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Spatial Consentration and Factors that Affect the Competitiveness of Province Superior Industries in Indonesia

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Abstract

This paper aims to analyze the agglomeration and competitiveness ofsuperior province main industries, the causality relationship between agglomeration and competitiveness industry and the factors that influence competitiveness of superior province main industries. This study large and medium scale industry raw data. The data used in this research were secondary data, panel data with time period 2006 – 2013 and cross section data this used 33 province in Indonesia. The data analysis used Hoover Balassa Index, Location Quotient, Grangger Causality method and panel data method with Fixed Effect Model.The result of analysis Granger Causality showed agglomeration and industrial competitivenessthat had a positive two-way relationship. The result of panel data regression showed factors that influence the competitiveness of superior province main industries. Those were compani size, raw material input, value added, foreign direct invesment, industry competition index,road infrastructure, electric infrasructure, and service bureaucracy dummy.

Keywords: Spatial cosentration, Competitiveness, Grangger causalty, Panel data, Superiorprovince industries

1. Introduction

In Indonesia's economic structure, the manufacturing industry sector is the primary driver of Indonesia's economic growth and acts as a *leading sector* in supporting the other sectors. This was seen through the industry sector's large contribution towards the creation of the national Gross Domestic Product (GDP) which was 25.54 percent as of 2013 (BPS 2014). The developing conditions of globalization and international trade cause a high level of competition. That condition is requiring the industry sector into increasing its competitiveness by producing products with higher quality and a more competitive selling price. With an industry sector that is undergoing deindustrialization, the industry sector is required to increase its competitiveness; on the other hand, it is necessary that an effort should be made through a series of reindustrialization policies to increase the national industry's competitiveness. An effort that can be done is an implementation of the integrated industrial development between central and local level. This is done by two approaches, namely the *top down* and *bottom up* approaches. Through the *top down* approach, the industrial development is done by paying attention to priorities that are nationally determined based on the ability to compete in the domestic and international market and followed by regional participation. The *bottom up* approach is an industry development in the regions through empowerment of industrial products in the regions (Kemenperin, 2010).The industry development in the regions is being done in order to push the creation of strong industrial competitiveness in the region and acts as an area's eminence source in facing global competition. This is being done on the basis of every area's condition with differences in economic potential, industrial progress rate, labor skills, and infrastructure availability. The potential differences among regions encourage the mobility factors of production, especially labor and capital in which ultimately causes grouping in industrial activities in certain areas.

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The centralization of industrial activities in a reagion will give an advantage of an agglomeration. The advantage of agglomeration is obtained as a result of the adjacent industrial locations; thus, itprovides production cost savings.

According to Tambunan (2001) the agglomeration approach can increase industrial competitiveness and create a national industrial power in the form of interdependence, linkage, and mutual support between the upstream industry, downstream industry, supporting industry, and related industry. Meanwhile, Allonso*et al* (2004) stated that one of the national strengthening competitiveness is the production efficiency in industrial activities. Product efficiency is easier to achieve through industrial agglomeration because the needed production factor (skilled labor) will be concentrated in that particular area. Other than that, with the industrial agglomeration, knowledge transfer will be easier and therefore, industrial productivity will increase and accelerate industrial growth. Furthermore, according to Kuncoro (2004) an industry sector development that is based on the potential and resources that each region has, along with an agglomeration approach is a strategic step to increase industrial competitiveness. And vice versa competitive industries will create conditions agglomeration.The industry sector development that became superior in every region is hoped to increase regional industry's competitiveness in which it will have an impact on the regional economy and the increase the national industry's competitiveness. Therefore, this piece of writing is intended to give an overview of the competitiveness and industrial agglomeration superior to the area and explains the relationship between competitiveness and industrial agglomeration on industries superior to the area. Next to be examined will be in regard to the factors that influence industrial competitiveness that is superior to the area.

2. Methods

The data used in this piece of writing were secondary data in a form of data panel that consisted of gathered *cross section* data and *time series* data. The time period used was the year 2006-2013. The used *cross section* data covered 33 provinces in Indonesia with 20 of those provinces owning one type of superior industry and 13 of those provinces owning two types of superior industry. With this piece of *cross section* data used, this was equal to 46 industries superior to the provinces. The industry data being used in the analysis were limited to only large and medium scale industries that were superior in each province. The industry's superior determination in each province was appointed by the Ministry of Industry based on the suggestions of the province's government. The source of data used in the analysis was provided by the Central Bureau of Statistics (BPS), Ministry of Industry, and the Capital Investment Coordinating Board (BKPM) that is in the 5 digit ISIC classification.Agglomeration Index or Hoover BalassaIndexto analyze the spatial concentration point of province superior industriy.Formulationof Hoover BalassaIndex to analyze the spatial concentration point is as follows:

$$\mathbf{HBI_{ij} = (Eij/\sum Eij)/(\sum_j E_{ij} / \sum\sum_j E_{ij})}$$

Where:

HBI_{ij} : Hoover Balassa Index / agglomeration index
E_{ij} : Employment of superior industry i in province j
$\sum Eij$: Total employment of total industry i in province j
$\sum_j E_{ij}$: Employment industry in province j
$\sum\sum_j E_{ij}$: Total employment in province j

Competitiveness indexformula is written as follows :

$$\mathbf{LQI_{ij} = (Eij/\sum Eij)/(\sum_j E_{ij} / \sum\sum_j E_{ij})}$$

Where:

LQ_{ij} : Competitiveness Index
E_{ij} : Output of superior industry i in province j
$\sum Eij$: Total output of total industry i in province j
$\sum_j E_{ij}$: Output industry in province j
$\sum\sum_j E_{ij}$: Total output in province j

The *Granger Causality* test is being done to detect whether there is a one-way relationship or a two-way relationship affecting each other (Gujarati 2004). In this piece of writing, the industrial agglomeration is an affecting factor to the industrial competitiveness in superior industries of Indonesia that are being analyzed. However, there stands a possibility of the industrial competitiveness affecting the industrial agglomeration.

Because of that, the relationship between agglomeration and industrial competitiveness are being analyzed by using the Granger Causality method on the data panel. Data panel regression is a regression method that can capture the behavior of a few individuals with different characteristics in a different period of time.

According to Baltagi (2005) one of the advantage of the data panel regression method is that they are able to detect and measure effects that are unobtainable by pure *cross section* data or pure *time series* data. In this piece of writing, the data panel regression method can be used to analyze factors that are affecting competitiveness of the industries superior to the province. The regression model that is estimated is based on the model used by Kuncoro and Wahyuni (2009), Alkay and Hewings (2010) and Purwaningsih (2011). The independent variable used consisted of industrial characteristics (specific industries) and regional characteristics (specific regions) that were added to the infrastructure variable and bureaucracy services. Therefore, here is the used model as shown below:

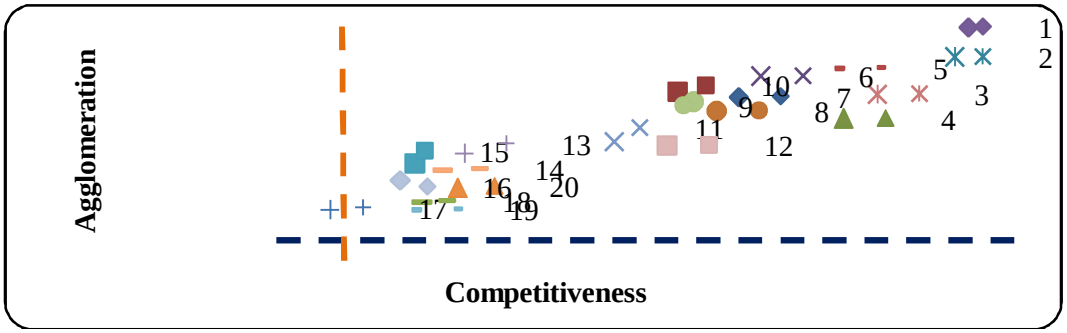
$$LQI_{it} = a_{it} + a_1 lnSIZ_{it} + a_2 lnRMI_{it} + a_3 lnNT_{it} + a_4 lnFDI_{it} + a_5 lnPMDN_{it} + a_6 lnPDRBK_{it} + a_7 IPS_{it} + a_8 lnUMP_{it} + a_9 lnIFR_{it} + a_{10} ln\ IFW_{it} + + a_{11} ln\ IFE_{it} + a_{12} DUMPTSP_{it} + e_{it}$$

A description of each variable:LQI_{it}: Industrial competitiveness index of i superior industries in t year.
SIZ_{it} :Company sizes based on the average labor force of i superior industries in t year. This variable acts as an economic scale proxy of the superior industry.
RMI_{it} : Raw material input of i superior industries in t year.
NT_{it} : The added value produced by i superior industries in t year. The added value is a deviation produced by the amount of output and input values.
FDI_{it}: ForeignDirec Invesment (FDI) in i privince t year.
$PMDN_{it}$: Domestic investment (PMDN) in i province t year.
$PDRBK_{it}$: ProductDomestic Regional Bruto per Kapita in i province in t year.
IPS_{it} :Industry competition index that is used to proxy the market structure on i province in t year.
UMP_{it}: The minimum wage in i province in t year.
IFR_{it} : The road infrastructure is a long paved road with good condition and is covering a country road, province and district roads in i province in t year.
IFW_{it} : The water i infrastucture in i province in t year.
IFE_{it} : The electric infrastructure in i province in t year.
$DUMPTSP_i$:A d*ummy* from the implementation of the integrated one-stop service (PTSP) in i province. A d*ummy* with 0 value for a year before the implementation of PTSP and 1 value for the implementation year and a year after the PTSP implementation.

3. Results

The determination of the industries superior to the province is based on economic indicators of employment, production volume, added value, and labor productivity. Based on those indicators, the government of the province suggests the type of industries superior to the province in which it is then decided by the Ministry of Industry.The mapping of the province's superior industry is based on the level of competitiveness and agglomeration shown in Picture 1. Based on that picture, it is noted that the superior regional industry mainly has a high level of competitiveness (LQI>1 value) and agglomeration (HBI > 1). Even so, there isa couple of superior regional industries that are competitive but not agglomerated (code 18 and 19) and has no competitiveness and not agglomerated (code 17). This is to show that an effort to increase competitiveness and agglomeration development is not needed.

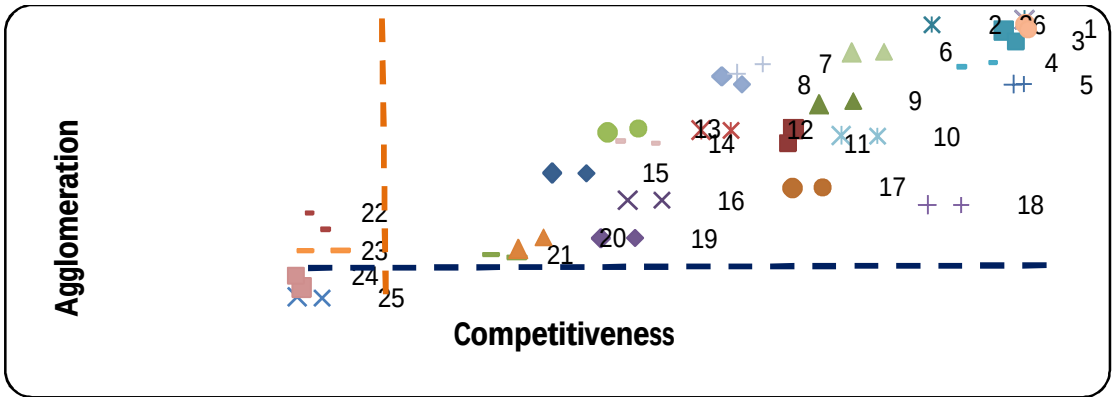
Picture 1. The Mapping of Superior Industries in the Regions Based on the Level of Competitiveness and Agglomeration in the Province with One Superior Industry (2014)



Descriptions of the Industry Types:

1. Handcrafted Goods(Bali)
2. Cassava (Lampung)
3. Seafood (Central Sulawesi)
4. Rubber (South Sumatera)
5. Textile (West Java)
6. Rubber (Bengkulu)
7. Essential Oil (Aceh)
8. Seafood (Kep. Riau)
9. Seafood (Southeast Sulawesi)
10. Cocoa (West Sumatera)
11. Cane (Central Kalimantan)
12. Coffee (Papua)
13. Cocoa (West Sulawesi)
14. Seafood (Maluku)
15. Handicrafts (NTB)
16. Coconuts(NorthMaluku)
17. Wood (DKI Jakarta)
18. Textile (Banten)
19. Fishery (Gorontalo)
20. Cocoa (NTT)

Picture 2. The Mapping of Superior Industries in the Regions Based on the Level of Competitiveness and Agglomeration in a Province with Two Superior Industries (2014).



Description of Industry Types:

1. Coconuts (North Sulawesi)
2. Cocoa (South Sulawesi)
3. Leather (Yogyakarta)
4. Palm Oil (Kalsel)
5. Tin (Babel)
6. Seafood (North Sulawesi)
7. Seafood (West Papua)
8. Palm Oil (Kaltim)
9. Palm Oil (Riau)
10. Seafood (South Sulawesi)
11. Palm Oil (North Sumatera)
12. Wood (East Java)
13. Palm Oil (Kalbar)
14. Wood (West Papua)
15. Rubber (North Sumatera)
16. Coconut (Riau)
17. Rubber (Jambi)
18. Rubber (West Kalimantan)
19. Wood (Central Java)
20. Wood (Yogyakarta)
21. Textile (Central Java)
22. Seafood (Babel)
23. Gemstone (Kalsel)
24. Rubber (Kaltim)
25. Textile (East Java)
26. Palm Oil (Jambi)

When examined in more detail, it is known that each type of industry achieved a relative variety in competitiveness and agglomeration. The highest distributor of high level of competitiveness and agglomeration is the industry of handcrafted goods in the Bali province (code 1), industry of cassava processing in Lampung (code 2) and textile industry and textile products in West Java (code 5).

The industry of handcrafted goods in the Bali province has a value of LQI 9.32 and an HBI value of 11.31. The high competitiveness of that industry is because of the high added value that is being produced which is Rp 220.8 billion with a productivity worth of Rp 89.3 million per labor in the year of 2011. The industry of handcrafted goods in the Bali province is agglomerated spatially in Klungkung regency, Tabanan regency, Gianyar regency, Karangasem regency, Bangli regency, Buleleng regency, Jembrana regency and municipality of Denpasar.The industry of cassava processing in Lampung reached a value of LQI 9.13 and HBI value of 9.52. This is supported by the achieved added value of Rp 1.1 trillion and productivity of Rp 472.3 million per labor in the year of 2011. Meanwhile in the textile industry and textile products in West Java, the high competitiveness is supported by the increase in labor productivity of 42.21 percent. The textile industry in West Java is spatially agglomerated in Majalengka regency, Bandung regency, City of Bandung, City of Bogor, Tasikmalaya, Garut regency, Ciamis regency, Kuningan regency, Cirebon, Subang, Purwakarta, Karawang, Cimahi, and Bekasi regency. In the meantime, the industry of woodcraft in the DKI Jakarta province is classified as uncompetitive and not agglomerated (LQI 0.21 and HBI 0.34). This is because the DKI Jakarta province is not a timber producing region or has no comparative superiority in the woodcraft industry.

Even so, DKI Jakarta is only as a docking place and marketing place of the woodcraft industry.Based on analysis results of the provinces with two superior industries (Picture 2), most of the superior industries are classified as competitive and agglomerated. There are a couple of industries with the highest level of competitiveness and agglomeration (code 1, 2, 3, 26, 4). Even so, there are also industries that are uncompetitive enough but yet are agglomerated (code 22 and 23), not only uncompetitive but also not agglomerated (code 24 and 25). The industry of coconut oil processing in North Sulawesi has a value of LQI 9.48 and HBI value of 9.57. The high level of competitiveness is supported by the achieved added value of Rp 2.9 trillion. Other than that, the industry of coconut oil processing in North Sulawesi has a large level of cost efficiency. The industry of coconut oil processing in North Sulawesi is spatially agglomerated in Talaud regency, City of Bitung, Minahasa regency, South Minahasa regency, North Minahasa, Southeast Minahasa, BolaangMongondow regency, North BolaangMongondow, South BolaangMongondow and West BolaangMongondow regency. Meanwhile, the industry of cocoa processing in South Sulawesi has a value of LQI 9.49 and HBI value of 9.35. The high competitiveness of the cocoa industry in that area is caused by the added value (Rp 1.1 trillion) dan produced labor productivity (Rp 902.39 million per labor). The industry of cocoa processing in South Sulawesi is spatially agglomerated in the City of Makasar, Luwu regency, Pinrang, Bone regency and the City of Palopo. As for the industry of leather processing in Yogyakarta, the high level of competitiveness (LQI 9.22) is supported by the productivity increase of 60.29 percent and achieved added value of Rp 324.1 billion. This is also supported by the existence of the central industry of leather processing that is in Bantul regency, Sleman, GunungKidul, KulonProgo and the City of Yogyakarta. Whereas the palm oil processing industry in Jambi reached a value of LQI 9.48 and HBI value of 9.50. The palm oil processing industry in Jambi is supported by the palm oil production that reached 1.3 million ton per year with a palm oil plantation area that reached 574.5 thousand hectare.

3.1 The Relationship of Industrial Agglomeration and Competitiveness

The relationship testing between superior industrial agglomeration and competitiveness in the region is done by the G*ranger Causality* test. The *Granger Causality* testing results are shown on Table 1.

Table 1. Granger Causality Test Results

Null Hypothesis	F-stat	Prob
HBI does not Granger Cause LQ	5.31176	0.0009
LQ does not Granger Cause HBI	24.85140	3.10^{-12}

Source: Processed Results

The testing results showed that agglomeration affects the industrial competitiveness and vice versa, the industrial competitiveness affects the industrial agglomeration as well. Therefore, it can be concluded that the superior industry in the region, the relationship between the agglomeration causality and two-way competitiveness. Which means, the agglomeration and competitiveness is affecting each other. When an industry is agglomerated in a certain area, then that industry becomes easier and cheaper to interact with relating industries, which can minimalize transaction costs and increase its competitiveness.

This is corroborating to the theory that states that industries that are agglomerated in a certain area will gain savings in transportation costs and transaction costs because of the proximity of the industries. Likewise, the more competitive anindustry, then the moredrives that industry to agglomerate in a certain area with a purpose to increase its efficiency. Empirically, The industrial mapping (Picture 1 and Picture 2) showed that most of the superior industries in the region that are competitive are agglomerated industries as well.

3.2 Factors that are affecting the Superior Industrial Competitiveness in the Province

The data panel regression model selection needs to be done before making anestimation.The best regression model selection will be tested by the Chow and Hausman test. The Chow test result showed a probability value of 0.000 which was less small than the actual value (α) 0.05 which was why the conclusion has individual heterogeneity in the model. A Hausman test was performed after and showed a probability value of 0.000 less small than the actual value (α) 0.05 which was why the conclusion had a non-*random* individual heterogeneity in the model. Therefore, the appropriate data panel model was the *fixed effect* model.

Table2. Estimation results of factors that are affecting the competitiveness of superior province main industries

Independent Variable	Coefficient	Probabilitas	Elasticity
Constants (C)	-17.6370	0.3057	-
Company Size (SIZ)	2.0170	0.0008***	0.1381
Raw Material Input (RMI)	9.5784	0.0626*	2.0283
Added Value (NT)	5.7563	0.0260**	0.8190
Foreign Direct Invesment (FDI)	2.0308	0.0000***	0.7502
Domestic Investment (PMDN)	0.6515	0.1987	-
Product Domestic Regional Bruto per Kapita	1.1610	0.4547	-
(PDRBK)	1.1539	0.0026***	0.0566
Industrial Competitiveness Index (IPS)	-0.9728	0.4656	-
Minimum Wage of the Province (UMP)	4.6255	0.0003***	0.8162
Road Infrastructure (IFR)	2.0853	0.6242	-
Water Infrastructure (IFW)	3.0064	0.0920*	0.4206
Electrical Infrastructure (IFE)	0.3287	0.0458**	
Service Bureaucracy Dummy (DUMPTSP)			
Adjusted R^2	0.9076		
Prob (F-statistic)	0.0000		

Source: Processing Results

Annotation : *** significant with actual value of1 % ($\alpha = 0.01$)
**significant with actual value of 5 % ($\alpha = 0.05$)
* significant with actual value of 10 % ($\alpha = 0.10$)

The estimation result showed a probability value of F-statistic (0.000) which was less small than the actual value (α) 0.05. This showed that at least there was one significant independent value affecting the industrial competitiveness. In order to know the significant independent variable, a t-test was being done. The result showed that the company size, industrial competitiveness index, road infrastruture significantly affecting actual value of 1 percent (0.01) and added value, foreign direct invesment and dummyservicebureaucracy significantly affecting with actual value of 5 percent (0.05). Whereas the significantly affecting raw material input and electrical infrastructure a significantly with an actual value of 10 percent (0.10). Meanwhile the domestic invesment, produk domestic regional bruto per kapita, theprovinces' minimum wage, and the water infrastructurewere not significantly affecting the industrial competitiveness.

The estimation results also showed that the *Adjusted* R^2 value (coefficient determination) was 0.9076. That particular value showed that 90.76 percent of the superior industrial competitiveness's diversity was explained by the independent variables that are in the model.Whereas, the remainder of 9.24 percent of diversity was explained by the other factors outside the model. Raw material input (RMI) is as the main raw materials that is significantly affecting the competitiveness positively is a variable that had the most impact with the elasticity value of 2.0283 percent.

The next in consecutive major variables that infuence is added value with elasticity 0.8190, the added values of a large industrial company increases, then the amount of efficiency produced by that industry will increase as well. Therefore, the added values showed the efficiency of an industry to grow. Road infrastructure is significantly and positively impacting towards industrial competitiveness with an elasticity value of 0.8162 This means that everytime there is a road length addition with good and medium condition of 1 % then the industrial competitiveness will increase by 0.8162 %. This result is in accordance to the classic theory that states that a road increase with good and medium condition will smoothen economical activities because of the cheap transportation cost (external savings) so that it fastens the creation of competitiveness.Foreign direct invesment with elasticity 0.8162. An industrial planting investment causes an accumulated addition to the industry's asset. An asset ownership as a cause to investments causes an industry to produce largely until the industry scale increases. A large industrial scale will eventually have an impact on the competitiveness.Electrical infrastructure with elasticity 0.4206, where if infrastructure electrical increases, will increase production capacity so that the industry will be more competitive. The company size (SIZ) is as an economic scale measurement that is significantly affecting the competitiveness positively.

The elasticity value of 0.1381 shows an economic scale increase of 1 percent will increase the industrial competitibeveness index by 0.1381 percent, *cateris paribus*. This result is according to the new hypothesis of the *New Economic Goegraphy* (NEG) in which states that economic scales industries are caused efisiensi. Industrial competitiveness index (IPS) that is used to approach a positively structured market towards industrial competitiveness. This result is corroborating to the theory that states that there are positive impacts in numerous companies in an area towards the creation of competitiveness. This is caused by the overwhelming knowledge that was obtained from the existence of thouse numerous companies. Other than that, it can also be caused by a competition among companies that will create competitions in order to fix the production process and product qualities being produced. This arouses companies to invent new technologies, company efficiencies, and fix company strategies to increase produced product qualities in order to compete with other companies (Puga 2009). The *dummy* variable in the implementation year of the integrated one-stop service (PTSP) is a condition measurement of bureaucracy service in every province that is significantly that competitiveness indusry. This is caused by this intergrated service condition that is directly related to the creation of competitiveness industries. However, this service condition will have a direct impact towards the smoothness of the economic activities, especially industrial activities involving business licensing and investment.

4. Conclusion

A huge part of the superior industries in Indonesia is competitive and agglomerated industries. Out of all the superior industries of the region that is classified as competitive, 60.87 percent of those are agriculture based processing industries (agroindustry). Furthermore, it can be proven that there are two-way causality relationships between competitiveness and agglomeration in regional superior industries. Therefore, superior industrial development of the region that is combined with increase competitiveness approach is the exact strategy to create agglomeration of superior industries of the regions. Moreover, impacting factors to increase ofcompetitiveness in superior industries of the regions are raw material input, added values, road infrastructure, foreign direct investment, electrical infrastrure, company sizes, and dummy implementation year of the integrated one-stop service (PTSP) is a condition measurement of bureaucracy service.

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