

APPLYING LOCATION QUOTIENT AND SHIFT-SHARE ANALYSIS IN DETERMINING LEADING SECTORS IN TELUK BINTUNI REGENCY

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ABSTRACT

Economic growth is an important aspect that reflects the success of a country or region's economic development. The changes of its driving sectors mainly influence the changes in economic growth. This study aims to identify the leading economic sectors and analyze the sectoral shifts of the Teluk Bintuni regency's economy. The data used in this study is the Gross Regional Domestic Product of both Teluk Bintuni Regency and Papua Barat province in the period from 2010 to 2018. In determining the leading sectors and analyzing the sector using Location Quotient and Shift-Share analysis. The results suggested that the manufacturing and mining, and quarrying sectors were the base sectors of Teluk Bintuni's economy. However, the result of Shift-Share analysis highlighted construction, education services, procurement of electricity and gas, and public administration, defense, and compulsory social security as competitive and progressive sectors during the same period. Policy implications of this study include evaluating and reformulating development strategies and programs and considering sectoral interconnection for further development planning.

Keywords: Location Quotient, Shift-Share, Leading Sectors, Teluk Bintuni

JEL : O11;R11;R58

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Introduction

Economic development is a continuous process of changing a country's economic condition or a region toward a better situation. The main goal of economic development in Indonesia is to improve Indonesian people's prosperity through the increase of national income. A sustainably higher economic growth could become a critical indicator for the continuity of economic development both at the national and regional levels.

In the decentralization era, responsibilities for regional economic development are taken mainly by local authorities. According to [Arsyad \(2010\)](#), regional economic growth is when local governments and communities manage their resources, establish partnerships with the private sectors to create new job opportunities, and stimulate economic activities. [Ambardi & Prihawantoro \(2002\)](#) also highlight that regional autonomy allows local governments

to develop their region independently by exploring and cultivating economic and financial potentials. Furthermore, local governments’ strategies in terms of the success of regional economic development are expected to reduce inequality between regions.

One strategy that can drive regional economic growth is prioritizing base economic sectors in the planned development programs to lead to a better performance of the whole economy. Moreover, regional economic growth can be assessed by analyzing Gross Regional Domestic Product (GRDP) data in a certain period. GRDP usually reflects the productivity of a region in terms of the value-adding of goods and services. Local authorities can also utilize it as necessary information regarding planning and evaluation of regional development.

The economic base theory states that a region’s economic growth’s primary determinant directly relates to the demand for goods and services imported from outside (Arsyad, 1999). A region would potentially have such leading sectors if it can competitively surpass other areas of the same sectors and lead to export (Suyatno, 2007).

Teluk Bintuni Regency is an autonomous region in Papua Barat province that is officially established in 2002. It consists of 24 districts, 155 villages, and two urban villages. Within Papua Barat province, Teluk Bintuni Regency places the first position regarding GRDP, compared to other regencies/cities. In 2018, the GRDP (calculated using constant price) of Teluk Bintuni regency reached 24,498.717 billion rupiahs, while the average GRDP was approximately 4,660 billion rupiahs. In 2018, the Teluk Bintuni regency’s economic development was 5.15 percent, which was slightly lower than the average growth of other regencies/cities within Papua Barat province was 5.90 percent (BPS, 2019).

Figure 1 provides information on the comparison of GRDP between Teluk Bintuni Regency and Papua Barat province in 2010-2018. In general, both Teluk Bintuni Regency and Papua Barat province experienced increasing trends in GRDP. There was a steady increase in provincial GRDP, from 41,362 billion rupiahs in 2010 to 60,464 billion rupiahs in 2018. Similarly, Teluk Bintuni’s GRDP also improved during the period, from 18,344 billion rupiahs in 2010 to 24,543 billion rupiahs in 2018. These trends indicate that the actual production of goods and services of economic sectors had been grown in Papua Barat province and Teluk Bintuni regency.

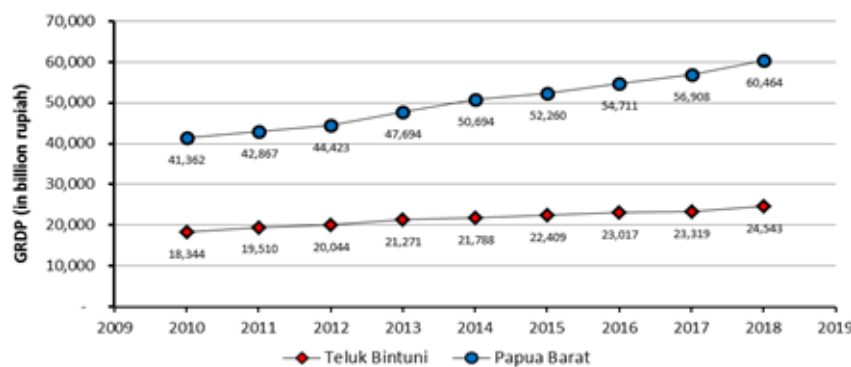


Figure 1: Comparison of GRDP between Teluk Bintuni Regency and Papua Barat Province

Source: BPS (2019)

Even though GRDP in Teluk Bintuni and Papua Barat had shown general improvements during the nine years, the GRDP growths showed some fluctuations during the same period, as illustrated in Figure 2. It can highlight that the annual GRDP development of Teluk Bintuni regency was mostly lower than the provincial level’s growth, except the development in 2011. Between 2011 and 2012, there was a stable growth in Papua Barat province, but a dramatic decrease in GRDP growth occurred in the Teluk Bintuni regency.

After that, both areas experienced doubled increases from 2012 to 2013 and then had several fluctuated trends happened until 2017, before significant gains in 2018.

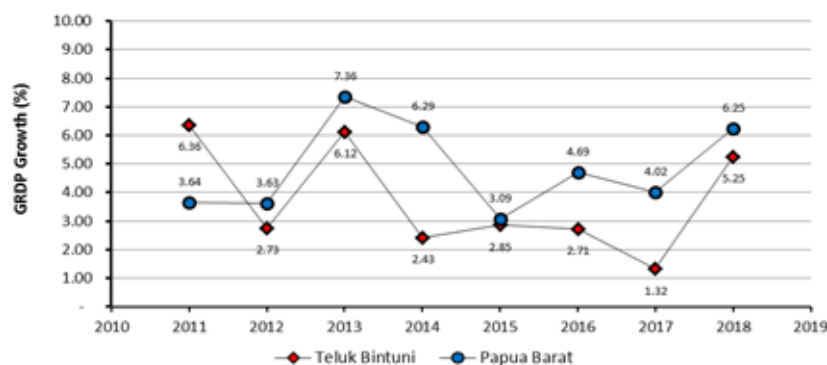


Figure 2: Comparison of GRDP Growth between Teluk Bintuni Regency and Papua Barat Province

Source: BPS (2019)

From 2011 to 2018, the Teluk Bintuni regency’s economic growth has been comprehensively formatted by the developments of its economic sectors, as presented in Table 1. The three top sectors with high growth in 2011 included construction, transportation and warehousing, and the manufacturing industry. However, several sectors showed fluctuations in their trends during the period, such as the manufacturing industry. Moreover, sectors like agriculture, forestry, and fishery, and mining and quarrying experienced harmful growths in such years. In 2018, economic sectors with the highest gains included construction, real estate, wholesalers, and retail.

Table 1: Sectoral Growth in Teluk Bintuni Regency’s GRDP, 2011 – 2018

No	Sector	Sectoral Growth (%)								
		2011	2012	2013	2014	2015	2016	2017	2018	
1	Agriculture, Forestry, and Fishery	-2.69	2.15	2.71	2.82	0.71	-1.34	3.39	4.54	
2	Mining and Quarrying	1.24	1.5	3.30	-0.08	2.19	0.71	-1.44	2.80	
3	Manufacturing Industry	11.08	3.32	8.23	3.89	2.86	3.81	2.38	6.48	
4	Procurement of Electricity and Gas	8.75	8.48	7.11	6.65	3.79	5.33	4.08	5.44	
5	Water Supply, Waste Management, Waste, and Recycling	0.96	1.44	1.81	2.15	2.36	1.46	1.59	2.48	
6	Construction	12.75	8.43	11.63	6.25	15.72	13.79	11.66	10.12	
7	Wholesalers and Retail, Automobile and Motorcycle Repairs	4.9	4.23	5.19	7.53	7.33	6.52	6.50	8.47	
8	Transportation and Warehousing	11.15	11.44	11.61	11.67	7.14	5.02	4.64	5.49	
9	Provision of Accommodation and Drinking	3.87	6.29	3.01	3.97	5.97	5.29	5.92	5.40	
10	Information and Communication	0.91	2.08	6.70	8.07	7.56	6.86	7.13	7.68	
11	Financial Services and Insurance	4.71	6.91	11.61	6.54	9.69	2.30	2.89	2.56	
12	Real Estate	6.8	9.86	9.05	9.20	9.30	7.58	7.85	8.25	
13	Company Services	1.86	2.62	3.01	3.37	3.17	5.41	5.95	5.49	
14	Public Administration, Defense, and Compulsory Social Security	9.54	12.65	9.46	8.23	8.72	7.79	5.92	6.12	
15	Educational Services	3.27	4.45	9.24	9.57	8.63	7.77	8.42	5.70	
16	Health Services and Social Activities	7.78	6.62	1.96	3.82	6.62	6.24	6.79	6.55	
17	Other Services	3.62	3.41	5.24	6.84	6.76	5.84	5.66	5.18	
	GRDP	6.36	2.73	6.12	2.43	2.85	2.71	1.32	5.25	

Source: BPS (2019)

Despite having the highest GRDP within Papua Barat province, Teluk Bintuni regency has a major challenge in terms of GRDP distribution inequality, which strongly relates to the high poverty rate. In 2018, the Teluk Bintuni regency's poverty rate was 31.30%, which was much higher than the poverty rate at the provincial level, which was 22.66%. The gap in interconnecting economic sectors also becomes a crucial issue in delivering development programs and Teluk Bintuni Regency strategies. Thus, it is essential to analyze determining potential economic sectors and identifying sectoral shifts in this region to address these problems.

This study aims to identify the leading economic sectors and analyze the sectoral shifts of the economy of the Teluk Bintuni regency in the period 2010-2018.

Literature Review

This literature review will discuss three points, including regional economic development, location quotient, and shift-share analysis.

Regional Economic Development

According to [Tarigan \(2005\)](#) regional economies can be categorized into two sectors; base and non-base activities. Base activities are essential for regional economic development due to their roles as primary drivers in economic growth. It was assumed that an improvement of base economic activities in a region would potentially provide multiplier effects. Other non-base economic sectors could also be encouraged to be grown. Conversely, a decrease in base economic activities would trigger the reduction in productivities among non-base activities ([Glasson, 1990](#), as cited in [Yulianti \(2019\)](#)). Therefore, considering potential base sectors in regional development planning should be a necessity for the local governments.

Furthermore, based economic sectors also associate with the income and the demand of goods and services in such regional areas. It is acknowledged that only base sectors are the booster of economic growth and export activities. Meanwhile, non-base economic sectors are empowered to meet the need for local consumption only because the demand derived from non-base activities mostly depends on the local community's income [Tarigan \(2005\)](#). Thus, understanding and prioritizing base economic activities had become a crucial aspect in developing regional economies ([Miranti et al., 2013](#)).

Recently, there have been many studies focusing on regional economic development. Studies conducted by [Putri et al. \(2016\)](#) the government (particularly local government and [Yulianti \(2019\)](#), for instance, had deeply explored leading sectors in provincial economic structures in Indonesia. Other researchers such as [Agustina \(2015\)](#); [Darma Putra & Yuli Pratiwi \(2019\)](#); [Khusaini \(2015\)](#); [Rahayu et al. \(2018\)](#); [Santoso \(2014\)](#), conducted a similar analysis in the level of regency/cities, using data in provincial level as a comparative reference. The results of previous studies have provided various evidence of the significance of potential base sectors for regional development and revealed appropriate analytical tools in the related studies.

Location Quotient

The location quotient (LQ) method is generally used to analyze clustered location/base activities and identify leading sectors in regional economies ([Putri et al., 2016](#)) the government (particularly local government. The concept of location quotient measures the ratio between a sector in GRDP of a particular region and the total value of the same sector in GRDP of the higher administration area. Suppose the calculated value of LQ is higher than 1. In that case, it indicates that the sectoral contribution at a specific region more dominant than the gift of a similar sector at the provincial level. It also means that there are production surpluses of associated sectors that occurred in such regency. However, suppose the LQ value is lower than 1. In that case, it means that the contribution of a particular sector in the region is less dominant than a similar sector's gift at the provincial level ([Rahayu et al., 2018](#)). Therefore,

regarding regional economic development, the results of the LQ can be an appropriate consideration taken by local governments in prioritizing leading sectors that have the potential to be more developed.

Shift-Share Analysis

The shift-share approach is a standard model used in regional analysis. This model was first developed by Daniel Creamer in 1943 (Nee et al., 2019). The shift-Share analysis is widely used in analyzing sectoral shifts of a regional economy compared to the economy of the national level. Data generally used in this approach can be sectoral economic activities and employment data. Similarly, Tarigan (2005) stated that shift-share analysis could be utilized in comparing the differences of sectoral growths between lower-level regions and a higher administration area, which is generally called the national level. Moreover, the shift-share analysis will be able to result in a comprehensive understanding of sectoral changes between the two at a certain point in time. In addition, the result of shift-share analysis also provides information regarding the ability of sectoral performance and competitiveness (Putri et al., 2016) the government particularly local government.

The shift-share analysis consists of three components, namely national share, proportional shift, and differential shift (Tarigan, 2005). National share measures the structural shift of a region, which is influenced by the structural shift of the national economy. Proportional shift, also called an industrial mix, relates to the gross value added of a sector at the regional level as a comparison of the total sectoral value at the national level. Differential shift or competitive position indicates the difference in sectoral growth of a region compared to sectoral growth at the national level. The total value of these three components simultaneously shows the real impact of regional economic growth (Arsyad, 1999).

Data and Research Methods

This research’s data is secondary data, gathered from both Teluk Bintuni Regency Statistic Board and Papua Barat Statistic Board. The data consisted of annual GRDP from 2010 to 2018. In overcoming the research problem, Location Quotient and Shift-Share analysis were applied in this study, respectively.

Location Quotient (LQ) is an analysis tool utilized to examine economic conditions to identify sectoral specialization in a study area compared to the reference region (Khusaini, 2015). LQ value can be calculated using Bendavid-Val’s formula as cited in Kuncoro (2004), as follows:

$$LQ = \frac{V_1^R / V^R}{V_1 / V} \tag{1}$$

where:

V^R = value of a sector in regency/city GRDP

V_1 = total value of regency/city GRDP

V = value of a sector in provincial GRDP

V_1^R = total value of provincial GRDP

The criteria used for LQ assessment include:

1. If the LQ value is greater than 1, the sector is categorized as a basis sector, indicating that a sector becomes more specialized in regency than at the provincial level.

2. If the LQ value is smaller than 1, the sector is categorized as a non-basic sector, meaning that a sector’s specialization level in regency is lower than in the provincial level.
3. If the LQ value is equal to 1, meaning that a sector’s degree of specialization is the same between regency and provincial levels.

The Shift-Share analysis is often used to analyze the change of a region’s economic structure compared to a higher administrative authority’s economic system as a reference. The formula set of Shift-Share Analysis includes:

1. The real impact of regional economic growth:

$$D_{ij} = N_{ij} + M_{ij} + C_{ij} \tag{2}$$

2. Influence of economic growth of regency:

$$N_{ij} = E_{ij} \cdot R_n \tag{3}$$

3. Proportional shift/industrial mix:

$$M_{ij} = E_{ij} \cdot (R_{in} - R_n) \tag{4}$$

4. Influence of competitive advantages:

$$C_{ij} = E_{ij} \cdot (R_{ij} - R_{in}) \tag{5}$$

where:

E_{ij} = GRDP of *ith* sector in regency/city

R_{ij} = Growth rate of *ith* sector in regency/city

R_{in} = Growth rate of *ith* sector in provincial level

R_n = Growth rate GRDP in provincial level

Finding and Discussion

In determining whether a sector becomes the leading sector, it is necessary to compare the contribution of a sector in regency to the same sector’s gift at the provincial level. This study would compare sectoral contributions of the Teluk Bintuni Regency to sectoral contributions in Papua Barat province. Using GRDP data from 2010-2018, the LQ approach’s result is presented in Table 2.

Table 2: LQ Results of Sectoral Shift in Teluk Bintuni Regency, 2010-2018

No	Sector	LQ Value									Average	Category
		2010	2011	2012	2013	2014	2015	2016	2017	2018		
1	Agriculture, Forestry, and Fishery	0.27	0.27	0.27	0.27	0.26	0.26	0.26	0.26	0.26	0.26	Non-base
2	Mining and Quarrying	1.59	1.56	1.67	1.67	1.27	1.76	1.79	1.82	1.88	1.74	Base
3	Manufacturing Industry	1.55	1.61	1.63	1.63	1.64	1.69	1.72	1.76	1.81	1.69	Base
4	Procurement of Electricity and Gas	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.00	0.03	Non-base
5	Water Supply, Waste Management, Waste, and Recycling	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	Non-base

No	Sector	LQ Value									Average	Category
		2010	2011	2012	2013	2014	2015	2016	2017	2018		
6	Construction	0.14	0.13	0.13	0.13	0.13	0.12	0.13	0.14	0.15	0.14	Non-base
7	Wholesalers and Retail, Automobile and Motorcycle Repairs	0.06	0.06	0.06	0.03	0.06	0.06	0.06	0.06	0.06	0.06	Non-base
8	Transportation and Warehousing	0.05	0.06	0.06	0.02	0.06	0.06	0.06	0.06	0.06	0.06	Non-base
9	Provision of Accommodation and Drinking	0.05	0.05	0.05	0.01	0.05	0.05	0.05	0.05	0.05	0.05	Non-base
10	Information and Communication	0.02	0.02	0.02	0.10	0.08	0.07	0.08	0.07	0.07	0.02	Non-base
11	Financial Services and Insurance	0.12	0.11	0.1	0.06	0.02	0.03	0.02	0.03	0.03	0.10	Non-base
12	Real Estate	0.1	0.1	0.1	0.07	0.10	0.11	0.11	0.11	0.11	0.11	Non-base
13	Company Services	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.03	0.03	Non-base
14	Public Administration, Defense, and Compulsory Social Security	0.17	0.17	0.17	0.17	0.17	0.18	0.18	0.18	0.19	0.18	Non-base
15	Educational Services	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.10	0.09	Non-base
16	Health Services and Social Activities	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	Non-base
17	Other Services	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.02	0.01	Non-base

Source: [Data processed \(2019\)](#)

Sectors with LQ values bigger than one were categorized into base sectors, while sectors with LQ values less than one were categorized into non-base sectors. According to the LQ results, only two economic sectors were classified as base sectors, namely mining and quarrying and manufacturing industry. On the other hand, other sectors were classified into non-base sectors due to having low LQ average indices (less than 1). The gas production operated by Tangguh LNG, followed by its derivative industry, had markedly contributed to Teluk Bintuni regency's regency's economic performance over the previous decade. In 2018, the manufacturing industry's industry's contribution to GRDP reached 54.13%, while the mining and quarrying sector contributes approximately 34.20% to the GRDP of Teluk Bintuni.

Furthermore, this finding was slightly different from the previous study by [\(Putri et al., 2016\)](#) the government (particularly local government. LQ calculation results indicated that agriculture and manufacturing industry were base sectors in Teluk Bintuni Regency LQ values more significant than 1. Using the different periods in the analysis might contribute to the differences of those findings.

Another criterion in determining the leading economic sector concerning a sector's ability is to compete with the same sector in a higher administrative area. There were possibilities that economic activities and economic growth in Teluk Bintuni had probably changed over 2010-2018. Therefore, we can reasonably apply Shift-Share analysis to indicate the structural changes that occurred. Table 3 provides results of the Shift-Share study of Teluk Bintuni regency's regency's GRDP.

Table 3: Results of Shift-Share Analysis of GRDP (using constant price), 2010-2018

No	Sector	Components (billion rupiah)			
		N_{ij}	M_{ij}	C_{ij}	D_{ij}
1	Agriculture, Forestry, and Fishery	267,618.78	-129,239.95	-65,064.14	73,314.69
2	Mining and Quarrying	3,648,127.48	-3,422,315.33	611,451.02	837,263.18
3	Manufacturing Industry	4,287,590.78	-506,581.22	879,186.62	4,660,196.17
4	Procurement of Electricity and Gas	93.12	36.28	0.87	30.27
5	Water Supply, Waste Management, Waste, and Recycling	215.79	-23.66	-121.34	70.79
6	Construction	93,281.62	188,689.70	33,538.62	315,509.94
7	Wholesalers and Retail, Automobile and Motorcycle Repairs	26,591.39	26,035.79	-16,174.58	36,452.60
8	Transportation and Warehousing	8,281.78	11,825.40	-3,658.23	16,448.96
9	Provision of Accommodation and Drinking	1,961.14	553.25	-506.23	2,008.16
10	Information and Communication	2,877.74	3,219.53	-2,516.37	3,580.90
11	Financial Services and Insurance	9,346.50	11,784.75	-9,929.09	11,202.16
12	Real Estate	7,935.19	7,993.81	-159.50	15,769.49
13	Company Services	300.71	104.80	-175.74	229.77
14	Public Administration, Defense, and Compulsory Social Security	96,558.33	96,741.08	933.13	194,232.54
15	Educational Services	16,364.59	7,936.95	1,418.35	25,719.89
16	Health Services and Social Activities	4,804.16	1,458.47	-356.15	5,906.47
17	Other Services	309.66	105.95	-71.75	343.86
	Total	8,472,258.76	-3,701,674.41	1,427,795.49	6,198,379.84

Source: Data processed (2019)

In general, between 2010 and 2018, Teluk Bintuni regency's economy had grown with an absolute value of approximately 6,198 billion rupiahs, indicating that economic performances worked progressively during the period. The real growth in the Teluk Bintuni economy was positively affected by the development that occurred at the provincial level (positive values of N_{ij}), which then mostly contribute to the real impact of regional economic growth (positive values of D_{ij}).

Furthermore, the result highlights three top sectors in terms of high competitiveness level (C_{ij}), namely manufacturing industry, mining and quarrying, and construction. The agriculture, forestry, and fishery sector, on the other hand, appears as a sector with the lowest competitiveness. Also, the building is the sector with the highest proportional shift (M_{ij}) during the period, followed by public administration, defense, compulsory social security, wholesalers and retail, automobile and motorcycle repairs, transportation and warehousing, and financial services and insurance. This finding also confirms the conclusion of the previous study conducted by Rauf et al. (2019), summarizing that the manufacturing industry sectors, mining and quarrying, and construction were competitive in the regency of Teluk Bintuni.

It is necessary to overlay the effects of competitive advantages (C_{ij}) and proportional shifts (M_{ij}) to figure out economic sectors' real growths. By matching the percentage of C_{ij} and M_{ij} values, each sector's profile can be depicted based on its competitiveness and industrial mix, as shown in Figure 3.

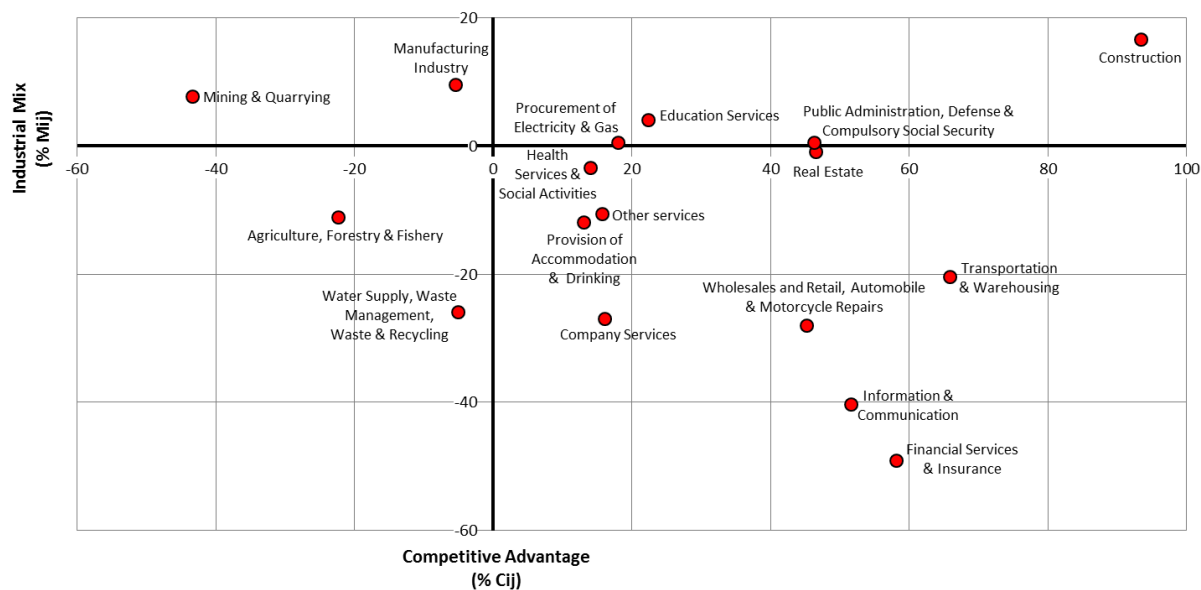


Figure 3: Profil of Sectoral Economic Growth of Teluk Bintuni Regency

Source: Data processed (2019)

It can be highlighted from Figure 3 that sectors that have higher competitive advantages and can be progressively developed in the Teluk Bintuni regency include construction, education services, procurement of electricity and gas, and public administration, defense, and compulsory social security. The construction sector had become the most progressive sector, with a higher competitive level than the same sector at the provincial level. It was caused by massive infrastructure development in the region. According to the 2005-2015 Regional Development Planning of Teluk Bintuni Regency, improving infrastructure bases, mostly road, bridge, and seaport development, has been essentially prioritized by the local government to open the isolations between sub-districts and villages. Improvement of the construction sector in the period is also expected to support economic activities by better interconnecting transportation means in the region.

Interestingly, base sectors such as mining and quarrying, and manufacturing industries do not appear as progressive sectors even though they have higher competitive advantages. It means that these sectors have not been rapidly developed in the region yet. Meanwhile, sectors that can grow a sector with a less competitive position but which can develop quickly include transportation and warehousing, information and communication, financial services and insurance, real estate, and wholesale and retail. Corporate services, health services, social activities, and the provision of accommodation and drinking, and other services can also expand rapidly. Agriculture, forestry and fisheries, water supply, and water management appear to be disadvantaged in competitiveness and progress.

Several policy implications for the local government of Teluk Bintuni Regency include: conducting evaluation, reformulating development programs based on the potential of leading sectors, and matching strategic plans involving sectoral interconnections. It allows the acceleration of growth in leading sectors to be a driving force for other sectors.

Conclusion

The results of this study lead to some conclusions highlighted as followed. First, according to Location Quotient analysis, the mining and quarrying and manufacturing industry still become the base sectors in Teluk Bintuni regency's economy over the past nine years.

Other sectors are classified into non-base sectors. The natural gas produced in this regency and its related processing industry had dominated the economic structure of this regency.

Second, summarizing from Shift-Share analysis, sectors with competitive advantages and can be progressively developed include construction, education services, procurement of electricity and gas, public administration, defense, and compulsory social security. Strategic programs in increasing accessibility between subdistricts and villages had contributed to the high progressiveness of the construction sector. Interestingly, base sectors such as mining and quarrying, and manufacturing industries do not appear as progressive sectors even though they have higher competitive advantages.

The findings of this study also have some policy implications to be recommended. Teluk Bintuni regency's local authority needs to evaluate and reformulate strategic policies to plan and implement economic development programs based on its leading economic sectors. Besides, the interconnection between sectors should be considered a critical factor in designing different development programs. It can reduce the high poverty rate as the central issue in the regions.

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