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Comparative Analysis of Regional Economic Development Inequality Across Indonesian Provinces Using Dynamic Klassen Typology and Williamson Index

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ABSTRACT

Purpose: This study aims to determine the economic growth position of each province in Indonesia based on economic growth and GDP per capita using Klassen typology. Additionally, it identifies changes and trajectories of inter-quadrant movements between the first and last observation years, evaluates provinces experiencing persistence, increase, or decrease in economic position, and determines the level of economic growth inequality between provinces in Indonesia related to the dynamics of regional position changes during the 2016–2024 period.
Design/methodology/approach – This study uses a quantitative method. The Klassen Typology is applied to classify provinces based on economic growth and GDP per capita, while the Williamson Index is utilized to measure regional inequality across Indonesia's vast territory.
Finding/Results – The results show that provinces with relatively high economic growth and GDP per capita tend to be concentrated in Java and parts of Sumatra, supported by stronger economic structures, investments, connectivity, and fiscal capacity. Conversely, provinces with relatively low performance tend to rely on the primary sector and face limited infrastructure and a lack of economic diversification.
Originality/Value – The originality of this study lies in the integration of the Klassen Typology and the Williamson Index with a detailed analysis of changes in provincial positions from the early years to the end of the period. This approach provides a dynamic perspective on economic mobility and regional inequality, serving as a solid basis for more targeted development policy formulation in Indonesia.

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1. Introduction

Economic inequality is a common phenomenon in development that affects economic development and community welfare; therefore, it needs to be overcome through the acceleration of regional development, one of which is by establishing growth centers (Tampubolon et al., 2022). From a regional development perspective, growth centers are expected to not only increase economic activity in the core region but also create economic linkages and spread the benefits of development to other regions (Pratama, Suparta, & Ciptawaty, 2021). An optimally developed economy can improve regional conditions in the public and private sectors, with the aim that the benefits are felt by all levels of society, including the lower class, either directly or indirectly through government policies (Muyassar, 2024).

Thus, regional economic growth is not solely measured by increasing output but also needs to be understood in the context of equity and the ability of each region to benefit from the development process. The government continues to strive to achieve a balance between national and regional development to realize equitable prosperity, taking into account the important role of regional development in supporting the success of national development (Devi et al., 2023). Therefore, the identification of positions and changes in economic performance between provinces is needed as a basis for formulating more specific development policies according to the characteristics of each region (Putri, Jokolelono, Yunus, Yunus, & Hakimi, 2025).

The Growth Pole is a strategic approach designed to accelerate the development process, increase community incomes, and support local government efforts to improve regional well-being, where focusing economic growth on areas with adequate potential and facilities can accelerate progress and encourage communities to seek better life opportunities (Efendi & Bhinadi, 2023).Thus, identifying areas with relatively high economic growth and income levels is important to identify areas that have the potential to play a role as growth centers and identify areas that require greater development interventions.

One approach that can be used to identify the relative position of a region is the Klassen Typology. This approach groups regions based on two main indicators, namely the rate of economic growth and GDP per capita relative to the average of the reference area. The results divide the region into four Quadrants, namely developed and fast-growing regions, developed but depressed regions, fast-developing regions, and relatively disadvantaged regions. This approach has been used in various studies to describe the economic structure and inequality between regions. For example, research on interregional inequality in Indonesia uses the Klassen Typology with the Williamson Index to identify the classification of provincial development and measure regional inequality (Rahmadani et al., 2024).

However, the use of the Klassen Typology, which only describes the position of the region in a given year or period, still has limitations because it produces a static picture. The classification of a province in Quadrant I, II, III, or IV has not directly indicated whether the province experienced an increase, decrease, or displacement during the study period (Himmah & Priana, 2025). In fact, changes in the position of a region from time to time can

provide important information about development dynamics, convergence or divergence processes, and the success or limitations of regional development policies. Provincial GDP data published by BPS (BPS, 2026a) also allows the observation of GDP development, growth rate, and derivative indicators over time.

Based on this gap, the novelty of this research lies in the development of Klassen Typology analysis from a static cross-sectional classification approach to an approach that pays attention to the dynamics of changes in regional position (dynamic regional trajectory). The study not only identified the Quadrants of each province in each observation year, but also traced the trajectory of each province's movement between the first observation year and the last observation year. With this approach, the research can identify provinces that remain in the same Quadrant (persistent), provinces that have increased their position (upward mobility), provinces that have decreased positions (downward mobility), and provinces that have experienced changes or transitions between Quadrants (Azizah, 2025).

This dynamic approach provides more in-depth information than a single-period classification because it can show how the spatial structure of Indonesia's economic growth changed over the study period. For example, provinces that were in Quadrant IV at the beginning of the period but moved to Quadrant III or I at the end of the period showed an increase in growth capacity and relative income. On the other hand, provinces that move from Quadrant I to Quadrants II, III, or IV show a weakening of the relative positions that need to receive policy attention. Thus, quadrant trajectory analysis can be used to distinguish regions that are consistently superior from those that are undergoing economic transformation.

Another novelty lies in the integration of the dynamics of the position of the Klassen Typology with the analysis of inequality between provinces. Thus, the research does not stop at the question of "which province is in a particular Quadrant", but also answers a more dynamic question, namely "how did the position of the provinces change during the observation period and is it followed by an increase or decrease in economic inequality between provinces. This approach allows for a more comprehensive analysis of the relationship between economic growth, regional income levels, regional position mobility, and development inequality (R. Tarigan, 2024).

This study uses economic growth and GDP per capita as the main indicators to determine the relative position of provinces in Indonesia (Nihayah et al., 2023). Furthermore, the dynamics of economic inequality between provinces were analyzed to obtain an overview of the level of development inequality during the study period (Ha, Le, & Pham, 2019). The use of time-lapse data allows each province to be observed consistently from the first observation year to the last observation year, so that changes in economic position are not only seen as conditions at a single point in time (Farid, Rahkmawati, Annisa, & Hafizi, 2026). This approach is also important because Indonesia's economic characteristics are very diverse and the development of each province can occur at different speeds (Sahrul & Nuringsih, 2023).

From several previous writings, this study aims to (1) determine the economic growth position of each province in Indonesia based on economic growth and GDP per capita using the Klassen Typology; (2) identify changes and trajectories of inter-provincial movements between the first observation year and the last observation year; (3) identify provinces that experienced

persistence, increase, or decline in economic position during the study period; and (4) determine the level of inequality of economic growth between provinces in Indonesia and attribute it to the dynamics of changes in regional positions. The results of this study are expected to provide a stronger empirical basis for the formulation of differentiated regional development policies, especially in determining areas that need to be strengthened as growth centers and areas that need intervention to accelerate the process of economic convergence (Pradipta & Apridar, 2024).

With this perspective, this research not only produces a position map of provincial economic development, but also produces a "trajectory" of economic change between provinces. The difference between the starting and final positions is important to understand whether Indonesia's regional development is moving towards equity or strengthening the concentration of growth in a particular region. Therefore, the integration of the dynamic Klassen typology and inequality measurement can make a stronger contribution in explaining the spatial transformation of the Indonesian economy compared to the static regional classification approach. From several previous studies, the current study aims to analyze comparative economic development and interprovincial development inequality in Indonesia during 2016–2024.

2. Literature Review and Hypothesis Development

The study on Regional Inequality between Provinces in Indonesia and Factors Affecting It, analyzes regional inequality between provinces in Indonesia and identifies factors that affect it during the period 2022–2023. Regional inequality was measured using the Williamson Index, while the independent variables analyzed included economic growth, infrastructure availability, and regional fiscal capacity ratios. This study uses a quantitative approach with a panel data regression analysis method covering 34 provinces in Indonesia. The results showed that the highest inequality occurred in West Papua Province with a Williamson Index value of 1.46, while the lowest was found in North Kalimantan with an index value of 0.17. Empirically, economic growth has been shown to have a positive and significant effect on regional inequality, where an increase in growth of 1% is estimated to increase the Williamson Index by 0.034%. The availability of infrastructure also showed a positive, but not significant, influence. In contrast, the regional fiscal capacity ratio has a negative and significant influence on inequality, with a 1% increase in the fiscal capacity ratio estimated to reduce inequality by 0.032%. These findings show the importance of equitable distribution of economic and fiscal development between regions to reduce regional disparities in Indonesia (Lania, Canon, & Payu, 2025).

Another study on inequality between regions and its relationship with government spending A study in Indonesia (Ariesta et al., 2022; Nasution, 2020). The influence of economic growth, investment, and human development indices on income distribution inequality in Indonesia (Febriyani & Anis, 2021), and fiscal policy in overcoming income inequality in Indonesia (Yuliani, Paturochman, Mubarok, & Muzaki, 2024), research to provide an understanding of the factors that drive regional inequality in Indonesia, as well as to develop policy recommendations that can be implemented by the government to minimize inequality in

Indonesia. This study uses dynamic panel regression with cross-sectional data of 33 provinces in Indonesia and a time series of 2012–2022. The method used is the Generalized Method of Moment (GMM), which includes the First Different GMM (FD-GMM) and System GMM (SYS-GMM) model approaches, parameter significance tests, model specification tests, bias tests, and model selection. According to the findings of this study, increasing domestic investment will increase regional inequality by 0.147 percent, reduce regional inequality by 0.775 percent, increase the Human Development Index (HDI) by 0.284 percent, increase agglomeration by 2.602 percent, and increase poverty by 0.146 percent. When all independent factors were kept constant, regional inequality decreased by 18.104 percent. Furthermore, the results of this study reveal that all independent variables have a significant impact on regional inequality in Indonesia (Syaifudin et al., 2024). The hypothesis of this study is that there is still inequality that occurs in several regions due to structural differences in each region.

3. Methodology

The data used in this study is a secondary type of data, namely data on all provinces in Indonesia starting from 2016 to 2024. The data used include data on GDP per capita in each province in Indonesia and data on the economic growth rate in each province in Indonesia. The analysis used is Klassen Tyupological Analysis and the Williamson Index Analysis.

3.1 Klassen Typology Analysis

The Klassen Typology Analysis is an analysis tool used to classify regions based on their economic potential. This tool was first introduced by Ludo Klassen, an economist who wanted to understand how regions can be grouped based on economic growth rates and per capita income. This typology aims to identify areas that require specific policy interventions to encourage more equitable and sustainable economic growth (Hendrawan, 2020). The criteria used consist of four.

Quadrant I (first), namely the fast developed and fast growing provinces (High Growth and High Income) are areas that have higher economic growth and per capita income compared to Indonesia.

Quadrant II (second), namely, high income but low growth (High Income but Low Growth). This area has a higher per capita income but a lower growth rate than Indonesia.

Quadrant III (third), namely high growth but low income (Hight Growth Low Income). These are areas that have a high growth rate, but the per capita income level is lower than that in Indonesia.

And Quadrant IV (fourth) is a relatively backward province because low growth and low income is an area that has a lower rate of economic growth and per capita income compared to Indonesia. The third part of the manuscript, Method, Data, and Analysis, is designed to describe the nature of the data. The method should be well elaborated and enhance the model, the approach to the analysis, and the steps taken. Table 1 explains the equations, which should be numbered as we illustrate.

Table 1. Klassen typology Quadrant

$\bar{Y}$ / $\bar{R}$	Yij >$\bar{Y}_j$	Yij < $\bar{Y}_j$
Row > $\bar{R}_j$	High Growth and High GDP per capita (I)	Low growth but high GDP per capita (II)
Row < $\bar{R}_j$	High Growth but Low GDP per capita (III)	Low growth and low GDP per capita (IV)

Source : Yulianti, Selawijaya, and Putriyani (2022)

Description:

Rij = the economic growth rate of each province
Rj = is the average rate of Indonesia's economic growth
Yij = GDP per capita per Province
Y'j = is the average of Indonesia's GDP per capita
The percentage contribution can be expressed in the following formula:

$$\text{Contributions} = \frac{E_i}{E_j} \text{ x } 100 \quad (3.1)$$

where :
Ei : Province I Revenue; i = 1,...,38
E.g. : GDP of region j; j = 1,...,38
The percentage growth rate can be expressed using the following formula:

$$\text{Growth Rate} = \frac{E_{i,j,t} - E_{i,j,t-1}}{E_{i,j,t}} \; x \; 100 \quad (3.2)$$

where :
Ei,j,t : Sector I income in Region J in Year T

3.2 Williamson Index

Measuring the inequality of regional economies can be applied to the calculation of the Williamson Index (IW). IW shows regional economic inequality based on GDP per capita and population (Hamrullah, Saudi, Djam'an, & Hamzah, 2026). The IW formula is as follows:

$$IW = \frac{\sqrt{\sum_{i=1}^{n} f_i (Y_i - \overline{Y})^2}}{\overline{Y}} \quad (3.3)$$

where :

Yi = GDP per capita in province i
$\overline{Y}$ = Indonesia's average GDP per capita
Fi= Total population in Province I
n = population in Indonesia
$Y_i - \overline{Y}$ = the difference between the province's GDP per capita and the national

If the Williamson inequality index figure is getting closer to zero, it shows smaller inequality; if the index number shows further from zero, it shows that inequality is widening.

4. Result and Discussion

4.1 Klassen Typology Analysis

In this study, the Klassen Typology analysis method uses a sectoral approach to identify the economic structure of the Regency by comparing the economic sectors of the Province. The Klassen Typology Analysis Method can describe a pattern and structure of economic growth in an area. Each region has different economic growth, so that these differences form an economic growth pattern in each region. The pattern of economic growth is analyzed using a comparison of the economic growth rate of a region that is studied with the economic growth rate in a wider area (Mukholifah & Priyadi, 2022).

The first step that needs to be taken before determining the qualifications of each quadrant is to calculate the average economic growth and average per capita income of the reference area in the analysis period. Furthermore, each region is compared with the average value to determine the position of its quadrant. This process allows for a more targeted analysis in formulating development policies, as each quadrant has different characteristics and intervention needs. The Klassen Typology Approach not only serves as a descriptive tool but also as a basis for the preparation of development strategies based on regional inequality, so that policy directions can be adjusted to the structural conditions and economic dynamics of each region. The following is the per capita income data from the 38 provinces in Indonesia:The author needs to report the results in sufficient detail so that the reader can see which statistical analysis was conducted and why, and later to justify their conclusions.

The Discussion and Analysis section highlights the rationale behind the results and answers the question of why the results are so. It shows the theories and evidence from the results. The section does not just explain the figures but also deals with this deep analysis to cope with the gap that it is trying to solve.

Table 2. Provincial GDP per Capita in Indonesia (2016-2024) (thousands)

No	Province	2016	2017	2018	2019	2020	2021	2022	2023	2024
1	Aceh	26.852	28.097	29.521	30.879	31.633	34.674	38.767	41.408	43.782
2	Sumatera Utara	44.392	48.004	51.427	54.620	54.979	57.442	62.922	68.306	73.575
3	Sumatera Barat	37.285	40.194	42.803	44.886	43.826	45.218	50.264	54.327	57.047
4	Riau	104.861	105.845	110.385	111.227	114.167	129.741	151.259	154.522	165.350
5	Jambi	49.495	53.993	58.225	60.829	57.958	64.771	76.224	79.850	86.722
6	Sumatera Selatan	43.361	46.315	50.105	53.359	53.843	57.745	68.239	71.958	75.132
7	Bengkulu	29.076	31.359	33.822	36.565	36.552	39.167	43.757	46.300	49.233
8	Lampung	34.054	36.998	39.716	42.172	39.290	40.807	44.982	48.191	51.370
9	Kepulauan Bangka Belitung	46.402	48.827	50.082	52.233	52.023	58.406	63.866	67.813	70.194
10	Kepulauan Riau	106.504	109.333	116.461	119.395	123.465	131.884	145.530	154.065	161.424
11	DKI Jakarta	210.075	228.003	247.678	268.052	262.615	274.660	299.675	322.619	344.350
12	Jawa Barat	34.894	37.223	40.273	43.309	43.237	45.234	49.137	52.652	56.080
13	Jawa Tengah	31.962	34.234	36.771	39.388	36.965	38.568	41.934	45.167	47.972
14	DI Yogyakarta	29.553	31.665	34.137	36.460	37.694	40.516	44.639	48.360	51.473

No	Province	2016	2017	2018	2019	2020	2021	2022	2023	2024
15	Jawa Timur	47.492	51.228	55.411	59.015	56.641	59.988	66.248	71.122	75.770
16	Banten	42.440	45.276	48.370	52.014	52.729	55.383	61.414	66.147	70.276
17	Bali	46.211	50.167	54.433	57.756	52.015	50.758	56.093	62.294	67.319
18	Nusa Tenggara Barat	23.787	24.987	24.706	25.716	25.184	26.009	28.671	29.926	32.282
19	Nusa Tenggara Timur	16.094	17.165	18.418	19.630	20.057	20.555	21.658	23.078	24.272
20	Kalimantan Barat	33.191	35.985	38.815	42.045	39.622	42.253	46.092	48.809	52.703
21	Kalimantan Tengah	43.905	48.293	52.107	56.625	57.145	62.834	72.973	75.271	79.320
22	Kalimantan Selatan	36.023	38.620	41.046	42.824	44.101	48.066	60.213	63.754	67.117
23	Kalimantan Timur	145.343	165.547	174.165	180.259	161.799	183.158	238.917	215.761	212.175
24	Kalimantan Utara	99.112	111.319	119.414	138.751	143.533	157.092	192.588	201.749	198.429
25	Sulawesi Utara	41.246	44.744	48.105	52.173	50.521	54.034	59.021	64.131	69.352
26	Sulawesi Tengah	41.082	45.157	55.519	61.056	66.306	82.017	106.068	112.461	120.750
27	Sulawesi Selatan	43.817	47.822	52.642	57.182	55.675	59.503	65.353	69.710	73.573
28	Sulawesi Tenggara	38.022	41.279	44.492	48.514	49.718	52.436	58.715	64.088	67.840
29	Gorontalo	27.545	29.565	31.828	34.977	35.693	37.087	39.691	42.341	44.433
30	Sulawesi Barat	27.513	29.676	32.059	34.112	32.837	35.195	37.034	39.547	42.718
31	Maluku	21.599	22.859	24.269	26.097	25.094	26.153	28.537	30.455	32.198
32	Maluku Utara	24.581	26.686	29.586	32.125	33.069	40.381	53.776	63.675	70.660
33	Papua Barat	74.585	78.424	84.958	87.542	73.933	74.022	78.141	108.110	131.636
34	Papua Barat Daya	0	0	0	0	0	0	0	58.450	59.064
35	Papua	54.002	57.864	63.386	56.619	46.416	54.051	59.384	78.055	81.009
36	Papua Selatan	0	0	0	0	0	0	0	58.677	61.583
37	Papua Tengah	0	0	0	0	0	0	0	103.508	118.774
38	Papua Pegunungan	0	0	0	0	0	0	0	16.870	18.105

Source: BPS (2025b), processed by the authors

Table 2 presents the development of the GDP per capita as an economic indicator of all provinces in Indonesia during the period 2016–2024. In general, there is a fairly consistent upward trend in almost all provinces, although in 2020 most regions experienced a slowdown or decline due to the impact of the Covid-19 pandemic. After 2021, the regional economic performance again shows a relatively strong recovery until 2024. For the Sumatra region, provinces such as Riau and the Riau Islands show relatively high values compared to other provinces on the island. Riau increased from Rp. 104,861 thousand in 2016 to Rp. 165,350 thousand in 2024, while the Riau Islands rose from 106,504 to 161,424 in the same period. Meanwhile, Aceh and Bengkulu are in the group with lower values although they still show a gradual increase trend.

In the Java region, DKI Jakarta had the highest value nationally throughout the research period, increasing from Rp. 210,075 thousand in 2016 to Rp. 344,350 thousand in 2024. This

reflects the high concentration of economic activity and the tertiary sector in the capital. Other provinces, such as West Java, Central Java, and DI Yogyakarta, showed stable growth, while East Java and Banten were in the middle group with a significant increase after 2021. In the Kalimantan region, East Kalimantan and North Kalimantan recorded very high values, especially after 2021. East Kalimantan even reached Rp. 238,917 thousand in 2022 before decreasing slightly in 2023 until 2024. This performance is closely related to the dominance of the mining and energy sectors. Central Kalimantan and South Kalimantan have also shown a fairly strong growth acceleration in the last three years.

In the Sulawesi region, Central Sulawesi stands out with a very significant surge from Rp. 41,082 thousand in 2016 to Rp. 120,750 thousand in 2024 reflects the expansion of the natural resource-based processing industry. Other provinces, such as South Sulawesi and North Sulawesi, experienced stable and progressive growth. Meanwhile, the Maluku and Papua regions show diverse dynamics. West Papua and Central Papua recorded a sharp increase in the period from 2023 to 2024. New provinces such as Southwest Papua, South Papua, Central Papua, and Mountainous Papua have started to have data since 2023, so they cannot be compared in the long span like other provinces. Overall, this table shows three main patterns: the long-term upward trend in almost all provinces throughout the observation year, contraction or slowdown in 2020 as a result of the pandemic, and the post-2021 recovery and acceleration, especially in natural resource-based provinces and processing industries. This data is certainly very relevant for the analysis of inequality between regions and can be the basis for the preparation of the Klassen Typology, by comparing the growth rate and the relative position of each province's per capita income to the national average.

Meanwhile, the economic growth rates of Indonesian provinces during the 2016–2024 period are presented in Table 3. Table 3 shows the development of economic indicators in each province in Indonesia from 2016 to 2024, which generally shows an increasing trend, although there are fluctuations in certain periods. Most provinces experienced consistent year-on-year growth, with a relative disruption seen in 2020 as a result of the global economic slowdown due to the pandemic. The province with the highest consistently score is DKI Jakarta, which shows the dominance of the national economy with a significant increase from year to year until it reaches its peak in 2024. Outside Java, natural resource-based provinces such as Riau, Riau Islands, East Kalimantan, and North Kalimantan also show relatively high achievements compared to other provinces. This reflects the contribution of the mining, oil and gas, and processing industries to the regional economic structure.

Table 3. GDP Growth Rate Based on Provincial Constant Prices in Indonesia (2016 – 2024) (%)

No	Province	2016	2017	2018	2019	2020	2021	2022	2023	2024
1	Aceh	3,29	4,18	4,61	4,14	-0,37	2,81	4,21	4,23	4,66
2	Sumatera Utara	5,18	5,12	5,18	5,22	-1,07	2,61	4,73	5,01	5,03
3	Sumatera Barat	5,27	5,30	5,14	5,01	-1,61	3,29	4,36	4,62	4,36
4	Riau	2,18	2,66	2,35	2,81	-1,13	3,36	4,55	4,21	3,52
5	Jambi	4,37	4,60	4,69	4,35	-0,51	3,70	5,12	4,67	4,51
6	Sumatera Selatan	5,04	5,51	6,01	5,69	-0,11	3,58	5,24	5,08	5,03
7	Bengkulu	5,28	4,98	4,97	4,94	-0,02	3,27	4,31	4,28	4,62

No	Province	2016	2017	2018	2019	2020	2021	2022	2023	2024
8	Lampung	5,14	5,16	5,23	5,26	-1,66	2,77	4,28	4,55	4,57
9	Kepulauan Bangka Belitung	4,10	4,47	4,45	3,32	-2,29	5,05	4,40	4,38	0,77
10	Kepulauan Riau	4,98	1,98	4,47	4,83	-3,80	3,43	5,06	5,16	5,02
11	DKI Jakarta	5,87	6,20	6,11	5,82	-2,39	3,55	5,25	4,96	4,90
12	Jawa Barat	5,66	5,33	5,65	5,02	-2,52	3,74	5,45	5,00	4,95
13	Jawa Tengah	5,25	5,26	5,30	5,36	-2,65	3,33	5,31	4,97	4,95
14	DI Yogyakarta	5,05	5,26	6,20	6,59	-2,67	5,58	5,15	5,07	5,03
15	Jawa Timur	5,57	5,46	5,47	5,53	-2,33	3,56	5,34	4,95	4,93
16	Banten	5,28	5,75	5,77	5,26	-3,39	4,49	5,03	4,81	4,79
17	Bali	6,33	5,56	6,31	5,60	-9,34	-2,46	4,84	5,71	5,48
18	Nusa Tenggara Barat	5,81	0,09	-4,50	3,90	-0,62	2,30	6,95	1,80	5,30
19	Nusa Tenggara Timur	5,12	5,11	5,11	5,25	-0,84	2,52	3,08	3,47	3,73
20	Kalimantan Barat	5,20	5,17	5,07	5,09	-1,82	4,80	5,07	4,46	4,90
21	Kalimantan Tengah	6,35	6,73	5,61	6,12	-1,41	3,59	6,45	4,14	4,46
22	Kalimantan Selatan	4,40	5,28	5,08	4,09	-1,82	3,48	5,11	4,84	5,05
23	Kalimantan Timur	-0,38	3,13	2,64	4,70	-2,90	2,55	4,48	6,22	6,17
24	Kalimantan Utara	3,55	6,80	5,36	6,89	-1,09	3,99	5,32	4,94	4,57
25	Sulawesi Utara	6,16	6,31	6,00	5,65	-0,99	4,16	5,42	5,48	5,39
26	Sulawesi Tengah	9,94	7,10	20,56	8,83	4,86	11,68	15,22	11,91	9,89
27	Sulawesi Selatan	7,42	7,21	7,04	6,91	-0,71	4,64	5,10	4,51	5,02
28	Sulawesi Tenggara	6,51	6,76	6,40	6,50	-0,65	4,10	5,53	5,35	5,40
29	Gorontalo	6,52	6,73	6,49	6,40	-0,02	2,40	4,03	4,50	4,13
30	Sulawesi Barat	6,01	6,39	6,26	5,56	-2,34	2,57	2,26	5,23	4,76
31	Maluku	5,73	5,82	5,91	5,41	-0,91	3,63	5,31	5,21	5,34
32	Maluku Utara	5,77	7,67	7,86	6,25	5,39	16,79	22,94	20,49	13,73
33	Papua Barat	4,52	4,02	6,25	2,66	-0,76	-0,51	2,03	5,18	20,80
34	Papua Barat Daya	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,82	3,60
35	Papua	9,14	4,64	7,32	-15,74	2,39	15,16	8,97	4,22	4,11
36	Papua Selatan	0,00	0,00	0,00	0,00	0,00	0,00	0,00	4,23	4,55
37	Papua Tengah	0,00	0,00	0,00	0,00	0,00	0,00	0,00	5,95	4,36
38	Papua Pegunungan	0,00	0,00	0,00	0,00	0,00	0,00	0,00	4,78	4,75

Source: BPS (2025a), processed by the authors.

From Table 3, in the Sumatra region, the growth was quite even. North Sumatra, Riau, and Jambi showed a steady increase, while Aceh and Bengkulu were in the group with a relatively lower score but still experienced a gradual upward trend. On the island of Java, in addition to DKI Jakarta, provinces such as West Java, East Java, and Banten showed progressive growth in line with the expansion of the industrial and service sectors. The Kalimantan region showed quite strong dynamics, especially after 2021, with a significant surge in East Kalimantan and

Central Kalimantan. Meanwhile, the Sulawesi region has shown interesting developments, especially Central Sulawesi, which has experienced rapid growth in recent years, indicating the transformation of the processing industry-based economic structure.

For Eastern Indonesia, such as Maluku and Papua, growth looks more moderate but still shows a positive trend. Several new provinces as a result of expansion in Papua began to have data from 2023 to 2024; therefore, it cannot be analyzed in the long term, but it shows quite diverse initial potential. Overall, Table 2 explains the inequality between regions where provinces with industrial and natural resource bases tend to have higher indicator values than provinces that rely on the traditional primary sector. This data is very important as a basis for further analysis, especially to examine regional disparities, economic convergence patterns, as well as for the preparation of the classification of the Klassen Typology to see the relative position of each province in the context of national development. Tabel 4 explain how to determine the Quadrant from the results of Classen's typology analysis from the per capita income and LPE data of 38 provinces in Indonesia throughout 2016 to 2024, a regional classification can be made based on the Klassen Typology Quadrant.

Table 4 Analysis of Klassen Typology

Province	Income per Capita (Thousands)	LPE (%)	Quadrant
Aceh	305.613	31,76	Quadrant 4
Sumatera Utara	515.667	37,01	Quadrant 4
Sumatera Barat	415.850	35,74	Quadrant 4
Riau	1.147.357	24,51	Quadrant 3
Jambi	588.067	35,50	Quadrant 3
Sumatera Selatan	520.057	41,07	Quadrant 2
Bengkulu	345.831	36,63	Quadrant 4
Lampung	377.580	35,30	Quadrant 4
Kepulauan Bangka Belitung	509.846	28,65	Quadrant 4
Kepulauan Riau	1.168.061	31,13	Quadrant 3
DKI Jakarta	2.457.727	40,27	Quadrant 1
Jawa Barat	402.039	38,28	Quadrant 2
Jawa Tengah	352.961	37,08	Quadrant 4
DI Yogyakarta	354.497	41,26	Quadrant 2
Jawa Timur	542.915	38,48	Quadrant 2
Banten	494.049	37,79	Quadrant 2
Bali	497.046	28,03	Quadrant 4
Nusa Tenggara Barat	241.268	21,03	Quadrant 4
Nusa Tenggara Timur	180.927	32,55	Quadrant 4
Kalimantan Barat	379.515	37,94	Quadrant 2
Kalimantan Tengah	548.473	42,04	Quadrant 2
Kalimantan Selatan	441.764	35,51	Quadrant 4
Kalimantan Timur	1.677.124	26,61	Quadrant 3

Province	Income per Capita (Thousands)	LPE (%)	Quadrant
Kalimantan Utara	1.361.987	40,33	Quadrant 1
Sulawesi Utara	483.327	43,58	Quadrant 2
Sulawesi Tengah	690.416	99,99	Quadrant 1
Sulawesi Selatan	525.277	47,14	Quadrant 2
Sulawesi Tenggara	465.104	45,90	Quadrant 2
Gorontalo	323.160	41,18	Quadrant 2
Sulawesi Barat	310.691	36,70	Quadrant 4
Maluku	237.261	41,45	Quadrant 2
Maluku Utara	374.539	106,89	Quadrant 2
Papua Barat	791.351	44,19	Quadrant 1
Papua Barat Daya	117.514	5,42	Quadrant 4
Papua	550.786	40,21	Quadrant 2
Papua Selatan	120.260	8,78	Quadrant 4
Papua Tengah	222.282	10,31	Quadrant 4
Papua Pegunungan	34.975	9,53	Quadrant 4
Amount	21.073.164	1.416	
average	554.557	37,26	

Source: BPS, data processed by the authors.

Klassen Typology Analysis on table 4, it can be explained that the data shows the development of economic indicators between provinces in recent years. In general, there is a tendency to increase in value from year to year, even though in certain periods there is a slowdown or temporary decline. Some provinces have relatively high and stable values, which indicates a better level of economic activity and community welfare than other provinces. On the other hand, there are also provinces with relatively low values, but still showing a positive growth trend from time to time. The difference in achievement between provinces illustrates the variation in the level of economic development in Indonesia. These conditions can be influenced by various factors, such as the regional economic structure, the availability of natural resources, the level of industrialization, investment, and the quality of infrastructure and human resources. Overall, this table provides an overview of the dynamics and inequalities of development between regions, which can then be further analyzed using approaches such as the Klassen Typology to determine the position and characteristics of each province in the national development structure. The following is a table that presents the classification of the regions of each province in Indonesia. The classification of the classen typology analysis can be seen in the following table 5, The classification of the Classen typology analysis can be seen in the following table 5, which explains each province based on its Quadrant.

Table 5. Classification of Regions based on Klassen Thypology Analysis

Quadrant 1 : developed region High Growth-High Income	**Quadrant 2 : developed region High Growth-Low Income**	**Quadrant 3 : Potential Low Growth-High Income**	**Quadrant 4 : backward Low Growth- Low Income**
DKI Jakarta	Sumatera Selatan	Riau	Aceh
Kalimantan Utara	Jawa Barat	Jambi	Sumatera Utara
Sulawesi Tengah	DI Yogyakarta	Kepulauan Riau	Sumatera Barat
Papua Barat	Jawa Timur	Kalimantan Timur	Bengkulu
	Banten		Lampung
	Kalimantan Barat		Kepulauan Bangka Belitung
	Kalimantan Tengah		Jawa Tengah
	Sulawesi Utara		Nusa Tenggara Barat
	Sulawesi Selatan		Nusa Tenggara Timur
	Sulawesi Tenggara		Kalimantan Selatan
	Gorontalo		Sulawesi Barat
	Maluku		Papua Barat Daya
	Maluku Utara		Papua Selatan
	Papua		Papua Tengah

Source: Data processed from Ryansyah, Hasibuan, and Daulay (2023).

From Table 5 explain about regional classification provides an overview of the relative position of each province in the national development structure. The explanation is:

Quadrant 1 (Advanced Region – High Growth, High Income): The provinces included in this classification are DKI Jakarta, North Kalimantan, Central Sulawesi, and West Papua. These provinces have high per capita income levels as well as economic growth that is above the national average. This condition reflects a strong economic structure, supported by leading sectors such as industry, mining, modern services, and relatively large investment. Areas in this Quadrant play a role as the driving force for national economic growth.

Quadrant 2 (Developing – High Growth, Low Income) covers provinces such as South Sumatra, West Java, DI Yogyakarta, East Java, Banten, several provinces in Kalimantan, Sulawesi, Maluku, and Papua. The characteristic of this region is relatively high economic growth, but the per capita income level is still below average. This means that these areas have the potential to accelerate development and are in the phase of economic expansion. The main challenge is to increase economic added value so that this growth can encourage a more equitable improvement in people's welfare.

Quadrant 3 (Potential – Low Growth, High Income) consists of the provinces of Riau, Jambi, Riau Islands, and East Kalimantan. These provinces have high per capita incomes, but their economic growth rates are relatively lower than average. Generally, the areas in this Quadrant are areas that have long depended on the natural resource sector. The challenge ahead is to

diversify the economy so that it does not stagnate and is able to maintain the level of welfare in the long term.

Quadrant 4 (Low Growth, Low Income) provinces that are included in the qualification in this Quadrant include Aceh, North Sumatra, West Sumatra, Bengkulu, Lampung, Central Java, West Nusa Tenggara, East Nusa Tenggara, South Kalimantan, West Sulawesi, as well as several new provinces in Papua. The regions in this Quadrant face a dual challenge, namely low economic growth and a below-average per capita income level. This condition shows the need for more intensive policy interventions, especially in improving infrastructure, quality of human resources, investment, and strengthening the region's economic base sector.

4.2. Williamson Index

The Williamson Index is a measure of income inequality to analyze how large the gap is between regions/regions. The basis for the calculation is using GDP per capita in relation to the number of population per region. The Williamson inequality index obtained is located between 0 (zero) and 1 (one).

Table 6. Number of Population/Provinces in Indonesia, 2016- 2024 (thousand)

No	Province	2016	2017	2018	2019	2020	2021	2022	2023	2024
1	Aceh	5.096	5.190	5.281	5.372	5.275	5.334	5.408	5.483	5.555
2	Sumatera Utara	14.103	14.262	14.415	14.563	14.799	14.936	15.115	15.387	15.589
3	Sumatera Barat	5.260	5.322	5.382	5.441	5.535	5.580	5.641	5.757	5.836
4	Riau	6.501	6.658	6.815	6.972	6.394	6.494	6.614	6.643	6.728
5	Jambi	3.459	3.515	3.570	3.625	3.548	3.585	3.631	3.679	3.724
6	Sumatera Selatan	8.161	8.267	8.370	8.471	8.467	8.551	8.657	8.744	8.837
7	Bengkulu	1.905	1.934	1.963	1.992	2.011	2.033	2.060	2.086	2.112
8	Lampung	8.205	8.290	8.371	8.448	9.008	9.082	9.177	9.314	9.420
9	Kepulauan Bangka Belitung	1.402	1.431	1.460	1.489	1.456	1.473	1.495	1.512	1.532
10	Kepulauan Riau	2.028	2.083	2.137	2.190	2.065	2.118	2.180	2.153	2.183
11	DKI Jakarta	10.278	10.374	10.468	10.558	10.562	10.610	10.680	10.672	10.685
12	Jawa Barat	47.379	48.038	48.684	49.317	48.274	48.782	49.406	49.860	50.345
13	Jawa Tengah	34.019	34.258	34.491	34.718	36.516	36.743	37.032	37.541	37.892
14	DI Yogyakarta	3.721	3.762	3.803	3.843	3.669	3.713	3.762	3.737	3.760
15	Jawa Timur	39.075	39.293	39.501	39.699	40.666	40.879	41.150	41.528	41.815
16	Banten	12.203	12.448	12.690	12.927	11.905	12.062	12.252	12.308	12.431
17	Bali	4.200	4.247	4.292	4.337	4.317	4.363	4.415	4.404	4.433
18	Nusa Tenggara Barat	4.896	4.956	5.014	5.070	5.320	5.390	5.474	5.560	5.646
19	Nusa Tenggara Timur	5.204	5.287	5.372	5.456	5.326	5.388	5.466	5.569	5.656
20	Kalimantan Barat	4.862	4.933	5.002	5.069	5.414	5.471	5.541	5.623	5.696
21	Kalimantan Tengah	2.550	2.605	2.660	2.715	2.670	2.702	2.741	2.774	2.810
22	Kalimantan Selatan	4.056	4.120	4.183	4.244	4.074	4.123	4.182	4.222	4.273
23	Kalimantan Timur	3.501	3.575	3.649	3.721	3.766	3.808	3.860	3.910	4.046
24	Kalimantan Utara	666	691	716	742	702	714	728	730	740
25	Sulawesi Utara	2.437	2.461	2.484	2.507	2.622	2.639	2.660	2.682	2.702

No	Province	2016	2017	2018	2019	2020	2021	2022	2023	2024
26	Sulawesi Tengah	2.922	2.966	3.010	3.054	2.986	3.022	3.066	3.087	3.122
27	Sulawesi Selatan	8.606	8.690	8.772	8.851	9.074	9.140	9.226	9.362	9.463
28	Sulawesi Tenggara	2.551	2.602	2.654	2.705	2.625	2.659	2.702	2.749	2.793
29	Gorontalo	1.151	1.168	1.186	1.203	1.172	1.181	1.193	1.213	1.228
30	Sulawesi Barat	1.307	1.331	1.356	1.380	1.419	1.437	1.459	1.481	1.503
31	Maluku	1.716	1.745	1.774	1.803	1.849	1.863	1.882	1.921	1.946
32	Maluku Utara	1.186	1.209	1.233	1.256	1.283	1.299	1.319	1.337	1.356
33	Papua Barat	893	915	938	960	1.134	1.157	1.183	1.187	579
34	Papua Barat Daya									627
35	Papua	3.207	3.265	3.323	3.379	4.304	4.355	4.419	4.483	1.061
36	Papua Selatan									542
37	Papua Tengah									1.473
38	Papua Pegunungan									1.467

Source: BPS (2026b), processed by the authors.

Table 6 presents the value of the Gross Regional Domestic Product and the number of people in the district/city area, which are estimates used to produce the estimated value of the average distribution known as the Williamson Index. For the period 2017–2022, GDP per capita figures are used based on constant prices. According to the Williamson Index analysis, the distribution of per capita income is more even if the Williamson Index is close to zero (Ryansyah et al., 2023). The Williamson Index has a range of 0 to 1. If the value of the Williamson Index is close to zero, then development inequality decreases, or the equitable distribution of development increases.

If the Williamson Index results are close to 1, then the level of inequality is increasing, and development is becoming more uneven. According to the indicator, the higher the Williamson Index, the greater the disparity; On the other hand, if it is smaller, the development will be more evenly divided. There are three categories of inequality, with an IW value of > 0.5. The medium category has an IW value = 0.5-0.35, and the low category has an IW value below < 0.35 (Ryansyah et al., 2023). The data needed to calculate IW other than GDP per capita in each province is data on the population in each province from 2016 to 2024. The population data are as follows in Table 5, which shows that the number of people per province in Indonesia from 2016 to 2024 shows a relatively consistent increasing trend in almost all regions. Nationally, Indonesia's population will increase from 258.705 million people in 2016 to 281.604 million people in 2024, reflecting stable population growth every year. Overall, this data illustrates that Indonesia's population growth during the period from 2016 to 2024 was stable with the largest concentration remaining on the island of Java.

The results of the IW calculation based on GDP per capita data and population data can be seen in table 7 below:

Table 7. Williamson Provincial Index in Indonesia, 2016 – 2024

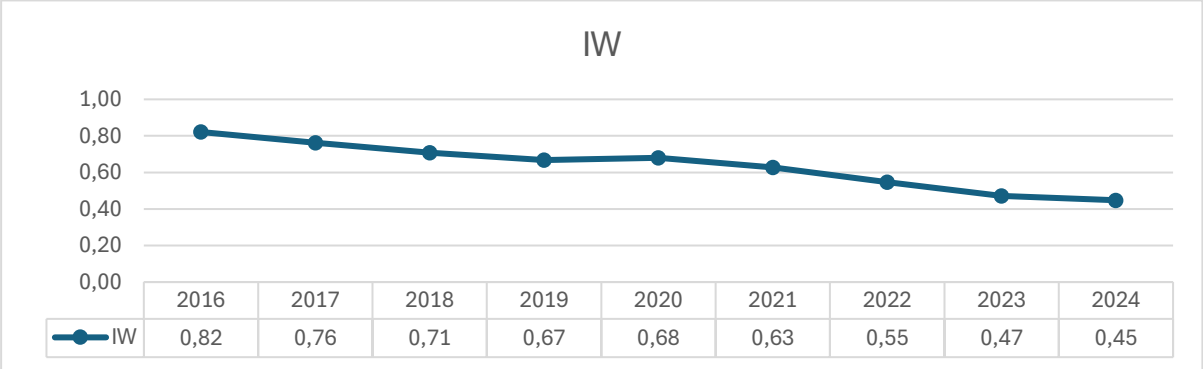
Year	IW	Criteria
2016	0.82	High inequality

2017	0.76	High inequality
2018	0.71	High inequality
2019	0.67	High inequality
2020	0.68	High inequality
2021	0.63	High inequality
2022	0.55	High inequality
2023	0.47	moderate inequality
2024	0.45	moderate inequality

Source : Processed

From Table 7, it can be seen that throughout 2016 to 2022, inequality was categorized as high. This indicates that economic development in that year was uneven economic development that resulted in the disparity of economic development in Indonesia being categorized as high. In 2023 and 2024, the disparity in economic development is slightly better, meaning that economic development in each province, although it cannot be said to be evenly distributed throughout Indonesia, has been included as a medium category. For more details, you can see the following graph 1.

Figure 1. IW in Indonesia, 2016-2024



Source : Proceed

Figure 1 shows that although the disparity category in Indonesia is included in the high category, which indicates an uneven economic development, it can be indicated that throughout 2016 to 2024, IW experienced a significant decline. This can be seen from 2016 with the IW level of 0.82 but continued to decline until 2022 to 0.55 even though it was still in the high category. In 2023 and 2024, IW will improve in the indices of 0.47 and 0.45. It is hoped that if this research is continued, it will increasingly show IW that is in the low category, which must be supported by economic growth in every province in Indonesia.

5. Conclusion and Suggestion

Based on the classification of the Klassen Typology Analysis, which divides the provinces into four quadrants based on the combination of economic growth rate and per capita income level, several strategic conclusions can be drawn, namely that those included in Quadrant 1 reflect

areas that have achieved a relatively good level of economic maturity, supported by superior sectors such as services, extractive industries, downstream natural resources, and government and trade centers. This region acts as a driving force for national growth and has relatively strong competitiveness.

The inclusion of Quadrant 2 reflects that this region has great potential for convergence (catching up). If high growth can be sustained and accompanied by a fair distribution of incomes, these regions have the opportunity to move up to Quadrant I in the medium term and are geared towards accelerating income increases and equity. Those included in Quadrant 3 explained that areas included in this quadrant are usually natural resource-based areas that have long enjoyed high incomes but have experienced a slowdown due to dependence on the primary sector or commodity fluctuations.

The main challenge in this quadrant is the need to diversify the economy and innovate so that growth returns to normal and is not stuck in stagnation. Those who fall into Quadrant 4 fall into the category of disadvantaged regions because they have low growth and per capita income. This group needs stronger policy interventions, especially in improving basic infrastructure, quality of human resources, access to investment, and strengthening local leading sectors. The distribution of provinces in the four quadrants shows that the development inequality between regions in Indonesia is still very real. A small part of provinsi has reached advanced conditions, while most are in the development stage and have opportunities for economic convergence. However, there are still regional groups that face serious structural challenges, especially in eastern Indonesia and some parts of Sumatra. This is evidenced by IW, which is still in the category of high inequality.

Overall, the conclusion to answer the purpose of the study is the first objective of the classification of provinces (Klassen Typology): Provinces in Indonesia are divided into four quadrants. Major business hub areas (such as DKI Jakarta) and commodity-rich areas (such as East Kalimantan) dominate the Advanced and Fast Growing Quadrant (Quadrant I). (2). Quadrant Movement Trajectory: There is a dynamic shift between observation years. Several developing provinces have successfully made the jump to the upper Quadrant (positive trajectory) due to the encouragement of investment and industrial downstreaming. On the other hand, there are provinces that experience a negative trajectory due to the decline in the performance of the main commodity sector. (3). Position Dynamics (Persistence & Change): The phenomenon of position persistence (Quadrant trap) is strongest in Quadrant I (established areas that remain superior) and Quadrant IV (disadvantaged areas that are difficult to get out of the downturn due to infrastructure limitations).and (4). Growth Inequality: The level of economic inequality between provinces in Indonesia remains high and persistent. The dynamics of changes in regional positions have not been able to level out output nationally, because massive economic growth is still concentrated in certain regions (such as Java).

6. Limitations and Future Research

The implication of this study is to determine the policy implications of differentiated regional policy, namely that the government can no longer implement a uniform development policy (one-size-fits-all). Interventions should be tailored specifically based on the quadrant

characteristics of each province. The downstream and diversification strategy (Quadrant III) is for commodity-rich areas that are experiencing an economic slowdown (Quadrant III), the implication is the urgency of increasing added value through industrial downstreaming and diversification to non-extractive sectors to avoid the resource curse phenomenon. Eradication of the Quadrant Trap (Quadrant IV): Persistently underdeveloped areas require massive investment in basic infrastructure (connectivity, electricity, internet) and improved quality of human resources to break the chain of economic isolation. National Revenue Redistribution: Given that economic growth is still concentrated in Java and the main business hub (Quadrant I), the government needs to optimize physical Special Allocation Fund (DAK) instruments and investment incentives outside Java to accelerate regional economic convergence.

For further research on the decomposition of the macro to micro sector, it is necessary to conduct a dynamic classn typology analysis at the district/city level within the province in Quadrant IV or III, to identify the smallest pockets of local growth that have not been mapped. Integration of Digital Economy and FinTech Variables: Include the variables of e-commerce adoption, internet penetration, and digital financial inclusion as determinants of provincial Quadrant mobility, considering that digital transformation is the main driver of growth in the modern era. External Shock Impact testing is needed, which is to observe the resilience of the province's economic trajectory by comparing the period before, during, and after the global crisis or extreme commodity price fluctuations, to see the volatility of the regional Quadrant position. The Policy Qualitative Approach (Mixed-Methods) needs to conduct more research = research in the governance of local institutions in provinces that have successfully made a Quadrant leap (positive trajectory) to find the best practice regulations that can be replicated by the regions in Quadrant IV.

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