ANALYSIS OF THE ECONOMIC POTENTIAL OF THE MANUFACTURING INDUSTRY SECTOR

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Abstract

The contribution of the manufacturing industry during 2019 decreased compared to 2018, where its contribution in 2018 was recorded at 9.09 percent while in 2019 it fell to 8.37 percent. The downward trend in the manufacturing industry value-added contribution of Sumatera Barat had occurred over the last 8 years. This study aims to determine which sub-sectors have the potential and advantages of each regency/municipality in Sumatera Barat. The type of research is a descriptive statistical analysis using Location Quotient (LQ) and shift-share analysis of the Gross Regional Domestic Product (GRDP) data of all sub-sectors of the manufacturing industry in all regencies/municipalities in Sumatera Barat. The results of the LQ and shift-share analysis obtained 4 regional groups, namely the first group there is 11 region that has fast manufacturing growth; the second group, there is 3 region that experiences deep growth in manufacturing but still has the potential to be developed; the third group is one municipality which has deep growth but developing industrial sector growth; the fourth group has 4 region depressed regions with weak competitiveness and also the contribution of the Province of Sumatera Barat is low. From the results of the two analyzes, the government can focus more on guiding manufacturing entrepreneurs, including those in potential, developing, and depressed regions.

Jel Classification:

O14; O12; O12; O12; O14

Keyword: Manufacture, Location Quotient, Shift-Share, Discriminant, Gross Regional Domestic Product

INTRODUCTION

The manufacturing sector plays an important role in national development and contributes to economic growth. The manufacturing sector also has a prominent place in employment, social welfare, and state revenues. Although the manufacturing sector is not a major accelerator of economic growth in Sumatera Barat, the number of workers absorbs quite a lot. Sumatera Barat was recorded to have as many as 241.54 thousand people working in the manufacturing industry as of August 2019 or 9.51 percent of the total population working in Sumatera Barat. The contribution of the manufacturing industry to the economy in Sumatera Barat can be seen from the added value of the manufacturing industry to the Gross Regional Domestic Product (GRDP) of Sumatera Barat. The contribution of the manufacturing industry during 2019 decreased compared to 2018, where its contribution in 2018 was recorded at 9.09 percent while in 2019 it fell to 8.37 percent. The downward trend in the manufacturing industry value-added contribution of Sumatera Barat had occurred over the last 8 years.

The manufacturing industry is believed to have linked both within its industry and also between sectors in the national economy. This relationship encourages that when this sector experiences growth, it will have an impact on other sectors. In line with this important role, the government through the Ministry of Industry focuses on improving the performance of the five domestic manufacturing sectors to be ready to enter the industrial era 4.0 and become a pillar of national economic growth. The five manufacturing sectors include food and beverages, textiles and wearing apparel, chemicals, automotive, and electronics. The performance improvement program requires the availability of accurate supporting data and information.

Manufacturing sub-sectors in GRDP are grouped according to the two digits Indonesian Industrial Standard Classification of All Economic Activities 2015 (ISIC). ISIC is a statistical standard classification of economic activities in Indonesia. ISIC only groups production units according to economic activity, does not differentiate production units according to ownership, type of legal entity, formal or informal. The two digits ISIC used in this survey is the ISIC according to the Head of BPS Regulation number 19 of 2017 (Badan Pusat Statistik, 2020) with the following details: Manufacture of Food Products and Beverages (ISIC 10 and 11), Manufacture of Tobacco products (ISIC 12), Manufacture of Textiles and wearing apparels (ISIC 13 and 14), Manufacture of Leather and related products and footwear (ISIC 15), Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials, bamboo, rattan and the like (ISIC 16), Manufacture of paper and paper products and Printing and reproduction of recorded media (ISIC 17 and 18), Manufacture of chemicals and chemical products, Manufacture of pharmaceuticals, medicinal chemical and botanical products (ISIC 20 and 21), Manufacture of rubber and plastic products (ISIC 22), Manufacture of other non-metallic mineral products (ISIC 23), Manufacture of basic metals (ISIC 24), Manufacture of fabricated metal products, excepts machinery and equipment, Manufacture of computers, electronic and optical products, Manufacture of electrical equipment (ISIC 25, 26 and 27), Manufacture of machinery and equipment n.e.c (ISIC 28), Manufacture of motor vehicles, trailers and semi-trailers, Manufacture of other transport equipment (ISIC 29 and 30), Manufacture of furniture (ISIC 31), Other manufacturing, Repair and installation of machinery and equipment (ISIC 32 and 33).

In Sumatera Barat, the manufacture of food products and beverages recorded the largest contribution to the growth of the manufacturing industry, which was 3.87 percent. The second contributor is the manufacture of textiles and wearing apparel with a contribution of 1.91 percent. Furthermore, the manufacture of rubber, plastic products, and other non-metallic mineral products also contributed around 1 percent. Meanwhile, other manufacturing industries contributed less than 1 percent. Almost all manufacturing industries listed at ISIC are in Sumatera Barat except for the manufacture of basic metals and machinery and equipment n.e.c.

In developing the economic potential of the processing industry in Sumatera Barat, several master plans and policies have been prepared. One of them is contained in the Regional Medium-Term Development Plan (RMTDP) of Sumatera Barat Province 2016-2021 prepared by the Regional Planning and Development Agency of Sumatera Barat Province. In the RMTDP, there are ten development priorities for Sumatera Barat for 2016-2021. The development priority is based on the potential possessed by the region in Sumatera Barat. To measure the economic potential in an area, the Economic Base Approach theory can be used. This theory measures the value of production, economic activity, and growth of each economic sector to produce a group of regional economic structures into leading and non-preferred sectors.

Research on economic potential analysis using the Economic Base Approach theory has been widely developed among researchers. For instance, (Amar, 2016) uses a regional economic model in the form of Location Quotient (LQ) to determine the leading sector (primary, secondary and tertiary) of the regional economy. Furthermore, (Rosa, 2019) also uses the LQ model in determining tourism as a leading sector. In addition, (Jumiyanti, 2018) uses LQ in determining the base and non-base sectors in the GRDP data of the business field. (Asmanita 2017) also analyzes the innovation potential of Small and Medium Industries (SMI) in the municipality of Padang. (Hajeri et al, 2015) analyze the determination of the leading sector of the economy in Kubu Raya Regency using Klassen, LQ, and shift-share typologies. (De FRETES, 2017) conducted an LQ and shift-share analysis to determine the leading sectors in Papua Province. (Ansofino, 2017) also uses LQ and shift-share analysis to determine the leading sector in Padang Municipality. (Malinda, 2015) uses LQ analysis, specialization index, shift-share, and SWOT analysis to determine leading sectors that have competitiveness in Agam Regency. (Yunus et al, 2021) used LQ, Dynamic LQ, and shift-share analysis in determining the leading sectors in the areas affected by the Earthquake, Tsunami, in Sulawesi Tengah Province. (Abidin, 2015) uses shift-share to analyze the transformation of the agricultural sector in Sulawesi Tenggara. (Hamzah, 2020) uses LQ and shift-share analysis to analyze the sub-sector of the leading manufacturing industry in the Province of the Bangka Belitung Islands. (Destiningsih et al, 2019) using the E-M shift-share analysis tool, connectivity quotient (CQ), and Typology Class to see potential sectors in the Jawa Tengah Province. Until now, the research which discusses the analysis of the potential of the manufacturing industry sector in each sub-sector or the two digits ISIC for each regency/municipality in Sumatera Barat is not available yet. Thus, it is necessary to analyze the economic potential to find out which sub-sectors or two digits ISIC have potential and advantages over each regency/municipality in Sumatera Barat. In this study, researchers used LQ analysis and shift-share analysis.

This study aims to determine which sub-sectors have the potential and advantages of each regency/municipality in Sumatera Barat. The type of research is a descriptive statistical analysis using Location Quotient (LQ) and shift-share analysis of the Gross Regional Domestic Product (GRDP) data of all sub-sectors of the manufacturing industry in all regencies/municipalities in Sumatera Barat.

METHODS

Several methods of measuring leading sectors in an area that are commonly used include: Location Quotient (LQ) analysis is used to show the magnitude of the role of the economic sector of a region by comparing the same sector in a larger area (Tarigan, 2014). This method is modified by identifying potential economic sectors that are superior and can be developed in an area. It is also used to identify the comparative advantage of a region. The formula for getting the leading sector in an area of analysis is as follows:

$$LQ_i = \frac{S_{ij}/S_j}{S_{in}/S_n}$$

where:

S_{ij} : GRDP in sector i in the analysis area j

S_j : GRDP in the analysis area j

S_{in} : GDP in sector i in the reference region

S_n : GDP in the reference region

LQ measurement produces the following criteria:

- If $LQ > 1$, sector i in the analysis area j is the leading sector, i.e. the sector with a higher level of specialization in the analysis area than the wider regional level (reference area).
- If $LQ = 1$, sector i in the analysis area j is not a leading sector, that is, a sector with the same level of specialization as the reference area.
- If $LQ < 1$, sector i in the analysis area j is not a leading sector, that is, a sector with a lower level of specialization than the reference area.

Shift-share analysis is one of the techniques for analyzing regional statistical data, such as GRDP, labor and others to observe the structure of the regional economy and its changes descriptively. This is done by focusing on sector growth in a region and projecting economic activity in that region with limited data (Tarigan, 2014). This analysis is one of the quantitative techniques commonly used to analyze changes in the economic structure of a region to the economic structure of a wider administrative area as a reference. In this method there are 3 parts, namely:

- Regional Share (RS) is a share component of regional economic growth caused by external factors. The hospital indicates an increase in regional economic activity as a result of applicable national policies.
- Proportional Shift (PS) component of regional economic growth caused by the good economic structure of the region, specializing in fast-growing sectors.
- Differential Shift (DS) is a component of regional economic growth due to competitive regional specific conditions. This element of growth is a regional competitive advantage that can encourage regional export growth.
- Shift-Share (SS) is the sum of Regional Share with Proportional Share and Differential Share.

If you want to see the advantages of a region in a region, the four elements are formulated as follows:

$$RS_{ij} = y_{ij0} \left(\frac{y_t}{y_0} - 1 \right)$$

$$PS_{ij} = y_{ij0} \left(\frac{y_{it}}{y_{i0}} - \frac{y_t}{y_0} \right)$$

$$DS_{ij} = y_{ij0} \left(\frac{y_{ijt}}{y_{ij0}} - \frac{y_{it}}{y_{i0}} \right)$$

$$SS_{ij} = RS_{ij} + PS_{ij} + DS_{ij}$$

where:

y_t = GRDP of the reference area for the year-end period.

y_0 = GRDP of the reference area at the beginning of the year.

y_{it} = GRDP of the reference area of sector i for the final year period.

y_{i0} = GRDP of the reference area of the i sector of the initial year period.

y_{ijt} = GRDP of the i sector analysis area for the final year period.

y_{ij0} = GRDP of the i -sector analysis area for the initial year.

The interpretation of the measurement results above is as follows:

- a. If $PS_{ij} > 0$, it means that sector i in an analysis area grows faster than sector i in the reference area, and vice versa.
- b. If $DS_{ij} > 0$, it means that the competitiveness of sector i in an analysis area is higher than the competitiveness of sector i in the reference area, and vice versa.
- c. If $SS_{ij} > 0$, it means that there is an increase in absolute value or an increase in regional economic performance in sector i in the analysis area.
- d. If $PS_{ij} > 0$ dan $DS_{ij} > 0$, it means that the region/sector with very rapid growth.
- e. If $PS_{ij} < 0$ dan $DS_{ij} > 0$, it means that the region/sector with growth is stunted but growing.
- f. If $PS_{ij} > 0$ dan $DS_{ij} < 0$, it means that the region/sector with growth is stunted but still has potential.
- g. If $PS_{ij} < 0$ dan $DS_{ij} < 0$, it means that the region/sector has low competitiveness and the role of the region is also low.

The data used in this study is secondary data in the form of GRDP data of the processing industry subsector (KBLI 2 digits) by district/city in West Sumatra in 2015 and 2019 sourced from the Central Statistics Agency (BPS) of West Sumatra Province (West Sumatra Statistics Center, 2020). The unit of observation in this study were all districts/cities in West Sumatra. The type of research used is a descriptive statistical analysis by modifying using Location Quotient (LQ) and shift-share analysis of Gross Regional Domestic Product (GRDP) data for all manufacturing industry sub-sectors in all districts/cities in Sumatera Barat.

RESULT AND DISCUSSION

Overview of the Manufacturing Industry Sector in Sumatera Barat

Development programs in developing countries generally carry out a structural transformation from the category of agricultural business to the category of the manufacturing industry. In Sumatera Barat, the manufacturing industry is not the largest, but its role is quite large in the community's economy in creating added value and absorbing labor. Based on data from the Survey of Large and Medium Industries and the Survey of Micro and Small Industries in 2019, it reveals that the distribution of the manufacturing industry sector between regency/municipality in Sumatera Barat is still not evenly distributed.

Table 1. Percentage of Number of Establishments, Workers and GRDP Manufacturing Industries by Regency/Municipality in Sumatera Barat, 2019

Regency/Municipality	Establishments	Workers	GRDP
Regency			
[01] Kepulauan Mentawai	0.40	0.44	0.53
[02] Pesisir Selatan	5.09	4.52	4.36
[03] Solok	5.54	5.46	3.09
[04] Sijunjung	1.92	1.69	1.12
[05] Tanah Datar	7.07	5.49	6.67
[06] Padang Pariaman	7.94	9.94	9.64
[07] Agam	14.68	9.94	9.79
[08] Lima Puluh Kota	16.72	14.34	4.69
[09] Pasaman	4.35	4.05	1.69
[10] Solok Selatan	1.36	1.91	1.14
[11] Dharmasraya	2.76	2.97	2.47
[12] Pasaman Barat	6.17	6.47	9.77
Municipality			
[71] Padang	10.77	17.78	35.56
[72] Solok	1.52	1.44	0.80
[73] Sawah Lunto	1.86	1.61	1.90
[74] Padang Panjang	1.55	1.94	1.42
[75] Bukittinggi	3.29	2.76	2.12
[76] Payakumbuh	3.68	3.92	1.59
[77] Pariaman	3.32	3.33	1.67
[00] Sumatera Barat	100.00	100.00	100.00

Source: BPS-Statistics of Sumatera Barat Province in 2019 (data processed)

The Municipality of Padang as the administrative center of Sumatera Barat Province as well as the center of the economy is still dominant as a center for the manufacturing industry in absorbing workers and value-added to GRDP. Table 1 shows that the Municipality of Padang has 10.77 percent of the establishment's manufacturing industry. Although the number of the establishments manufacturing industry in Padang Municipality is still below the other two regencies, namely Lima Puluh Kota Regency (16.72 percent) and Agam Regency (14.68 percent). However, the contribution of the Municipality of Padang to GRDP exceeds that of other regencies/ municipalities, reaching 35.56 percent, as well as employment in this sector reaching 17.78 percent.

The number of establishments in the manufacturing industry sector in Lima Puluh Kota and Agam Regencies is the first and second highest in Sumatera Barat. The manufacturing industry in these two regions absorbs a large number of workers, namely 14.34 percent and 9.94 percent, respectively. This indicates that most of the establishments in the area are micro and small establishments. The Mentawai Islands as the only archipelagic region in Sumatera Barat have the smallest establishments of manufacturing industries compared to other regencies/municipalities. At least this sector can be seen from all sides. From the GRDP contribution, the Mentawai Islands Regency is only 0.53 percent of the total Sumatera Barat, in terms of the number of establishments it is 0.40 percent, while the workforce in this sector is only 0.44 percent.

Results of the Analysis of the Economic Potential of the Manufacturing Industry Sector in Sumatera Barat

Analysis of the economic potential of the manufacturing industry sector between regencies/municipalities in Sumatera Barat is carried out using an economic base approach. The measurement methods used for this approach are LQ analysis and shift-share analysis. The data used in this analysis is regency/municipality GRDP data in Sumatera Barat according to the manufacturing industry sub-sector in 2015 and 2019. The results of the calculation of LQ in 2019 by the sub-sector of the manufacturing industry and regency/municipality in Sumatera Barat can be seen in Table 2.

According to (Sjafrizal, 2008), the basic sector is a sector that is the backbone of the regional economy because it has a fairly high competitive advantage. Meanwhile, the non-base sector is other sectors that have less potential but function as a support for the basic sector or service industries. From the calculation of LQ in 2019, for the Mentawai Islands Regency, the manufacturing industry sub-sector or ISIC that has an LQ value of more than 1 is ISIC 10 and 11, ISIC 15, ISIC 16, ISIC 20 and 21, ISIC 29 and 30, ISIC 31, ISIC 32 and 33. Thus, the sub-sector is the base sub-sector (B) or the leading sub-sector in the economic development of the manufacturing sector in the Mentawai Islands Regency in 2019. The sector with an LQ value of less than 1 (non-base sector) is ISIC 13 and 14, ISIC 17 and 18, ISIC 22, ISIC 23, ISIC 25, 25, and 27. Furthermore, the leading sub-sectors for Pesisir Selatan Regency are only ISIC 10, 11, and 31, while the others are non-basic sub-sectors. In Solok Regency, the leading sub-sectors are only ISIC 10, 11, and 16. Likewise, Tanah Datar Regency, only has 3 leading sub-sectors, namely ISIC 13, 14, and 22.

Lima Puluh Kota Regency as an area that is the center of industrial manufactures and the second-largest absorption of workers has superior sub-sectors in the form of ISIC 10, 11, 15, 16, 17, 18, 23, 25, 26, 27, and 31. Agam Regency as an area with the second largest number of industrial manufactures only has leading sub-sectors in the form of ISIC 13, 14, 32, and 33. Meanwhile, Padang Municipality which is the center of government and the region that contributes the most to the economy has superior sub-sectors in the form of ISIC 13, 14, 22, 23, 25, 26, 27, 29, 30, 32, and 33. The leading sub-sectors for the other regions can be seen in Table 2.

Table 2. The Results Of The Calculation of LQ by Sub-Sector Of The Manufacturing Industry And Regency/Municipality in Sumatera Barat, 2019

Regency/Municipality	ISIC 10 and 11	ISIC 13 and 14	ISIC 15	ISIC 16	ISIC 17 and 18	ISIC 20 and 21	ISIC 22	ISIC 23	ISIC 25, 26 and 27	ISIC 29 and 30	ISIC 31	ISIC 32 and 33
Regency												
[01] Kepulauan Mentawai	1.68	0.05	2.75	13.13	0.36	22.63	0.04	0.81	0.34	2.18	8.58	1.26
[02] Pesisir Selatan	1.93	0.40	0.07	0.58	0.27	0.75	0.00	0.01	0.18	0.57	1.02	0.50
[03] Solok	1.97	0.30	0.12	1.51	0.57	0.92	0.00	0.01	0.21	0.22	0.91	0.99
[04] Sijunjung	1.94	0.14	0.00	6.06	0.88	0.29	0.00	0.26	0.48	0.42	1.71	1.64
[05] Tanah Datar	0.95	1.22	0.28	0.49	0.20	0.24	1.59	0.46	0.70	0.31	0.54	0.35
[06] Padang Pariaman	0.90	1.00	1.13	0.74	0.44	4.19	0.57	1.59	0.60	1.82	0.82	0.35
[07] Agam	0.81	2.12	0.91	0.52	0.50	0.18	0.22	0.73	0.72	0.09	0.50	1.69
[08] Lima Puluh Kota	1.57	0.30	3.09	1.80	1.53	0.65	0.01	1.05	1.04	0.21	1.29	0.61
[09] Pasaman	1.11	1.38	0.96	3.77	1.32	0.80	1.27	0.03	0.83	0.80	1.46	1.25
[10] Solok Selatan	1.00	0.06	0.55	3.51	0.41	0.31	1.70	1.67	0.35	0.29	2.27	0.73
[11] Dharmasraya	1.59	0.08	0.00	2.94	0.27	0.13	1.60	0.13	0.18	0.13	1.82	0.60
[12] Pasaman Barat	1.33	0.43	0.02	0.81	0.17	0.20	1.50	0.48	0.20	0.38	0.40	0.45
Municipality												
[71] Padang	0.59	1.00	0.55	0.26	0.74	0.43	1.67	1.61	1.16	1.70	0.47	1.24
[72] Solok	1.69	0.57	1.53	3.05	8.04	0.85	0.00	0.03	7.53	1.71	6.09	1.92
[73] Sawah Lunto	1.42	1.38	0.15	2.32	3.77	1.59	0.01	0.09	1.04	0.17	4.26	0.61
[74] Padang Panjang	1.22	1.56	13.89	0.95	0.83	0.92	0.00	0.43	0.66	0.47	1.76	1.12
[75] Bukittinggi	0.76	2.42	2.77	0.78	6.95	0.95	0.00	0.51	2.97	1.30	2.27	2.50
[76] Payakumbuh	1.78	0.42	7.18	4.10	6.70	4.42	0.01	0.12	3.85	0.34	3.61	2.20
[77] Pariaman	1.13	1.06	0.19	0.86	1.57	0.40	0.01	1.22	3.42	0.54	1.91	1.23

Source: BPS-Statistics of Sumatera Barat Province in 2019 (data processed)

Furthermore, shift-share analysis is carried out to determine the economic work productivity of each regency/municipality on the economy of Sumatera Barat Province. The data used is the GRDP of the manufacturing industry sub-sector by regency/municipality in Sumatera Barat in 2015 and 2019 and the GRDP of the Province of Sumatera Barat in 2015 and 2019. Based on the results of the shift-share calculation for each regency/municipality, it is known that the business sector that has the positive Proportional Share (PS) components are different. The results show that in the Mentawai Islands Regency, only ISIC 25, 26, 27, 29, and 30 have relatively higher growth compared to the growth of similar sub-sectors in Sumatera Barat Province, while other sub-sectors have relatively lower growth than similar sub-sectors in Sumatera Barat Province. It can be seen from the negative Proportional Share value. Based on the PS and DS values for each ISIC for the Mentawai Islands Regency, it can be concluded that ISIC 25, 26, 27, 29, and 30 are sub-sectors that have stunted growth but still have the potential to be developed in the Mentawai Islands Regency compared to other sub-sectors that have competitiveness low and their contribution is also low (Table 3, Table 4 and Table 5).

For Pesisir Selatan Regency, the sub-sectors of the manufacturing industry that have the potential to be developed are ISIC 10, 11, 17, 18, 25, 26, 27, 29, and 30, while the rest still have low competitiveness and contribute. The interesting thing about Solok Regency is the presence of ISIC which has very rapid growth namely ISIC 13, 14, 16, 32, and 33. ISIC whose growth is stunted but has the potential to be developed in Solok Regency is ISIC 10, 11, 17, 18, 25, 16, and 27, while ISIC 20, 21, and 23 are industrial sub-sectors that have stunted growth but can develop because they have fairly high competitiveness.

There are fewer potential industrial sub-sectors in Sijunjung Regency than Solok Regency, namely ISIC 13, 14, and 16 and only ISIC 22 has low competitiveness and contribute. Meanwhile, ISIC which has stunted growth but has the potential to be developed and has fairly high competitiveness is ISIC 10, 11, 17, 18, 20, 21, 23, 25, 26, 27, 29, 30, 31, 32 and 33.

Table 3. Shift-Share Calculation Results by sub-sector of the manufacturing industry (ISIC 10, 11, 13, 14, 15 and 16) and Regency/Municipality in Sumatera Barat

Regency/ Municipality	ISIC 10 and 11		ISIC 13 and 14		ISIC 15		ISIC 16	
	PS	DS	PS	DS	PS	DS	PS	DS
Regency								
[01] Kepulauan Mentawai	-1,871.00	-4,066.03	-30.92	-75.63	-21.65	-15.45	-42.82	-53.17
[02] Pesisir Selatan	11,228.53	-8,814.37	-373.01	-3,589.19	-2.54	-1.32	-0.08	-3.61
[03] Solok	14,087.82	-243.44	3,189.99	1,651.85	-1.47	-0.13	7.49	1.15
[04] Sijunjung	4,272.76	-1,305.58	351.14	64.20	-	-	12.18	2.21
[05] Tanah Datar	38,990.88	24,909.87	15,431.58	1,408.10	1.14	7.64	0.59	-3.92
[06] Padang Pariaman	65,608.42	46,116.31	18,039.27	1,112.40	-33.57	7.38	2.09	-7.98
[07] Agam	-732.10	-20,518.51	61,722.74	26,127.58	8.00	39.87	-9.85	-17.29
[08] Lima Puluh Kota	44,352.51	27,121.73	1,762.38	-780.78	-41.65	13.74	7.44	-4.59
[09] Pasaman	9,933.49	5,854.16	2,846.12	-1,096.59	-4.68	1.09	3.24	-5.25
[10] Solok Selatan	-6,281.24	-9,353.56	126.01	2.38	1.97	4.18	-0.23	-6.02
[11] Dharmasraya	12,511.26	3,122.49	464.14	121.15	-	-	12.45	2.34
[12] Pasaman Barat	51,342.68	20,931.52	5,942.60	-1,428.50	-1.18	-0.46	5.91	-5.04
Municipality								
[71] Padang	48,781.66	713.65	88,374.52	30,342.03	-108.63	-36.22	3.01	-9.54
[72] Solok	-1,415.18	-4,937.16	271.22	-595.88	-14.59	-9.26	-10.60	-14.38
[73] Sawah Lunto	11,223.91	5,070.05	9,717.28	5,472.04	-2.75	-1.61	0.60	-5.48
[74] Padang Panjang	2,147.36	-2,096.65	2,620.30	-1,386.30	99.38	166.05	-3.41	-5.39
[75] Bukittinggi	-9,069.06	-13,415.37	-9,919.28	-20,120.00	-3.62	18.11	-1.24	-3.66
[76] Payakumbuh	24,673.19	19,096.54	-553.08	-1,690.23	-136.05	-91.87	22.19	14.24
[77] Pariaman	14,860.69	10,704.04	6,129.85	3,184.31	-4.76	-3.36	-1.70	-3.74
Sumatera Barat	334,646.58	98,889.71	206,112.87	38,722.94	-266.65	98.38	7.26	-129.12

Source: BPS-Statistics of Sumatera Barat Province in 2019 (data processed)

Tanah Datar Regency and Padang Pariaman both have industrial sub-sectors with fairly rapid growth in the form of ISIC 10, 11, 13, 14, 22, and 31. Agam Regency which has a large number of industrial manufacture, it turns out that the sub-sectors still have a lot of competitiveness low and its contribution is also low, including ISIC 10, 11, 16, 22, 25, 26, 27, 29, 30 and 31. Unlike Agam Regency, Lima Puluh Kota Regency only has ISIC 31 which has low competitiveness and contribute. The ISICs with very rapid growth is ISIC 10,11 and 22, while other ISICs such as ISIC 13, 14, 15, 16, 17, 18, 20, 21, 23, 25, 26, 27, 29, 30, 32, and 33 experiencing slow growth but has potential for development in the region. Pasaman Regency has similarities in seeing the potential of the industrial sub-sector with Lima Puluh Kota Regency.

Solok Selatan, Dharmasraya, and Pasaman Barat Regencies as expansion areas also have quite rapid growth in several industrial sub-sectors. However, each sub-sector or ISIC area that is growing rapidly is different, for Solok Selatan Regency ISIC 13, 14, 15, 22, and 31, for Dharmasraya Regency ISIC 10,11,13,14,16 and 22, for Pasaman Barat Regency ISIC 10, 11, 29, 30, and 31. The sub-sectors that need attention from the government in Solok Selatan Regency are ISIC 10,11 and 16, in Pasaman Barat Regency ISIC 15 and 22, while in Dharmasraya Regency there is no ISIC that has the competitiveness and low contribute.

The Municipality of Padang as an area that triggers industrial growth in Sumatera Barat has quite a several sub-sectors with rapid growth. However, some sub-sectors have low competitiveness and roles, such as ISIC 15, 20, 21, 23, 32, and 33. So that local governments need to stimulate institutional support and social and economic infrastructure, especially for business actors engaged in the sub-sector.

Table 4. Shift-Share Calculation Results by sub-sector of the manufacturing industry (ISIC 17, 18, 20, 21, 22 and 23) and Regency/Municipality in Sumatera Barat

Regency/ Municipality	ISIC 17 and 18		ISIC 20 and 21		ISIC 22		ISIC 23	
	PS	DS	PS	DS	PS	DS	PS	DS
Regency								
[01] Kepulauan Mentawai	-0.52	-2.14	-864.45	-74.29	-42.29	-29.84	-1,738.58	-139.56
[02] Pesisir Selatan	4.96	-4.25	-249.37	-29.64	-3.99	-2.31	-210.32	-35.26
[03] Solok	4.58	-9.21	-71.96	88.09	-2.37	-0.59	-87.78	68.31
[04] Sijunjung	2.80	-5.54	-11.71	8.57	-1.37	-0.12	-691.37	434.33
[05] Tanah Datar	5.90	-4.55	-21.60	62.70	7,062.50	12,182.33	-3,779.22	6,732.32
[06] Padang Pariaman	41.45	10.60	-1,949.77	557.29	5,305.78	7,968.65	-18,427.95	34,986.46
[07] Agam	33.12	-4.23	-60.30	42.16	-2,646.29	-1,487.77	-17,859.92	8,252.23
[08] Lima Puluh Kota	22.50	-35.75	-182.13	17.68	11.99	26.89	-18,983.10	88.92
[09] Pasaman	9.42	-7.14	-56.40	22.35	85.16	1,113.82	-101.72	89.76
[10] Solok Selatan	1.50	-2.32	-7.11	12.91	572.43	1,562.60	-3,125.53	3,786.41
[11] Dharmasraya	0.55	-5.03	-18.09	1.97	4,265.66	6,189.42	-1,130.81	64.33
[12] Pasaman Barat	8.98	-3.91	-106.31	19.28	-15,818.62	-8,079.49	-11,851.93	5,131.94
Municipality								
[71] Padang	182.05	-5.61	-1,738.67	-600.24	25,123.10	53,148.11	-296,562.54	-79,084.77
[72] Solok	25.30	-27.31	-41.13	4.38	-0.81	0.74	-57.15	20.37
[73] Sawah Lunto	37.82	-15.85	-82.19	87.28	-32.61	-22.77	-288.95	295.68
[74] Padang Panjang	8.65	-0.24	-61.22	19.66	-17.32	-13.52	-2,654.57	-291.99
[75] Bukittinggi	120.66	9.66	-85.10	38.84	-12.18	-9.28	-2,240.49	1,684.59
[76] Payakumbuh	37.68	-38.25	-439.33	-14.71	-10.61	-5.93	-366.93	267.36
[77] Pariaman	13.34	-6.75	-71.69	-22.15	-247.05	-236.51	-1,535.61	5,412.10
Sumatera Barat	560.74	-157.82	-6,118.52	242.13	23,591.12	72,304.42	-381,694.49	-12,236.50

Source: BPS-Statistics of Sumatera Barat Province in 2019 (data processed)

The Municipality of Bukittinggi as the center of trade and marketing in Sumatera Barat does not have a significant impact on the development and performance of its industrial sub-sector. Almost all of its sub-sectors have experienced slow growth and have low competitiveness and role, although some still have the potential to be developed such as ISIC 15, 20, 21, 23, 25, 26, and 27. Only ISIC 17 and 18 experienced very fast growth. For other urban areas such as Padang Panjang, Payakumbuh, and Pariaman, each has different sub-sectors that have the potential to be developed and can grow quickly. This can be seen in Tables 3, 4, and 5. If the results of the shift-share of each district/city are transformed into a scatter plot diagram, a regency/municipality economic gap diagram will be obtained for each sub-sector which can be seen in Picture 1, 2, and 3.

Table 5. Shift-Share Calculation Results by Sub-Sector Of The Manufacturing Industry (Isic 25, 26, 27, 29, 30, 31, 32 And 33) And Regency/Municipality in Sumatera Barat

Regency/ Municipality	ISIC 25, 26 and 27		ISIC 29 and 30		ISIC 31		ISIC 32 and 33	
	PS	DS	PS	DS	PS	DS	PS	DS
Regency								
[01] Kepulauan Mentawai	7.07	-23.08	7.77	-1.72	-172.26	-203.57	-18.69	-0.15
[02] Pesisir Selatan	61.07	-71.88	5.57	-17.02	-66.32	-94.59	-74.28	-12.58
[03] Solok	14.93	-98.07	1.63	-4.45	-19.31	-36.53	21.02	98.12
[04] Sijunjung	73.98	-18.46	0.13	-4.60	5.01	-7.24	-54.96	0.68
[05] Tanah Datar	284.86	-498.37	-0.16	-19.42	31.72	11.06	-32.79	30.62
[06] Padang Pariaman	876.97	-33.57	139.76	-6.07	122.14	77.02	-78.47	17.03
[07] Agam	-707.45	-2,079.82	-0.05	-8.38	-74.66	-106.61	-83.02	360.35
[08] Lima Puluh Kota	303.25	-542.36	7.05	-1.40	-105.26	-145.39	-27.37	51.74
[09] Pasaman	22.67	-211.71	-0.10	-12.42	4.34	-9.82	-28.78	25.89
[10] Solok Selatan	27.09	-41.60	2.13	-0.78	36.20	21.09	-0.79	21.60
[11] Dharmasraya	9.32	-68.18	1.95	-0.90	10.61	-16.72	-37.20	4.99
[12] Pasaman Barat	270.81	-33.09	33.16	2.97	46.02	23.61	-50.27	66.91
Municipality								
[71] Padang	11,263.12	5,858.90	511.12	42.08	187.09	94.80	-1,441.74	-224.70
[72] Solok	440.40	-616.25	7.14	-5.33	-4.69	-35.56	-69.44	-21.93
[73] Sawah Lunto	216.12	-99.86	1.51	-1.23	20.88	-26.61	-20.60	10.79
[74] Padang Panjang	66.22	-92.51	3.95	-1.91	25.61	10.97	-65.99	-18.72
[75] Bukittinggi	261.43	-851.19	21.72	-1.66	-27.05	-57.50	-252.31	-89.79
[76] Payakumbuh	636.55	-266.76	3.63	-0.50	64.70	34.79	-29.04	56.54
[77] Pariaman	1,075.27	213.47	6.03	-1.63	-30.11	-50.08	-61.23	-2.95
Sumatera Barat	15,203.67	425.61	753.95	-44.37	54.67	-516.87	-2,405.94	374.47

Source: BPS-Statistics of Sumatera Barat Province in 2019 (data processed)

Source: BPS-Statistics of Sumatera Barat Province in 2019 (data processed)

Figure 1. Diagram of the Economic Disparity Of Regency/Municipality in Sumatera Barat by Sub-Sector Of The Manufacturing Industry

Overall, the results of the shift-share analysis of the industrial sub-sector for each regency/municipality in Sumatera Barat are classified into four groups, as follows (Picture 2):

1. Group I (positive PS and positive DS) is a group of regencies/municipalities with rapid growth in the manufacturing sector, there are 11 regency/municipality, namely Solok, Tanah Datar, Padang Pariaman, Agam, Lima Puluh Kota, Pasaman, Dharmasraya, Pasaman Barat, Sawahlunto Municipality, Payakumbuh and Pariaman. This is in line with the results of (Malinda, 2015) research, where the manufacturing industry sector of Agam Regency has advantages and competitiveness so that it has the potential to be developed to improve the regional economy. In these 11 regencies/municipalities, it can be seen that their economic growth has increased rapidly, especially from sub-sectors or ISIC 10, 11, 13, 14, 22, 25, 26, and 27.
2. Group II (positive PS and negative DS) is a group of regencies/municipalities where the growth of the manufacturing industry sector is hampered but still has the potential to be developed. There are 3 regency/municipality, namely Pesisir Selatan Regency, Sijunjung and Padang Panjang Municipality. In these 3 regencies/municipalities, it can be seen that several industrial sub-sectors have the potential to be developed, especially from the sub-sector or ISIC 16, 17, 18, 29, 30, and 31.
3. Group III (negative PS and positive DS) is a group of regencies/municipalities whose industrial sector growth is hampered but is developing, there is 1 regency/municipality, namely the Municipality of Padang. This is in line with the results of (Ansofino, 2017) research, where the manufacturing industry sector of the Municipality of Padang has experienced a decline in its comparative and competitive advantages in the Sumatera Barat region. In the Municipality of Padang, several industrial sub-sectors continue to grow, especially from ISIC 15, 20, 21, 32, and 33.
4. Group IV (negative PS and negative DS) is a group of depressed region regencies/municipalities with weak competitiveness and low role for Sumatera Barat Province, there is 4 regency/municipality, namely: Mentawai Islands Regency, Solok Selatan Regency, Solok Municipality, and Bukittinggi Municipality. This is due to the geographical condition of the area which has not been maximally utilized and managed by existing natural resources. In these four regencies/municipalities several industrial sub-sectors are still underdeveloped and their potential is also low, especially ISIC 23.

Source: BPS-Statistics of Sumatera Barat Province in 2019 (data processed)

Figure 2. Disparity diagram of the regency/municipality manufacturing industry sector in Sumatera Barat

To test the accuracy of the grouping of potential areas of the manufacturing sector according to shift-share analysis, the discriminant analysis method is used. Before performing discriminant analysis, the data which are assumed to be normally multivariate distribution must be tested first. To find out whether the data has a normal multivariate distribution, hypothesis testing is used. The form of the hypothesis is:

H_0 : data have normal multivariate distribution

H_1 : data is not normally multivariate distributed

Table 6. The Results Of The Grouping Of Potential Areas Of The Manufacturing Sector According To Shift-Share Analysis In Sumatera Barat

Group		Predicted Group Membership				Total
		I	II	III	IV	
Original	I	11	0	0	0	11
	II	0	3	0	0	3
	III	0	0	4	0	4
	IV	0	0	0	1	1
Cross-validated	I	8	1	1	1	11
	II	1	2	0	0	3
	III	0	0	4	0	4
	IV	0	1	0	0	1

Source: BPS-Statistics of Sumatera Barat Province in 2019 (data processed)

Based on the grouping results from Table 6, it can be calculated the APPER (Apparent Error Rate) value to see how big the percentage of grouping error is in the process of grouping potential areas of the manufacturing sector according to shift-share analysis. Based on the calculation of the accuracy level of the determination of the grouping of potential manufacturing industry areas using the shift-share analysis, it can be seen that the resulting grouping has a fairly high grouping accuracy, namely 100% or in other words, there is 19 regency/municipality whose grouping is correct. If cross-validation is carried out, there are 73.7% of the data can be classified correctly and the amount of error in the grouping is quite small, namely 26.3% or in other words there are 14 data whose grouping is correct. This means that the grouping of potential areas of the manufacturing sector according to shift-share analysis has fairly good accuracy.

CONCLUSION

According to the results of the LQ analysis, each regency/municipality in Sumatera Barat has a basic sub-sector or a leading sub-sector. When compared with the results of the shift-share analysis, the sub-sector that is experiencing rapid growth is also the leading sub-sector in the LQ analysis. From the results of the shift-share analysis, there are 4 regional groups, namely the first group there is 11 regency/municipalities that have fast manufacturing industry growth, the second group there are 3 regency/municipality has hampered the growth of the manufacturing industry sector but still have the potential to be developed, the third group has 1 municipality which has stunted growth in the industrial sector but is developing and finally in group four there is 4 regency/municipality that are depressed regions with weak competitiveness and low role for Sumatera Barat Province. The grouping of potential areas of the manufacturing sector according to shift-share analysis has fairly good accuracy. Not only regional grouping, but the results of this analysis can also show which sub-sectors of the

manufacturing industry have the economic potential to be developed in each regency/municipality in the Sumatera Barat region, which can be seen in Tables 3, 4, and 5.

From the results of the two analyzes, the government can focus more on guiding establishments in the manufacturing industry, which are categorized as potential, developing, and depressed areas. Guidance can be carried out in sub-sectors that are potential and superior in the region in the form of training and assistance in terms of marketing, financial management, and increasing production. This research can be developed by conducting an in-depth study of the problems faced by establishments in each of the leading sub-sectors in each of these groups. This finding is different from the findings by (Amar, 2016) where the economic development of the West Sumatra region has been running following the potential of its natural and human resources, this is explicitly demonstrated by their respective advantages district/city. A total of seven districts/cities in West Sumatra have advantages in the primary economic sector, as many as six of which have advantages in the secondary economic sector and as many as four regencies/cities have advantages in the economic sector tertiary. The realization of the basic economy in West Sumatra has encouraged mobility of goods and services through inter-regional trade efficiently as shown by the relative surplus index of 1.92 and the index absolute value of 350.189 billion and has a multiplier effect on increasing regional income and employment territory in a meaningful way.

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