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Industrial Agglomeration Analysis for Local Economic Growth (Case Study Medium-Large Industries at North Sumatera)

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Abstract

The ideas for creating share value have been shown to improve economic performance. In this study, we aim to map the Location Quotients of Medium-Large Industries (IBS) agglomeration in North Sumatra and show how industrial agglomeration affects local economic growth and company performance. In this study, we use Location Quotients (LQ) index to measure the agglomeration of Medium-Large Industries (IBS) by district or city. The measurements were carried out in 34 regencies and cities in North Sumatra between 2017 and 2019. The results show that IBS agglomeration increased by 20.59% in 2017 and a steady increase by 23.53% in 2018 to 2019. The added value of this study is the expansion of the dominant logic co-creation concept, with the principle of industrial agglomeration able to assist companies in achieving sustainability and competitive advantage by promoting the creation of shared value, ranging from planning corporate resources to meeting the economic value for all stakeholders.

Keywords: *Industrial Agglomeration; Co-creation; Competence; Economic Performance*

INTRODUCTION

Industrial agglomeration shows economic improvement on a city scale and Medium-Large Industries (IBS). It is impacted by technological advances as well as business and organizational life demands. Industrial agglomeration is expected to increase with the phenomenon of population inflows (or labor) and physical capital or infrastructure available in it (Song, 2010). The process of returning costs to the IBS scale (*Industri Besar Sedang*) can be done with local government cost efficiency; agglomeration economy; increased technological innovation of production; improved relationship between IBS and its economic structure. Increased scale of yield in the establishment of industrial agglomeration can occur in production activities, economic agglomeration, and geographic ecosystems dynamics (Song, 2010).

Industrial agglomeration increases the acceleration of urban labor increases, resulting in the expansion of public infrastructure and intensified urban utilization (Tang et al., 2022). In other words, industry agglomeration is able to improve marketing performance. While other research states that industrial agglomeration tends not to directly improve marketing performance (Resbeut, Gugler, & Charoen, 2019). Industrial agglomeration not only creates new economic benefits but also greatly enhances the effects of handling environmental pollution (Xie, et al., 2019). Thus, there is a gap that provides the potential to continue this research. Another thing behind why this research is important is, there is an economic gap in industrial agglomeration areas with suburbs (Coe, 2016; Phelps & Ozawa, 2003). In addition, economic growth problems in North Sumatra showed that in the first quarter of 2021 recorded -1.85%, higher than the previous quarter of -2.94% (BI, 2021). As of the end of December 2021, it was up 2.5% to 3.3%. Overall, in 2021, the economy of North Sumatra is predicted to grow at a rate of 3% to 4.5% (BI, 2021). While in 2022 it is projected to grow in the range of 3.7% to 4.5% (IDXChannel, 2021). In terms of industrial

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companies, North Sumatra's economic growth in the third quarter of 2021 was mainly supported by the performance of the agricultural and trade industries. Improvements in the performance of the agricultural industry are mainly sourced from palm oil production that began to enter the harvest period amid the improved CPO export performance (BI, 2021). While in other areas such as Gresik, East Java, the rate of industrial agglomeration development as measured by the Williamson Index ranges from 0.95 to 0.97 and has increased since 2013. The value is even far above the national level (Hardjoko et al., 2021). Kashgar in China also showed the success of industrial agglomeration after urbanization (Bai, Xu, & Liu, 2020). Seeing the phenomenon of agglomeration in other regions can show high economic growth, should North Sumatra with supporting resources, can become a more developed industrial agglomeration area. The agglomeration of North Sumatra needs to develop experience and learn from Gresik in the management of industrial areas to improve the economy of the region. On the basis of the results of economic growth and the above gaps, this research model is built in increasing the level of economic growth and regional development that is synergistic and sustainable.

To address various research gaps and business phenomena, this research model is established by developing value creation alongside the support of local governments, Bank Indonesia, consumers and notably between IBS. The model will be tested at an industrial agglomeration unit in the North Sumatra Region and will be evaluated based on service dominant logic (SDL) perspectives. Dominant logic indicates that co-creation of value is a form of interdependence between IBS with each other and with stakeholders. Reciprocal exchanges informed by the values of economic actors and co-creation depend on the creation of meaningful social bonds that add to the social value of agglomeration (Lusch, Vargo & O'Brien, 2007). Interdependence shows all stakeholders contribute to creating value for economic growth and performance.

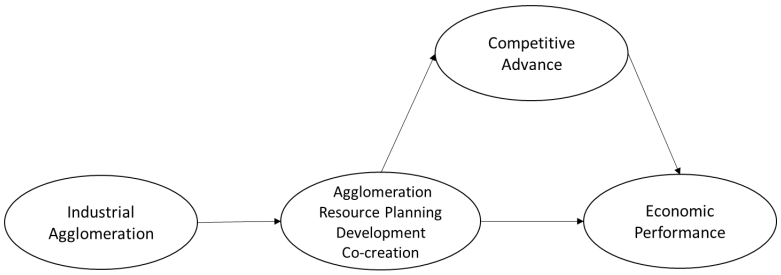

Figure 1 The modelling framework of Agglomeration Resource Planning Development Co-creation

LITERATURE REVIEW

Industrial agglomeration has to date been the most prominent spatial feature of economic value-enhancing activities. In concrete terms, industrial agglomeration is generally defined as "the geographical proximity of interconnected corporate industries in a particular field, related to similarity and/or complementarity" (X. Wang, Lin & Shi, 2020). Agglomeration is a centralized industrial activity with a level of geographic concentration that takes place in a centralized location. The size of geographical concentration increases according to demand and supply factors. Such an electronic production manufacturing industry is largely shaped by supply-side agglomeration externalities (L. Wang, 2017). Agglomeration is a phenomenon as old as a city consisting of a series of industrial processes and forming an economic cycle (Phelps & Ozawa, 2003) or a region that has an industrial concentration (Manzini & Luiz, 2019). The process of agglomeration cannot be separated from the influence of globalization. IBS agglomeration is a complex and powerful process of social law that occurs in a single integrated entity with regard to geographical boundaries. The geographic concentration of industrial activity serves as an indication of presence leading to the agglomeration or dispersion of industrial activities. The interaction between economies of scale and production/service costs gives rise to a relationship between ibs companies and workers/customers (B2C)

or between B2B. Integration results in agglomeration (Zekos, 2003). The growth stage consists of a period in which the number of company entries increases. The presence of new technologies commercialized by pioneering entrepreneurs and investors is a contributing factor to agglomeration. Co-creation logic of competing advantages with regard to spatial concentrations, including co-location, business and industrial activities called "agglomeration of industry" or "industrial district", "industrial estate" to describe the distribution of business and industrial activity across spaces (Brosnan, Doyle & O'Connor, 2016).

Industry agglomeration can occur as the start-ups population grows rapidly to take advantage of market opportunities, the industry as a whole is fragmented as start-ups experiment extensively with business models often associated with similar but different technologies, increasing market needs, companies that already have a business model, regions which has a greater potential for the company to develop better business models, generate a better value proposition, and consequently to gain a larger market share. Superior input factors can be, but are not limited to, transportation costs, lower labour, natural resources more talent, and a better and more supportive cultural, sociological and legal environment for business. This region has a much higher probability of developing into industrial agglomeration (Zekos, 2003). The effectiveness of the relationship between producers and consumers or even between producers is part of agglomeration in the world economy. The dominant logic of industry and marketing co-creation is that competitive advantage is the result of a localization process, indeed grouping, that produces knowledge and is innovation-oriented involving institutions (including government), culture, values, history and economic structure (Huggins & Izushi, 2015). IBS agglomeration strength is greater for industries with large economies of scale. High productivity due to agglomeration effects, but agglomeration is a consequence not the cause of high productivity (Zekos, 2003).

Industry agglomeration indicates collaboration and resource sharing between financial institutions and institutions. Through economies of scale agglomeration has a major impact on regional economic development. The assessment of industrial agglomeration degrees generally uses the index system assessment method, which is scientific, objective, and effective. Competitive advantage is an index system built from the point of view of economic competitiveness (Li & Hu, 2014). The synergistic effect of industrial agglomeration makes the company unique and builds the company's competitive position (Kamukama, 2013). A key factor in achieving the goals of industrial agglomeration depends on the significant transformation of economic development, industry, and resource planning systems (Tang, Peng, & Yang, 2022). Since neoclassical economics and new economic geography theories emerged, relevant studies on industrial clusters have mainly focused on endogenous evolution and economic benefits, which involve agglomeration externalities. Marshall (1920) attributes the existence of agglomerations to three externalities: (1) skilled labor pools; (2) easy access to local vendors or clients and (3) intellectual skills. Its influence is closely related to the scale of economic activity in a particular industry and region. The growth of industrial agglomeration and innovation continuously improves the urban and regional economy. Industrial companies in the agglomeration space will share infrastructure, resources and market information. This will encourage specialization and concentration of production and create agglomeration economies of scale. Since economies of scale in industry are conducive to production specialization and concentration, it can reduce operating costs and increase economic efficiency (Xie, Yao, Han, & Fang, 2019).

RESEARCH METHODOLOGY

First, this study determined the area classified as industrial agglomeration in North Sumatra, with a focus on the Cluster of Medium-Large Industries (IBS), so as to produce the size of which areas or clusters belong to IBS. Indicators for the IBS industry are measured if LQ > 1, then the region including IBS means being able to meet the needs of its own region and able to export abroad; Whereas if LQ < 1 means that the region does not include IBS, it means it is not able to meet the needs of its own area and has dependency with

other areas. If LQ = 1 means the region includes IBS and is only able to meet its own needs (Achmad, 2018).

In this study, industrial agglomeration was measured by the LQ index (location Quotients) to measure moderate agglomeration of large industries by district/ city. The measurements were carried out in 34 regencies / cities in North Sumatra in the range of 2017 - 2019. The data to calculate the LQ index obtained from BPS are in the form of IBS regency / city i workforce in year t in North Sumatera (BPS,2017; BPS,2018; BPS,2019). The formula of LQ is defined as:

$$LQ_{it} = \frac{E_{rit}/E_{*it}}{E_{r*t}/E_{**t}}$$

With,

E_{rit}: IBS regency / city i workforce in year t in North Sumatera

E_{*it} : Total labor of regencies / cities in north Sumatera

E_{r*t}: Total IBS workforce in North Sumatera

E_{**t} : Total workforce in the t year in North Sumatra.

There are some definitions of LQ index to define industry be concentrated in a region or not, that is, LQ value between 1 and 1.2. For example: If $LQij$ is above one, then industry I is said to be concentrated in region j (Tian (2013)). Di lain sisi, A LQ greater than 1.2 indicates a significant uotientation of the industry in the local area – possibly a key economic strength. Higher numbers mean greater specialisations. Anything over 2 is a major uotientation. (https://economy.id.com.au/fnqroc/location-quotient).

Table 1 Results of mapping of the Agglomerated IBS Region of North Sumatera

Region/Sector	Location Quotient			Agglomerated		
	2017	2018	2019	2017	2018	2019
Nias	0.00	0.00	0.00	No	No	No
Mandailing Natal	0.16	0.48	0.47	No	No	No
Tapanuli Selatan	0.30	0.26	0.22	No	No	No
Tapanuli Tengah	0.44	0.50	0.53	No	No	No
Tapanuli Utara	0.07	0.11	0.11	No	No	No
Toba Samosir	0.52	0.49	0.52	No	No	No
Labuhan Batu	0.65	0.50	0.50	No	No	No
Asahan	1.04	1.09	1.11	Yes	Yes	Yes
Simalungun	1.02	0.67	0.61	Yes	No	No
Dairi	0.06	0.08	0.05	No	No	No
Karo	0.14	0.15	0.15	No	No	No
Deli Serdang	2.24	2.27	2.34	Yes	Yes	Yes
Langkat	0.67	0.62	0.59	No	No	No
Nias Selatan	0.01	0.01	0.01	No	No	No
Humbang Hasundutan	0.09	0.11	0.12	No	No	No
Pakpak Barat	0.00	0.00	0.00	No	No	No
Samosir	0.00	0.00	0.00	No	No	No
Serdang Bedagai	1.05	1.09	0.86	Yes	Yes	No
Batu Bara	0.85	1.02	1.24	No	No	No
Padang Lawas Utara	0.33	0.44	0.41	No	No	No
Padang Lawas	0.89	1.05	1.03	No	Yes	Yes
Labuhan Batu Selatan	1.00	1.05	1.07	No	Yes	Yes
Nias Barat	0.00	0.00	0.00	No	No	No
Sibolga	0.05	0.05	0.03	No	No	No
Tanjung Balai	0.59	0.61	0.64	No	No	No
Pematang Siantar	1.24	1.44	1.48	Yes	Yes	Yes
Tebing Tinggi	0.67	0.82	0.81	No	No	No
Medan	1.77	1.68	1.63	Yes	Yes	Yes
Binjai	0.39	0.44	0.50	No	No	No
Padangsidempuan	0.09	0.06	0.06	No	No	No
Gunung Sitoli	0.07	0.03	0.03	No	No	No

This research will use LQ> = 1 has been categorized as an industrial localization. In this section there are some areas that are consistently agglomerated. But there are also those who have not initially been agglomerated experiencing an increase in the LQ index until finally agglomerated. Next, it displays the effect of agglomeration as measured by the location quotient index on economic growth indicated by the PDRB (gross regional quotient product) on the basis of prevailing prices. The PDRB on the basis of prevailing prices describes the added value of goods and services calculated using the prevailing price in each year. The results of regression calculations for each year are displayed in the following table. Tabel 2 Regression Test Results.

Table 2 Regression Test Results

Year	Significance F (Anova)	Intecept	X variable
2017	0.00004	28,527,014	19,837,053
2018	0.00012	30,756,784	20,097,101
2019	0.0001	33,012,691	21,111,299

The results of the calculation are done using the degree of freedom $\alpha = 5\%$. Since the P-value (significance F) for the three years is worth less than the degree of freedom, it can be concluded that the location quotient index used to determine the agglomeration of one region has a significant effect on the PRDB. Regression results displayed through intercept and X variables show a positive relationship between the LQ index and the PDRB. This suggests to increase the PDRB of an area can be done by increasing the LQ index. Therefore, to increase the economic growth of an area can be done by increasing the LQ index, namely by increasing the number of workers in a city / district. The implication is the increase of industries that are shamanic in order to increase the number of workers.

FINDING AND DISCUSSION

From the calculation of LQ that obtained the number of regions that include industrial agglomeration in North Sumatra, namely Asahan, Deli Serdang, Pematang Siantar and Medan (four regions that are consecutively industrial agglomeration); Coal, Padang Lawas and Labuhan Batu Selatan in early 2017 are still agglomerated and in 2018-2019 showed an increase to the agglomeration; Simalungun, Serdang Bedagai, in 2017 was agglomerated but the following year decreased and did not include industrial agglomeration. Labuhan Batu Utara 2017-2018 includes industrial agglomeration areas, but in 2019 decreased to not be agglomerated.

Thus, the results of the determination of industrial agglomeration areas in North Sumatra there are 10 regions that are agglomerated and or have been agglomerated in the period of 2017-2019. In comparison in 2017 = 20.59% and in 2018-2019 = 23.53%, as shown in the Table 2 below.

Table 2 North Sumatra Industrial Agglomeration Region

Wilayah/Sektor	Teraglomerasi		
	2017	2018	2019
Asahan	Yes	Yes	Yes
Simalungun	Yes	No	No
Deli Serdang	Yes	Yes	Yes
Serdang Bedagai	Yes	Yes	No
Batu Bara	No	Yes	Yes
Padang Lawas	No	Yes	Yes
Labuhan Batu Selatan	No	Yes	Yes
Labuhan batu Utara	Yes	No	Yes
Pematang Siantar	Yes	Yes	Yes
Medan	Yes	Yes	Yes
Total AI	7	8	8

For now, the agglomeration area in North Sumatra consists of Medan, Binjai, Deli Serdang and Karo (or known as Mebendaro) based on Presidential Decree no. 62 year 2011(Mardianta, Kombaitan, Purboyo, & Hudalah, 2017). The existence of Medan and Deli Serdang is in accordance with the results of this study. However, Binjai and Karo have not yet entered into the agglomeration.

The results show that the appropriate location for agglomeration is Regency/City which consistently has an LQ index greater than 1 consistently for the last 3 years. Areas that meet are Asahan, Deli Serdang, Pematang Siantar and Medan. Because Medan and Deli Serdang are already agglomeration areas, attention should be paid to the Pematang Siantar and Asahan areas. By establishing Pematang Siantar and Asahan as agglomeration areas, it will encourage the government to carry out appropriate policies in order to support the economy in these areas for economic growth in North Sumatra.

Location Quotients IBS North Sumatera has ten Industrial Estates (Agglomeration). Out of ten there are eight areas that have a strong impact on increasing profits which are reflected in the following aspects: AI changes the competitive nature of an industrial enterprise, enhances competitiveness, limits and weakens competitors by establishing partnership strategies, adopting higher quality resources and capabilities, enhancing development effects economics, capture technological potential, reduce risk by forming strategic partnerships, enter the market agilely, gain benefits and diversify product portfolios, achieve economies of scale and reduce production costs (Yu, Yu, & Ye, 2021). The benefits of the agglomeration of the North Sumatra IBS industry significantly increase the GRDP or economic performance. All aspects of IA cannot be separated from the role of Joint Value Creation with stakeholders. Enterprise resource planning enables agglomerations to more effectively define strategic types and operational requirements, mapping skills and knowledge. determine more effectively the number of resources and types for each part needed over a certain period of time; identify gaps and priorities of infrastructure resources more effectively, decide more effectively on actions/investments, align overall strategy and operational management processes. Thus, AI is proven to be able to improve the economic performance of North Sumatra. Agglomeration Resource Planning Development Co-creation is able to create added value for North Sumatra's economic growth. This means that the presence of ARPD Co-creation is in line with the ability to strengthen economic growth and company performance.

Dominant logic emphasizes co-creation based on the concepts of resource-based logic and co-production. Dominant logic indicates that the scarcity of production, its value is irreplaceable and difficult to replicate, resources can maintain the competitiveness of the company. Resources emphasize the impact of marketing on development. In fact, the root of the resource-based view is the dynamic capabilities of the company. In the dynamic process of industrial agglomeration, the concept of "competence" refers to the ability of interaction between resources to always face flexibly any environmental changes, "dynamic" refers to the ability to continuously update competitiveness and maintain industry performance in line with environmental changes. Co-creation of dynamic capabilities can make companies more flexible to adapt to changing industrial agglomeration environments. The synergistic effect of industry agglomeration makes the company unique and builds the company's competitive position. The agglomeration of North Sumatra’s IBS creates long-term relationships between companies and stakeholders such as governments or institutions. Therefore, networking, social ties, and mutually beneficial friendships are cornerstones in the agglomeration industry. Dominant logic calls it structural capital (Lusch et al., 2007), human capital, and relational capital that serves as actors or important determinants of competitive advantage in the agglomeration of the IBS Industry of North Sumatra.

CONCLUSION AND FURTHER RESEARCH

This study extends the concept of dominant logic co-creation (Vargo & Lusch, 2007) with the principle that industrial agglomeration is a valuable resource, which helps companies achieve sustainability and competitive advantage by promoting shared value creation, starting from planning corporate resources to fulfilling value. economy for all stakeholders. Location Quotients IBS Industrial agglomeration can be increased if there is value creation in Agglomeration Resource Planning Development.

The company's industrial resource plan represents economic activity in transportation, coordination or communication and has the support of manpower, capital goods or technical expertise. Competitive advantage as a type of industrial agglomeration externality, captures the industry's need for similar natural resources where the input-output relationship in the co-creation of industrial agglomeration value chains (Wang, Lin & Shi, 2020) can be empowered by corporate managers and other units. in a synergistic business. This research has policy-level implications regarding the role of planning and designing industrial agglomerations in North Sumatra in creating an industrial estate ecosystem. Industrial agglomeration will be built based on the creation of added value for agglomerated areas and develop new designs for areas that have agglomeration potential, if the Location Quotient value is close to 1 (one).

This study focuses on the Location Quotients of North Sumatra IBS, with reference to the LQ data for 2017-2019. This study aims to explore economic performance, especially the economic growth of North Sumatra on the basis of creating shared value in the Industrial Agglomeration area. This problem is complex, such as a set of values, symbols of provisions, procedures and LQ standards, and it is very likely that by 2020 industrial agglomeration will increase. The results of this study will more strongly reflect the AI value creation factor on economic growth if it is included with comprehensive data. The next research is open for AI development in North Sumatra by increasing the number of LQ IBS with the support of the latest data.

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