

Analysis of the Impact of the Mining Sector on Regional Competitiveness in West Nusa Tenggara Province

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Abstract

The existence of mineral and coal resources in an area is often considered an advantage that can increase the competitiveness of the area. However, regions with large mining sector GDP do not always show high economic growth. For example, West Sumbawa Regency, which has a significant mining sector, only recorded an average economic growth rate of 3.19% between 2010 and 2023, placing it in the second lowest position in West Nusa Tenggara Province (NTB). This research aims to analyze the economic structure and sector shifts in each district in NTB using Location Quotient (LQ) and Shift Share analysis, as well as to form a Regional Competitiveness Index model with a Geographically and Temporally Weighted Regression (GTWR) approach. The results of the study show that the majority of districts in NTB have a base sector in the agricultural sector, except for West Lombok Regency in the transportation sector and West Sumbawa Regency in the mining sector. Sector shifts show different potentials, but the mining sector in areas that have not been massively exploited still has opportunities to be developed. The Regional Competitiveness Index model shows that the influence of the mining sector on competitiveness is not significant between regions with high and low mining sectors. In conclusion, excessive dependence on the mining sector can hinder economic growth and reduce regional competitiveness. It is important to maintain a balance between the development of the mining sector and other more sustainable sectors for stable and diversified economic growth.

INTRODUCTION

Mineral and coal resources are valuable assets that can provide benefits for a region. The use of coal as the main energy source must be optimized, while minerals, including associated minerals, play a role as industrial raw materials in various sectors such as metals, chemicals, pharmaceuticals, construction, automotive, and defence (Igogo et al., 2021; Zhang et al., 2023). With the existing mineral and coal potential, the area has the opportunity to expand its comparative advantage and increase competitiveness compared to other regions (Danja & Wang, 2024; Diana et al., 2015; Thibeault et al., 2023).

Competitiveness, according to Fedulova et al., (2019), is defined as productivity produced by labor or the ability of an entity, be it a company, region, or state, to increase income by utilizing labor and resources productively and sustainably. This concept is also regulated in the Regulation of the Minister of Home Affairs of the Republic of Indonesia No. 54 of 2010, which states that regional competitiveness is the ability of the regional economy to achieve high and sustainable economic growth, and remains open to competition with

other provinces both domestically and internationally (Khan et al., 2018; Raszkowski & Bartniczak, 2018).

Research related to regional competitiveness has been conducted by various parties, including Dijkstra et al. (2011) who compiled the regional competitiveness index in Europe based on three main pillars: the basic pillar, the efficiency pillar, and the innovation pillar. These pillars are given different weights according to regional economic conditions. In Indonesia, BRIN (2019) developed a Regional Competitiveness Index (IDSD) using four aspects and twelve pillars, which are applied in all provinces and districts/cities without paying attention to the specific characteristics of the region. West Nusa Tenggara Province, for example, has districts with different mining potentials, such as West Sumbawa Regency which excels in this sector, but does not necessarily have high competitiveness (Erb, 2016; Iskandar et al., 2024; Utami & Salma, 2026).

Despite the widespread assumption that regions with large mining sector outputs possess high economic competitiveness, empirical evidence from NTB shows a paradox. West Sumbawa Regency, which has a significant mining sector, only recorded an average economic growth rate of 3.19% between 2010 and 2023 placing it in the second lowest position in NTB. This indicates a disconnect between mining sector dominance and regional competitiveness. Moreover, previous competitiveness indices, such as those developed by BRIN, fail to account for spatial and temporal heterogeneity, as well as the unique characteristics of resource-dependent regions. Therefore, a gap exists in understanding how the mining sector truly affects regional competitiveness when spatial and temporal dimensions are considered (Atienza et al., 2021; Breul & Atienza, 2022; Wang et al 2019). This study is urgent for several reasons. First, without a clear understanding of the mining sector's actual contribution to competitiveness, local governments may continue to over-invest in extractive industries at the expense of more sustainable sectors. Second, the risk of resource curse where resource-rich regions experience slower economic growth is real in NTB, particularly in West Sumbawa. Third, the absence of a region-specific competitiveness index that incorporates spatial and temporal dynamics limits the effectiveness of economic policy making. Addressing this urgency is critical to preventing long-term economic stagnation and ensuring equitable development across NTB (Dorasamy, 2025; Ramadhan, 2025).

The novelty of this research lies in three aspects. First, it integrates Location Quotient (LQ) and Shift Share analyses with a Geographically and Temporally Weighted Regression (GTWR) approach to model regional competitiveness (Hu et al., 2022; T. Wang & Liang, 2025). Second, unlike previous studies that apply a one-size-fits-all index, this study develops a competitiveness model that accounts for spatial and temporal heterogeneity across districts in NTB (Imam, 2022; Lincoln, 2020; Sani et al., 2026). Third, this research explicitly examines the non-linear relationship between mining sector dominance and regional competitiveness, providing new insights into the resource curse phenomenon at the district level in Indonesia.

This research aims to analyze the economic structure and sectoral shifts in each district in West Nusa Tenggara (NTB) using Location Quotient (LQ) and Shift Share analysis, to form a Regional Competitiveness Index model through a Geographically and Temporally Weighted Regression (GTWR) approach, and to examine whether the mining sector

significantly influences regional competitiveness compared to other sectors such as agriculture and transportation. Theoretically, this research enriches the literature on regional competitiveness by incorporating spatial and temporal dimensions into the analysis of resource-based economies and provides empirical evidence on the resource curse hypothesis at the sub-provincial level. Practically, the findings can guide local governments in NTB to design more balanced economic development strategies, reduce over-dependence on the mining sector, and identify alternative base sectors that can enhance sustainable regional competitiveness.

METHOD

This research was quantitative research with a descriptive and associative approach. This research uses secondary data obtained from the Central Statistics Agency (BPS) and various other official sources, covering the period from 2015 to 2023. The data used includes the Gross Regional Domestic Product (GDP) on the basis of Constant Prices (ADHK) in 2010 in West Nusa Tenggara Province and each district in West Nusa Tenggara Province. In addition, data related to the regional competitiveness index, which consists of the basic pillar, the efficiency pillar, and the innovation pillar, were also used for this analysis.

Location Quotient (LQ) Analysis

The Location Quotient (LQ) method is used to assess the specialization of the economic sector at the Regency/City level compared to the Provincial level. The LQ formula compares the role of certain sectors in the Regency/City GDP with the same role at the Provincial level. The results of the LQ calculation can classify economic sectors into base or non-base sectors, which helps in regional growth evaluation and economic policy planning.

Shift Share Analysis

Shift Share analysis is applied to identify the factors that cause changes in economic structure that contribute to regional growth. This method includes the calculation of Regional Potential, Proportional Share, and Differential Shift, which together provide an overview of the dynamics of sectoral growth in the regions compared to the Provincial level.

GTWR Modelling

Modelling using the Geographically and Temporally Weighted Regression (GTWR) method was used to identify spatial and temporal heterogeneity in the data. GTWR is a development of the GWR model that considers the spatial and temporal proximity of each observation point. GTWR parameter estimation uses a weighting matrix that integrates spatial-temporal information, so as to provide a more accurate estimate of the influence of research variables on regional competitiveness.

Table 1. GWTR Modelling Variables

Code	Variable	Year	Source
Y	Regional Competitiveness Index (IDSD)	2015-20223	Processing Data
X1	Mining Sector GDP (MINE)	2015-2023	BPS Regency/City
X2	Human Development Index (HDI)	2015-2023	BPS NTB Province

Code	Variable	Year	Source
X3	Investment Realization (INVEST)	2015-2023	NTB One Data
X4	Number of IUPs (IUPs)	2015-2023	NTB One Data
X5	GDP in the Agricultural Sector (AGRO)	2015-2023	BPS Regency/City

Source: Processed secondary data, 2026

RESULTS AND DISCUSSION

Location Quotient (LQ) Analysis

Location Quotient (LQ) analysis conducted in eight districts in West Nusa Tenggara (NTB) in 2023 shows the variation of base sectors that contribute to the economy of their respective regions. East Lombok, North Lombok, West Lombok, and Central Lombok counties have several significant base sectors such as agriculture, processing industry, and health services, which show an important role in supporting local economic needs. On the other hand, West Sumbawa Regency is highly dependent on the mining sector as the only base sector, which shows a high economic dependence on the sector. Sumbawa and Bima Regencies have various diverse base sectors, but there are several sectors such as mining and processing industries in Sumbawa that are classified as non-base sectors, showing variations in the economic structure in this region.

Shift Share Analysis

The Shift Share analysis provides an overview of the shift in economic structure in these districts during the 2015-2023 period. In East Lombok Regency, almost all sectors show great potential for growth except for the processing industry sector, which has a lower Regional Potential (PR) value. North Lombok Regency stands out with sectors such as agriculture, electricity procurement, and government administration that have the potential to drive economic growth, although most other sectors are less competitive. In West Lombok Regency, the majority of sectors experienced relatively rapid growth, but only four sectors had high competitiveness.

Central Lombok and West Sumbawa regencies show different dynamics. In Central Lombok, the majority of sectors show rapid growth potential, although some sectors such as mining and water procurement do not show significant potential. West Sumbawa Regency, although dominated by the mining sector, does not show great growth potential in the sector, with other sectors such as agriculture and corporate services having more potential. In Sumbawa and Bima Regencies, the majority of sectors show potential to drive rapid economic growth, although there are some sectors that do not show great potential, such as the mining sector in Sumbawa and the construction and government administration sectors in Bima. Dompu Regency also shows the majority of sectors with significant growth potential, especially in the agricultural and processing industry sectors which have strong competitiveness at the provincial level.

Overview of Regional Competitiveness Conditions (IDSD) and Descriptive Statistical Analysis

This study analyzes the Regional Competitiveness Index (IDSD) in West Nusa Tenggara Province (NTB) using three main pillars: the basic pillar, the efficiency pillar, and

the innovation pillar. The basic pillars include the quality of institutions, infrastructure, and basic health and education, while the efficiency pillar involves the efficiency of the market of goods, labor, and market size. The innovation pillar focuses on technology readiness, research quality, and business sophistication. Descriptive statistical data show significant variation in IDSD between districts/cities in NTB from 2015 to 2023, reflecting differences in the distribution of these pillar indicators.

The results of multiple linear regression showed that most independent variables such as Human Development Index (HDI), Investment, and mining business permits (IUP) had a significant influence on IDSD. However, the mining (MINE) and investment (INVEST) variables did not show significant influence. The R-Square value of 0.7727 indicates that this model is able to explain 77.27% of the variability in the IDSD, while the rest is influenced by other variables that are not included in the model. This emphasizes the importance of a multidimensional approach in understanding regional competitiveness in NTB.

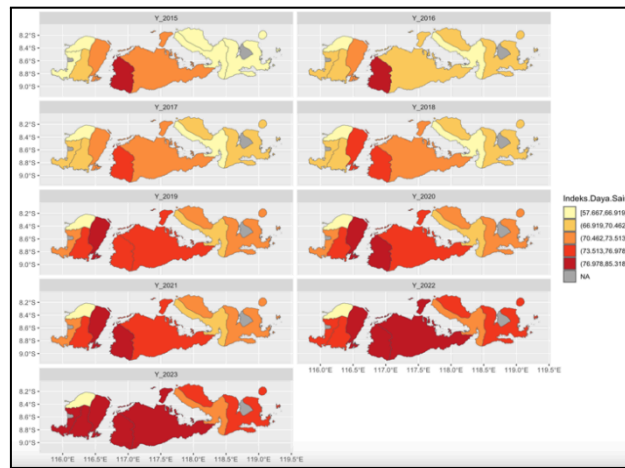


Figure 1. Mapping of Regional Competitiveness Index in 2015-2023
 Source: GTWR analysis and spatial mapping results, 2026

Multicollinearity Test

The multicollinearity test was performed to detect the presence of a linear relationship between independent variables in the model. The results of the test with the VIF method showed that there were no variables with a VIF value of more than 5, so that the model was free from multicollinearity problems.

Table 2. Multicollinearity Test Results

Independent Variables	VIVID
MINE	1.969940
IPM	1.622923
INVEST	1.970779
IUP	1.205613
AGRO	1.286651

Source: Calculation results using statistical software (EViews/Python/R), 2026

GTWR Analysis and Modelling

The GTWR analysis involves spatial and temporal diversity tests. The Breusch-Pagan test shows the presence of spatial diversity in the model. In addition, the boxplot visualization shows temporal diversity in the Regional Competitiveness Index during 2015-2023, indicating spatial and temporal effects.

GTWR modelling is done by selecting the right kernel function. The adaptive Bisquare kernel function was chosen because it has lower AIC and RMSE values and higher R-Square than other kernel functions. The GTWR model is then estimated using this kernel function.

Table 3. Summary of the estimated value of the GTWR model parameters

Parameter Estimation	Minimum	Q_1	Median	Q_3	Maximum
$\hat{\beta}_0$	-4.487	1.250	9.191	25.488	31.422
$\hat{\beta}_1$	0.036	0.066	0.093	0.110	0.148
$\hat{\beta}_2$	0.390	0.493	0.769	0.904	1.007
$\hat{\beta}_3$	-0.137	-0.038	0.006	0.062	0.228
$\hat{\beta}_4$	0.024	0.030	0.049	0.064	0.088
$\hat{\beta}_5$	0.104	0.112	0.123	0.151	0.170

Source: GTWR model estimate results, 2026

Best Model Selection

The GTWR model was selected as the best model based on the comparison with the Multiple Linear Regression model. GTWR shows higher R^2 and Adjusted R^2 values, as well as lower AIC and RMSE values, indicating better performance in explaining the variability of the Regional Competitiveness Index.

Parameter Estimation

The parameter estimation shows the distribution of coefficient values from several main variables in 2015-2023 in districts/cities in NTB. The MINE variable has a fairly high influence on the increase in the Regional Competitiveness Index, especially in 2015 and 2016. The HDI variable tends to have a low influence until 2017, but its influence increased significantly from 2018. The INVEST variable has a diverse influence, with its peak in 2020. The IUP variable showed a low influence at the beginning of the period, but increased since 2021. The AGRO variable had a high influence in 2015 and 2016, but declined over time.

In 2015-2023, the variables MINE, IPM, IUP, and AGRO consistently had a significant effect on the Regional Competitiveness Index in most districts/cities, with certain variations seen in 2020.

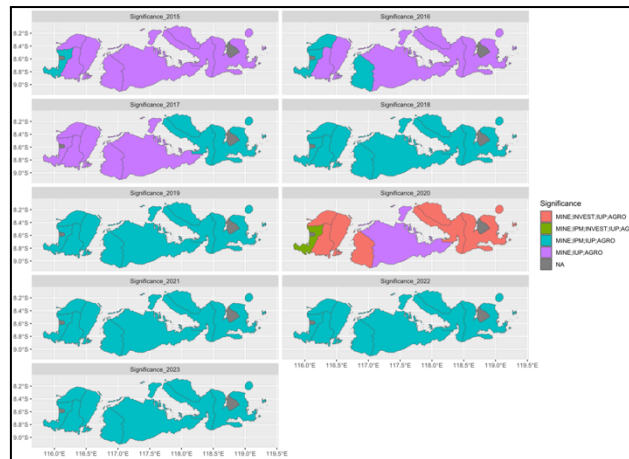


Figure 2. Significance of Variables at a real level of 5%
 Source: GTWR parameter significance test results, 2026

The results of the analysis show that the majority of districts in West Nusa Tenggara Province (NTB) have a base sector in the fields of agriculture, forestry, and fisheries, except for West Sumbawa and West Lombok Regencies. West Lombok Regency has a transportation sector as its base sector, supported by the existence of two large ports, while West Sumbawa Regency only depends on the mining and quarrying sectors. This dependence poses significant risks, especially related to resource curses, where dependence on unsustainable resources can hinder the growth of other sectors. Shift Share analysis shows that most sectors in NTB district are still experiencing progressive growth, although some sectors in certain districts show negative values, such as the financial services sector in West Sumbawa and the construction sector in West Lombok. In particular, the low value of differential shifts in West Sumbawa shows that the mining sector, although dominant, is not able to make a significant contribution to regional economic growth. This is further clarified through the regional competitiveness index which shows fluctuations in value in West Sumbawa, even though this area has a large mining sector. Reliance on one key sector limits the region's ability to improve overall competitiveness, while low performance in the labour and innovation sectors further indicates a resource curse. The Geographically and Temporally Weighted Regression (GTWR) approach reveals that although the mining sector has an effect on regional competitiveness, production fluctuations and excessive dependence on this sector are a major challenge, especially for West Sumbawa. Therefore, it is necessary to manage natural resources wisely and diversify the economy so that this region does not depend only on the non-renewable sector, in order to ensure the sustainability of economic growth and increase the competitiveness of the region in the future.

CONCLUSION

The results of the analysis show that the agriculture, forestry, and fisheries sectors remain the main base sectors in most districts in NTB, except in West Sumbawa and West Lombok Regency which are more dependent on the mining and transportation sectors. Although the mining sector has the potential to be developed, over-reliance on this sector, as seen in West Sumbawa, can hinder economic growth if other sectors are neglected. Shift

share analysis reveals that although the mining sector in NTB can have a positive impact on economic growth, uncontrolled exploitation actually reduces growth potential, as happened in West Sumbawa. In addition, the results of the GTWR analysis show that although the mining sector contributes to regional competitiveness, its influence is not significantly higher than that of regions with a base of other sectors. For further research, it is recommended that a more comprehensive approach be used in the formation of regional competitiveness indexes, taking into account more indicators to be more representative. In addition, the development of the mining sector should not be carried out excessively, but should be adjusted to domestic needs and accompanied by the development of other sectors that are more sustainable to ensure more stable and diverse economic growth.

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