

# Potential Agglomeration of Small Food Industry

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## Potential Agglomeration of Small Food Industry in Palembang, South Sumatra Indonesia

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### 2 ABSTRACT

The pattern of the spread of small food industries in Palembang show has led to the establishment of concentration patterns or clusters. This is evident from the grouping type of food industries in certain regions of the city of Palembang. The pattern of industrial activity concentration is spatially often identified with the agglomeration. It is, therefore, necessary to study the level of concentration and agglomeration force for small food industries. The population in this study was small food industries scattered throughout the districts in the city of Palembang. The analytical tool used Herfindahl index, locational Gini index, and the Agglomeration Strength Index. The results showed industrial concentration is highest in the district food Ilir Timur II at 1.4177 with labor contribution of 4.75 percent. Rated power at small industrial agglomeration in Palembang foods obtained at 0.03042, with a specialization level of 0.03036. Overall there are 488 units of small food industry businesses in Palembang and 21.7 percent are in the district of East Ilir II predominantly small soft drink industry with a total production amounting to Rp. 11,779,574. This suggests that small soft drink industry potential for development because it has a fairly wide market prospect and raw materials are relatively easy to obtain, although the potential for agglomeration is still relatively weak. Therefore, developing soft drink industry needs to consider the use of a cluster-based industrial strategy which is based on industry specialization driven by the occurrence of agglomeration in an effort to develop a competitive advantage in the face of competition in the free market era.

**Keywords:** Spatial Concentration, Agglomeration, Herfindahl Index, locational Gini Index, Agglomeration Strength Index

JEL Classification: L60; L66

### 1. INTRODUCTION

The development of small industries today is very important, because of its strategic socio-economic and political functions. The problem that arises for the development of this small industry is the development of economic globalization. Globalization is characterized by the growth of cross-border market systems, increased openness and dependence of the national economy in the international economic network, the development of multinational companies, the increasing volume of investment and cross-border trade, as well as the increasing share of world production and trade by multinational companies.

In the context of national development, the role and function of small industries has been widely understood. In almost every area,

small industries are economic areas that involve the interests of many communities. Small industries play a role in the procurement of various needs of products and services for the community and for large-scale economic activities.

Small industries are now a major force for economic development in each region. In the long run, the development of small industries is directed to serve as a dynamicator for other sectors and will lead all sectors of the economy to a higher level of growth. Thus, small industries can truly become the backbone of the economy and encourage ongoing development.

As in other areas, economic development in Palembang has the main goal to increase the number and type of job opportunities

for the community. One effort that can be done is by encouraging the development of industrial activities as the main economic activity (*prime mover*) that can provide a multiplier effect on the growth of other sectors.

The industrialization process that has been going on so far has had an impact on the reform of the economic structure, not only at the national level but also at the regional level, including the city of Palembang as part of the administrative region of Palembang City Province. This change in economic structure is characterized by a greater contribution of industrial sector than other economic sectors in Palembang. In 2020, the industry sector contributed 45.67 percent to the Gross Regional Domestic Product (GDP) of Palembang City. The magnitude of this contribution shows the high intensity of industrial sector development in Palembang.

Industrial activities in Palembang are dominated by small industries, both from business units and absorbed labor. In 2020, there are 92.78 percent of business units came from small industries with a workforce absorption of 37.22 percent. This shows the large role of small industries in supporting development in Palembang.

One of the small industrial activities in Palembang that has the potential to be developed is the food industry. In 2020, the small food industry made a significant contribution to the development of small industries in Palembang, where the contribution of revenue amounted to 72.2 percent of the total revenue of the industrial sector. Although the number of business units is still below the small industrial sub-sector of chemicals and building materials, and the small industrial sub-sector of metals and services, as seen in Table 1. But small food industry subsectors are able to absorb more labor than other subsectors. Subsector of small food industry in Palembang is spread in several sub-districts. The most are in the district lir Timur II, with the number of business units as many as 106 units and labor absorbed by 821 people (Table 2).

The distribution pattern of small food industry subsectors in Palembang implicitly reflects the existence of "concentration patterns" or "clusters" of small industrial activities, especially for small industries that are dominant in the region. Fujita and Thisse (1996), states that **spatial concentration is a spatial grouping of each industry and economic activity**, where the industry is located in a particular region. Spatial concentration indicates the share of an area and the distribution of the location of an industry. If an industry's spatial distribution is uneven and there is an area that dominates the industrial site, it shows that the industry is spatially concentrated in the region (Aiginger and Rossi-Hansberg, 2003a).

Discussion of the pattern of concentration of industrial activities and economic activity spatially in various literature is often identified with agglomeration (Kuncoro and Wahyuni, 2009). Agglomeration itself is a very important location factor, both in the form of industrial groupings, housing, the concentration of shops in shopping centers, are equally the main means to improve economic efficiency, because there is a concentration of human activities in a particular location.

**Table 1: Small industry in Palembang, 2020**

Industrial branch	Business unit	Investation value (Rp. 000)	Labor (person)
Food	537	21,075,458	5,308
Clothing and Leather	331	12,586,550	3,784
Chemical and Building Materials	749	4,720	4,720
Metals and Services	677	20,644,949	3,768
Craft and General	162	1,980,552	2,523
Total	2,455	56,292,228	20,103

Source: The Central Statistics Agency of South Sumatra Province, 2020

**Table 2: Food small industry distribution area in Palembang City, 2020**

District	Business Unit	Investment value (Rp. 000)	Labo (person)
Alang-alang Lebar	4	9,035,195	33
Bukit Kecil	19	230,390	86
Gandus	6	381,500	64
ILIR Barat I	42	1,091,895	368
ILIR Barat II	20	450,312	143
ILIT Timur I	96	1,706,051	736
ILIR Timur II	106	1,991,901	821
Kalidoni	10	432,390	30
Kemuning	18	773,699	133
Kertapati	3	527,900	22
Plaju	4	56,250	23
Sako	31	859,362	325
Seberang Ulu I	38	706,532	273
Seberang Ulu II	18	461,634	121
Sukarame	73	2,250,158	705
Sematang borang	0	0	0
Total	488	20,955,169	3,883

Source: The Central Statistics Agency of Palembang city, 2020

In line with what Montgomery stated in Kuncoro (2012), agglomeration is a spatial concentration of economic activity in a region due to savings due to adjacent locations that are often identified with spatial clusters of companies, workers and consumers. Although the benefits obtained from industrial agglomeration are quite large, in reality the small industry in the city of Palembang, especially the subsector of the small food industry does not seem to have formed an agglomeration. The new pattern is limited to the tendency and potential formation of industrial agglomeration (Mukhlis et al., 2017).

Tight competition as a result of globalization and liberalization gives demands to small industries to be able to compete, including small food industries in the city of Palembang. The condition that allows the small food industry in Palembang city to survive the competition with large industries is to merge in an agglomeration. Small food industries should be able to create efficient economies of scale, so that small food industries can move in an unfragmented market (Kuncoro, 2013).

Given the benefits of agglomeration due to the existence of industrial sites in an area is very large, it is important to know about the existence of industrial agglomeration sites, especially small food industries in the city of Palembang. Through the agglomeration

of small food industry is expected to provide spread effect to the surrounding area, thus giving a significant positive influence also to the surrounding area. In this study, the search about the location of small food industry agglomeration in Palembang was conducted through literature studies and direct observations in the field.

## 2. THEORETICAL FRAMEWORK

### 2.1. Industry Concept

Industry is a collection of companies that produce homogeneity goods (Haryadi et al., 2016). An industrial company produces certain products that have the company's characteristics. Products produced by each company must get legal protection and should not be separated from government supervision. Based on this concept, industry has two meanings: (1) Broad understanding, industry covers all businesses and activities in the field of economics **is productive**; (2) In a narrow sense, the industry only includes the **processing industry which is an economic activity** that conducts **the activity of converting a basic** mechanical, chemical, **or by hand** goods so that it becomes semi-finished goods and or finished goods, then goods that lack value into goods of more value and nature more to the final use.

### 2.2. Industry Classification by International Standard of Industrial Classification (ISIC)

Industries can be classified by several commodity groups, based on business scale and by relationship between their products. The most universal classification is based on the International Standard of Industrial Classification (ISIC). This ISIC classification is based on the approach of commodity groups, which are broadly differentiated to the nine groups listed below (Central Bureau Statistics of South Sumatra, 2021):

1. ISIC 31: Food, beverage and tobacco industry
2. ISIC 32: Textile, apparel and leather industries
3. ISIC 33: Wood industry and wooden goods, including home furnishings
4. ISIC 34: Paper industry and goods from paper, printing and publishing
5. ISIC 35: Chemical industry and goods from chemical, petroleum, coal, rubber and plastics
6. ISIC 36: Non-metal mining industry, except petroleum and coal
7. ISIC 37: Basic metal industry
8. ISIC 38: Industrial goods from metals, machinery and equipment
9. ISIC 39: Other processing industries.

The criteria used by the Ministry of Industry and Trade in assessing small industries use the number of labor force, production and number of sales. This is based on the nature of small industries that are generally labor-intensive, so that with the increase in the labor force and the amount of production or sales means that small industries are able to survive in the environment.

### 2.3. Spatial Concentration

Rauch (1993) stated in the **concentration of economic activity spatially, there are three things that are interrelated, namely the**

**interaction between economies of scale, transportation costs, and demand. To gain and increase the power of economies of scale, companies tend to be located in areas with large local demand. However, large local demand tends to be located around concentrated economic activity.** Next, Fujita and Thisse (1999) explains that basically, the thinking about agglomeration is based on the importance of increased results due to economies of scale and transportation costs, as well as backward and forward inter-industry links. However, a large local demand tends to be located around the concentration of economic activity. Furthermore, Head and Mayer (2004), explains that in essence, the idea of the agglomeration is based on increasing returns due to economies of scale and transport costs, as well as linkages backward and forward between industries.

According to Aiginger and Rossi-Hansberg (2003), the spatial concentration is regional share showing the locational distribution of an industry. Meanwhile, industry specialization is defined as the industrial distribution of a region. Spatial concentration indicates the level of activity and locational distribution of industries in the region.

The approach is often used to analyze the spatial concentration is Herfindahl index, denoted by HS, showing the location of the sub-sectors distribution in certain areas. HS values range between zero and one. The higher the HS the increasingly unequal distribution and industrial subsectors S tends to be concentrated in specific areas.

Ellison and Glaeser (1994), Analyze the spatial concentration using the labor-based index, known as locational Gini index (GEG). This index is used to analyze the spatial concentration of manufacturing industry in the United States. Based on the analysis, it can be concluded that the spatial concentration occurs because of natural advantages and knowledge spillover. However, because it is difficult to measure the impulse of knowledge spillover towards spatial concentration, then Ellison and Glaeser argued about the contribution of natural advantages based on factor endowment that simultaneously influences and drive the company's internal economies of scale.

### 2.4. Agglomeration

Ellison et al. (2010), states that the agglomeration does not always happen in the industry. Agglomeration can occur in several different industries and interrelated. More industrial agglomeration leads to an explanation of the formation or development of a cluster. Agglomeration generates benefits for regional development through the movement of goods, human resources, and ease of information. The labor market becomes larger in an industrial area that is agglomerated for information on employment become more numerous. While other costs incurred is the cost of living, commuting and other costs will be cheaper.

The natural advantage for the industrial sector occurred because of the availability of raw materials and means of supporting infrastructure. While the spillover of knowledge is supported by the increasing degree of education workers.

Companies tend to always group in specific locations. This indicates that the increased scale of returns can be achieved by

companies in the group, if that is not achieved then the grouping is only temporary. According to McCann (2001), that there are three sources why the scale of increased returns is always achieved, namely: (1) Information Spillovers. If many companies in the industry are classified as similar, then by grouping at the same location then the workforce in a particular company will be relatively easy to relate to the labor of other local companies. Thus, the exchange of information both between workers and between companies will be easier and take place at all times; (2) Nontraded local inputs. The circumstances in which companies in similar industries are grouped somewhere then there are certain production inputs that become more efficient when used jointly by workers in those companies than if those inputs were purchased individually by those companies; and (3) Availability of Local skilled labor pool. The availability of skilled labor in the region will lead to lower labor costs for companies on the site.

### 3. LITERATURE REVIEW

Chollidah (2012), in her study of small food processing industry in Semarang district, find from 19 districts in the District of Semarang, the concentration of small food processing industry is concentrated in a single district, the District Tuntang. The magnitude of the power of agglomeration occurs in small industrial processed foods, concentrated in Semarang district amounted to 0.069856, with little industry specialization level of processed food amounted to 0.070254. Policy planning and development are considered strategic for the development of small food processing industry is the cluster approach.

Tilaar (2010), in her study of the distribution of agglomeration locations in Indonesia, found that the industrial sector plays an important role in the economy of a region. In Indonesia, the industrial sector is the major sector in the economy because it contributes greatly to Indonesia's Gross Domestic Product over the last 10 years. The concentration of industry that occurred in the region will benefit so-called agglomeration economies and provide a positive influence on economic development.

Lafourcade and Mion (2007), in their study of the spatial concentration and size of companies (agro-industry), using the Location Quotient, found that the relative specialization in a region occur if industry specialization in an area larger than industry specialization in the main areas (aggregate).

Ellison and Glaeser (1999), in their study of natural agglomeration advantages associated with the use of locational Gini index Ellison and Glaeser index, found the spatial concentration of industries occur because of natural advantages and knowledge spillover.

Agglomeration research with geogarfic economic approach was conducted by (Markusen, 1996). The goal is to look at the pattern of industrial clusters or industrial agglomeration in the United States. Based on variable business structure and economies of scale, investment decisions, cooperation with suppliers, network of cooperation between entrepreneurs in clusters, network of cooperation with companies outside the cluster, market and labor migration, local cultural identity associations, the role of local

governments, and the role of associations, the cluster pattern is distinguished into four districts, namely Marshallian District, District Hub and Spoke, Satellite District, and State-anchored District.

Kim (1995) in his study of industrial regional localization in the United States using variable resource intensity, economies of scale, and variable dummy found changes in resource use and economies of scale significantly explaining the tendency of regional localization in the United States.

#### 3.1. Flow of Thought

As seen in Figure 1, the potential agglomeration of small food industry in Palembang will be calculated using Herfindhal index, Locational Gini Index, and Agglomeration Strength Index. Through the size of each index, it will be seen whether the small food industry in the city of Palembang has the potency to agglomerate.

### 4. MATERIAL AND METHODS

Research emphasis on small industrial agglomeration food in the city of Palembang in 2020, due to the small industrial sector including the food industry subsectors little big contribution in the creation of employment and income from the industrial sector. Primary data was collected through questionnaire by survey method. The sampling method used was convenient sampling, which comprised of 60 samples.

The data used are secondary data and primary data, obtained from various agencies such as the Central Bureau of Statistics of Palembang, the Ministry of Industry, Trade and Cooperatives Palembang. In addition, data obtained through the library of literature in the form of textbooks, scientific articles, and other sources that are relevant to the topic being studied.

This study used a qualitative descriptive approach to provide an overview of the condition of the small industrial sector food in Palembang. Estimation tools used among others;

#### 4.1. Herfindahl Index (H<sup>s</sup>)

H<sup>s</sup> values range between zero and one, the higher H<sup>s</sup> the increasingly unequal distribution locations, and small businesses tend to be concentrated in specific areas (Ellison et al., 2010);

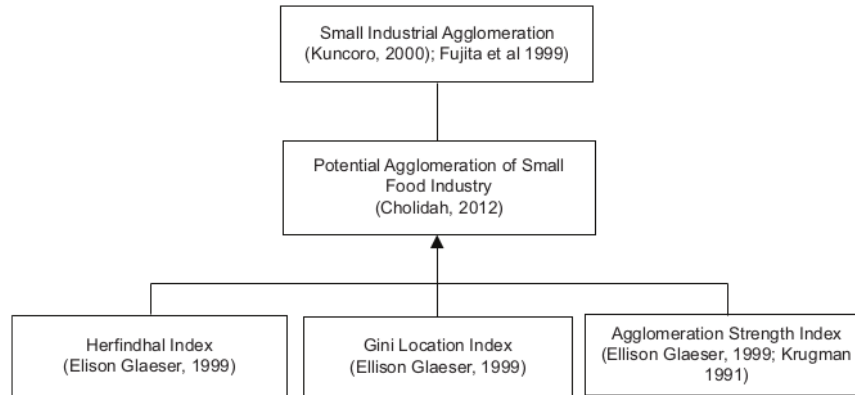
$$H^S = 2 \sum_{i=1}^m S_{ij}^2 \quad (1)$$

and;

$$S_{ij} = \frac{E_{ij}}{\sum E_j} \quad (2)$$

Where: H<sup>s</sup> = The concentration ratio (percent); m = number of areas/regions; and S<sub>i</sub> = share of small industrial employment subsector i at sub-district in Palembang; E<sub>ij</sub> = labor sector i in region j; ΣE<sub>ij</sub> = total employment in the sector i and j.

Figure 1: Schematic flow of thought



4.2. Potential Agglomeration

The Power of Small Industry Agglomeration food in Palembang calculated using locational Gini index and Agglomeration Strength Index (Ellison et al., 2010);

4.2.1. Locational Gini index

$$G_{EG} = 2 \sum_{i=1}^m (S_{ij} - E_{ij})^2 \tag{3}$$

and;

$$E_{ij} = \frac{\sum_j E_{ij}}{\sum_j E_{ij}} \tag{4}$$

4.2.2. Agglomeration strength index (Ellison et al., 2010)

$$G_{EG} = \frac{g_{EG}}{1 - \sum_{i=1}^m (E_{ij})^2} \tag{5}$$

Where:  $G_{EG}$  = Force that drives concentration spatial agglomeration;  $g_{EG}$  = Gini locational;  $S_i$  = share of small industrial employment subsector  $i$  at subdistrict in Palembang;  $E_{ij}$  = Share of small industrial employment subsector  $i$  in Palembang.

5. RESULTS AND DISCUSSION

The spatial concentration provides the advantages of saving localization and urbanization that encourages agglomeration. Localization savings associated with externalities in an industry has given rise to the phenomenon of industrial clusters, often called industrial clusters or industrial districts. The region has diverse small businesses, such as Palembang rare phenomenon of an industrial district, is a cluster which occurs naturally.

Industry cluster that occurred in the city of Palembang mostly industrial complex shaped clusters, which do not occur naturally and in need of investment and government intervention, as well as other related institutions in building a relationship with based on rationality. In this regard, it is necessary to do a study on the

potential level of concentration and agglomeration of small food industries in the city of Palembang in the development of the small industry.

5.1. Spatial Concentration of Small Food Industries in Palembang Based on Herfindahl Index

The spatial concentration level of small food industry in Palembang city was analyzed using Herfindahl Index to show the distribution of subsector locations in Palembang as seen in Table 3. The highest index in the subsector of small industries in Palembang is in Ilir Timur II subdistrict of 1.4177, the second rank is in Ilir Timur I subdistrict of 1.2710. The lowest index is in Sematang Borang sub-district because there is no small food industry, and Kertapati sub-district. The high index figures in Ilir Timur II sub-district show that the dominance of labor distribution in the area is greater than other sub-districts in Palembang. The high index figure is due to Ilir Timur II subdistrict is the largest soft drink producing area in Palembang with a production value of Rp. 11,779,574.

Sub-district Sematang Borang has the lowest spatial concentration value because the area did not reveal any small food industry. In the realm of informal and based on field surveys, in the district of Sematang Borang have small food industries, but the food industry has not been registered yet. It is also the problem when calculating the distribution of small food industry workers in those locations. Based on survey results, the distribution of the largest labor force in the district Sematang Borang found on clothing and leather industries, as well as metals and services.

Other distribution of the lowest labor contained in sub-Kertapati, because in this area the greatest contributions come from the sub-sectors of clothing/textiles. To improve the low labor distribution in the region, the local government should give serious consideration to doing counseling and providing assistance to small industry players, especially mothers of households to be given the skills to create and manage an innovative food that has more value. Moreover, the improvement of road infrastructure is also very influential on the development of small food industry. If the roads are good, then the main attraction for the investors to invest in the area.

**Table 3: Figures Herfindahl index in Palembang, 2020**

District	Labori	Contributions of Labor	IH	Ranked
Alang-alang lebar	33	0.1910	0.0570	12
Bukit kecil	86	0.4979	0.1485	10
Gandus	64	0.3705	0.1105	11
ILIR Barat I	368	2.1305	0.6355	4
ILIR Barat II	143	0.8279	0.2469	7
ILIT Timur I	736	4.2610	1.2710	2
ILIR Timur II	821	4.7531	1.4177	1
Kalidoni	30	0.1737	0.0518	13
Kemuning	133	0.7700	0.2297	8
Kertapati	22	0.1274	0.0380	15
Plaju	23	0.1332	0.0397	14
Sako	325	1.8815	0.5612	5
Seberang ulu i	273	1.5805	0.4714	6
Seberang ulu ii	121	0.7005	0.2089	9
Sukarame	705	4.0815	1.2174	3
Sematang borang	0	0.0000	0.0000	16

Source: Author

**Table 4: Locational Gini index figures and food small industry agglomeration strength index in Palembang, 2020**

Industry	Business unit	$s_i$	$x_i$	$g_{EG}$	$G_{EG}$
Food	537	0.21864	0.04439	0.03036	0.03042
Clothing and leather	331	0.13486	0.02738	0.01155	0.01156
Chemical and building materials	749	0.30511	0.06195	0.05913	0.05935
Metals and services	677	0.27554	0.05594	0.04822	0.04837
Craft and general	162	0.06586	0.01337	0.00275	0.00276

Source: Author

### 5.2. Strength of Small Food Industry Agglomeration in Palembang Based on Locational Gini Index and Agglomeration Strength Index

Based on calculations using the Gini index locational and agglomeration strength, as seen in Table 4, obtained the degree of specialization of small food industry subsector amounted to 0.03036. While the magnitude of an agglomeration that encourages spatial concentration on small food industries in Palembang at 0.03042. The highest value is precisely located on a small industrial chemicals and building materials, with a specialization level of 0.05913 and the value of the power of agglomeration of 0.05935. This indicates that the level of specialization of the small food industry is still relatively low compared to the small industrial chemicals and building materials.

Saving urbanization occurs when the majority of small food industries are concentrated in the district of East Ilir II. Saving urbanization gave rise to the phenomenon called by agglomeration. The development of small food industry subsectors are concentrated in the district of East Ilir II, Palembang happens impulse potential agglomeration caused by externalities in the form of knowledge spillover and specialized labor. It is also driven by market access, population, and transportation facilities. The population is a potential demand for the small industrial output of

food, thus supporting its development as the natural advantages the region an important role in the process of agglomeration.

### 5.3. Spatial Concentration Suitability Small Industries Food with Potential Locations in Palembang

Development of small food industry sector in Palembang consider the use of cluster-based industrial strategy. Based on industry specialization driven by agglomeration in developing competitive advantages of the small industrial sector in the city of Palembang in the face of competition in the free market era.

Based on the survey, the region has the potential for agglomeration is Ilir Timur sub-district II, with the kind of small industries soft drink. It is based on the consideration that the soft drink industry has a fairly broad market prospects and does not require imported raw materials.

Planning the development of small industries with a soft drink on a cluster approach II East Ilir subdistrict in Palembang is strategic because it not only raises the cost efficiency but also can increase bargaining power and have a positive influence on regional economic development. The cluster approach to stimulate innovation through the exchange of experience and knowledge among small food industry players in Palembang in the upstream-downstream, and able to provide a framework to face the challenges of globalization.

## 6. CONCLUSION

Small industrial food in Palembang is concentrated in the district of East Ilir II with a value of 1.4177 with the amount of labor distribution of 821 workers of the total workforce in the city of Palembang amounted to 17 273 workers. Lowest spatial concentration in the sub-Sematang Borang and sub-Kertapati, with each value of 0.0000 and 0.0380.

Type of small industry which potential to developed in Palembang, especially in the district of East Ilir II is the soft drink industry, as the market outlook is quite wide, availability of raw materials, and mastery of technology manufacture of soft drinks are easily understood by the workforce. Specialization level of small food industrial by using analytical tools localization Gini index of 0.03036, and not more precious than a small chemicals and building materials industries that are equal to 0.05913. Based on the number of agglomeration strength index of at 0.03042 show little food industry has great potential to agglomeration, although still at low level.

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# Potential Agglomeration of Small Food Industry

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