

# Location Quotient and Shift Share Analysis for Sragen's Economic Potential

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# Location Quotient and Shift Share Analysis for Sragen's Economic Potential

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## Abstract

**Background:** The basic economic theory approach can be used to measure the performance of regional economic development in the Sragen Regency, Central Java Province. This study aims to analyze the economic sectors that are the base/leading and prospective to strengthen regional productivity. The measurement through a quantitative approach uses Location Quotient and Shift Share methods with secondary data of the Gross Regional Domestic Product (GRDP) of Sragen Regency and Central Java Province from 2015 to 2019. Based on the research results, six sectors are considered in the base/leading and prospective sectors, including Agriculture, Forestry & Fisheries, Electricity & Gas Procurement, Wholesale & Retail Trade, Car & Motorcycle Repair, Corporate Services, and Other Services. In addition, ten other sectors are non-base but have prospective development. Only the Mining and Quarrying sector is in the category of non-basis and not prospective sector. The results of the Shift Share Analysis show that the Manufacturing Industry has the highest competitiveness compared to other sectors in Sragen Regency.

**Keywords:** Base, location quotient, non-base, regional development, regional economic potential, shift-share analysis.

## Introduction

The main principle of regional autonomy in Indonesia is to give greater authority to regions (regencies/cities and provinces) to manage and manage their respective development households (Saragih, 2018, p. 9). One of the regional development agendas is local economic development which according to Muluk (2013, p. 72) is interpreted as an effort to eliminate various obstacles to efforts to build community welfare. In order to achieve this, good development planning is needed so that it can optimize every potential and creativity in the area (Muluk, 2013, p. 70). This potential-based development needs to be carried out based on scientific studies to support both the planning aspect and the evaluation of whether the potential has been contained in development planning (Saragih, 2018, pp 5-9). In addition, in order to achieve sustainable development and growth results, coherence of strategies and policies is needed which at least includes efforts to increase productivity, competitive advantage and efficiency, adequate logistics systems to the development of a *demand-based* and export-oriented economy (Stimson, Stough, & Roberts, 2006, pp. 10-11).

The performance of regional economic development needs to be measured and assessed. One reason is that there may be a sector that is short-term superior in terms of volume, added value, or absorption of its workforce but is inefficient when compared to a region elsewhere; or sectors that are less dominant in a region turn out to have good development prospects in the future (Stimson, Stough, & Roberts, 2006, p. 105). Some indicators that can be used in this measurement are Gross Regional Domestic Product (GRDP), distribution of management/control over production factors and equal distribution of income of the population, the number of workers, the poverty rate of the area, the level of productivity, to the quality of the environment (Saragih, 2018, p. 20). Measurements of productivity, efficiency and growth, for example, can be done using indicators such as regional income (GDP), financial/economic viability, specialization/comparative-competitive advantage, and productivity of superior products (Saragih, 2018, p. 43). This measurement is a concept from a theory, namely the theory of economic bases. In this case, the theory sees an economic sector based on both base and nonbase sectors. The base sector is seen in terms of production that can meet the consumption needs of the region independently. Moreover, this sector – the base sector – can also export its production to other regions. Meanwhile, its non-production base sector is only sufficient for the consumption of the area (Stimson, Stough, & Roberts, 2006, p. 106).

One method for measuring base economic sectors is *Location Quotient* (LQ) whose calculations have been popular among researchers and tend to be easy to do because they do not require complicated calculations and analysis (Isserman, 1977, p. 33). In addition, this method can also show a comparative picture of the advantages of a region in producing a commodity/sector (Saragih, 2018, p. 140). Here are various studies that use this method. The *Shift Share Analysis* approach is also often used to measure sectoral competitive advantage in a region.

## Literature Review

Here are some research precedents through *location quotient* and *shift-share* methods carried out to identify base/superior economic sectors to develop the regional economy.

**Table 1.** Various studies use *the Location Quotient (LQ) method.*

| Writer                                      | Method   | Result  |
|---|--|---|
| Isabhandia & Setiartiti (2021)              | <i>SLQ, DLQ, Shift Share Analysis (SSA), Klassen Typology &amp; SWOT</i> | SLQ & DLQ results show 3 (three) base and prospective sectors in Kulon Progo with identification based on 2013-2017. Calculations are used for the development of regional economic strategies.   |
| Morrissey (2014)                            | <i>Location Quotient (LQ)</i>  | The related sectors of Financial Services and Insurance as well as Transport and Telecommunications have prospects in the BMW region of Ireland so regional policies can lead to efforts to develop that potential.   |
| Puspitaningrum & Sudrajat (2021)            | <i>Location Quotient, Shift Share, SWOT Analysis</i>                     | The leading commodities in the agricultural sector are cashew, rice, coconut, sweet potato and sugarcane. While on farms in the form of rabbits, ducks and cows. In fisheries in the form of shrimp ponds and mujahir fish. Development policy in the South Coast of Purworejo Regency needs to be directed at technological modernization. |
| Manullang, Rusgiyono, & Warsito (2019)      | <i>Location Quotient, Shift Share &amp; Moran's Index</i>                | Each district/city in Central Java has its own superior aquaculture commodities and their production values are not related to each other. Cilacap Regency is the main area in this aquaculture commodity.  |
| Sihaloho, Saragi, & Simbolon (2018)         | <i>Location Quotient</i>   | In Toba Samosir District, the leading sectors are Agriculture, Processing Industry and Procurement of Electricity, Water and Gas. The agricultural and industrial sectors contribute 2/3 to GDP.  |
| Ekowati, Prastyo, & Mukson (2020)           | <i>Location Quotient &amp; Co Variance</i>                               | Grobogan district is the largest producer of rice and soybeans in Prov. Central Java so that the agricultural sector is the base / flagship and can supply food needs in Central Java, especially rice, soybeans and corn which have LQ > 1.  |
| Diansari, et al., (2021)                    | <i>Location Quotient</i>   | There are 15 commodities in the agricultural sector identified as superior/base to be developed in Molaan Mongondow District, Sulut. Some of them have become the government's main focus to develop.   |
| Berawi, Zagloel, Perdana, & Mulyanto (2017) | <i>Location Quotient</i>   | LQ is used to provide alternative routes for the Trans Sumatra toll road based on the calculation of GRDP, superior commodities and population density.   |

Source: *processed by Researchers, 2023*

## Method

This quantitative research takes the locus in Sragen Regency to examine the leading sectors or the base of the area. In this case, data analysis methods are carried out, namely *Location Quotient (LQ)* and *Shift Share Analysis* with secondary data in the form of a

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percentage of Sectoral GDP on the Basis of Constant Prices in Sragen Regency. Moreover, the secondary data is also obtained from Central Java Province using data in the form of *time series*, namely data from 2015 to 2019 in order to provide an overview of how far changes have occurred in each sector and in aggregate.

This LQ method has 2 (two) ways, namely *Static* and *Dynamic*. The difference is that DLQ introduces the growth rate in its calculations while SLQ focuses on the value of GDP only (Arrazy, 2020, pp. 370-371). *Shift-share analysis* itself is used to determine the extent of competitiveness of a sector to local and regional economic growth (Stimson, Stough, & Roberts, 2006, pp. 84-85). *Shift share analysis* calculates the influence of regional growth (Nij), competitive advantage (Cij), and *proportional shift/industry mix* (Mij), and (Hermanto, 2000, p. 56).

**1. Static Location Quotient (SLQ) formula:**

$$LQ = \frac{V_i/V_t}{Y_i/Y_t}$$

$V_i$  = Sectoral GRDP Value of Sragen Regency

$V_t$  = Total GDP Value of Sragen Regency

$Y_i$  = Sectoral GDP Value of Prov. Central Java

$Y_t$  = Total GDP Value of Prov. Central Java

The results of the SLQ analysis will show, if: 33

SLQ > 1; indicates base/featured sector, has comparative advantage.

SLQ < 1; indicates a non-base sector, has no comparative advantage.

SLQ = 1; indicates a non-base sector, the production is only sufficient for consumption of the area or needs to be imported from outside the region.

**2) Formula Dynamic Location Quotient (DLQ):**

$$DLQ_{ij} = \left( \frac{IPPS_{ij}}{IPPS_t} \right)^t$$

$$IPPS_{ij} = \frac{(1 + g_{ij})}{(1 + g_j)}$$

$$IPPS_i = \frac{(1 + G_i)}{(1 + G)}$$

$DLQ_{ij}$  = Sectoral Dynamic Location Quotient in Sragen District

$IPPS_{ij}$  = Index of potential development of sector  $i$  in Sragen Regency

$IPPS_i$  = Index of development potential of sector  $i$  in Prov. Central Java

$t$  = The difference between the final year and the initial year used in the study

$g_{ij}$  = sectoral growth rate in Sragen Regency

$g_j$  = average sector growth in Sragen Regency

$G_i$  = sectoral growth rate in Prov. Central Java

$G$  = average sector growth in Prov. Central Java

The results of the DLQ analysis will show if:

DLQ > 1; The sector is prospective.

DLQ < 1; The sector is not prospective.

**3) Formula Shift Share Analysis (SSA):**

1. Effects of regional economic growth

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

*Proportional shift/sector mix*

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

Level of competitive advantage/sector competitiveness

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

Impact of Regional Economic Growth

$$D_{ij} = N_{ij} + M_{ij} + C_{ij}$$

where: <sup>22</sup>

$E_{ij}$  : Value of GDP Sector  $i$  at the district level

$R_{ij}$  : GDP growth rate of Sector  $i$  in Sragen Regency

$R_{in}$  : GDP growth rate of Sector  $i$  in Prov. Central Java

$R_n$  : Average GDP growth at the Prov. Central Java

## Result and Discussion

### 1. SLQ Calculation Results

**Table 2.** SLQ Calculation Results of Sragen Regency

| No | Sector   | 2015 | 2016 | 2017 | 2018 | 2019 | Average |
|----|--|------|------|------|------|------|---------|
| 1  | Agriculture, Forestry and Fisheries                                | 0,99 | 1,15 | 1,13 | 1,12 | 1,12 | 1,10    |
| 2  | Mining and Quarrying   | 0,15 | 0,18 | 0,19 | 0,18 | 0,18 | 0,18    |
| 3  | Processing Industry  | 0,81 | 0,97 | 1,00 | 1,02 | 1,04 | 0,97    |
| 4  | Electricity and Gas Procurement                                    | 1,36 | 1,58 | 1,56 | 1,58 | 1,45 | 1,51    |
| 5  | Water Procurement; Waste Management, Waste, and Recycling          | 0,88 | 1,03 | 1,02 | 1,02 | 1,02 | 0,99    |
| 6  | Construction   | 0,58 | 0,67 | 0,66 | 0,65 | 0,64 | 0,64    |
| 7  | Wholesale and Retail Trade; Car and Motorcycle Repair              | 1,26 | 1,45 | 1,43 | 1,40 | 1,40 | 1,39    |
| 8  | Transportation and Warehousing                                     | 0,73 | 0,83 | 0,81 | 0,79 | 0,78 | 0,79    |
| 9  | Provision of Accommodation and Food & Drink                        | 0,83 | 0,98 | 0,99 | 1,00 | 1,01 | 0,96    |
| 10 | Information and Communication                                      | 0,33 | 0,39 | 0,39 | 0,39 | 0,38 | 0,38    |
| 11 | Financial Services and Insurance                                   | 0,85 | 0,90 | 0,99 | 1,01 | 1,01 | 0,95    |
| 12 | Real Estate  | 0,46 | 0,54 | 0,53 | 0,54 | 0,54 | 0,52    |
| 13 | Company Services   | 1,03 | 1,18 | 1,18 | 1,18 | 1,17 | 1,15    |
| 14 | Government Administration, Defense, and Compulsory Social Security | 0,70 | 0,81 | 0,80 | 0,80 | 0,79 | 0,78    |
| 15 | Education Services   | 0,92 | 1,07 | 1,06 | 1,07 | 1,06 | 1,04    |
| 16 | Health Services and Social Activities                              | 0,80 | 0,91 | 0,89 | 0,88 | 0,88 | 0,87    |
| 17 | Other Services   | 0,96 | 1,08 | 1,04 | 1,03 | 1,02 | 1,03    |

Source: processed by Researcher, 2023

The leading sector (base) increased from 3 sectors (2015) to 10 sectors (2019). However, when viewed from the average value in the last 5 years, only 6 sectors are considered to be superior / base sectors. On trend, the majority of sectors have decreased SLQ numbers. This decrease occurred in 12 sectors out of a total of 17 sectors (deficit of 0.58%). In this case, the Mining & Quarrying sector became the sector with the largest decline (-0.19).

Meanwhile, the Processing Industry Sector has the potential to become a base sector in the future considering its significant upward trend every year even starting from 2017-2019 has passed SLQ > 1 even though the 5-year average is still 0.97. This growth is also reflected

in the processing industry sector, which is the largest contributor to Sragen's GDP, reaching 37.26% in 2020. Meanwhile, judging from the 4 (four) sectors that contributed the largest GDP in 2020, namely the Processing Industry (37.26%), Large Trade and Retail (18.32%), Agriculture (14.79%) and Construction (6.68%), only the Construction sector in 2019 and on average in the last 5 years has not reached  $SLQ > 1$ ; Even included in the bottom 4 (four) sectors

## 2. DLQ Calculation Results

By calculation, DLQ is different from SLQ. The fundamental difference is that DLQ uses the basis of sectoral GDP growth rate in its calculations while SLQ does not.

**Table 3.** DLQ calculation results of Sragen District.

|    | Sector   | Average Sragen (%) | Average Jawa Tengah (%) | DLQ   |
|----|--|--------------------|-------------------------|-------|
| 1  | Agriculture, Forestry & Fisheries                                  | 1,89               | 2,00                    | 4,98  |
| 2  | Mining & Quarrying   | 3,40               | 7,48                    | 0,42  |
| 3  | Processing Industry  | 7,60               | 4,49                    | 34,97 |
| 4  | Electricity & Gas Procurement                                      | 3,50               | 5,16                    | 1,66  |
| 5  | Water Procurement; Waste Management, Waste, and Recycling          | 4,97               | 4,49                    | 8,16  |
| 6  | Construction   | 5,16               | 6,17                    | 3,18  |
| 7  | Wholesale &; Retail Trade; Car & Motorcycle Repair                 | 5,10               | 5,82                    | 3,72  |
| 8  | Transportation & Warehousing                                       | 5,25               | 6,81                    | 2,38  |
| 9  | Provision of Accommodation & Food & Drink                          | 9,27               | 7,50                    | 12,39 |
| 10 | Information & Communication  | 12,10              | 11,40                   | 7,24  |
| 11 | Financial Services &; Insurance                                    | 6,33               | 5,51                    | 9,36  |
| 12 | Real Estate  | 6,78               | 6,10                    | 8,41  |
| 13 | Company Services   | 9,75               | 9,84                    | 5,62  |
| 14 | Government Administration, Defense, and Compulsory Social Security | 2,78               | 3,06                    | 4,37  |
| 15 | Education Services   | 7,82               | 7,42                    | 7,02  |
| 16 | Health Services &; Social Activities                               | 7,33               | 8,50                    | 3,44  |
| 17 | Other Services   | 7,09               | 9,02                    | 2,47  |

Source: processed by Researcher, 2023

Based on calculations, almost all sectors (16 sectors) have DLQ numbers  $> 1$  which means that it has the potential for development. Only the Mining and Quarrying sector has  $DLQ < 1$ , which is 0.42. This is understandable considering that Sragen Regency does not have many natural resources that can be exploited.

The Processing Industry sector has the highest DLQ value reaching 34.97 and followed by Accommodation and Food and Drink Provision at 12.39. This indicates that these three sectors have the best prospects in the future seen from their significantly increased growth rate, especially the Processing Industry sector which although on average 5 years has not become a base sector, in 2019 it is included in the base sector.

## 3. SLQ & DLQ Matrix of Sragen Regency

The matrix below is used to illustrate the relationship between SLQ and DLQ values to determine which sectors are prospective-base, non-prospective base, non-prospective base, and non-prospective base.

**Table 4.** SLQ &; DLQ Matrix Quadrant Sragen District

| Quadrant            | DLQ>1<br>(Prospektif)   | DLQ<1<br>(Tidak Prospektif) |
|---------------------|---|-----------------------------|
| SLQ>1<br>(Base)     | <ol style="list-style-type: none"> <li>1. Agriculture, forestry &amp; fisheries</li> <li>2. Electricity &amp; Gas Procurement</li> <li>3. Large and Retail Procurement, Car and Motorcycle Repair</li> <li>4. Company Services</li> <li>5. Education Services</li> <li>1. Other Services</li> </ol>   | -                           |
| SLQ<1<br>(Non-Base) | <ol style="list-style-type: none"> <li>1. Processing Industry</li> <li>2. Water Procurement, Waste Management, Waste and Recycling</li> <li>3. Construction</li> <li>4. Transportation &amp;; Warehousing</li> <li>5. Provision, Accommodation &amp;; Food &amp; Drink</li> <li>6. Information &amp;; Communication</li> <li>7. Financial Services &amp;; Insurance</li> <li>8. Real Estate</li> <li>9. Government Administration, Land and Compulsory Social Security</li> <li>10. Health Services &amp;; Social Activities</li> </ol> | Mining and Quarrying        |

The above quadrant explains as follows:

- 1) Quadrant 1 (SLQ>1 and DLQ>1) explains that the current base sector will still be prospective in the future. Based on the results of the analysis that has been done, there are 6 (six) sectors in this quadrant. These various sectors have the potential to become *winning sectors* in the future so that development policies need to be directed to continue to optimize them. The sector in this quadrant has contributed as much as 40% to the formation of the GRDP of Sragen Regency in 2020.
- 2) Quadrant 2 (SLQ<1 and DLQ>1) explains that a sector that is not seeded/non-base at present has prospects for becoming superior/base in the future. The results of the analysis show that the sectors in this quadrant are 10 (ten). The large number of sectors in this quadrant reflects the development of development in Sragen Regency, considering that the majority of existing sectors have the largest contribution share to the GDP of Sragen Regency in 2020 of 57.19%.



- 3) Quadrant 3 (SLQ>1 and DLQ<1) explains that a sector that is currently base/superior but has no prospects for future growth. The analysis showed that no sectors were in this quadrant.
- 4) Quadrant 4 (SLQ<1 and DLQ<1) explains that a sector that is not a flagship/non-base sector cannot currently be expected to have good prospects in the future. In Sragen Regency there is only 1 (one) sector in this quadrant, namely Mining and Quarrying, which means it has no prospects to become a leading sector in the future. This could possibly be due to the lack of exploitable natural resources in Sragen District.

#### 4. Shift Share Analysis (SSA) Calculation Results

The results of SSA calculations are outlined in Table 5 below.

**Table 5.** SSA Analysis Results.

|    | Sektor   | Nij          | Mij              | Cij              | Dij          |
|----|--|--------------|------------------|------------------|--------------|
| 1  | Agriculture, Forestry & Fisheries                                  | 1.501.321,07 | 1.214.520,13     | -16.970,14       | 269.830,80   |
| 2  | Mining & Quarrying   | 232.989,49   | -57.980,43       | -97.923,38       | 77.085,68    |
| 3  | Processing Industry  | 3.066.097,86 | 1.701.451,81     | 1.053.347,0      | 2.417.993,0  |
| 4  | Electricity & Gas Procurement                                      | 16.113,52    | -7.800,69        | -2.906,97        | 5.405,86     |
| 5  | Water Procurement; Waste Management, Waste, and Recycling          | 6.779,87     | -3.767,86        | 349,00           | 3.361,02     |
| 6  | Construction   | 631.080,12   | -235.893,61      | -69.447,22       | 325.739,28   |
| 7  | Wholesale &; Retail Trade; Car & Motorcycle Repair                 | 1.935.289,77 | -796.366,93      | -152.240,84      | 986.682,00   |
| 8  | Transportation & Warehousing                                       | 259.232,77   | -78.362,00       | -44.697,25       | 136.173,52   |
| 9  | Provision of Accommodation & Food & Drink                          | 276.779,02   | -61.782,50       | 57.848,58        | 272.845,10   |
| 10 | Information & Communication  | 144.182,90   | <b>35.825,02</b> | 13.147,82        | 193.155,74   |
| 11 | Financial Services &; Insurance                                    | 245.922,92   | -116.966,49      | <b>29.258,42</b> | 158.214,86   |
| 12 | Real Estate  | 91.258,05    | -34.784,79       | 6.972,71         | 63.445,98    |
| 13 | Company Services   | 37.699,29    | <b>2.077,92</b>  | -432,52          | 39.344,69    |
| 14 | Government Administration, Defense, and Compulsory Social Security | 207.386,88   | -145.947,10      | -5.885,89        | 55.553,89    |
| 15 | Education Services   | 357.874,97   | -83.208,57       | 16.697,63        | 291.364,03   |
| 16 | Health Services &; Social Activities                               | 67.512,64    | -7.250,99        | -9.161,01        | 51.100,64    |
| 17 | Other Services   | 157.700,48   | -6.971,09        | -35.837,63       | 114.891,76   |
|    | <b>Total PDRB</b>  | 9.235.221,61 | 4.515.152,04     | 742.118,33       | 5.462.187,90 |

Source: processed by Researcher, 2023

In general, in the time span from 2015-2019, the economic growth of Prov. Central Java contributed positively to the GDP growth of Sragen Regency marked by increasing GDP by Rp 9,235 billion. The biggest influence is in the Processing Industry sector (Rp 3,066 M); Agriculture, Forestry & Fisheries (Rp 1,501 M), and Wholesale & Retail Trade, Car & Motorcycle Repair (Rp 1,935 M). Meanwhile, in terms of *proportional shift*, it can be seen that there are only 2 (two) sectors, namely Information & Communication and Corporate Services that have a positive value which means they have a high industry mix, while 15 other sectors and total calculations are negative.

In terms of competitive advantage/competitiveness, the total value is positive, which means that Sragen Regency has a competitive advantage over Prov. Central Java. However, this total value was helped by the positive value of 7 (seven) sectors, where the Processing Industry recorded the largest number (Rp 1,053 M) which means that the level of competitive advantage is greater when compared to similar sectors in Central Java Province. Meanwhile, other sectors – 10 (ten) sectors – have negative values which means they have weak competitiveness compared to the same sector in Prov. Central Java. The positive value of *DIJ* in all sectors shows the economic performance of Sragen Regency continues to have growth as seen from its value increase which in total reached Rp 5,462 billion.

The results of this study provide identification of superior sectors/priorities that are different from the RPJMD of Sragen Regency for 2021-2016 in Strategy 1, namely "Increasing production and productivity of the agricultural and fisheries sector" in order to achieve Target 3.1, namely "Increasing per capita income". Although the potential of agriculture is indeed large, the focus that is only heavy on this focus tends to be biased because it does not lift other prospective and competitive base sectors such as Large and Retail Trade, Processing Industry, and several other sectors contained in the SLQ & DLQ quadrant and SSA results. Providing policy focus to industry is very important considering the decline in the percentage of industrial growth in Sragen Regency with a figure of 0.6% in 2020 which previously touched 3.2% in 2019 as stated in the RPJMD. This is caused by the low level of education and skills of workers.

## Conclusion

Research that has been conducted shows that there are 6 (six) sectors that are base and prospective and 10 (ten) other sectors that are currently included in the non-base category but have future development prospects in terms of their high growth rate. Meanwhile, based on the calculation of *Shift-Share analysis*, the Processing Industry has the highest competitiveness compared to other sectors. This research can be an initial study of how regional economic strategies and policies are directed to optimize the potential and opportunities that exist today in Sragen Regency. This study needs further development, especially in terms of relation to labor absorption and its correlation with poverty alleviation, considering that the increase in GDP cannot necessarily be concluded in line with improving community welfare and reducing poverty. What is contained in this initial research can be a reference from regional development planning that has been stated in Mission 3 of the RPJPD Sragen Regency 2005-2025, namely development based on regional superior potential so that resources and policy instruments can be directed to optimize the identified potential sectors.

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