



Analysis of Theil Comparative Decomposition Index to Measure Regional Inequality Due to Industrialization Residues

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Abstract: The Industrial sector in Kendal County, Indonesia, is one of the national strategic projects aimed at promoting investment accumulation and job creation. Unfortunately, the rapid development of this Industrial sector has resulted in income inequality compared to other sectors. This research aims to examine and measure the contribution of the Industrial sector in Kendal County to aggregate inequality. Methodologically, this research uses a quantitative descriptive approach, which involves indexing inequality to reveal economic phenomena. The inequality indices include the Gini ratio index, the Williamson index, and the Theil index. In Kendal County, inequality is at a moderate to high level, as evidenced by a Gini ratio index of 0.411 and a Williamson index of 0.775. On the other hand, the Theil index reaches 0.519, placing it in between the Gini ratio and the Williamson index. The high inequality in Kendal County is attributed to the Industrial sector, accounting for 41.19%. The Industrial sector significantly contributes to the widening of inequality in Kendal County. This is due to the Industrial sector attracting production input factors such as investments, resources, human capital, monetary conditions, and technological innovation. However, the trickle-down effect does not occur between the Industrial sector and other economic sectors such as agriculture, food and beverages, trade, services, and accommodation.

Keywords: Regional Inequality; Industrialization Residues; Theil Comparative Decomposition Index

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INTRODUCTION

Kendal County is one of the regions with rapid Industrialization development. Naturally, industrialization attracts various resources as production inputs (Gokan & Turnovsky, 2023). These include labor, investment, raw materials, financial capital, and rent. This attraction of industrialization causes other regions to be relatively left behind. Moreover, the growth of an industrial area is usually much faster than its hinterland. This has led to widening inequality between regions due to industrialization. As one of the impacts of Industrialization, Kendal County has an important analysis of the equitable distribution of the results of economic development supported by Industrialization. Industry-based economic development should absorb a lot of labor and increase the capacity of the money supply (Ghosh, 2020). In addition, the fruits of this growth should also be enjoyed by other hinterland sectors such as food and beverage, accommodation, construction and real estate, trade, and agriculture (Chen & Lin, 2021). Therefore, there is a high urgency to analyze sector- and region-based income inequality to evaluate the direction of economic development and growth.

Table 1. Expenditure Distribution of Kendal County Population (percent)

| Year | 40% of low-income population | 40% of middle-income population | 40% of high-income population |
|-------------|-------------------------------------|--|--------------------------------------|
| 2017 | 19,41 | 37,45 | 43,14 |
| 2018 | 19,90 | 39,35 | 40,75 |
| 2019 | 18,53 | 38,31 | 43,16 |
| 2020 | 18,64 | 40,15 | 43,16 |
| 2021 | 17,93 | 37,22 | 44,85 |
| 2022 | 18,88 | 36,12 | 45,00 |

Source: BPS Kendal (2022); BPS Jawa Tengah (2023)

Economic development in Kendal County leaves a residue in the form of income inequality between population groups. The 20% of the high-income group has increased by 1.86% over the past 5 years. This indicates that the majority of economic growth has been enjoyed by the high-income group. On the other hand, the 40% low-income group experienced a slight decrease from 19.41% (2014) to 18.88% (2022), even at its lowest point in 2021 after the pandemic this group experienced a decrease in distribution to reach 17.93% of total population expenditure in Kendal County. The expenditure of this group is supported by government spending in the form of transfer payments, which has continued to increase since the pandemic. So, the increase in expenditure of the low-income group makes sense if it is associated with government assistance, especially for pre-prosperous households. Another analysis is that inequality is contributed by the 40% middle-income group, which has also experienced a decline over the past 5 years. This population group decreased from 37.45% (2017) to 36.12% (2022) or a decrease in contribution of around 1.33%. In the context of inequality analysis, this middle-income population group is usually in a dilemma, namely on the one hand not receiving the spillover of economic growth, but on the other hand not also receiving government assistance through the transfer payment mechanism (Wijaya, Susanto, Heruwarsi, Giyanti, & Ibrahim, 2021). This is what causes the middle-income population group to be most easily eroded in its distribution of the total population expenditure portfolio.

Table 2. Data of Poverty in Kendal County 2018-2022

| Poverty Indicators | Data of Poverty | | | | |
|--------------------------------------|------------------------|-------------|-------------|-------------|-------------|
| | 2018 | 2019 | 2020 | 2021 | 2022 |
| Amount of Poor Population (Thousand) | 94,70 | 91,20 | 97,50 | 100,00 | 93,0 |
| Poverty Percentage (%) | 9,84 | 9,41 | 9,99 | 10,24 | 9,33 |
| Poverty Depth Index (P1) | 1,85 | 1,47 | 1,37 | 1,51 | N.A |
| Poverty Severity Index (P2) | 0,47 | 0,32 | 0,25 | 0,33 | N.A |
| Poverty Line (Rp/Capita/Month) | 353.127 | 369.769 | 396.691 | 407.387 | 433.864 |

Source: BPS Kendal (2022); BPS Jawa Tengah (2023)

In line with inequality, Kendal district experiences fluctuations in the number of poor people and the poverty rate. As inequality between population groups by income increased in 2021, the number of poor people and the poverty rate also increased. This can explain why the main contributors to inequality are the poor and the poverty rate. The number of poor people and the poverty rate in Kendal County will increase until 2021 and decrease in 2022. This is also in line with the poverty depth and severity indices, which have improved. These indications explain the success in reducing poverty, especially extreme poverty in Kendal District. However, the inverse trend between the number of poor people and the poverty rate and the poverty depth and severity index during 2018-2020 shows the fluctuation of the vulnerable poor around the regional poverty line. This has caused the poor population to increase, especially during the pandemic crisis, even though the poverty depth and severity index has improved.

In addition to income groups, employment status represented by the business sector is also part of the analysis of inequality between sectors. Through this analysis, poverty can be traced by the business sector so that sector policies can be taken more effectively (Gokan & Turnovsky, 2023). The sectors with the lowest per capita income are health services and other services (including tourism) with incomes of around 12.91 million/year and 12.43 million/year, respectively. The sectors with the next lowest income are trade (18.04 million/year) and transportation (19.59 million/year). The next lowest per capita income is agriculture with a per capita income of 24.84 million/year. So, for the time being, it can be concluded that these 5 sectors are pockets of poverty. Inequality will be more pronounced if compared with other sectors that have high per capita income such as the mining sector (74.14 million/year), Industrial sector (49.54 million/year), real estate (55.03 million/year), and financial services sector (49.24 million/year).

Table 3. GRDP at Constant Prices, Number of Workers per Sector, and GDP per Capita of Kendal County in 2021

| Sector | GRDP (Rp.million) | Amount of Labor (People) | GRDP per capita (Rp.million) |
|--------------------------------------|------------------------------|---|---|
| Agriculture, Forestry, and Fisheries | 6.148.391,81 | 247.567 | 24,84 |
| Mining and Quarrying | 324.333,72 | 4.374 | 74,14 |
| Processing Industry | 12.744.039,51 | 257.253 | 49,54 |
| Construction | 2.171.807,86 | 70.302 | 30,89 |
| Trade | 3.829.741,96 | 212.260 | 18,04 |
| Transportation and Warehousing | 487.528,58 | 24.892 | 19,59 |
| Information and Communication | 1.783.343,43 | 6.562 | 271,79 |
| Financial and Insurance Services | 564.145,49 | 11.457 | 49,24 |
| Real Estate | 309.475,83 | 5.624 | 55,03 |
| Education Services | 761.220,36 | 39.057 | 19,49 |
| Health and Social Services | 227.253,57 | 17.602 | 12,91 |
| Other Services | 414.396,69 | 33.328 | 12,43 |

Source: BPS Kendal (2022); BPS Kendal (2023); BPS Jawa Tengah (2023)

In a regional analysis, some sectors with the lowest per capita income are usually concentrated in certain geographical locations. For example, the agriculture sector is usually concentrated in rural areas and parts of the highlands. Also, the trade and other services sectors are usually concentrated in areas outside the centers of economic growth and development. Figure 3 shows the difference in elevation of the sub-districts in Kendal County, where Plantungan District has an elevation of 697.99m above sea level while Weleri District is at 4.88m above sea level. Usually, the concentration of regional inequality is due to various factors that theoretically and empirically occur in various regions, one of which is Kendal District. One of the factors is the concentration of production inputs and economic activities in areas with certain typologies (Hassan, Shaheen, & Ullah, 2020). In addition, the geographical conditions of the region such as limited road access in the mountains and rural areas cause people to be isolated from access to education, resulting in low employment status and income (Chancel et al, 2023). These various analyses are interconnected between poverty, inequality by income group, inequality by economic sector, and regional inequality (Zhang & He, 2021).

The massive inequality in Kendal County is suspected to be due to the rapid development of Kendal Industrial Estate. Kendal Industrial Estate is an Industrial estate located in Kendal County, Central Java, Indonesia. This Industrial estate is one of the various Industrial estates that are developing in Indonesia to encourage economic growth, investment, and job creation. Its location is relatively strategic as it is close to major cities such as Semarang and Surakarta, and has easy access to seaports, airports, and major road networks. The main objective of developing Industrial estates such as Kendal is to attract investment from local and international companies and encourage the growth of the Industrial sector. This is expected to create jobs for the local community, increase local revenue, and improve the economic competitiveness of the region. Kendal Industrial Estate usually has facilities and infrastructure that support company operations, such as good roads, reliable electricity systems, clean water, and adequate communication and internet facilities. In addition, Industrial estates often have training and education centers to help develop a competent workforce.

Kendal Industrial Estate can serve various Industrial sectors, such as manufacturing, logistics, agribusiness, electronics, automotive, and many other sectors, depending on government policies and market demand. Usually, the local government and authorities are involved in determining the types of industries that will be encouraged in the Industrial park. In recent years, many Industrial estates in Indonesia and around the world have focused more on the concept of sustainability. This includes efforts to reduce environmental impacts, promote the use of renewable energy, and comply with strict environmental regulations. Kendal Industrial Estate may also pay attention to this aspect of sustainability in its development. Kendal Industrial Estate is one example of the government and private sector's efforts to develop the regional and national economy through Industrial estate development. The development of this Industrial estate can provide significant economic benefits to the community and surrounding area.

Theoretically, economic development is a multidimensional process, which involves major changes, both to changes in economic structure, social change, reducing or eliminating poverty, reducing inequality, and unemployment in the context of economic growth. Jhingan (2012), regional development is a function of the potential of natural resources, labor, and human resources, capital investment, infrastructure and development facilities, transportation and communication, Industrial composition, technology, economic situation, and inter-regional trade, regional development funding and financing capabilities, entrepreneurship (entrepreneurship), regional institutions and the development environment at large (Sjafrizal, 2018).

Regional economic development is a process in which local governments and their communities manage existing resources and form a partnership pattern between local governments and the private sector to create new jobs and stimulate the development of economic activities in the region. Regional economic development is a process that includes the formation of new institutions, the development of alternative industries, improving the capacity of the existing workforce to produce better products and services, identifying new markets, transferring knowledge, and developing companies (Arsyad, 2011).

Every regional development effort has the main objective of increasing the number and types of employment opportunities for local communities. To achieve this goal, the government and the community must jointly take the initiative of regional development by using all the potential it has (Popescu, 2012). Differences in regional conditions have implications for the style of development that will be applied. The decline in policy patterns that are successful in one region does not necessarily provide the same benefits for other regions (Todaro & Smith, 2015). Thus, the pattern of development policies taken by a region must be adjusted to the conditions and potential of the region concerned. Therefore, in-depth research on the conditions and potential of each region must be carried out to obtain data and information that are useful for determining the direction of regional development planning.

Unfortunately, economic development often leaves inequality in its early stages. Inequality or pleasure is the difference in economic income between the rich and the poor, resulting in differences in prosperity (Zhang D., 2023). Inequality occurs in the economic activities of a region due to differences in geographical conditions, and natural resource content of each region. These differences encourage uneven regional development. Inequality causes the level of development and income in a region to experience differences due to the factors of production and available resources. This results in a relative standard of living in society.

The classic debate on efficiency and equity continues to this day. Through his famous work "Equality & Efficiency: The Big Tradeoff", Arthur M. Okun (Okun, 2015). Built the synthesis since 1975, that inequality and efficiency will always be a tradeoff in the process of economic development. He continued, that the tradeoff between the two is divided into several main factors, namely the control of financial resources and capital, the power to intervene in the market, equalization of opportunities and income, and the endowment of human resources. According to him, this tradeoff problem occurs in all countries of the world even countries that are currently developed (Haughton & Khandar, 2009). However, inequality in developed countries has been reduced through fiscal policies, including social security and production efficiency (Vo et al, 2019).

Efficiency is often the goal of economic development in various countries. This is based on the framework that economic efficiency in the production mechanism of goods and services can encourage accelerated growth (D' Hombres, Weber, & Elia, 2012). Various public policies are carried out to achieve this, economic growth being the main target of macro indicators. Unfortunately, economic development and growth cannot guarantee equity. Like the production function, development and growth are determined by capital (capital and financial), labor, resources (land, assets, etc.), and technology (Biewen & Flachaire, 2018). Economic growth usually revolves around these production inputs. Therefore, the results of development are mostly felt and enjoyed by capital accumulation, resource owners, labor masters, and higher education holders because they can produce technology. The rotation of development and growth in these production inputs causes accelerated growth in areas where there is an accumulation of production factors. Then, this is what causes inequality, especially between areas with a large accumulation of production factors and areas with a minimal accumulation of production factors (Grundler, 2015).

The phenomenon of inequality is the Kuznets Theory (Kutuk, 2022) with the inverted U hypothesis. This theory explains that income between regions increases at the beginning of the economic development phase and then decreases along the economic development process. Usually, early development growth is centered on the modern sector of the economy where employment is low. Inequality increases due to the gap between the modern and traditional sectors. In the long run, as an economy reaches maturity, it tends to narrow along with the level of per capita income with differences in the rate of output growth between countries.

Income inequality is the distribution of income across individuals or households in society (Sukirno, 2006). Income inequality is one of the problems in developing countries. A person's income distribution is used by experts to calculate the amount of income received by each individual or household. Income distribution presents the unequal distribution of the results of a country's development among its population (Todaro & Smith, 2015). Income distribution for analytical and quantitative purposes distinguishes two main measures. Personal income distribution or income size distribution is the total income received by an individual or household. The "functional" distribution of income or income according to the share of distribution factors, considers individuals as a separate totality. Absolute income distribution is the sum of the percentage of the population whose income reaches a certain level.

Income inequality is related to the distribution of income received by people in a region. The higher the income inequality, the more unequal the distribution of income in society. As a result, there is a gap between people who have a relatively good economy and people who have a low economy. The results of Ceriani, Scarbrosetti, & Scervini (2022) explain that income inequality affects the unemployment rate and district/city minimum wage. This is due to the existence of a relatively low-income regional group that prioritizes employment opportunities and supports employment policies to reduce inequality and promote more inclusive growth. Income distribution as a measure of relative poverty. Poverty levels are categorized into two: absolute poverty and relative poverty. Relative poverty is the proportion of regional income distribution to calculate poverty. Absolute poverty is when basic income does not meet basic needs (Sukirno, 2006).

Frequently used measures of inequality are the Gini Index, Theil Index, and the World Bank's measure of inequality. Alternatively, income inequality can be measured using the Gini ratio (Todaro & Smith, 2015). One way to measure income inequality in a region is using the Gini ratio, which is seen from the value between 0 and 1. If the Gini ratio is closer to the value of 1, it means that the income inequality of a region is getting higher, while if the Gini ratio shows a value of 0, it means that people's income has been evenly distributed (Sakti &

Maudita, 2022).

There are two models of inequality, namely the Harrod Domar theory and the Neo-classical theory. Harrod Damar's theory suggests that high savings rates lead to economic growth. Conversely, low economic growth is caused by low savings rates. Therefore, the balance between production and expenditure can increase economic growth. According to the Neo-classical theory, the decline in regional inequality does not occur at the beginning of inter-regional development but at the first stage and vice versa (Grundler, 2015).

This study aims to measure and examine the contribution of Industrial sector development through Kendal Industrial Estate to inequality in Kendal County. Thus, the local government can carry out various policy schemes for equalization. The growth of the Industrial sector is expected to be an economic catalyst in the concept of trickle-down effect for other sectors behind it.

METHODOLOGY

This research is a type of research with quantitative methods. Quantitative methods are systematic research that uses mathematical and statistical models to describe phenomena (Collis & Hussey, 2014). In addition, this research also uses a descriptive approach to explain the results of quantitative calculations so that explanations related to the results can be described (Collis & Hussey, 2014). The research has been carried out from the beginning to the middle of 2023 on 500 households scattered across 12 districts in Kendal District. Samples are selected using a multi-stage random sampling approach from the level of districts, villages, and townships, to neighbors and households. The purpose of descriptive quantitative research is to make a mathematical analysis, description, systematic, factual, and accurate description of the various phenomena studied. This research aims to determine inequality in various perspectives in Kendal County.

a. Williamson Index

The Williamson Index (WI) is obtained by calculating the root of the sigma operation of household per capita income (Y_i) minus Kendal District per capita income (Y). This is then multiplied by the quotient of the total population of the study or sample area (F_i) by the total population of Kendal District (n). Finally, the result of this root is divided by the per capita income of Kendal district (Y).

$$IW = \frac{\sqrt{\sum (Y_i - Y)^2 \left(\frac{F_i}{n}\right)}}{Y}$$

b. Gini Ratio

GR which is the Gini Ratio of F_{pi} is the percentage of the population in the income/expenditure class. While F_{ci} is the cumulative frequency of total income/expenditure in the income/expenditure class. F_{ci-1} is the cumulative frequency of total income/expenditure in the previous group's ($i-1$) income/expenditure class.

$$GR = 1 - \sum_{i=1}^n F_{pi}(F_{ci-1} + F_{ci})$$

c. Decomposition of Theil Index

Theil index analysis can describe the proportion of causes of inequality and the type of inequality that occurs (Wijaya, Susanto, Heruwarsi, Giyanti, & Ibrahim, 2021). Theil analysis can be decomposed as needed so that the analysis can be in-depth and has several interconnected frameworks. Theil analysis in this study consists of several analyses to reduce the analysis of inequality that occurs in the Kendal County study area. According to Sato (2008), the distribution theory of inequality should fundamentally be able to describe: "how unequal the distribution is" and explore the question of "why such inequality exists". Conclusions are drawn using the Theil Index parameter of 0 to 1, where closer to 1 means higher inequality (Iskandar & Saragih, 2018). The distribution of inequality can be analyzed based on several boundaries, namely by economic sector and regional boundaries. Both of these can be done to describe the distribution of inequality from different angles. This study describes inequality in several analyses.

$$TI = \sum \left(\frac{y_i}{y_j}\right) \ln \left(\frac{\frac{y_i}{y_j}}{\frac{n_i}{n_j}}\right)$$

Within-Region Inequality and Within-Sub-Region Inequality is a theil analysis to measure within-region inequality. This analysis is divided into Kendal District and sub-region levels. At the area level, KDW is calculated based on the sigma quotient of household per capita income (Y_i) with Kendal District per capita income (Y_j). Next, the sigma result is multiplied by the log of the quotient of Y_i with Y_j divided by the total population of Kendal District (n_i) with the total population of the sub-region (n_j).

The decomposition of the Entrophy Theil Index in this study changes the grouping of data classes that were originally income groups based on subregions into income groups based on economic sectors. This decomposition is mainly for sub-regions because it does not have any smaller sub-regions. In addition, sector-based Entrophy Theil Index analysis will provide a new picture of inequality between sector-based income groups.

$$ETI = \sum \left(\frac{Y_s}{Y_a} \right) \ln \left(\frac{\frac{Y_s}{Y_a}}{\frac{n_s}{n_a}} \right)$$

Sector-based In-Sub-Regional Inequality is an Entropy Theil Index analysis to measure inequality within sub-regions by sector group. At the sub-region level, KDSw is calculated based on the sigma of the sub-region's sector i (Ys) per capita income quotient with the sub-region's aggregate per capita income (Yes). Next, the sigma result is multiplied by the log of the quotient Ys by Yes divided by the total population of sector i (ns) sub-region by the total aggregate population of sub-region (na).

In the end, the comparative decomposition analysis of the Entrophy Theil Index analyzes industrialization residues through the deviation between aggregate ETI and ETI without industrial sectors. Thus, the residual contribution of industrialization to inequality can be expressed in the following calculation operation.

$$\frac{ETI_{aggregate} - ETI_{without\ Industry\ Sector}}{ETI_{aggregate}} \times 100\%$$

RESULTS

Kendal County has had massive economic growth and development. This certainly leaves development residues that are a consequence of regional development and public policy implementation.

Table 4. Calculation of Regional Inequality in Kendal County using the Gini Ratio Approach

| Income Group | Total Sample | Average Percentage | Sample Income Class (Fpi) | Total Income Cumulative | Index of Income (Fci) | Fci-1 + Fci | Fpi(Fci-1 + Fci) |
|------------------|--------------|--------------------|---------------------------|-------------------------|-----------------------|-------------|------------------|
| ≤1 juta | 57 | 761.930 | 0,16286 | 43.430.000 | 0,04013 | 0,04013 | 0,007 |
| > 1 jt s.d 1,5jt | 52 | 1.439.519 | 0,14857 | 74.855.000 | 0,10931 | 0,14944 | 0,022 |
| > 1,5jt s.d 2 jt | 47 | 1.873.404 | 0,13429 | 88.050.000 | 0,19068 | 0,29998 | 0,040 |
| > 2jt s.d 2,5jt | 53 | 2.412.855 | 0,15143 | 127.881.334 | 0,30885 | 0,49953 | 0,076 |
| > 2,5jt s.d 3jt | 51 | 2.885.529 | 0,14571 | 147.162.000 | 0,44484 | 0,75369 | 0,110 |
| > 3jt s.d 4 jt | 28 | 3.701.786 | 0,08000 | 103.650.000 | 0,54063 | 0,98547 | 0,079 |
| > 4jt s.d 6 jt | 37 | 5.116.216 | 0,10571 | 189.300.000 | 0,71556 | 1,25619 | 0,133 |
| > 6 jt | 25 | 12.312.000 | 0,07143 | 307.800.000 | 1,00000 | 1,71556 | 0,123 |
| | 350 | 3.812.905 | - | 1.082.128.334 | | | 0,589 |

Conclusion $\sum_{i=1}^n F_{pi}(F_{ci-1} + F_{ci}) = 0,589$

So, the Index of Gini Ratio

$$= 1 - \sum_{i=1}^n F_{pi}(F_{ci-1} + F_{ci})$$

$$= 1 - 0,589$$

$$= 0,411$$

According to the Gini Ratio Approach, Kendal District's inequality is at an index of 0.411 and this index is classified as moderate because it is in the interval between 0.300 and 0.500. This Gini Ratio Index value is relatively higher when compared to the Gini Ratio Index of Central Java Province, which is at an index of 0.366. Kendal District's inequality is predicted to be higher than that of Central Java Province through the initial hypothesis. This is because the income distribution of high-income groups in Kendal County is more dominant than in Central Java Province. The income distribution of high-income earners tends to increase in the last 5 years. However, the economic growth of Kendal County is higher than that of Central Java Province. Therefore, the inequality phenomenon in Kendal County is part of the development residue because economic growth is relatively centralized, leaving other regions behind.

Table 5. Calculation of Regional Inequality in Kendal County using the Williamson Index Approach

| Income Group | Amount of Sample | Average (Yi) | Income Total | Population Probability (Fi) | Deviation (Yi - Y) | Quadrate (Yi - Y) ² | $(Y_i - Y)^2 \left(\frac{F_i}{n} \right)$ |
|------------------|------------------|--------------|--------------|-----------------------------|--------------------|--------------------------------|--|
| ≤1 juta | 57 | 761.930 | 43.430.000 | 0,163 | - 3.050.975 | 9.308.449.529.843 | 1.515.947.494.860,18 |
| > 1 jt s.d 1,5jt | 52 | 1.439.519 | 74.855.000 | 0,149 | - 2.373.386 | 5.632.960.016.355 | 836.896.916.715,66 |
| > 1,5jt s.d 2 jt | 47 | 1.873.404 | 88.050.000 | 0,134 | - 1.939.501 | 3.761.663.144.149 | 505.137.622.214,23 |
| > 2jt s.d 2,5jt | 53 | 2.412.855 | 127.881.334 | 0,151 | - 1.400.050 | 1.960.139.002.683 | 296.821.048.977,75 |
| > 2,5jt s.d | 51 | 2.885.529 | 147.162.000 | 0,146 | - 927.376 | 860.025.484.299 | 125.317.999.140,77 |

Differences in economic development due to regional factors refer to inequalities in economic growth between regions and sectors in Kendal District. This is a complex phenomenon that is a consequence of the economic development concept and framework chosen by the local government. One of them is the construction of an industrial area that attracts resources, leaving other areas short of resources.

Table 7. Calculation of Inequality without Industry Sector using Theil Index

| Region | GRDP | Labor | GRDP Per Capita | Yi/Yj | Ni/Nj | (Yi/Yj)/(Ni/Nj) | Log Neutral | (Yi/Yj)Ln((Yi/Yj)/(Ni/Nj)) |
|---|-------------|-------|-----------------|----------|----------|-----------------|-------------|----------------------------|
| Kendal County | 841.672.334 | 301 | 2.796.254 | | | | | |
| Agriculture | 413.768.334 | 202 | 2.048.358 | 1,36512 | 1,490099 | 0,916127 | 0,00876 | 0,0119585 |
| Trade | 150.550.000 | 33 | 4.562.121 | 0,612928 | 9,121212 | 0,067198 | 0,270011 | 0,1654974 |
| Services | 277.354.000 | 66 | 4.202.333 | 0,665405 | 4,560606 | 0,145903 | 0,192481 | 0,1280781 |
| Inequality without Industry Sector ($\sum(Yi/Yj)Ln((Yi/Yj)/(Ni/Nj))$) | | | | | | | | 0,3055341 |

Industry Sector Contribution to Inequality is the Percentage of Aggregate Inequality minus Inequality without the Industry Sector

$$\begin{aligned}
 \text{Industry Sector Contribution to Inequality} &= \left(\frac{\text{Aggregate Inequality} - \text{Inequality Without Industry Sector}}{\text{Inequality Aggregate}} \right) \times 100\% \\
 &= \left(\frac{0,5195 - 0,3055}{0,5195} \right) \times 100\% \\
 &= \left(\frac{0,214}{0,5195} \right) \times 100\% \\
 &= 0,4119 \times 100\% \\
 &= 41,19\%
 \end{aligned}$$

Aggregate inequality shows overall inequality, while inequality without the Industrial sector is inequality when the value of GRDP and the number of workers in the Industrial sector are excluded from the calculation. As a result, inequality without the Industrial sector becomes relatively low at 0.305 from the original aggregate inequality of 0.519. In terms of contribution, the Industrial sector contributes 41.19% to income inequality in Kendal County. This can be seen from the difference between aggregate inequality and inequality without the Industrial sector. In other words, the difference is the contribution of the Industrial sector to inequality. The Industrial sector in Kendal County grew rapidly and massively when the development of Kendal Industrial Estate attracted investment, infrastructure development, human resource accumulation, technological development, and money circulation. This has caused the Industrial sector to grow rapidly while other sectors are left behind (Mussard, Seyte, & Terraza, 2003). This is also signaled by the isolated impact of the Industrial sector on other sectors. The Industrial sector is expected to attract other sectors to grow such as agriculture, accommodation, services, and trade. Unfortunately, this impact is allegedly not yet happening in Kendal County.

DISCUSSION

Inequality in Kendal County

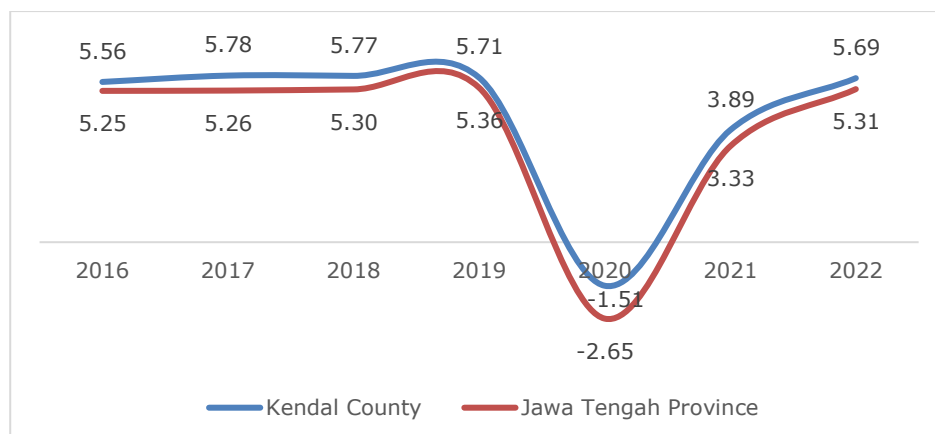
Inequality refers to significant inequalities or differences in the distribution of resources, wealth, opportunities, or access among individuals, groups, or regions within a society or economy. Inequality can take many forms, such as economic, social, or educational inequality, and is often a concern in the context of social and economic development to achieve justice and equality. Inequality can occur due to a variety of complex factors that interact with each other. Economic inequality can occur when some population groups or regions have greater access to economic resources, such as jobs, high salaries, asset ownership, and investment (Popescu, 2012). Factors such as inequality in income and wealth, access to business opportunities, and quality of employment can contribute to economic inequality.

Next, inequality occurs as a result of social processes, which relates to inequalities in access to social services such as education, housing, health care, and social security. Factors such as discrimination, inequality in education, and differences in access to social services can exacerbate social inequality. In addition, inequality also occurs due to public policy issues such as government policies of regional development or sectoral push (Fosu, 2010). Policies that favor certain groups or do not take into account the interests of other groups can exacerbate political and social inequality (Yunitasari, Fauzan, & Prianto, 2023).

Along with that, inequality can develop due to differences in the opportunities available to individuals or groups. This can include access to quality education, training, and good jobs. However, the geographical location of communities spread across different landscapes can also play a role in inequality (Wijaya, Susanto, Heruwarsi, Giyanti, & Ibrahim, 2021). Urban areas often have more economic opportunities and access to services than rural areas. Geographical inequality results from unequal access to public services and economic growth such as roads, markets, goods exchanges, ports, shops, training centers, and so on, which can affect the socioeconomic conditions of the community.

Meanwhile, in the digital era, technological advances can open up new opportunities, but can also increase inequality if some groups do not have equal access to these technologies. Inequality is often a complex issue that requires a multidimensional approach to understand and address. Efforts to reduce inequality involve economic, social, and political policies that aim to improve access to and distribution of resources and increase equality of opportunity for all members of society. (Hassan, Shaheen, & Ullah, 2020)

A case of high economic growth occurred in Kendal County. Its growth has always been above the economic growth of Central Java Province and Indonesia nationally. Unfortunately, this high growth leaves several residues, one of which is the agglomeration of economic development in certain areas. Kendal County grows agglomerated in industrial areas such as Kaliwungu, Weleri, and the City Area. As the graph below shows, Kendal County grew at a higher rate of 0.5 to 1.0 percent than Central Java Province.



Picture 1. Economic Growth Chart of Kendal County and Central Java Province 2016-2022
Source: BPS Kendal (2023); BPS Jawa Tengah (2023)

Essentially, economic growth can increase inequality if it is not matched by appropriate efforts for a more equitable distribution of income and wealth (Ghosh, 2020). This happens when the benefits of economic growth are skewed to already wealthy groups or certain sectors, while more vulnerable groups of society do not experience a significant increase in income. There are several mechanisms through which economic growth can increase inequality. First, inequality in access to opportunities, especially access to new growth centers. In some cases, economic growth can create inequalities in access to economic opportunities. Groups that already have greater capital or economic resources can more easily take advantage of new opportunities that arise during growth (Sato, 2008).

Second, massive migration and urbanization follow and are concentrated in regions with massive economic development incentives. Economic growth is often accompanied by population migration from rural areas to cities. If infrastructure and access to decent jobs do not keep pace with urban population growth, this can increase inequality between those who are successful in finding jobs and those who are not (Arsyad, 2011; Aprelia & Arif, 2022). Third, structural changes in the economy lead to the elimination of groups in certain business sectors. Economic growth can cause structural changes in a country's economy. If the sectors that grow faster are those that only employ certain groups (for example, the high-tech sector that requires certain qualifications), then this can increase employment inequality (Yuliani et al, 2020).

Fourth, tax and fiscal policies are not reformed to keep pace with economic growth and development. Non-progressive tax policies or fiscal policies that favor certain groups can increase economic inequality. Taxes that weigh more heavily on low incomes than high incomes can exacerbate inequality (Giannola, Petraglia, & Scalera, 2016). For example, high-income taxpayers who are in arrears should be penalized and fined but instead, receive an amnesty or waiver of fines. The poor, on the other hand, are subject to value-added tax, land and building tax, contributions, and so on for almost every item they consume.

To avoid increasing inequality during economic growth, the government as the policy authority must take appropriate action. These include redistribution policies, job protection, skills training, and other measures aimed at ensuring that the benefits of economic growth are enjoyed by the whole society, not just a few groups (Biewen & Flachaire, 2018). Thus, it is important to understand that economic growth alone does not necessarily guarantee a reduction in inequality; active efforts are needed to achieve a better balance in the distribution of wealth and income.

Industrialization Residues as a Nucleus Contributor of Regional Inequality

The regions in Kendal County have different leading/base sectors and these sectors become the economic base of employment for the people in the region. The most visible is the coastal area, which may be more focused on the agricultural sector of the capture fisheries subsector, while others are more related to the Industrial or service sector in the typology of lowland areas. These differences can affect economic growth rates as economic sectors develop at different rates (Giannola, Petraglia, & Scalera, 2016). Sectoral growth in each region is supported by

transportation infrastructure, such as roads, ports, terminals, markets, and others, which can increase the region's ability to access national and international exchange mechanisms (Li et al., 2022). Regions with good infrastructure will be better able to export local products and run businesses efficiently, which can increase economic growth as in the urban areas of Kendal City, Weleri, and Kaliwungu as the base of Industrial areas (Yunitasari, Fauzan, & Prianto, 2023; Wahyuningrum & Aisyah, 2023).

The progress of a region tends to attract more investment from the private sector and financial support from the government so that economic development and growth are sustainable. In contrast to underdeveloped or undeveloped areas, these areas are not attractive for investment as they do not promise good return expectations for investors (Popescu, 2012). This investment can be used to develop infrastructure projects, industries, and sectors that support economic growth, especially the opening of new jobs to increase the size of the region's economic circulation capacity. Subsequently, the investment will be captured as an opportunity to meet the labor needs in the development area. Thus, the level of education, skills, and labor productivity in a region can add ammunition to promoting economic growth (Ceriani, Scarbrosetti, & Scervini, 2022). Regions with a skilled and educated workforce are usually better able to contribute to more advanced economic sectors. High levels of education that result in skills and productivity usually occur in areas that have relatively close access to education. Kendal County has complete higher education and secondary education in the urban areas while secondary education in the mountains is relatively far from where people live.

The Industrial sector can cause inequality towards other sectors in the economic context of a country or region. This inequality can occur because the Industrial sector has several characteristics that can give it a competitive advantage or allow it to develop faster than other sectors (Vo et al, 2019). Often, the Industrial sector tends to have higher productivity levels than other sectors. This can be due to automation, advanced technology, and specialization in production. Due to higher productivity, the Industrial sector can create more value-added per unit of labor, which can increase the income of workers in the sector (Haughton & Khandar, 2009).

Industrial sectors often receive more investment in capital and technology compared to other sectors. This investment can help the Industrial sector to grow faster and more efficiently. In addition, the Industrial sector usually has the drive to innovate and improve production processes, which can allow it to remain competitive (Sahn & Younger, 2005). A strong Industrial sector can often increase exports of its products to international markets. This helps bring in foreign exchange for the country or region, which can be used to support the growth of other sectors or for public spending (Bao et al, 2023).

Successful Industrial sectors tend to make significant contributions in the form of taxes to the government, which can be used for funding public projects, such as infrastructure and social services. This can improve income equality if the government distributes these revenues fairly (Castelnovo, 2022). Some industry sectors may have market structures that favor large firms or firms with greater competitive advantage (Cnossen & Sinn, 2003). This can result in the concentration of wealth and income in the hands of a few powerful firms or individuals within the sector. Firms in Industrial sectors often have greater negotiating power when dealing with suppliers, labor, and business partners. This can result in benefits in the form of larger profit margins or more favorable contracts (Ceriani, Scarbrosetti, & Scervini, 2022).

CONCLUSION

The development of Kendal Industrial Estate is driving rapid economic growth. Unfortunately, this economic growth has resulted in greater inequality between sectors. Other sectors are increasingly left behind as the Industrial sector attracts the accumulation of production inputs. This is also due to the non-achievement of the trickle-down effect from the development of the Industrial sector to other sectors. The Industrial sector is unable to attract agriculture, accommodation, food and beverage, construction, trade, services, and other sectors to develop. Therefore, the local government needs to recondition its policies to equalize development and economic growth in Kendal County. One of them is by tightening the relationship and impact of the Industrial sector, which is currently developing massively, with other sectors to support the Industrial sector. Thus, a trickle-down effect can be achieved between the Industrial sector and other sectors in Kendal County.

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