

Growth Without Equity? Evaluating Regional Disparities in a Mining-Dependent District Using Williamson Index, Klassen Typology, and Paired Samples T-Test

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ABSTRACT

This study examines inter-regional development disparities in West Nusa Tenggara Province, focusing on West Sumbawa Regency, whose economy is highly dependent on the mining sector. Using a descriptive-comparative quantitative approach for 2019–2024, the study applies the Williamson Index to measure regional inequality, the Klassen Typology to classify ten regencies/cities based on economic growth and GRDP per capita, and paired-samples t-tests to compare human development, unemployment, and poverty indicators between West Sumbawa Regency and nine other regions. The Williamson Index remained high throughout the study period, ranging from 0.555 to 0.790, indicating persistent regional inequality. West Sumbawa Regency was the only region classified in Quadrant I, with economic growth of 12.01% and GRDP per capita of Rp235.09 million in 2024, substantially exceeding the provincial average. Meanwhile, eight of the nine comparison regions were classified in Quadrant IV, and none were classified in Quadrant III. The paired-samples t-tests show that West Sumbawa Regency had a significantly higher Human Development Index than seven of nine comparison regions, while its unemployment and poverty rates were not consistently lower. These findings indicate a potential abundance paradox and characteristics of an enclave economy, where mining-driven output growth has not been fully accompanied by improvements in employment and poverty reduction. The study highlights the need for policies that strengthen local economic linkages, promote sectoral diversification, and develop workforce capabilities to support more inclusive regional development.

INTRODUCTION

Inequality and disparities in economic development across regions are structural issues that continue to be faced by various regions, particularly those with differing economic characteristics and production capacities. Differences in economic structure, capital formation, trade activities, and a region's ability to create job opportunities can result in varying levels of economic growth and development across regions (Seti et al., 2025).

Furthermore, regional inequality can also be influenced by the concentration of investment and economic activity in specific regions, meaning that the benefits of growth are not always distributed evenly. Iacob et al. (2025) demonstrate that foreign direct investment (FDI) flows are also linked to the dynamics of regional economic inequality. These conditions indicate that economic growth at the regional level must be assessed not only in terms of increased output but also in terms of the distribution of development benefits across regions.

This issue becomes even more complex in regions rich in natural resources and dependent on extractive industries. The concentration of resource-based industries in certain regions can boost economic activity and regional growth, but at the same time has the potential to widen development disparities with other regions (Wang et al., 2025). Research by Paredes et al. (2025) shows that mining-producing regions can achieve higher income levels, but this is not always accompanied by equitable socioeconomic conditions across regions. This phenomenon indicates the potential for “growth without equity,” where economic growth driven by natural resources is concentrated in specific regions. In line with this, Xu et al. (2024) demonstrate that dependence on natural resources can be linked to the “resource curse” a phenomenon where an abundance of resources does not necessarily lead to more equitable regional development. Development challenges in mining regions are not limited to economic growth but also encompass the sustainability of development and the achievement of socioeconomic goals (Zhang et al., 2025).

The economic impact of extractive activities must also be viewed in terms of their ability to improve community well-being. High value-added in the mining sector does not automatically guarantee improved human development if economic benefits are not supported by effective policies and the allocation of public resources. Masduki et al. (2022) demonstrate that the quality of regional spending plays a crucial role in reducing poverty and improving the Human Development Index. On the other hand, limited employment opportunities and the vulnerability of communities in mining areas can create distinct socioeconomic problems. Danneaux et al. (2026) highlight subnational disparities in the vulnerability of mining workers in the face of structural changes in the energy sector, while (Mazorodze, 2025) finds a link between youth unemployment and illegal mining activities. Thus, the success of development in resource-rich regions cannot be assessed solely through economic growth and per capita income; it must also take into account the distribution of development benefits and the socioeconomic conditions of the community.

This situation is relevant to West Nusa Tenggara Province, particularly West Sumbawa Regency, which has an economic structure heavily dependent on the mining sector. During the 2019–2024 period, the mining sector contributed more than 76% to West Sumbawa Regency’s total GRDP, reaching 84.61% in 2024 (West Sumbawa Regency Statistics Agency, 2025). This dominance is reflected in West Sumbawa Regency’s per capita GRDP, which reached Rp235.09 million in 2024, accompanied by an economic growth rate of 12.01% (West Sumbawa Regency Statistics Agency, 2026). This situation places West

Sumbawa Regency in a very distinct economic position compared to most other regencies and cities in West Nusa Tenggara. However, the high per capita GRDP and economic growth raise questions about the extent to which this mining-based economic advantage is related to equitable development across regions in West Nusa Tenggara Province.

A number of previous studies have used quantitative approaches to identify disparities and the stage of regional development. Nopiah et al. (2024), for example, integrated the Williamson Index and Klassen's Typology to analyze regional development disparities in Western Indonesia. Meanwhile, Purnamasari et al. (2025) applied the Williamson Index, Klassen's Typology, and the Location Quotient to analyze economic growth and development disparities among regencies and cities in West Nusa Tenggara Province. Nevertheless, research on regional disparities in West Nusa Tenggara can still be further developed by paying greater attention to the characteristics of resource-rich regions, particularly areas dominated by the mining sector such as West Sumbawa. This approach is important because the high per capita GRDP in mining regions can result in a different picture of economic development compared to other regions.

Given these conditions, this study aims to evaluate interregional development disparities in West Nusa Tenggara Province, with a primary focus on West Sumbawa Regency in the context of a resource-rich region. This study uses the Williamson Index to measure the level of development inequality, Klassen's Typology to identify the relative position of each regency/city based on economic growth and per capita GRDP, and the Paired Samples t-test to test differences in development indicators between West Sumbawa Regency and each comparison region based on paired observations in the same year of observation. The integration of these three approaches is expected to provide a more comprehensive picture of whether the economic advantages resulting from the dominance of the mining sector in West Sumbawa Regency are aligned with equitable regional development. This study uses the 2019–2024 period to describe development conditions before the operational impacts of mineral downstream processing facilities/smelters are fully reflected in the region's socioeconomic indicators.

METHODS

Data Types and Sources

This study employs a descriptive-comparative quantitative approach to evaluate interregional development disparities in West Nusa Tenggara (NTB) Province, with West Sumbawa Regency as the primary focus within the context of a resource-rich region. The units of analysis consist of 10 regencies/cities in West Nusa Tenggara Province, namely West Lombok, Central Lombok, East Lombok, North Lombok, Sumbawa, West Sumbawa, Dompu, Bima, Bima City, and Mataram City. The study period covers the years 2019–2024.

The data used are secondary data obtained from publications by the Central Statistics Agency (BPS) of West Nusa Tenggara Province and the regency/city BPS offices. The main

variables used include per capita GRDP, economic growth rate, population size, Human Development Index (HDI), percentage of the population living in poverty, and the open unemployment rate (OUR). This data was used to measure the level of inequality, identify the region's development status, and compare the development characteristics of West Sumbawa Regency with those of other regions.

Data analysis was performed using Microsoft Excel and IBM SPSS Statistics. Microsoft Excel was used for preliminary data analysis and calculation of the Williamson Index, while IBM SPSS Statistics was used to generate scatter plots for the Klassen typology analysis and to test for differences in means using a paired samples t-test.

Williamson Index

The Williamson Index is used to measure the level of economic development inequality among regions based on variations in per capita GRDP, taking into account the population of each region. The higher the index value, the greater the disparity in per capita GRDP among regions.

The formula for the Williamson Index is:

$$IW = \frac{\sqrt{\sum_{i=1}^n (Y_i - \bar{Y})^2 \left(\frac{f_i}{N}\right)}}{\bar{Y}}$$

Notes:

- IW = Williamson Index
- Y_i = GRDP per capita of the i-th regency/city
- $\bar{Y}$ = average GRDP per capita of all regencies/cities included in the analysis in the Province of West Nusa Tenggara
- f_i = population of the i-th regency/city
- N = total population of all regencies/cities included in the analysis
- n = number of regencies/cities analyzed.

The Williamson Index values were then used to describe the level of development inequality among regions during the 2019-2024 period. Calculations were performed for each year of the study to track the evolution of interregional disparities over time. The use of the Williamson Index as a measure of regional inequality was also applied in the studies by Nopiah et al. (2024) and Purnamasari et al. (2025).

Klassen Typology

Tipologi The Klassen typology was used to identify the relative position of each regency/city based on economic growth rates and per capita GRDP. Grouping was performed by comparing the values of each regency/city with the average value of the entire region under analysis.

The Klassen typology classification in this study consists of four quadrants:

Table 1. Klassen's Typological Classification Based on Economic Growth and GRDP per Capita

Quadrant	Economic Growth	GRDP per Capita	Classification
I	$r_i > \bar{r}$	$y_i > \bar{y}$	Developed and rapidly growing regions
II	$r_i < \bar{r}$	$y_i > \bar{y}$	Developed but Stagnant Regions
III	$r_i > \bar{r}$	$y_i < \bar{y}$	Rapidly Developing Regions
IV	$r_i < \bar{r}$	$y_i < \bar{y}$	Relatively Underdeveloped Regions

Source: Adapted from Klassen's Typology, processed by the author.

Notes:

- r_i = economic growth rate of the i-th district/city
- $\bar{r}$ = average economic growth rate of all regencies/cities
- y_i = GRDP per capita of the i-th regency/city
- $\bar{y}$ = average GRDP per capita of all regencies/cities.

The positioning of each regency/city was mapped using a scatter plot with the assistance of IBM SPSS Statistics, with economic growth rate and GRDP per capita serving as the basis for forming the four quadrants. The results of this clustering were used to examine the position of West Sumbawa Regency compared to other regencies and cities.

The Klassen typology approach, combined with the Williamson Index, has been used to identify regional development and disparities by Nopiah et al. (2024), while Purnamasari et al. (2025) applied it in an analysis of regency and city development in West Nusa Tenggara Province.

Paired Samples t-test

The t-test for two means (Paired Samples t-test) is used to identify differences in development indicators between West Sumbawa Regency and each of the comparison regencies/cities in West Nusa Tenggara Province. The Paired Samples t-test is a statistical method used to compare two groups of data that are paired or have a specific relationship. The test is conducted by comparing the mean difference between two paired observations (Ayu Rahmani et al., 2025).

In this study, the relationship between observations was established based on the same observation period. Data from West Sumbawa Regency for a specific year were compared with data from each of the comparison regencies/cities for the same year during the 2019-2024 period. Thus, each pair of regions had six pairs of observations representing the status of development indicators during equivalent time periods.

The analysis was conducted separately for West Sumbawa Regency and each of the nine comparison regencies/cities: West Lombok Regency, Central Lombok Regency, East Lombok Regency, North Lombok Regency, Sumbawa Regency, Dompu Regency, Bima Regency, Bima City, and Mataram City. The analysis was applied to three development

indicators: the Human Development Index (HDI), the open unemployment rate (OUR), and the percentage of the population living in poverty.

Statistically, the paired samples t-test examines whether the mean difference between two paired observations differs significantly from zero. Therefore, the test was conducted based on the difference in indicator values between West Sumbawa Regency and each comparison region in the same year of observation. This approach is consistent with the principle of the paired t-test, which involves analyzing the differences between each pair of observations and then testing the mean of those differences (Rietveld & van Hout, 2017).

The difference for each pair of observations is calculated as follows:

$$D_i = X_i - Y_i$$

Notes :

- D_i : the difference in indicator values for the i-th pair of observations
- X_i : the indicator value for West Sumbawa Regency in year i
- Y_i : the indicator value for the comparison regency/city in year i.

The calculated t-value for each pair of regions is obtained from the mean difference ($\bar{AD}$) and the standard deviation of the differences (sD) for all pairs of observations, using the following formula:

$$t = \frac{\bar{D}}{sD/\sqrt{n}}$$

Notes:

- $\bar{D}$ = mean difference of the observation pairs
- sD = standard deviation of the differences
- n = number of observation pairs ($n = 6$ for each pair of regions, with degrees of freedom $df = n - 1 = 5$).

It should be noted that given the limited number of observation pairs ($n = 6$, $df = 5$) for each test, as well as the conduct of 27 separate t-tests (nine comparison regions $\times$ three indicators) without correction for multiple comparisons, significance results at the 5% level should be interpreted with caution. These limitations are discussed further in the Conclusion section.

The hypotheses used in the tests are as follows:

- H_0 : There is no difference in the mean development indicators between West Sumbawa Regency and the comparison regencies/cities.
- H_1 : There is a difference in the mean development indicators between West Sumbawa Regency and the comparison regencies/cities.

The test was conducted at a significance level of 5% (α). If the Sig. (2-tailed) value is < 0.05 , then H_0 is rejected, indicating a significant difference in means between West Sumbawa Regency and the comparison region. Conversely, if the Sig. (2-tailed) value is ≥ 0.05 , then H_0 is not rejected, meaning there is insufficient evidence to conclude that there is

a significant difference in means. These decision criteria align with the application of the Paired Samples t-Test to test for differences in the means of two paired data sets (Ayu Rahmani et al., 2025).

The Paired Samples t-test is a parametric test that, in its application, considers the distribution of the differences between pairs of observations. Therefore, the interpretation of the test results must take into account the characteristics of the distribution of the differences and the structure of the pairs of observations used (Rietveld & van Hout, 2017).

RESULTS AND DISCUSSION

Analysis of Development Inequality Based on the Williamson Index

The results of the Williamson Index calculations indicate that interregional development inequality in West Nusa Tenggara Province remained relatively high during the 2019-2024 period. In 2019, the Williamson Index value was 0.555, then increased to 0.704 in 2020. This value remained relatively high through 2024, peaking at 0.790 in 2022. Although it declined to 0.726 in 2023, the index value rose again to 0.789 in 2024. Overall, this pattern indicates that development disparities among regencies and cities in West Nusa Tenggara have not shown a consistent decline.

Table 2. Williamson Index of Interregional Development Inequality in West Nusa Tenggara Province, 2019–2024

Year	Index Williamson	Interpretasi
2019	0,555	Moderate inequality
2020	0,704	High inequality
2021	0,701	High inequality
2022	0,790	High inequality
2023	0,726	High inequality
2024	0,789	High inequality

Source: Data from the Central Statistics Agency of West Nusa Tenggara Province and the Central Statistics Agencies of the regencies and cities in West Nusa Tenggara Province, compiled by the author (2026).

The high Williamson Index value reflects significant disparities in per capita GRDP levels among regencies and cities. One of the most striking disparities is found in West Sumbawa Regency, which has a per capita GRDP that is significantly higher than that of most other regions. In 2024, West Sumbawa's per capita GRDP reached Rp235.09 million, while the average per capita GRDP for all regencies and cities in the analysis was only around Rp50.66 million. This disparity is linked to West Sumbawa's economic structure, which is heavily dominated by the mining sector. Thus, the high output value generated by resource-based regions can create significant regional income disparities compared to regions with more diversified economic structures.

This finding aligns with the results of Wang et al. (2025), who noted that the concentration of resource-based industries in specific regions can drive regional economic growth while simultaneously shaping the spatial concentration of economic activities. The findings of Paredes et al. (2025) also indicate that mining-producing regions may have higher income levels, but this advantage is not always accompanied by equitable socioeconomic conditions across regions. Thus, the strong economic performance of mining regions must be interpreted with caution, as an increase in regional output does not automatically indicate equitable development.

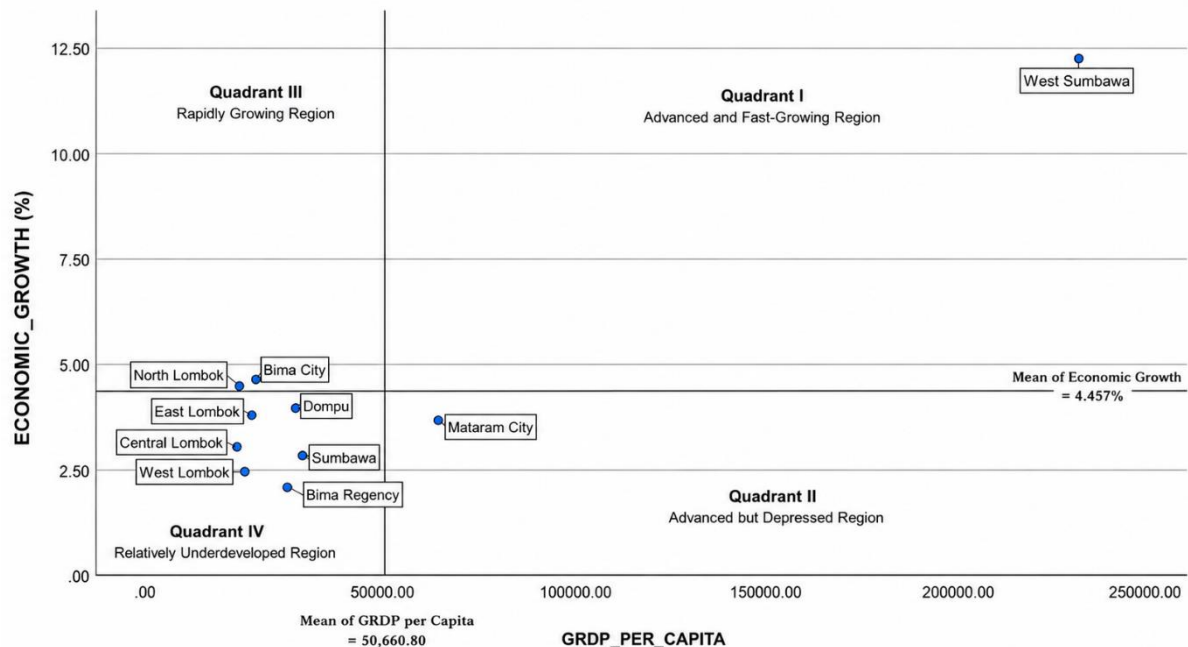
In the context of NTB, this situation becomes even more significant because West Sumbawa has economic characteristics that differ significantly from those of most other regencies and cities. The dominance of the mining sector generates substantial added value and drives per capita GRDP to a much higher level, but at the same time widens the economic gap between West Sumbawa and other regions. This aligns with the “resource curse” perspective proposed by Xu et al. (2024), which posits that dependence on natural resources does not necessarily lead to more balanced regional development. Therefore, West Sumbawa’s high per capita GRDP cannot be directly interpreted as evidence that the entire NTB region enjoys the same level of economic development.

These Williamson Index results are also consistent with the research by Purnamasari et al. (2025) which indicates disparities in economic growth and development among regencies and cities in West Nusa Tenggara Province. Meanwhile, Nopiah et al. (2024) indicate that the Williamson Index can be used to identify the level of regional disparity, but this measure does not yet provide information regarding the developmental status of each region. Therefore, the results of the Williamson Index in this study need to be supplemented with a Klassen typology analysis to determine the relative position of each regency/city based on economic growth and per capita GRDP.

Klassen’s Typology Analysis

Klassen’s typology is used to supplement the results of the Williamson Index by identifying the relative position of each regency/city based on two indicators: economic growth rate and GRDP per capita. Based on the 2024 calculations, the average economic growth rate for regencies and cities in West Nusa Tenggara Province was 4.457%, while the average GRDP per capita was 50,660.80 thousand rupiah. These two values serve as benchmarks for determining the position of each region within the four quadrants of the Klassen Typology.

Figure 1. Scatter Plot of District/City Class Typologies in West Nusa Tenggara Province in 2024



Source: Data analyzed using IBM SPSS Statistics (2026).

Figure 1 shows a fairly clear difference in economic standing among regencies and cities. West Sumbawa Regency is in Quadrant I, as it has an economic growth rate of 12.01% and a per capita GRDP of Rp235,091 thousand, both of which are well above the regional average. In contrast, Mataram City is in Quadrant II, with a per capita GRDP of Rp54,382 thousand which is above average but an economic growth rate of 4.12% that remains below the average of 4.457%. The other eight regencies and cities are in Quadrant IV because their economic growth and per capita GRDP are below average.

Table 3. Classification of Regencies/Cities Based on Klassen's Typology in West Nusa Tenggara Province, 2024

Regency/City	Economic Growth (%)	GDP per Capita (Thousand Rp)	Quadrant	Klasifikasi
West Lombok Regency	3,02	25.044	IV	Relatively Underdeveloped Areas
Central Lombok Regency	3,34	20.368	IV	Relatively Underdeveloped Areas
East Lombok Regency	4,20	18.588	IV	Relatively Underdeveloped Areas
North Lombok Regency	4,28	22.874	IV	Relatively Underdeveloped Areas
West Sumbawa Regency	12,01	235.091	I	Developed and Fast-Growing Regions

Regency/City	Economic Growth (%)	GDP per Capita (Thousand Rp)	Quadrant	Klasifikasi
Sumbawa Regency	3,12	34.509	IV	Relatively Underdeveloped Areas
Dompu Regency	3,62	36.120	IV	Relatively Underdeveloped Areas
Bima Regency	2,82	27.153	IV	Relatively Underdeveloped Areas
Bima City	4,04	32.479	IV	Relatively Underdeveloped Areas
Mataram City	4,12	54.382	II	Developed but Depressed Regions

Source: Data analyzed using IBM SPSS Statistics (2026).

The results in Table 3 show that West Sumbawa Regency is the only region in Quadrant I that is, a developed and rapidly growing area. West Sumbawa has an economic growth rate of 12.01%, nearly three times the average economic growth rate of regencies and cities in NTB, as well as a per capita GRDP of Rp235,091 thousand, which far exceeds the average of Rp50,660.80 thousand. This position highlights West Sumbawa's economic advantage over other regions. This high GRDP per capita and economic growth are linked to West Sumbawa's economic structure, which is heavily dominated by the mining sector.

On the other hand, Mataram City is in Quadrant II a developed but under pressure region. Mataram City's per capita GRDP of Rp54,382 thousand is slightly above the regional average, but its economic growth rate of 4.12% remains lower than the average of 4.457%. This situation indicates that while Mataram City's per capita income is relatively high, its economic growth has not yet surpassed the average for regencies and cities in West Nusa Tenggara in 2024.

Meanwhile, eight regencies and cities are in Quadrant IV relatively underdeveloped areas namely West Lombok, Central Lombok, East Lombok, North Lombok, Sumbawa, Dompu, Bima, and Bima City. All of these regions have per capita GRDP and economic growth rates below the regional average. Interestingly, no regency or city is classified in Quadrant III, or the rapidly developing region. This indicates a rather contrasting development pattern: a concentration of regions with very high economic performance in West Sumbawa, while most other regions remain at a relatively low level.

This pattern reinforces the findings of the previous Williamson Index, which highlighted significant interregional development disparities in NTB. West Sumbawa stands out as the most prominent region, ranking far above the average in terms of both economic growth and per capita GRDP, while the majority of regencies and cities fall into Quadrant IV. This situation indicates that West Sumbawa's strong economic performance cannot be interpreted solely as a reflection of equitable regional development, as this advantage is heavily influenced by its mining-based economic structure.

This finding is consistent with Purnamasari et al. (2025) yang menunjukkan adanya perbedaan posisi perkembangan ekonomi antarkabupaten/kota di NTB berdasarkan

pertumbuhan ekonomi dan PDRB per kapita. Hasil tersebut juga mendukung temuan (Nopiah et al., 2024) that the Klassen Typology can be used in conjunction with the Williamson Index to provide a more comprehensive picture of development status and disparities among regions. Thus, the results of the Klassen Typology in this study reinforce the indication that a region's resource wealth and high economic growth do not automatically imply equitable development at the regional level.

Paired Samples t-test

Table 4. Results of the Paired Samples t-Test Comparing Social Welfare Indicators in West Sumbawa Regency with Those in Other Regencies and Cities in West Nusa Tenggara Province, 2019–2024

No	Indicator Variables	Regional Groups	Mean ($\bar{X}$)	Standard Deviation (SD)	Value t	Sig. (2-tailed)	Results ($\alpha = 0.05$)
1	Human Development Index (HDI)	West Sumbawa Regency	73,00	1,75	23,049	<0.001	There is a significant difference
		West Lombok Regency	69,86	2,06			
2		West Sumbawa Regency	73,00	1,75	34,329	<0.001	There is a significant difference
		Central Lombok Regency	68,04	2,09			
3		West Sumbawa Regency	73,00	1,75	20,523	<0.001	There is a significant difference
		East Lombok Regency	68,15	2,32			
4		West Sumbawa Regency	73,00	1,75	120,825	<0.001	There is a significant difference
		North Lombok Regency	66,01	1,87			
5		West Sumbawa Regency	73,00	1,75	23,230	<0.001	There is a significant difference
		Sumbawa Regency	69,36	2,13			
6		West Sumbawa Regency	73,00	1,75	24,515	<0.001	There is a significant difference
		Dompu Regency	69,61	2,07			
7		West Sumbawa Regency	73,00	1,75	34,329	<0.001	There is a significant difference
		Bima Regency	68,04	2,09			
8		West Sumbawa Regency	73,00	1,75	-22,415	<0.001	There is a significant difference
		Bima City	76,95	1,33			
9		West Sumbawa Regency	73,00	1,75	-28,946	<0.001	There is a significant difference
		Mataram City	79,92	1,17			
10	Open	West Sumbawa	4,59	1,05	3,113	0,026	There is a

No	Indicator Variables	Regional Groups	Mean ($\bar{X}$)	Standard Deviation (SD)	Value t	Sig. (2-tailed)	Results ($\alpha = 0.05$)
11	Unemployment Rate (TPT)	Regency					significant difference
		West Lombok Regency	3,58	0,68			
		West Sumbawa Regency	4,59	1,05	4,021	0,010	There is a significant difference
		Central Lombok Regency	2,80	0,53			
		West Sumbawa Regency	4,59	1,05	4,496	0,006	There is a significant difference
		East Lombok Regency	2,80	0,90			
		West Sumbawa Regency	4,59	1,05	6,378	0,001	There is a significant difference
		North Lombok Regency	1,73	0,85			
		West Sumbawa Regency	4,59	1,05	4,597	0,006	There is a significant difference
		Sumbawa Regency	2,99	0,65			
		West Sumbawa Regency	4,59	1,05	5,352	0,003	There is a significant difference
		Dompu Regency	2,82	0,35			
16		West Sumbawa Regency	4,59	1,05	5,267	0,003	There is a significant difference
		Bima Regency	2,31	0,48			
17		West Sumbawa Regency	4,59	1,05	2,486	0,055	There is no significant difference
		Bima City	3,77	0,41			
18		West Sumbawa Regency	4,59	1,05	-2,590	0,049	There is a significant difference
		Mataram City	5,49	0,79			
19	Percentage of Poor Population (%)	West Sumbawa Regency	13,16	0,56	-6,359	0,003	There is a significant difference
		West Lombok Regency	13,94	0,89			
20		West Sumbawa Regency	13,16	0,56	1,905	0,115	There is no significant difference
		Central Lombok Regency	13,07	0,57			
21		West Sumbawa Regency	13,16	0,56	-17,438	<0.001	There is a significant difference
		East Lombok Regency	15,34	0,54			
22		West Sumbawa Regency	13,16	0,56	-28,544	<0.001	There is a significant difference
		North Lombok Regency	26,46	1,68			

No	Indicator Variables	Regional Groups	Mean ($\bar{X}$)	Standard Deviation (SD)	Value t	Sig. (2-tailed)	Results ($\alpha = 0.05$)
23		West Sumbawa Regency	13,16	0,56	-3,698	0,014	There is a significant difference
		Sumbawa Regency	13,62	0,41			
24		West Sumbawa Regency	13,16	0,56	4,754	0,005	There is a significant difference
		Dompu Regency	12,27	0,38			
25		West Sumbawa Regency	13,16	0,56	-12,371	<0.001	There is a significant difference
		Bima Regency	14,48	0,35			
26		West Sumbawa Regency	13,16	0,56	24,349	<0.001	There is a significant difference
		Bima City	8,57	0,29			
27		West Sumbawa Regency	13,16	0,56	35,006	<0.001	There is a significant difference
		Mataram City	8,55	0,31			

Source: Data from BPS for West Nusa Tenggara Province and BPS Regencies/Cities in West Nusa Tenggara Province, processed by the author using IBM SPSS Statistics. (2026).

Results *Paired Samples t-test* used to identify differences in development indicators between West Sumbawa Regency and each comparative district/city during the 2019–2024 period. The test was carried out on three indicators, namely the Human Development Index (HDI), the Open Unemployment Rate (TPT), and the percentage of the poor population. Interpretation is done based on the value *Sig. (2-tailed)* at a significance level of 5%.

In the HDI indicator, all nine regional pairs showed significant differences with West Sumbawa Regency ($p < 0.05$). The average HDI of West Sumbawa during the observation period was 73.00, higher than West Lombok Regency (69.86), Central Lombok (68.04), East Lombok (68.15), North Lombok (66.01), Sumbawa (69.36), Dompu (69.61), and Bima Regency (68.04). On the other hand, the average HDI of West Sumbawa is lower than that of Bima City (76.95) and Mataram City (79.92). These results show that there is a significant difference in average HDI between West Sumbawa and all comparative regions.

In the TPT indicator, eight of the nine regional pairs showed significant differences. The average TPT of West Sumbawa is 4.59%, higher than West Lombok Regency (3.58%), Central Lombok (2.80%), East Lombok (2.80%), North Lombok (1.73%), Sumbawa (2.99%), Dompu (2.82%), and Bima Regency (2.31%). Meanwhile, the average TPT of West Sumbawa is lower than that of Mataram City (5.49%). The difference in TPT between West Sumbawa and Bima City was not statistically significant, with a value of $p = 0.055$. Thus, although there is a tendency for differences in TPT between the two regions, statistical evidence at the level of 5% is not enough to state that there is a significant difference in average.

In the indicator of the percentage of poor population, eight of the nine regional pairs showed significant differences. The average percentage of poor people in West Sumbawa during the observation period was 13.16%. This value is lower than West Lombok (13.94%), East Lombok (15.34%), North Lombok (26.46%), Sumbawa (13.62%), and Bima Regency (14.48%). On the other hand, the average poverty in West Sumbawa is higher than that of Dompu (12.27%), Bima City (8.57%), and Mataram City (8.55%). Meanwhile, the difference between West Sumbawa and Central Lombok was not statistically significant, with a p value = 0.115.

The findings in Table 4 become more meaningful when associated with the economic structure of West Sumbawa Regency. The results of the previous analysis showed that West Sumbawa has a very strong economic position compared to most districts/cities in West Nusa Tenggara Province. This advantage is mainly related to the dominance of the mining and quarrying sector in the regional economic structure. In 2024, the sector will contribute around 84.61% to West Sumbawa's GDP, while regional economic growth will reach 12.01% and GDP per capita will reach IDR 235.09 million. This condition shows that mining activities are the main source of regional economic output.

This economic advantage is also reflected in the results of the Klassen Typology which places West Sumbawa in Quadrant I, which is an area with economic growth and GDP per capita above the average of West Nusa Tenggara Province. Thus, macroeconomically, West Sumbawa can be categorized as an area with relatively superior economic performance. However, these results need to be distinguished from the achievements of social development because the high GDP per capita does not automatically indicate that all the benefits of economic activities have been distributed equally to the community.

This situation illustrates what this study refers to as the “paradox of abundance.” This paradox does not imply that the presence of natural resources always results in negative impacts. In fact, research on Indonesia indicates that dependence on the mining sector can make a positive contribution to regional per capita income growth. Hilmawan & Clark. (2019), for example, found that mining dependence at the district level in Indonesia is positively correlated with real per capita income. Thus, the high per capita GRDP in West Sumbawa is one of the tangible benefits of the presence of mineral resources and mining activities.

However, high economic growth does not automatically guarantee equitable distribution of development benefits. The results of the *Paired Samples t-test* give an indication of the existence of this misalignment. West Sumbawa has a very high economic position, but the average TPT of 4.59% is still higher than seven out of nine comparison regions. In fact, the difference with Bima City is not statistically significant. This shows that the amount of added value generated by the mining sector has not been automatically reflected in the advantages of labor absorption compared to other regions.

The same pattern can be seen in poverty indicators. Although West Sumbawa has a much higher GDP per capita, the average percentage of the poor population still reaches 13.16%. This value is indeed lower than several districts such as North Lombok and East Lombok, but it is still higher than Dompu, Bima City, and Mataram City. In addition, the difference between West Sumbawa and Central Lombok is not significant. These findings show that regional economic excellence has not completely resulted in a uniform pattern of excellence in community welfare indicators.

This phenomenon is consistent with the characteristics of an enclave economy a condition in which a region's primary economic activities are heavily dependent on a specific sector, particularly the extractive sector, but in which that sector's linkages to the local economy and the process of economic transformation are not yet sufficiently strong. Recent literature has even specifically identified the characteristics of an enclave economy in West Sumbawa Regency, pointing to high dependence on the mining sector and weak sectoral diversification as one of the region's structural economic issues (Amala & Aheruddin, 2026).

This indication becomes even more relevant when the results of this study show that there is a difference between the advantages of economic output and several welfare indicators. The mining sector is capable of generating very high GDP per capita, but the mechanisms of transmitting its benefits to the job market and poverty reduction do not show the same strong pattern. In other words, the sectors that are the main motor for the formation of GDP do not necessarily have the same ability to create wide job opportunities or improve the welfare of all community groups.

These findings are also consistent with studies on the socioeconomic conditions of communities surrounding the West Sumbawa mining area. A SMERU study shows that the significant contribution of the mining and quarrying sector in West Sumbawa goes hand in hand with persistent issues of poverty and inequality (Indrio et al., 2024). Another study on rural communities in the West Sumbawa gold mining area also identified various obstacles in community empowerment programs, including institutional limitations, a lack of managerial resources, and insufficient private-sector support (Ali et al., 2019).

However, the results of this study cannot be used to definitively conclude that West Sumbawa has experienced the "resource curse." This is important because empirical evidence regarding the relationship between natural resources and development in Indonesia does not always indicate negative impacts. (Hilmawan & Clark, 2019) actually found no evidence of the resource curse at the regency level in Indonesia and identified a positive relationship between dependence on mining and per capita income. Therefore, the findings of this study are more appropriately understood as an indication of an imbalance between the generation of economic output and the equitable distribution of socioeconomic benefits, rather than as causal evidence of the resource curse.

cio-economic benefits, rather than as causal evidence regarding *the resource curse*.

In this context, HDI provides a more positive picture. The results showed that the HDI of West Sumbawa was significantly different from all comparison areas and on average higher than the seven comparison districts. This shows that the economic capacity of the region has gone hand in hand with the achievement of human development which is relatively better than most districts. Thus, the development pattern of West Sumbawa cannot be described as a failure to convert resource wealth into overall welfare. On the other hand, there are positive development outcomes in the human development dimension, but these economic benefits have not fully shown the same pattern in the dimensions of employment opportunities and poverty.

Thus, the results of Williamson, Klassen Typology, and *Paired Samples t-test* form a unified finding. The Williamson Index and the Klassen Typology show the economic advantages of West Sumbawa, while the results of the different tests show that these advantages do not fully translate into uniform advantages in all welfare indicators. This condition shows a paradox between the amount of economic capacity generated by mineral resources and the distribution of development benefits in the socio-economic dimension.

Consequently, West Sumbawa's development strategy cannot rely solely on sustaining growth in the mining sector. It is necessary to strengthen local economic linkages, diversify productive sectors, improve the quality of the workforce, and expand employment opportunities so that the value added generated by the extractive sector can have a broader multiplier effect on the community. The literature on mining regions also indicates that weak local linkages and a lack of diversification are key characteristics that can perpetuate an enclave economy (Amala & Aheruddin, 2026).

Thus, the paradox of abundance in West Sumbawa Regency does not lie in the mining sector's inability to generate economic growth, but rather in the fact that the relationship between economic output creation, labor absorption, and poverty reduction is not yet fully balanced. Therefore, the term "indications of an enclave economy" is more appropriate than stating that West Sumbawa is definitively an enclave economy. The evidence obtained in this study shows a pattern consistent with these characteristics, but further verification requires an analysis of intersectoral linkages, the distribution of value added, local labor absorption, or an input-output analysis.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

This study aimed to evaluate inter-regional development disparities in West Nusa Tenggara (NTB) Province, with West Sumbawa Regency (KSB) as the focus, given its economic structure that is highly dependent on the mining sector. Based on the Williamson Index, Klassen Typology, and Paired Samples t-test analyses over the 2019–2024 period, inter-regional development disparity in NTB Province remains high and persistent, with the Williamson Index ranging between 0.555 and 0.790 throughout the observation period

without a consistent downward trend. The Klassen Typology results reinforce this finding: KSB was the only region classified in Quadrant I (advanced and fast-growing), recording 12.01% economic growth and a GRDP per capita of Rp235.09 million in 2024, while eight of the nine other regencies/cities fell into Quadrant IV and none reached Quadrant III.

The Paired Samples t-test results indicate that KSB's economic advantage was not fully matched by uniform advantages in social welfare indicators. Its Human Development Index (HDI) was significantly higher than seven of nine comparison regions, yet its unemployment rate and poverty rate did not show a consistent advantage over other regions, and were not even significantly different from Kota Bima (unemployment) and Lombok Tengah Regency (poverty). These findings indicate the presence of an abundance paradox and a pattern consistent with the characteristics of an enclave economy, in which the high value added generated by the mining sector has not been fully transmitted into stronger labor absorption and poverty reduction compared to other regions in NTB. Accordingly, this study extends the understanding that the macroeconomic performance of a resource-rich region needs to be assessed with caution, since economic growth and GRDP per capita advantages cannot be directly interpreted as evidence of equitable development.

This study is subject to several limitations. First, it relies on secondary data at the regency/city level and does not capture variation in socioeconomic conditions at the household level around mining areas. Second, the descriptive-comparative approach means the findings cannot establish causal relationships, including the definitive presence of a resource curse in KSB. Third, the 2019-2024 study period precedes the full impact of the mineral downstream/smelter facility, so findings cannot yet be generalized to later periods. Fourth, each Paired Samples t-test relied on only six observation pairs ($n = 6$, $df = 5$) and was conducted 27 times separately without correction for multiple comparisons, and this study did not report effect sizes so statistical significance should be interpreted alongside an assessment of practical magnitude.

Recommendations

Based on these findings and limitations, further research is recommended to employ intersectoral linkage or input-output analysis to more thoroughly examine indications of an enclave economy in KSB, including measuring the multiplier effect of the mining sector on the local economy. Future studies are also encouraged to incorporate household-level microdata around mining areas to capture distributional impacts in greater detail, and to extend the observation period to cover conditions after the downstream/smelter facility becomes fully operational, in order to determine whether the disparity pattern identified is temporary or permanent. In addition, applying formal econometric approaches, such as panel regression models to test the resource curse hypothesis, could provide stronger causal evidence than the descriptive-comparative approach used here, alongside corrections for multiple comparisons, reported effect sizes, and normality testing of paired differences. From a policy perspective, these findings support strengthening local economic linkages,

diversifying productive sectors, and improving the quality and absorption of the local workforce, so that the benefits of natural resource-based economic growth in KSB can be more equitably felt by the community.

REFERENCE

- Ali, I. I., Sutarna, I. T., Abdullah, I., Kamaluddin, K., & Mas'ad, M. (2019). Inhibiting And Supporting Factors Of Village-Owned Enterprises In Gold Mining Areas In West Sumbawa. *Sociohumanities*, 21(3). <https://doi.org/10.24198/Sosiohumaniora.V21i3.23464>
- Amala, F., & Aheruddin, A. (2026). Analysis Of The Economic Structure Of Mining-Based Regions: Indications Of Enclave Economy In West Sumbawa Regency. *Journal Of Economics Research And Policy Studies*, 6(2), 355–368. <https://doi.org/10.53088/Jerps.V6i2.3130>
- Ayu Rahmani, D., Risnawati, & Fikri Hamdani, M. (2025). T-Student Test Two Paired Samples (Paired Sample T-Test). *Indonesian Journal Of Education Research*, 4(2).
- Bps West Sumbawa Regency. (2025). *General Explanation Of The General Explanation Of The Gross Regional Domestic Product Of West Sumbawa Regency By Business Field 2021-2025*.
- Bps West Sumbawa Regency. (2026). *Growth Rate Of Gross Regional Domestic Product On The Basis Of Constant Prices 2010 By Business Field In West Sumbawa Regency (Percent), 2024*.
- Danneaux, A., Le Gallic, T., Lefèvre, J., Vishwanathan, S. S., & He, G. (2026). Coal Mine Workers In The Climate Transition: Subnational Vulnerability Disparities In China And India. *Environmental Research Letters*, 21(3), 034026. <https://doi.org/10.1088/1748-9326/Ae3fb3>
- Hilmawan, R., & Clark, J. (2019). An Investigation Of The Resource Curse In Indonesia. *Resources Policy*, 64. <https://doi.org/10.1016/J.Resourpol.2019.101483>
- Iacob, S. E., Badea, L., Șerban-Oprescu, G. L., Hrebenciuc, A., Stanef, M. R., & Nastasia, S. (2025). Bridging The Regional Divide - The Impact Of Fdi On Economic Inequality. *Amfiteatru Economic*, 27(19). <https://doi.org/10.24818/Ea/2025/S19/11350>
- Indrio, Veto Tyas, Ana Rosidha Tamyis, Wandira Larasati, & Sylvia Andriyani Kusumandari. (2024). *Preliminary Assessment: Socioeconomic Conditions Of Mining Circle Communities In West Sumbawa Regency*. Research Report No. 1/2024. Jakarta: The Smeru Research Institute. https://smeru.or.id/publication-id/asesmen-pendahuluan-kondisi-sosioekonomi-komunitas-lingkar-tambang-di-kabupaten?utm_source=chatgpt.com
- Masduki, U., Rindayati, W., & Mulatsih, S. (2022). How Can Quality Regional Spending Reduce Poverty And Improve Human Development Index? *Journal Of Asian Economics*, 82. <https://doi.org/10.1016/J.Asieco.2022.101515>

- Mazorodze, B. T. (2025). Youth Unemployment And Illegal Mining In South Africa. *Cogent Social Sciences*, 11(1). <https://doi.org/10.1080/23311886.2025.2588029>
- Nopiah, R., Barika, B., & Septriani, S. (2024). Mapping The Regional Development Disparities In Western Indonesia: An Integrative Approach Of Williamson Index And Klassen Typology. *Socio-Economic And Humanistic Aspects For Township And Industry*, 2(4). <https://doi.org/10.59535/Sehati.V2i4.356>
- Paredes, R. P., Arpi, R., Vilca Huayta, O. A., Chavez Flores, R., Sucari Turpo, H., Alfaro-Alejo, R., Huamani, A., & Saravia, H. (2025). Impact Of Mining On Socioeconomic Status In Puno, Peru. *Sustainability (Switzerland)*, 17(22). <https://doi.org/10.3390/Su17229951>
- Purnamasari, N. A., Hadijati, M., Hidayati, L., Saputra, D., & Graha, S. S. S. (2025). Analysis Of Economic Growth And Development Inequality Among Districts/Cities In West Nusa Tenggara Province Using The Williamson Index, Klassen Typology, And Location Quotient Methods. *Variance: Journal Of Statistics And Its Applications*, 7(1), 93–104. <https://doi.org/10.30598/Variancevol7iss1page93-104>
- Rietveld, T., & Van Hout, R. (2017). The Paired T Test And Beyond: Recommendations For Testing The Central Tendencies Of Two Paired Samples In Research On Speech, Language And Hearing Pathology. *Journal Of Communication Disorders*, 69. <https://doi.org/10.1016/J.Jcomdis.2017.07.002>
- Seti, T. M., Christian, M., & Jiba, P. (2025). Determinants Of Provincial Economic Growth Disparities In South Africa Post-Democracy. *African Journal Of Business And Economic Research*, 20(3). <https://doi.org/10.31920/1750-4562/2025/V20n3a4>
- Wang, Z., Lu, Y., Zhu, C., & Wang, J. (2025). How Resource Industry Spatial Agglomeration Affects Regional Economic Growth: Evidence From China. *Chinese Journal Of Population Resources And Environment*, 23(4). <https://doi.org/10.1016/J.Cjpre.2025.10.013>
- Xu, X., Huang, R., & Cai, H. (2024). The Impacts On Regional Development And “Resource Curse” By Energy Substitution Policy: Verification From China. *Energies*, 17(17). <https://doi.org/10.3390/En17174394>
- Zhang, S., Sun, Y., Zhang, Y., Chen, X., Luo, Z., & Chen, F. (2025). Assessing The Status Of Sustainable Development Goals In Global Mining Area. *Land*, 14(12). <https://doi.org/10.3390/Land14122355>