added		
	2003	2010	2018	2003	2010	2018
1. Jakarta (Kanti)	20.52	15.18	10.69	30.50	27.38	14.20
2. Banten	17.16	23.17	18.28	21.81	20.05	21.72
3. West Java	62.32	61.64	71.02	47.69	52.57	64.08
Kangga (2-3)	79.47	84.82	89.31	69.50	72.62	85.80
Total	100.00	100.00	100.00	100.00	100.00	100.00

According to Statistics Indonesia (*Badan Pusat Statistik* – BPS), the population in Kanti region continues to increase from 7.46 million people in 2003 to 10.48 million in 2018. This was also accompanied by an increase in the number of workers. BPS noted that there were 3.97 million workers in the Kanti region in February 2003 and an increase of 5.04 million in February 2018. Even the head of BPS of Jakarta in the period 2012-2015, Nyoto Widodo, also said that Jakarta (Kanti) has been getting demography bonus since 2010 and is expected to peak in 2025 [5].

The potential of Kanti region is also found in the field of investment. The Indonesia Investment Coordinating Board (*Badan Koordinasi Penanaman Modal* – BKPM) noted that total investment in the Kanti region tends to increase by 40.24 trillion rupiah in 2003 to 119.36 trillion rupiah in 2018. The increase in the value of investment should be used as a driver to increase the production of goods and services, so as to encourage economic growth to continue to increase. This is in accordance with Sodik (2005), Sitompul (2007), Rustiono (2008), and Luntungan (2008) in [6] that investment had a positive effect on regional economic growth.

Unfortunately, these potentials are not commensurate with the acquisition of the economic growth rate of Jakarta (Kanti) which decreased during 2010-2018 (BPS, 2020). As a domestic market force, the increase in the population should be accompanied by an increase in the number of workers (including the phenomenon of demography bonus) and the growing value of investment can be a momentum to drive economic growth in the Kanti region significantly.

In terms of its larger size, LMI is considered more productive in absorbing labor and creating greater value added. Therefore, the change or even decrease in LMI's contribution is a major indication as an obstacle to economic growth in the Kanti region. Thus, researchers want to know the location and dynamics of the shift of LMI agglomeration that occur between Kanti and Kangga regions. In addition, researchers also want to know the effect of the shift of LMI agglomeration and other factors on economic growth in the Kanti region.



2. Methodology

2.1. Research Scope

This paper studies about LMI that located in Kanti and Kangga regions. Districts/cities covered by these two areas were used as individual units that observed during the period 2003-2018. The focus of this study is to find the location and observe the shifting dynamics of LMI agglomeration in both regions. The shift in LMI agglomeration has an indication of the negative impact on economic growth in the Kanti region. So, this study will also identify factors that affect economic growth in the Kanti region in 2003-2018. The selection of the research period is considered on the scope of the observation unit in the panel data structure and the problems that occur in the Kanti region. Jakarta became the worst province due to the monetary crisis in 1998 [7]. Therefore, the initial year of research in 2003 reflects the economic revival of Jakarta after the 1998 economic crisis and the final year of 2018 research seeks to include the most up-to-date information.

The variables that used in this study are taken from the economic and population dimensions. In the economic dimension includes economic growth, LMI agglomeration rate, labor productivity in LMI, value investment in LMI, while in the social dimension of population only covers population density. Economic growth with the proxy value of real GDRP 2010 is defined as a dependent variable. Meanwhile, other variables (LMI agglomeration rate which is calculated based on number of workers in LMI (labor intensive), labor productivity in LMI, value investment in LMI with the proxy foreign and domestic investment, and population density) are defined as independent variable.

2.2. Method of Collecting Data

The data that used in this study are secondary data mostly obtained from the BPS and equipped from BKPM. The variables used in this study are as follows:

1. The real GDRP 2010 (PDRB) is the amount of value added that generated by all business units in a particular region calculated based on the price in 2010 as the base year in billion rupiah.
2. LMI agglomeration rate (TA) is a measure of LMI concentration in a region that calculated using the Location Quotient (LQ) labor approach, Hoover-Balassa coefficient, in units with the following formula:

$$LQ = \frac{E_{ij}/E_j}{\sum_j E_{ij}/\sum_j E_j} \quad (1)$$

where E_{ij} shows the number of sector i workers in the j area, E_j shows the total workforce in the j area, $\sum_j E_{ij}$ shows the number of sector i workers in the j aggregate area, and $\sum_j E_j$ shows the total labor in the j aggregate area. A region is said to experience agglomeration if the resulting LQ value is greater than 1, otherwise if the resulting LQ value is less than 1.

3. Population density (PDT) is the number of inhabitants occupying an area per square kilometer unit (person/km²).
4. Labor Productivity in LMI (PTK) is the ability of workers in the LMI sector to produce goods and services and calculated by the output value divided by the number of workers (million rupiah/worker).
5. Foreign Investment (PMA) is the realization value of capital accumulation or flow of funds derived from foreign investors in the form of individuals, business entities incorporated or not, and the government in thousand U.S. dollar.
6. Domestic Investment (PMDN) is the realization value of capital accumulation or flow of funds derived from domestic investors in the form of individuals and business entities incorporated or not in million rupiah.

2.3. Analysis Method

There are two kinds of statistical methods used in data analysis, namely descriptive statistics and inferential statistics [8]. Descriptive analysis is conducted through the presentation of thematic maps in



the Exploratory Spatial Data Analysis (ESDA) and Geographic Information Systems (GIS) analysis tools to identify the new locations and illustrate the dynamics of LMI agglomeration in Kanti and Kangga regions. Meanwhile, inferential analysis that used is the regression of panel data with individual units of five administrative cities in Kanti region, namely South Jakarta, East Jakarta, Central Jakarta, West Jakarta, and North Jakarta and annual units during the period 2003-2018. The significance level (α) used is 5%.

Researchers perform the formation of factors (new variables) from variables that may be strongly linearly correlated between TA and PDT (see Appendix A). Thus formed a new variable that is a Labor-Intensive Potential Factor (PPK) which is a linear combination of TA and PDT (see Appendix B). Basically, the meaning of PPK is about the ability to achieve agglomeration through the potential of a dense population.

The model was developed from the Cobb-Douglas production function that used in the Solow-Swan economic growth theory, where output is influenced by inputs in the form of capital production factors, labor, and other factors that may affect the production process [9]. Furthermore, the stage regression analysis of panel data is presented in Figure 3. Taking into account the common effect model (CEM) that does not support in modeling economic growth in the Kanti region and the panel data structure that meet the $T > N$ conditions, the initial model proposed by the researchers is a fixed effect model (FEM) that can be written as follows (Judge et al. in [10]):

$$\ln(\text{PDRB})_{it} = \alpha_i + \beta_1 \text{PPK}_{it} + \beta_2 \ln(\text{PTK})_{it} + \beta_3 \ln(\text{PMA})_{it} + \beta_4 \ln(\text{PMDN})_{it} + \varepsilon_{it} \quad (2)$$

where:
$$\alpha_i = \alpha + \mu_i \quad (3)$$

To confirm the initial model proposed by researchers, Hausman Test is conducted to select the best model between FEM or random effect model (REM) [11]. In contrast to FEM which accommodates changes in the characteristics of each individual in the intercept, in REM the difference in individual characteristics is accommodated in the error model as showed by the equation (4) and (5).

$$\ln(\text{PDRB})_{it} = \alpha + \beta_1 \text{PPK}_{it} + \beta_2 \ln(\text{PTK})_{it} + \beta_3 \ln(\text{PMA})_{it} + \beta_4 \ln(\text{PMDN})_{it} + \varepsilon_{it} \quad (4)$$

where:
$$\varepsilon_{it} = u_i + v_{it} \quad (5)$$

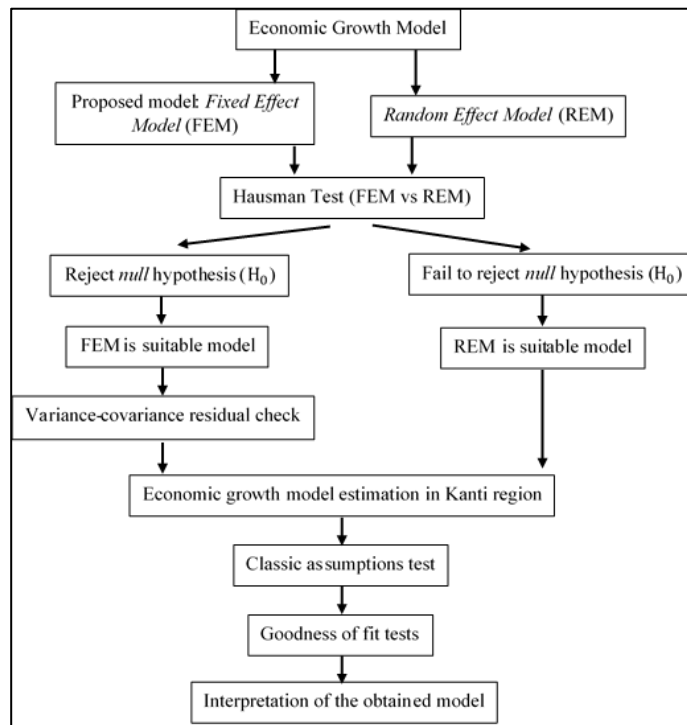


Figure 3. Panel Data Regression Analysis Stage Diagram.

3. Results and Discussion

3.1. Identification Location and Dynamics of LMI Agglomeration in Kanti dan Kangga Regions

The number of labor and value added in LMI are indicators that can be used to see the concentration of industry [12]. Based on the current year, the histogram shown in Figure 4 shows that in 2018 both indicators have a positive skewness. This indicates that the distribution of LMI activity in the Kanti and Kangga regions is uneven. LMI's companies that have a high number of labor and value added are located in only a few districts/cities. On the other hand, companies with low number of labor and value added are more widespread in most districts/cities in Kanti and Kangga regions.

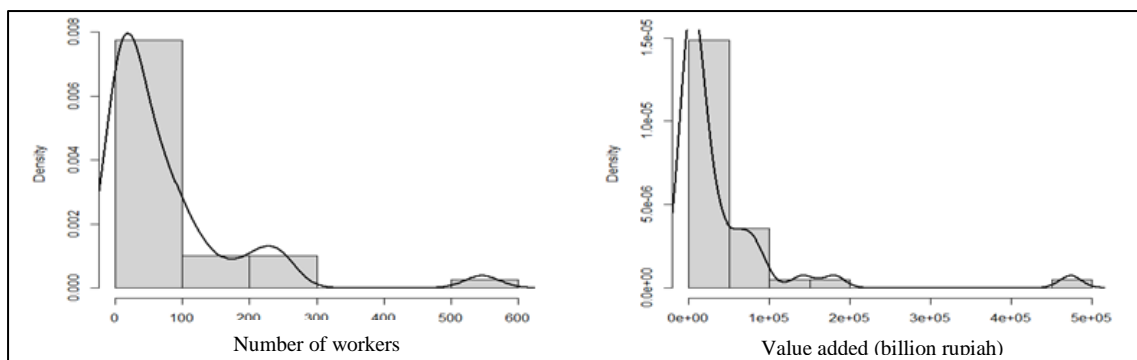


Figure 4. Labor and value-added distribution in Kanti and Kangga Regions.

Furthermore, the identification of agglomeration and non-agglomeration areas is carried out using ESDA and GIS analysis tools. The presentation of LQ scores through thematic maps in Appendix D is done to focus on geographical analysis of reality. A region is said to agglomerate when the resulting LQ score is greater than 1, whereas a region is said not to agglomerate when the LQ score is less than 1. In Kanti region, LMI agglomeration is located in two cities, North Jakarta and East Jakarta



(Appendix D). North Jakarta has a tendency to develop into a very high agglomeration area. This is supported by the fact that there are two big industrial areas located in North Jakarta, namely Cakung Remaja Development and Berikat Nusantara Zone (Persero). Meanwhile, East Jakarta is also an agglomeration area but tends to remain in the moderate category. This is also in accordance with the existing reality that there is only one main industrial area namely Jakarta Industrial Estate Pulogadung (JIEP).

While in the Kangga region, it is seen in Appendix D that LMI is agglomerated in Bandung, Bekasi, Bogor, Karawang, Purwakarta, Serang, Sukabumi, Tangerang, Cilegon City, Tangerang City, Bandung City, and Cimahi City. This is supported by [13], that the development of LMI agglomeration area in Kangga region during the period 2010-2014 tends to occupy these districts/cities. This discovery is also supported by the fact that there are indeed several industrial estates in their respective regions presented in Appendix E.

From Appendix D, an interesting finding obtained is that there is a shift in agglomeration from North Jakarta to Bekasi. This is indicated by the level of LMI agglomeration in the area of origin (North Jakarta) which has decreased and the level of LMI agglomeration in the destination area (Bekasi) which has increased. The shift occurred from 2006 to 2009. North Jakarta had again agglomerated very high in 2013 to 2015, but the following year again shifted to Bekasi. Meanwhile, the shift of LMI agglomeration from East Jakarta to Bekasi is not seen on the thematic map when using the LQ categorization based on the same interval length. It can only be seen through the level of LMI agglomeration in East Jakarta which tends to decrease from 2008 to 2018 as following Figure 5.

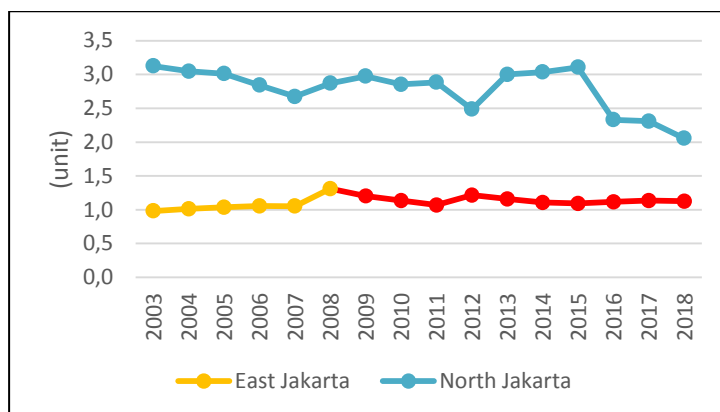


Figure 5. The Level of LQ score of Agglomeration Areas in Kanti Region, 2003-2018.

In addition, the supporting factors for the shift of LMI agglomeration are the distance between North Jakarta and East Jakarta with Bekasi which is close or even tangent so that it is reasonable for economic actors in the LMI sector to move to more profitable areas. In the end, Bekasi consistently held on to the highest LMI agglomeration rate until 2018. This discovery also continues the research of [12] that until 2018 also formed a regional network that connects LMI agglomeration in Jakarta, West Java, and Banten so as to form an increasingly large unity. Then more details of this study found that there is only greater Bekasi that lasts until 2018. This discovery was also confirmed by [14] that the LMI sector has a big role in supporting economy of Bekasi.

The thing to note is that in practice the development of industrialization in the LMI sector does not occur naturally, but is carried out in the corridor of industrial estate development strategy that is closely related to the spatial policy of the region run by each provincial government and regional government. This industrial area is then managed by the management of developer companies that have business licenses to provide various facilities and infrastructures that support the industrial activities of the companies in it. This discovery is a supporting fact for the implementation of industrial estate development strategy in West Java contained in Local Government Regulation Number 22 of 2010 about Concerning Spatial Plan of West Java in 2009-2029 Article 54 letter (f) in [15] that optimization of industrial estates in West Java is indeed focused on the dominant industrial area located in Bekasi.



3.2. Factors Affecting on Economic Growth in Kanti Region

To determine the magnitude of the influence of significant independent variables on economic growth in the Kanti region, it is carried out a parameter estimate and test by removing PMA variable from the model. This is because the model to be obtained is for estimation purposes so the variables that are not significant to economic growth (see Appendix F) must be eliminated for re-estimation model. It can be seen through the t-statistical value of each independent variable compared to $t_{0,05;71}$ value to test these hypothesis statistics below:

$H_0: \beta_i = 0$ for $i = 1,2,3,4$ (The i -th independent variable does not affect the economic growth in the model)

$H_1: \beta_i \neq 0$ for $i = 1,2,3,4$ (The i -th independent variable affects the economic growth in the model)

The decision to reject H_0 is obtained when the t-statistical of each independent variable value is greater than $t_{0,05;71}$ value, and vice versa. By referring to the stages presented in Figure 3 and consideration of the test results in Appendix G and H, the most appropriate estimation method was Fixed Effect Model with Cross Section Seemingly Unrelated Regression (FEM-SUR). The results of the parameter estimation and tests of the economic growth model in the Kanti region in 2003-2018 are presented in Table 2.

Table 2. The Results of Parameter Estimation and Tests without PMA Variable

Variable	Coefficient	Std. Error	t-Statistic	Decision
C	10.9295	0.1132	96.206	Reject H_0
PPK	-0.3032	0.0516	-5.8698	Reject H_0
Ln(PTK)	0.1924	0.0199	9.6642	Reject H_0
Ln(PMDN)	0.0282	0.0078	3.5940	Reject H_0
Dependent Variable: Ln(PDRB)				
$t_{(0,05;72)}$	1.6663			
R-squared	0.8732			
F-statistic	70.8198			
Prob(F-statistic)	0.0000			
Individual Effect				
South Jakarta	0.0991			
East Jakarta	- 0.1396			
Central Jakarta	- 0.1210			
West Jakarta	- 0.2274			
North Jakarta	0.3890			

Based on Table 2, at the test level 5% obtained equations to predict economic growth of the five cities in the Kanti region based on labor-intensive potential factors, labor productivity, and PMDN with the ability to predict by 86.08% which can be written as follows:

$$\ln(\widehat{PDRB}) = (10,9295 + u_i) - 0,3031PPK + 0,1921 \ln(PTK) + 0,0282 \ln(PMDN) \quad (6)$$

This means that these independent variables are able to explain the variation in economic growth in the Kanti region by 86.08%, while the rest is explained by other variables.

The shift in LMI agglomeration in the Kanti region has an indirect effect on its economic growth. However, the individual effects of each city in the Kanti region can be a clue to indicate the effect of LMI agglomeration shifts on their respective economic growth. North Jakarta is an LMI agglomeration area that is able to maintain its economic growth to continue to rise by 0.3890% despite the extreme shift in LMI agglomeration. This is supported by the existence of high export and import activities in the Tanjung Priok Port so as to support the economy of North Jakarta. Meanwhile, in East Jakarta, the effect of shifting of LMI agglomeration caused its economic growth to fall by 0.1396%. In addition, there is also one non-agglomeration area of LMI that is able to maintain its economic growth



to remain stable, namely South Jakarta. Meanwhile, other non-agglomeration areas of LMI, namely West Jakarta and Central Jakarta, experienced a drastic decline in its economy due to the shifting effects of LMI agglomeration.

The labor-intensive potential factor (PPK) has a negative and significant effect on economic growth in the Kanti region. The coefficient of regression is -0.3032, meaning that each increase in the intensive potential score of one unit will decrease economic growth in the Kanti region by 0.3032% assuming *ceteris paribus*. The negative influence of labor-intensive potential on economic growth in the Kanti region comes from the density of the population which is the original variable. A lower increase in LMI agglomeration than an increase in population density causes the trend of labor-intensive potential to decline as economic growth increases. This is because the growing population is not optimally absorbed in the industrial sector due to LMI agglomeration that shifted out of Kanti region.

The labor productivity in LMI (PTK) has a positive and significant effect on economic growth in the Kanti region. The regression coefficient is 0.1924, meaning that any increase in labor productivity rate by 1% will increase economic growth in the Kanti region by 0.1924% assuming *ceteris paribus*. This is in keeping with Solow-Swan's theory that increased labor productivity can boost economic growth through increased output per created workforce. The results of this study also support the findings of [16] that the productivity of the manufacturing industry sector has positively and significantly affected economic growth. Labor with higher productivity will be able to produce goods and services more efficiently. In other words, the increasing productivity of LMI's labor makes it possible to increase the production of goods and services at a fixed number of workers. Thus, economic growth will increase through the level of output per labor which is also increasing in the LMI sector.

Domestic investment (PMDN) has a positive and significant effect on economic growth in the Kanti region. The coefficient of regression is 0.0282, meaning that any increase in the value of domestic investment realization by 1% will increase economic growth in the Kanti region by 0.0282% assuming *ceteris paribus*. This is in keeping with Solow-Swan's theory that increased capital accumulation can boost economic growth. The result of this study also supports the findings of [17], [18], [19], and [20] that domestic investment has positively and significantly affected economic growth. The flow of funds through domestic investment can increase the economic growth of the region through increasing public income. In terms of production, domestic capital can increase capital stock so that production capacity will also increase, ultimately the increase in output will encourage the economy to grow (Irawan & Suparmoko in [20]).

4. Conclusions and Suggestion

4.1. Conclusions

Based on the analysis and the results of the discussion that has been conducted, the researchers draw the following conclusions:

1. LMI agglomeration in Kanti and Kangga regions during the period 2003-2018 tends to remain in certain districts/cities only. In Kanti region, LMI agglomeration is located in North Jakarta and East Jakarta. While in Kangga region, LMI agglomeration is located in Bandung, Bekasi, Bogor, Karawang, Purwakarta, Serang, Sukabumi, Tangerang, Bandung City, Cilegon City, Cimahi City and Tangerang City.
2. During the period 2003-2018, a relatively stable shift in LMI agglomeration occurred from East Jakarta to Bekasi. Meanwhile, LMI agglomeration shift that occurred from North Jakarta to Bekasi tends to fluctuate more. This is shown through the backflow of LMI agglomeration to North Jakarta before finally shifting back to Bekasi.
3. Labor-intensive potential factor has a significant negative effect, while labor productivity and domestic investment variables have a significant positive effect on economic growth in the Kanti region. The shifting effect of LMI agglomeration in East Jakarta caused economic growth to decline. Meanwhile, North Jakarta was able to maintain its economic growth to continue to rise despite the extreme shift in LMI agglomeration.



4.2. Suggestion

Based on the results of the discussion and conclusions obtained, researchers provide the following suggestions:

1. Considering that LMI agglomeration can have a positive influence on regional economic growth, the Provincial Government of Jakarta is expected to adapt the implementation of LMI agglomeration in North Jakarta to encourage economic growth in East Jakarta and West Jakarta in accordance with regional spatial planning for industry.
2. The Provincial Government of Jakarta needs to review specific policies to maintain LMI agglomeration in North Jakarta and increase LMI agglomeration in East Jakarta for regional economic growth.
3. The Provincial Government of Jakarta needs to optimize the absorption of labor in LMI sector to increase and spur economic growth, especially for East Jakarta.
4. The suggestion to further research is that identification of LMI agglomeration areas also needs to be considered through value added of LMI and in the analysis it is necessary to include investment of LMI variable so that it can more focus on economic growth issues through the LMI point of view.

Appendices

Appendix A. Correlation Matrix

	TA	PTK	PMA	PMDN	PDT
TA	1	0.2611	-0.4121	-0.2255	-0.7027
PTK	0.2610	1	-0.1530	0.2599	0.0459
PMA	-0.4121	-0.1530	1	0.1831	0.1566
PMDN	-0.2255	0.2599	0.1831	1	0.2680
PDT	-0.7027	0.0459	0.1566	0.2680	1

Appendix B. The Results of Factor Analysis Method for Labor-Intensive Factor

Table B.1. Total Variance Explained Table

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.703	85.134	85.134	1.703	85.134	85.134
2	.297	14.866	100.000			

Extraction Method: Principal Component Analysis.

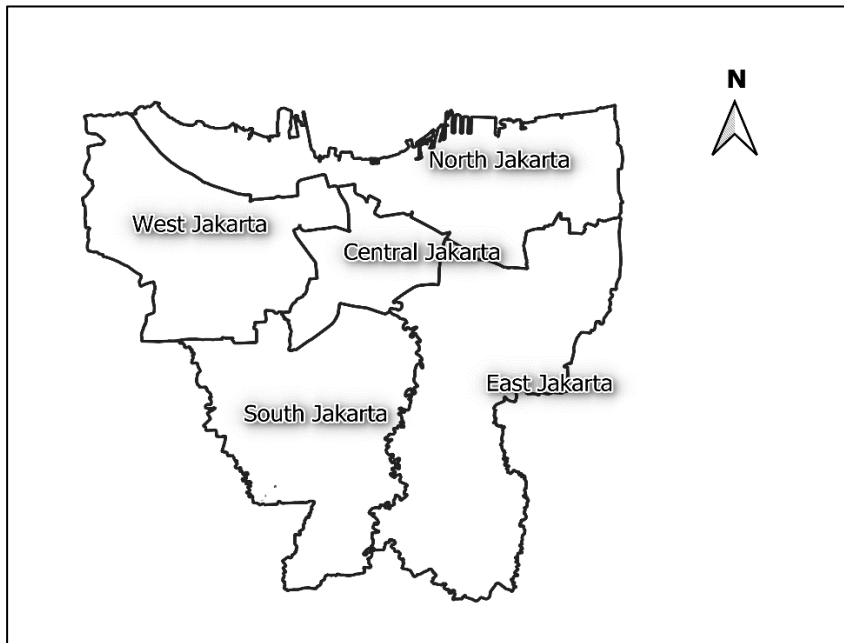
Table B.2. Component Matrix Table

Component 1	
Zscore(TA)	.923
Zscore(PDT)	-.923

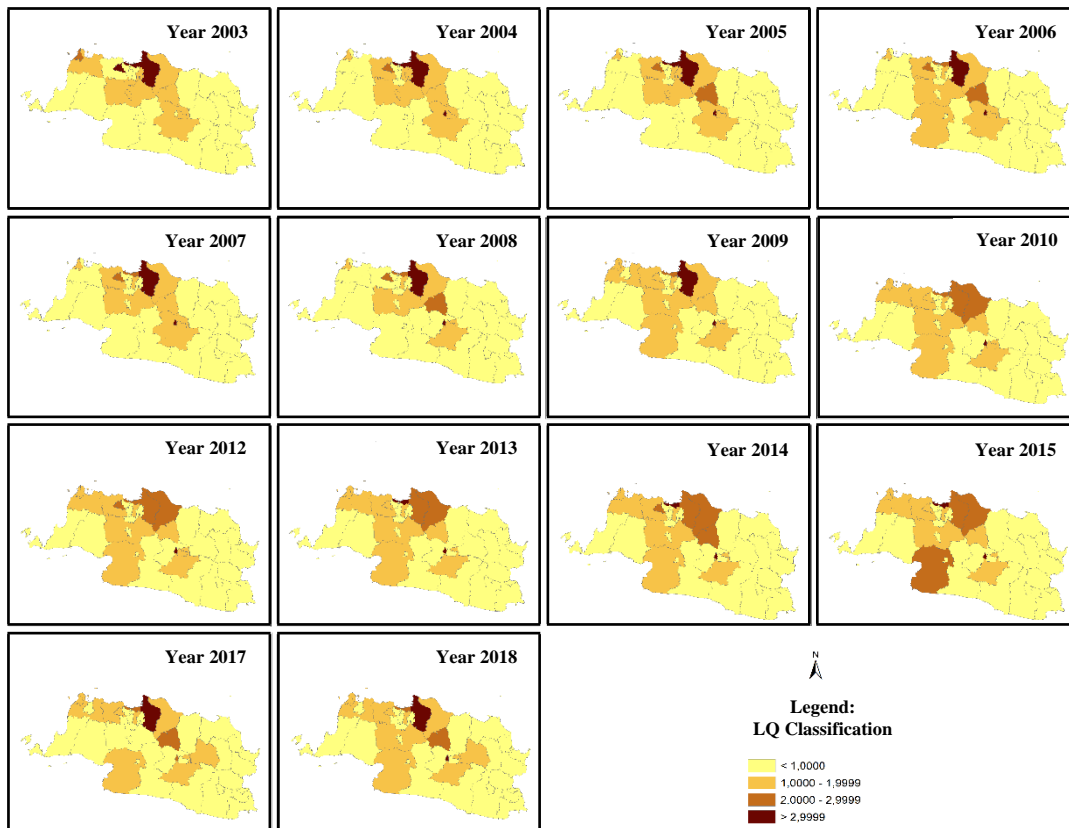
Extraction Method: Principal Component Analysis.
a. 1 components extracted.



Appendix C. Kanti Region Map



Appendix D. The Locations of LMI Agglomeration in Kanti and Kangga Regions, 2003-2018





Appendix E. The List of Industrial Manufacture Area by Districts/Cities in Kangga Region

Province	District/City	Name
Banten	Serang	Kawasan Industri Nikomas Gemilang, Modern Cikande Industrial Estate, Kawasan Industri Terpadu MGM Cikande, Kawasan Industri SBS, Kawasan Industri Terpadu Wilmar
	Tangerang	Millenium Industrial Estate, Kawasan Industri Pasar Kemis, Kawasan Industri dan Pergudangan Cikupas, Kawasan Industri Purati Kencana Alam, Kriya Idola Industrial Park, Kawasan Industri Sumber Rezeki
	Kota Cilegon	Krakatau Industrial Estate Cilegon (KIEC), Kawasan Industri Panca Puri, Kawasan Industri dan Pergudangan Taman Tekno BSD
West Java	Bekasi	Kawasan Industri Terpadu Indonesia China, Bekasi International Industrial Estate, MM2100 Industrial Town BFIE, MM2100 Industrial Town MMID, Kawasan Industri Jababeka, East Jakarta Industrial Park, Kawasan Industri Gobel, Kawasan Industri Marunda Center, Greenland International Industrial Center (GIIC), Kawasan Industri Lippo Cikarang
	Bogor	Cibinong Center Industrial Estate dan Kawasan Industri Sentul
	Cimahi	Kawasan Industri Cimahi Caringin (KICC) dan Kawasan Industri Leuwigajah
	Karawang	Kawasan Industri Indotaisei, Kawasan Industri Kujang Cikampek, Kawasan Industri Mitrakarawang, Karawang International Industrial City, Suryacipta City of Industry, Mandalapratama Permai Industrial Estate, Podomoro Industrial Park, Kawasan Industri Artha Industrial Hill, Kawasan Industri GT Tech Park, Karawang New Industry City, Kawasan Industri Pertiwi Lestari, Karawang Jabar Industrial Estate
	Purwakarta	Kota Bukit Indah Industrial City, Kawasan Industri Lion, Kawasan Industri SKI, Kawasan Industri MOS
	Sukabumi	Kawasan Industri Sukabumi

Appendix F. The Results of Parameter Estimation and Tests Using FEM-SUR

Variable	Coefficient	Std. Error	t-Statistic	Decision
C	10.9045	0.1236	88.2493	Reject H_0
PPK	-0.2995	0.0534	-5.6098	Reject H_0
Ln(PTK)	0.1914	0.0198	9.6864	Reject H_0
Ln(PMA)	0.0055	0.0093	0.5933	Fail to Reject H_0
Ln(PMDN)	0.0278	0.0080	3.4858	Reject H_0
Dependent Variable: Ln(PDRB)				
$t_{(0.05;71)}$	1.6666			
R-squared	0.8760			
F-statistic	62.6802			
Prob(F-statistic)	0.0000			

Appendix G. The Result of Hausman Test

Correlated Random Effects - Hausman Test
Equation: REM
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	37.081309	3	0.0000



Appendix H. The Results of Variance-Covariance Residual Structure Check

H.1. LM Test

Hypothesis statistics:

$H_0: \sigma_i^2 = \sigma^2$ for $i = 1, 2, 3, \dots, N$ (the variance-covariance residual structure is homoscedastic)

H_1 : at least one $\sigma_i^2 \neq \sigma^2$ for $i = 1, 2, 3, \dots, N$ (the variance-covariance residual structure is heteroscedastic)

Test statistics:

$$LM = 39.0072$$

$$\chi^2_{(N-1)} = \chi^2_{(4)} = 9.4877$$

Decision: reject H_0 because $LM > \chi^2_{(4)}$

Conclusion: the variance-covariance residual structure is heteroscedastic

H.2. Lambda LM Test

Hypothesis statistics:

$H_0: cov(u_{it}, u_{jt}) = 0$ for $i \neq j$ (there is no correlation between individuals)

$H_1: cov(u_{it}, u_{jt}) \neq 0$ for $i \neq j$ (there is a correlation between individuals)

Test statistics:

$$\lambda_{LM} = 32.8707$$

$$\chi^2_{\left(\frac{N(N-1)}{2}\right)} = \chi^2_{(10)} = 18.3070$$

Decision: reject H_0 because $\lambda_{LM} > \chi^2_{(10)}$

Conclusion: there is a correlation between individuals

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