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ANALYSIS OF THE DETERMINANTS OF POVERTY IN UNDERDEVELOPED REGIONS OF SUMATRA ISLAND

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Abstract

Sumatra Island has shown a strong economic performance in terms of its contribution to the national GDP. However, the island still has seven underdeveloped regions. This situation is further exacerbated by a high percentage of poverty in each of these underdeveloped areas. This research aims to map the progress of poverty in these underdeveloped regions of Sumatra Island using the Klassen typology, and to analyze the faktors influencing poverty in these regions through panel data regression analysis. The mapping analysis conducted using the Klassen typology consistently places North Nias Regency in the quadrant with a high poverty percentage and low per capita gross regional domestic product (PDRB) throughout the study period. Meanwhile, most other regencies have shifted their quadrant positions. The panel data regression analysis results indicate that significant faktors reducing poverty include the length of well-maintained roads, the Human Development Index (HDI), capital expenditure, and per capita PDRB. On the other hand, the open unemployment rate (TPT) significantly increases poverty. Social assistance spending does not have an effect on poverty in the underdeveloped regions of Sumatra Island.

***Keywords: Determinants of poverty, panel data regression, Sumatra Island, Underdeveloped Regions*.**

INTRODUCTION

Economic development is an effort to achieve an increase in per capita income growth with the aim of increasing output at a rate exceeding the population growth rate in a sustainable manner (Todaro, 2013). The development process should consider both economic growth and equity. According to Lincoln Arsyad (2013), development in a country must consider the economic development of its regions. Regional economic development is the activity of managing regional resources by involving the relevant regional government officials and all elements of the community through establishing good collaborative relationships to create job opportunities and developing economic activities for the welfare of the people. This is to encourage the quality of life and improve community welfare, so its implementation is based on a plan and carried out repetitively. Economic development must be felt in every region, so successful development should not leave behind underdeveloped regions within it. Based on Presidential Regulation (Perpres) Number 63 of 2020 concerning the Designation of Underdeveloped Regions for 2020-2024, an underdeveloped region can be defined as a region whose area and community are less developed compared to other regions on a national scale.

The issue of underdeveloped regions is a consequence of development disparities that can become a vulnerability point for national unity (Putra et al., 2015). According to Bappenas (2013), underdeveloped regions are characterized by limited accessibility to socio-economic infrastructure and services, along with a relatively remote geographical location. This is compounded by conditions of limited natural resources and vulnerability to disasters. When observed at a macro level, significant development disparities exist between villages and cities, between Eastern Indonesia and Western Indonesia (KBI), between Java and regions outside Java, and so on (Bappenas, 2013). According to Presidential Regulation Number 63 of 2020, there are 62 regencies designated as underdeveloped regions in Indonesia. This designation was made by considering six main criteria: the economic condition of the community, the quality of human resources, the availability of infrastructure, regional financial capacity, the level of accessibility, and regional characteristics. The fundamental problem often faced by underdeveloped regions is closely related to high poverty levels. Poverty is understood as a situation where individuals lack the capability or opportunity to meet their basic needs, including health, a decent standard of living, and various other important accesses (World Bank, 2015). At the national level, Indonesia's poverty rate has shown a declining trend over the past ten years, as shown in Figure 1. This condition reflects the government's

commitment to poverty alleviation efforts. However, the poverty rate in underdeveloped regions remains relatively high. Therefore, poverty eradication in underdeveloped regions is a priority development focus, in line with national development goals that emphasize accelerating poverty reduction across all regions (Gumilang, 2017).

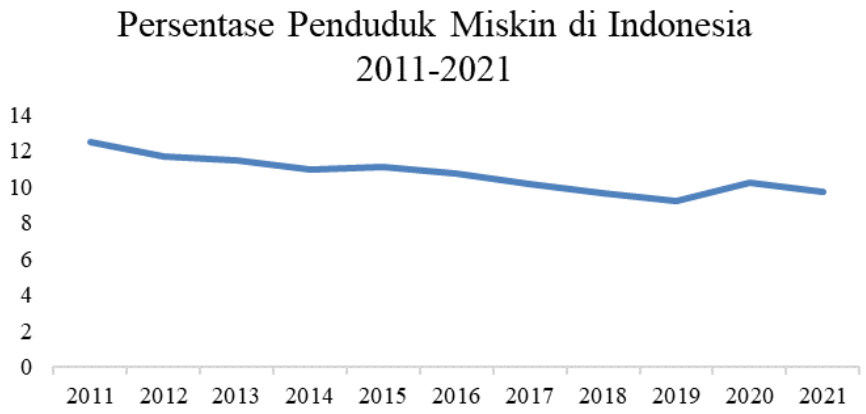

Figure 1 Average Poverty Percentage in Indonesia 2011-2021
Source: BPS, 2022 (processed)

Sumatra Island is the second largest island in Indonesia with an area of 443,065.8 km². This vast area is accompanied by significant natural resource wealth. The natural resources in Sumatra Island have high economic value and, if managed optimally, have great potential to boost the trade and industry sectors. Some of the main commodities characteristic of Sumatra include rubber, palm oil, tobacco, petroleum, tin, bauxite, coal, and natural gas (BPIW PUPR, 2017). The island is even one of the regions with the largest number of oil and gas-producing areas in Indonesia. Furthermore, the allocation of oil and gas revenue-sharing funds (DBH) for Sumatra Island in 2021 was recorded at IDR 3.7 trillion (DJPK, 2021). With such abundant natural resource potential, local governments should be able to utilize this advantage to promote increased prosperity and welfare for their communities.

Based on its contribution to the national GDP in 2021, Sumatra Island was the 2nd (second) largest contributor after Java Island to the national GDP, with a share reaching 21.70 percent and a cumulative (c-to-c) growth rate of 3.18 percent. Despite having abundant natural wealth and a relatively high GDP contribution, Sumatra Island still accounts for 7 out of 62 (11 percent) underdeveloped regions in Indonesia. The distribution of these regions spans 4 provinces: Nias Regency, South Nias Regency, North Nias Regency, and West Nias Regency in North Sumatra Province; Mentawai Islands Regency in West Sumatra Province; Pesisir Barat Regency in Lampung Province; and North Musi Rawas Regency in South Sumatra. This contrasts with Java Island, which is already free from underdeveloped regions. Even islands with relatively lower economic performance like Kalimantan Island have been freed from underdeveloped regions, while Sulawesi Island only contributes 3 underdeveloped regions (4 percent).

A relatively large GDP, as reflected by a region's contribution to the national GDP, should enable its population to have a decent quality of life and standard of living (Mankiw, 2018). However, conversely, the underdeveloped regions in Sumatra Island have a very high percentage of poor population. The underdeveloped regions in Sumatra Island have a percentage of poor population considered very high when compared to the national average poverty rate in Indonesia. Overall, the percentage of poor population in Indonesia is 9.57 percent, while the average percentage of poor population in Sumatra Island is 9.37. Meanwhile, the average percentage of poor population in the underdeveloped regions of Sumatra Island is 19.3 percent, as shown in Figure 2.

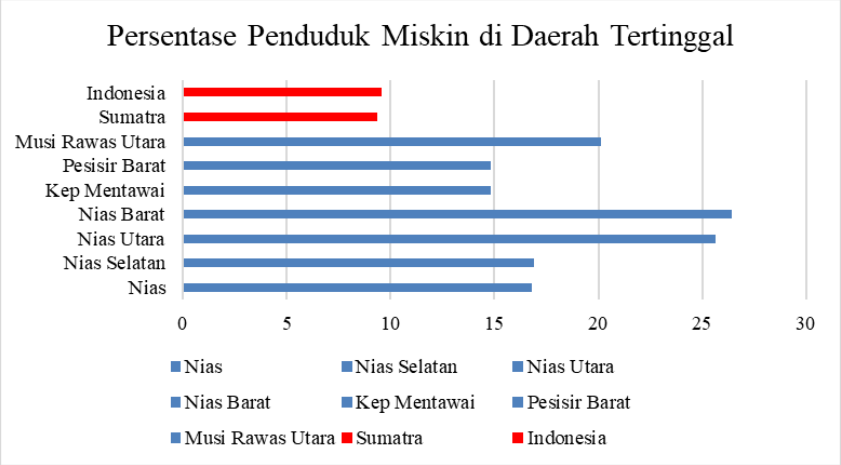

Figure 2 Percentage of Poor Population in Underdeveloped Regions of Sumatra Island in 2021
Source: BPS, 2022 (processed)

Looking more specifically at each underdeveloped region in Sumatra Island, it is found that 4 (four) out of 7 (seven) underdeveloped regions in Sumatra Island are located in North Sumatra Province. In terms of Gross Regional Domestic Product (GRDP) in 2021 based on current prices, North Sumatra Province recorded IDR 859.87 trillion, while based on constant 2010 prices, it was IDR 547.65 trillion. This was accompanied by a growth rate of 2.61 percent. However, the region with the largest contribution of poor population to the economic structure in Sumatra Island is also North Sumatra Province, at 23.37 percent (BPS, 2022). This phenomenon—where relatively good performance exists at both the island and even provincial levels, yet underdeveloped regions with high percentages of poor populations persist—makes it an interesting topic to investigate, particularly regarding the determinants of poverty in these related regions. Therefore, an analysis of the factors influencing poverty in the underdeveloped regions of Sumatra Island is crucial to conduct.

LITERATURE REVIEW

Poverty

Poverty is a condition where individuals are unable to enjoy various choices or opportunities to meet their basic needs (World Bank, 2015). In line with this, poverty, including that caused by low income, creates an inability to obtain basic goods and services, which has implications for welfare. Besides income, poverty is also caused by low quality of education and health status, poor sanitation and access to clean water, inadequate physical security, and limited opportunities to improve quality of life. The Central Statistics Agency (BPS) views poverty through the concept of efforts to meet basic needs (basic needs approach). This concept originates from the *Handbook on Poverty and Inequality* released by the World Bank. Using this poverty measurement benchmark, the population can be classified as poor if their average monthly per capita expenditure is below the poverty line. The poverty line itself reflects the minimum rupiah value of expenditure required by a person to meet their basic needs. The poverty line is the sum of the food poverty line (GKM) and the non-food poverty line (GKMN). The food poverty line is measured by the minimum expenditure value for food, equivalent to 2,100 kilocalories per capita per day, while the non-food poverty line is the minimum expenditure value for non-food needs such as housing, clothing, education, and health. Kuncoro (2006) categorizes the causes of poverty into three factors: (1) Differences in the pattern of resource ownership that cause inequality in income distribution. This results in the poor having limited resources coupled with low resource quality; (2) Low quality of human resources leading to low productivity, which in turn implies low wage levels; (3) Differences in access to capital. Regarding poverty measurement itself, according to Agustina (2018), there are three indicators: head count index, poverty depth index, and poverty severity index.

Underdeveloped Regions

Based on Presidential Regulation No. 63 of 2020, an underdeveloped region is a regency where the area and its community are not sufficiently developed compared to other regions on a national scale. According to this regulation, underdeveloped regions are designated based on six criteria: community economy, human resources, infrastructure, regional financial capacity, accessibility, and regional characteristics.

Table 1 Underdeveloped Region Indicators 2020-2024

No	Kriteria	Indikator
1	Perekonomian Masyarakat	a. Produk domestik regional bruto per-kapita
		b. Persentase pengeluaran rumah tangga non makanan; dan
		c. Persentase penduduk yang bekeria di sektor non pertanian
2	Sumber Daya Manusia	a. Persentase wanita usia 15-49 (lima belas sampai dengan empat puluh sembilan) tahun yang melahirkan dalam 2 (dua) tahun terakhir dengan penolong persalinan tenaga medis
		b. Persentase balita diberi imunisasi lengkap
		c. angka partisipasi sekolah menengah pertama; dan
		d. Angka partisipasi sekolah menengah atas
3	Sarana dan Prasarana	a. Persentase desa yang mempunyai pertokoan
		b. Persentase desa yang mempunyai fasilitas kesehatan
		c. Persentase desa yang mempunyai dokter
		d. Persentase desa yang mempunyai sekolah dasar
		e. Persentase desa yang mempunyai sekolah menengah pertama
		f. Persentase rumah tangga pengguna listrik
		g. Persentase rumah tangga pengguna telepon/telepon genggam;
		h. Persentase penduduk pengguna internet; dan
		i. Persentase rumah tangga pengguna air bersih
4	Kemampuan Keuangan daerah	Pendapatan asli daerah per-kapita
5	Aksesibilatas	a. Persentase desa dengan jenis permukaan jalan utama terluas aspal/beton
		b. Persentase desa yang mudah mencapai fasilitas kesehatan; dan
		c. Persentase desa yang mudah mencapai sekolah menengah pertama
6	Karakteristik Daerah	a. Persentase desa yang tidak mengalami bencana; dan
		b. Persentase desa yang tidak mengalami konflik sosial

Source: Ministry of Villages, Development of Disadvantaged Regions, 2020

Based on the Criteria and supported by the indicators in the Table above, underdeveloped regions are then determined and categorized into 3 (three) groups: advanced, underdeveloped, and severely underdeveloped. For the period 2020–2024, 62 regions/regencies from 11 provinces in Indonesia are designated as underdeveloped regions. According to Kuncoro (2012), the main cause of underdeveloped regions is more due to development policies that rely on sectoral development rather than a spatial dimension approach. Consequently, development in a region is driven by market forces. Thus, regions with attractive returns will inevitably become a magnet for investors or other people. This is what causes advanced regions to become more advanced, while underdeveloped regions do not progress.

Human Development Index (HDI)

The United Nations Development Program (UNDP) defines the Human Development Index as a composite index used to measure the achievement process of human development in a country/region. In its composition, the HDI is based on three dimensions: health (longevity), education/knowledge, and a decent standard of living. This index is used as an indicator to describe holistic development performance in a region/area. The HDI is considered a measure that shows the results of a development program implemented over several previous years. Therefore, the magnitude of the HDI serves as an assessment of how advanced development has been in a certain period, based on population quality related to life expectancy, knowledge, and a decent standard of living (Todaro, 2013).

The calculation of the HDI is based on three components:

1. **Health**
   The health variable can be seen in Life Expectancy at Birth (LEB), which is a benchmark for estimating a person's life in years. The standard set by UNDP for measurement has a lower limit of 25 years and a maximum of 85 years.
2. **Education**
   The knowledge variable can be seen through education. Education itself is described by two indicators: years of schooling and literacy rate. For years of schooling, it is assessed from the length of schooling in years, with a minimum of 0 and a maximum of 15 years. Meanwhile, the literacy rate uses the limit agreed upon by countries, up to 100.
3. **Decent Standard of Living**
   The Decent Standard of Living is indicated or assessed through the welfare enjoyed by the population. UNDP measures it with Adjusted Real Gross Domestic Product, while BPS calculates it using the average real per capita expenditure adjusted with the Atkinson formula.

Infrastructure

Infrastructure is a form of public capital realized through the provision of facilities such as roads, bridges, and drainage systems, which are generally built through government investment (Mankiw, 2018). Infrastructure serves as an important input in the production process and influences economic activities through various mechanisms, both implicitly and explicitly. Besides strengthening the production process, the existence of infrastructure also encourages increased output and job creation. However, the quality of available infrastructure also determines the level of efficiency of economic activities across various sectors. According to Jhingan (2014), infrastructure is understood as a complementary good that plays a crucial role for private investment and is a determinant in long-term economic growth. Infrastructure includes physical systems that provide transportation services, water supply, buildings, and other public facilities needed by the community to meet basic needs in social and economic life.

The development of a region can be seen, among others, from the availability of infrastructure such as roads, electricity, sanitation, irrigation, ports, and airports (Sukmawati, 2016). Adequate infrastructure availability can enhance the fulfillment of community needs and impact welfare improvement. The linkage between infrastructure and poverty is also highly significant. Kwon (2011) explains that poor communities tend to live in remote or isolated areas, making their mobility very limited; this condition underscores the importance of road infrastructure. In the context of poverty alleviation, road infrastructure can provide direct effects (its own effect) through job creation from construction activities, as well as indirect effects (the through effect) through increased interaction between producers and consumers and the strengthening of economic activities.

Furthermore, infrastructure is strongly linked to human development, especially in education and health, through the development of public facilities supporting both sectors. Capello (2007) asserts that infrastructure influences poverty reduction indirectly through increased economic growth. This aligns with Nuraliyah's (2010) findings, which show that increased infrastructure availability impacts increased production activities, which in turn drives economic growth. This economic growth has implications for reduced poverty levels due to job creation that can lower unemployment. Nugroho (2015) also emphasizes the importance of providing decent and easily accessible infrastructure for the poor, as increased infrastructure accessibility will encourage economic activity and ultimately improve the living standards of the poor.

Social Assistance Expenditure

Social assistance is a program of transfers in the form of money or goods aimed at reducing poverty through welfare distribution and providing protection for households from possible changes in income receipt. Social assistance targets meeting a minimum decent standard of living, minimum nutritional needs, or helping households face occurring risks (FAO, 2003). This program is temporary in nature and partly permanent. Examples of temporary assistance include programs for victims of natural disasters, economic crises, or due to specific government policies. Examples of permanent assistance are given to communities with permanent vulnerabilities, such as people with disabilities, the elderly, and neglected children. In general, recipients are determined by considering income and other socioeconomic criteria of the population. Assistance recipients are targeted at specific groups, namely poor households with children, low-income elderly, or other parties in need (International Labour Organization, 2012).

Common social assistance programs implemented in Indonesia include the Family Hope Program (PKH), Indonesia Smart Program, Indonesia Healthy Program, Non-Cash Food Assistance, and various other assistance as part of fiscal stimulus during the pandemic. Meanwhile, at the regional level, there are social assistance policies in the form of income transfers funded from the Regional Budget (APBD). Local governments have the authority to design social assistance schemes according to the needs of their jurisdiction. This is in line with the realization of social assistance expenditure plans managed by each region. Generally, social assistance expenditure aims to fund activities for social rehabilitation, social security, social empowerment, poverty alleviation, and disaster management. Most literature states that the goal of social assistance, which is also a component of social protection programs, is to alleviate poverty through ensuring access to basic needs and increasing opportunities to earn income by providing access to payments/credit and fostering labor market formation (Robalino et al., 2012).

Gross Regional Domestic Product

Gross Regional Domestic Product (GRDP) is simply defined as a depiction of a region's ability to create added value in a certain period. In the compilation of GRDP, there are three approaches: the production approach, income approach, and expenditure approach. These three approaches show the composition of added value data detailed according to sources of economic activity (production), income, and components of its use. GRDP through the production (industry) approach is compiled by summing the gross value-added components that can be created by related economic sectors from their various production activities. GRDP from the income approach is calculated through compensation for factors of production consisting of wages and salaries, land rent, interest on capital, and profits, all before deducting income tax and other direct taxes (BPS). The expenditure approach explains the use of that added value (BPS, 2016).

GRDP is one of the macroeconomic indicators that can be used to show the level of development and economic structure of a region. GRDP values are presented based on current prices and constant prices. Current/market prices consider the influence of prices in the current year. Meanwhile, constant prices do not consider the influence of prices and are based on prices in a specific base year. The GRDP growth rate is calculated using GRDP at constant prices by subtracting the GRDP value of year n with the GRDP value of year n-1, then divided by the GRDP value of year n-1 and multiplied by 100 percent. This growth rate shows the development of aggregate income from one period to the previous period. GRDP per capita is a depiction of the added value created for each resident due to production activities. An increase in value added per capita is expected to improve the overall standard of living of the community, which ultimately increases income and reduces poverty in a region.

Capital Expenditure

Capital expenditure is budget expenditure to acquire fixed assets and other assets expected to provide benefits for more than one accounting period. Capital expenditure is used to obtain fixed assets of local governments, such as equipment, buildings, infrastructure, and other fixed assets. Theoretically, there are three ways to acquire these fixed assets: (1) self-construction, (2) exchange with other assets, and/or (3) direct purchase. Capital expenditure is generally directed for public interest in poverty alleviation through infrastructure development that supports increased economic activity. Ultimately, this will increase community income and reduce poverty. Additionally, capital expenditure for facilities and infrastructure plays a role in job creation, thereby impacting labor absorption and reducing unemployment rates through increased income.

Based on category, capital expenditure is divided into three: 1. Expenditures that result in the acquisition of fixed assets or other assets that can increase the assets of the local government. 2. Expenditures that exceed a minimum ownership limit for fixed assets or other assets set by the local government. 3. Acquisition of fixed assets intended not for sale. On the other hand, according to Syaiful (2006) in Kusnandar and Siswantoro (2012), there are five core groups categorized as capital expenditure: Land Capital Expenditure, Machinery and Equipment Capital Expenditure, Building Capital Expenditure, Road, Irrigation, and Network Capital Expenditure, and Other Physical Capital Expenditure.

Unemployment Rate

Unemployment is the number of people who do not have a job or are in the process of looking for work, while workers are people who have a job. The unemployment rate is the ratio of the number of unemployed to the size of the labor force (Blanchard and Johnson, 2017). Labor Force Participation Rate (TPAK) and Open Unemployment Rate (TPT) are indicators often used in assessing the success of development in the employment field. TPT is the percentage of the number of unemployed to the number of labor force. Open unemployment

consists of those who do not have a job and are looking for work, those who do not have a job and are preparing a business, those who do not have a job and are not looking for work because they feel it is impossible to get a job, and those who already have a job but have not started working (BPS, 2015). The unemployment rate is formulated as follows:

TPT = (Number of Unemployed / Number of Labor Force) × 100

Unemployment is a phenomenon suspected to be one of the causes of poverty in a region. In this research, the unemployment highlighted is open unemployment, which consists of the labor force that is currently not working or currently looking for work but has not yet found it (Tinambunan, 2018). Unemployment is a complex problem in macroeconomics that poses a major challenge for developing countries. Economic development struggles to create job opportunities faster than population growth in developing countries.

METHOD

In this research, the type of data used is secondary data in the form of panel data consisting of time series and cross-section. The chosen time range is between 2010 and 2021. The objects selected in this research are the Underdeveloped Regions in Sumatra Island, namely Nias Regency, South Nias Regency, North Nias Regency, West Nias Regency, Mentawai Islands Regency, Pesisir Barat Regency, and North Musi Rawas Regency.

Table 2 Type and Source of Data

Variable	Unit	Source
Percentage of Poor Population	Percent	BPS
Human Development Index (HDI)	Index	BPS
Length of Road in Good Condition	Km	BPS
Social Assistance Expenditure	Rupiah	BPS
GRDP per capita	Rupiah	BPS
Capital Expenditure	Rupiah	Ministry of Finance
Open Unemployment Rate	Percent	BPS

Analysis Method

The analysis methods used are descriptive and quantitative. The descriptive analysis method uses Klassen Typology, while the quantitative method uses panel data regression analysis. The model is used to analyze the factors influencing poverty in underdeveloped regions. The obtained data is processed using computer programs, namely Microsoft Excel and EViews 12. Alternative policies that can be taken by the government are formulated based on the results of the analysis of the influence of related factors on poverty. The following variables are used in the analysis:

1. Percentage of Poor Population (PPM)
2. Human Development Index (HDI)
3. Length of Road in Good Condition (PJL)
4. Social Assistance Expenditure (BLJ)
5. Gross Regional Domestic Product per Capita (GRDP)
6. Capital Expenditure (BLM)
7. Open Unemployment Rate (TPT)

Klassen Typology Analysis

Klassen Typology analysis can be included as a descriptive analysis method, which functions to describe data as information to make it clearer and easier for the reader to understand. Descriptive analysis using Klassen typology involves placing descriptions in a Cartesian diagram with four quadrants, to determine the position of each

province in Indonesia based on the Percentage of Poor Population and Gross Regional Domestic Product (GRDP). To understand its development, this analysis examines the beginning and end years of the study, namely 2010 and 2021. Klassen Typology is an approach used to group regions or populations based on similar characteristics and poverty levels. This approach is used to help understand differences and similarities in poverty levels between different regions or population groups. In forming the Klassen typology, the characteristics used to group regions or populations can vary, such as income level, education level, access to basic services, unemployment rate, health status, or other relevant factors. The selection of these characteristics is based on the goals and analytical context to be achieved.

The World Bank (2009) in *Poverty and Social Exclusion in India* explains the use of Klassen typology to map poverty and social exclusion in India, and how this method can help formulate more effective policies. Khan et al. (2016) also provide a comprehensive review of the use of Klassen typology and other methods in geographic poverty mapping, including various approaches and techniques used in analysis. The use of Klassen typology can vary depending on the context, available data, and specific analysis objectives. At each stage, it is important to use accurate and representative data, as well as consider the relevant social, economic, and cultural context in understanding poverty and designing effective policies. This study uses variables on both axes of the Klassen typology: the percentage of poor population and GRDP per capita.

Panel Data Method

Panel data is a method in econometrics derived from the combination of cross-section and time series data with the aim of obtaining better estimation results through an increase in the number of observations, which implies an increase in degrees of freedom (Nuryanto and Pambudiko, 2018). Meanwhile, according to Gujarati (2013), panel data (pooled data) is a combination of cross-section and time series data. The panel data method is also a method used for empirical analysis that cannot be done using only time series or cross-section data. Based on Firdaus (2011), there are two advantages of using the panel data method compared to time series and cross-section methods, namely:

1. Panel data makes the number of observations larger because panel data is a combination of cross-section and time series data. Based on this, the estimated parameters will also be more accurate due to the larger number of observations compared to other models. The marginal effects originating from the explanatory variables are shown from two sides, namely individual and time. Panel data also provides more informative data, reduces collinearity between variables, and increases degrees of freedom, which means increasing efficiency.
2. Panel data is better at identifying data issues that cannot be addressed by cross-section or time series alone, so panel data can reduce identification problems. Panel data is also able to control heterogeneity among individuals.

Panel data analysis has three estimation methods that can be used: Pooled Least Square/Common Effect Model (PLS), Fixed Effect Model (FEM), and Random Effect Model (REM). PLS is the simplest technique model. This method essentially uses a combination of all data (pooled). This method is also the simplest method with constant intercept and slope. The FEM method is a model that considers changes in intercepts across cross-sections and time series caused by omitted variables. Meanwhile, the REM method is a model that arises when there is a correlation between individual effects and explanatory variables, or has a non-random pattern. Therefore, this method is also capable of improving the efficiency of the estimated parameters by including parameters that differ across time and individuals into the error (Firdaus, 2011).

Model Selection

Statistical tests are needed in the model selection stage to obtain the best model and efficient estimates. Statistical tests are conducted through Chow test, Hausman test, and LM test.

1. **Chow Test**

   The Chow test is one of the statistical tests to determine the choice between Pooled Least Square (Common Effect Model) and Fixed Effect Model through the following hypothesis:
   H0: Pooled Least Square (PLS)
   H1: Fixed Effect Model (FEM)
   If the p-value is smaller than the significance level used, there is sufficient evidence to reject H0. Based on these results, the chosen model is the fixed effect model.

2. **Hausman Test**
   The Hausman test is conducted if the testing results from the Chow test accept H1, namely the fixed effect model (FEM), which will then be compared with the random effect model based on the following hypothesis:
   H0: Random Effect Model (REM)
   H1: Fixed Effect Model (FEM)
3. **LM Test**
   The LM test is used in selecting between the pooled least square (PLS) model and the random effect model (REM) based on the following hypothesis:
   H0: Pooled Least Square (PLS)
   H1: Random Effect Model (REM)
   If the result of the LM test is significant with a chi-square probability > α, then there is sufficient evidence to reject H1, so the model used is pooled least square (PLS). If the result of the LM test is significant with a chi-square probability < α, then reject H0, meaning the random effect model is used.

Goodness of Fit Test

1. **t-test**
   The t-test is conducted to see the influence of each independent variable on poverty. It can be concluded that this t-test is performed to test the significance of the influence of independent variables on the dependent variable. The hypothesis is:
   If the probability (p-value) is less than the significance level, it means reject H0, which indicates that the independent variable in the model has a significant influence on the dependent variable at the α percent significance level.

2. **F-test**
   The F-test is a statistical criterion test conducted to see how the independent variables collectively influence the dependent variable. The F-test is used to determine the influence of independent variables in the model as a whole (simultaneously) on the dependent variable by comparing the F-statistic value (p-value) with the probability of the significance level (α). If the probability (p-value) is less than the significance level, there is sufficient evidence to reject H0, meaning that simultaneously the independent variables in the model have a significant influence on the dependent variable at the α percent significance level.

3. **R^2 Test (Coefficient of Determination)**
   The coefficient of determination test is used to see the proportion of variation explained by the independent variables on the dependent variable. The value for this test ranges between zero and one. The higher the R-squared value, the closer the coefficient of determination is to the model, and thus the model is categorized as better. Conversely, if the R-squared value is smaller, the value closer to 0 indicates a less good model. This happens because it indicates that there are other variables outside the model that influence the dependent variable (Wijayanti, 2018).

Classical Assumption Tests

Econometric models need to be analyzed using assumption tests to be free from problems of multicollinearity, autocorrelation, and heteroscedasticity (Juanda B., 2009). The econometric tests in question are:

1. **Multicollinearity**
   Multicollinearity means there is a relationship between independent variables in a regression, which can cause difficulty in interpreting the parameter estimates of the regression coefficients. Therefore, the multicollinearity test is conducted to detect violations of the assumption due to the existence of a linear relationship between independent variables in a model. To detect or know if a model is indicated to have multicollinearity, it can be seen from the F-test results being significant overall and having a high R-squared value, but in the t-test many variables are not significant because their standard deviations are large. If in the test the correlation value is more than 0.8, then the independent variables used have a multicollinearity problem (Juanda, 2009).

2. **Heteroscedasticity**
   Heteroscedasticity is a violation of the classical assumption due to non-constant variance of the residuals. Thus, the heteroscedasticity test is a test conducted to identify the presence or absence of deviations from the assumption of homoscedasticity. Heteroscedasticity occurs when the error variance is not constant or varies. Detecting heteroscedasticity can be done with the Goldfeld-Quandt test, Breusch-Pagan test, and White test. One way to overcome this is by transforming the model by weighting the original data, known as Generalized Least Squares (Juanda, 2009).

3. **Autocorrelation**
   Autocorrelation indicates the existence of correlation between residuals (ε). Autocorrelation can also be interpreted as a disturbance where there is serial correlation between residuals (Juanda B., 2009). This autocorrelation will cause parameter estimates to be unbiased and consistent, but have a standard error biased downwards so that the t-statistic value is high (overestimated). To detect the presence of autocorrelation, the Durbin-Watson (DW) test can be used by comparing the DW value from the model with the DW table.

4. **Normality Test**
   The normality test is a test conducted to determine whether the error term is normally distributed or not. This can be identified through the Jarque-Bera test by looking at its probability value. The hypothesis tested is:
   H0: The error term is normally distributed.
   H1: The error term is not normally distributed.
   If the Jarque-Bera value is greater than the significance level, then accept H0, meaning the error term in the model used is normally distributed.

Research Model

The research conducted examines the determinants of poverty in underdeveloped regions of Sumatra Island. This study uses one dependent variable, namely the Percentage of Poor Population (PPM), and six independent variables: Human Development Index (HDI), Length of Road in Good Condition (PJL), Social Assistance Expenditure (BLJ), GRDP per capita (GRDP), Capital Expenditure (BLM), and Open Unemployment Rate (TPT).

The model used in this research is as follows:

$$PPM_{it} = \alpha 0 + \beta 1 HDI_{it} + \beta 2 lnPJL_{it} + \beta 3 lnBLJ_{it} + \beta 4 lnGRDP_{it} + \beta 5 lnBLM_{it} + \beta 6 TPT_{it} + \varepsilon_{it}$$

Description:

α0 = Intercept
β1 – β6 = Coefficients of independent variables
PPM*it* = Percentage of Poor Population (percent)
HDI*it* = Human Development Index (Score, natural logarithm)
lnPJL*it* = Length of Road in Good Condition (Kilometers, natural logarithm)
lnBLJ*it* = Social Assistance Expenditure (rupiah, natural logarithm)
lnGRDP*it* = GRDP per capita for each regency at Current Prices (million rupiah, natural logarithm)
lnBLM*it* = Capital Expenditure (rupiah, natural logarithm)
TPT*it* = Open Unemployment Rate (percent)
ε*it* = Error term
i = Underdeveloped Regency in Sumatra Island (7 Regencies)
t = Time

Operational Definition

In an effort to standardize interpretation, the operational definitions in this research include:

1. Percentage of Poor Population (PPM)
   The dependent variable, percentage of poor population, is the number of people with income below the poverty line divided by the total population.
2. Human Development Index (HDI)
   HDI is a composite index of health, education, and purchasing power used to measure the achievement of human development in a country or region.
3. Length of Road in Good Condition (PJL)

Length of road in good condition is a measurement of the length of road in a regency that is in good condition. This road length is measured in kilometers (km).

4. Social Assistance Expenditure (BLJ)
   Social expenditure is the budget allocated for social assistance expenditure in a region.
5. Gross Regional Domestic Product per capita (GRDP)
   GRDP is the total final output produced by all economic units divided by the population.
6. Capital Expenditure (BLM)
   Capital expenditure is expenditure by the government whose benefits exceed one budget year and will add assets or regional wealth and subsequently will add routine expenditures such as operational and maintenance costs.
7. Open Unemployment Rate (TPT)
   The open unemployment rate is the percentage of the labor force that is not working to the total labor force.

RESULTS AND DISCUSSION

Based on Presidential Regulation Number 63 of 2020 concerning the Designation of Underdeveloped Regions for 2020–2024, there are seven regencies in Sumatra Island that still hold the status of underdeveloped regions. These seven areas are spread across four provinces: Nias Regency, South Nias Regency, North Nias Regency, and West Nias Regency in North Sumatra Province; Mentawai Islands Regency in West Sumatra Province; North Musi Rawas Regency in South Sumatra Province; and Pesisir Barat Regency in Lampung Province. Overall, these seven regencies represent approximately 11 percent of the total 62 underdeveloped regions in Indonesia.,The underdeveloped status in these regions is not a new phenomenon; it has been recorded since the issuance of Presidential Regulation Number 131 of 2015 for the 2015–2019 period. Referring to the derivative policy, namely Minister of Villages Regulation Number 11 of 2020, a region is categorized as underdeveloped based on six aspects: community economic conditions, human resource quality, availability of infrastructure, regional fiscal capacity, regional accessibility, and geographical characteristics. The combination of these factors is the root cause of the high poverty levels in each regency classified as an underdeveloped region.

In North Sumatra Province, the agricultural sector remains the economic backbone in the four underdeveloped regencies (Nias, South Nias, North Nias, and West Nias). About 88.37 percent of the workforce depends on this sector for their livelihood. However, the dominance of agriculture has not been able to drive an increase in welfare due to the low quality of human resources, which impacts low productivity. This condition also suppresses farmers' income. Furthermore, development directed by the North Sumatra Provincial Government is considered not to have provided adequate priority for the agricultural sector in this area. The geographical location of Nias Island, far from the provincial administrative center, and the poor condition of road infrastructure also weaken economic activity. The minimal budget support for infrastructure development at the provincial level has slowed the acceleration of development in this region (Batubara 2017).

Mentawai Islands Regency in West Sumatra Province faces the main challenge of vast village areas that are disproportionate to the very low population density of only about 14 people per square kilometer. This condition hinders the government in providing public services evenly. The long distances between settlements, coupled with limited basic infrastructure such as health facilities, education, and administrative services, are significant obstacles to improving community welfare (Kemenko PMK 2021). In South Sumatra Province, North Musi Rawas Regency is the only region that still holds underdeveloped status and has the highest poverty rate, despite having a relatively small population. A poverty line reaching Rp 456,000 per capita also influences the high percentage of poor people, primarily due to the high cost of basic necessities. The scarcity of economic centers forces residents to shop in neighboring areas such as Singkut District and Lubuklinggau City (Bappeda Musi Rawas Utara 2019). The population's dependence on rubber and palm oil commodities, whose prices are highly volatile, makes them vulnerable to falling into poverty when prices drop.

Meanwhile, Pesisir Barat Regency in Lampung Province also faces issues of inadequate accessibility and infrastructure. According to the Provincial RAD-PPDT of Lampung 2018–2019, this regency ranks second to last in road quality and electrification ratio. As a new autonomous region, Pesisir Barat requires a large budget to catch up with development, while its Regional Original Revenue (PAD), which only reached Rp 19.794 billion (2.58 percent of the total regional revenue of Rp 766.301 billion), is still far from sufficient to support accelerated development. In terms of regional characteristics, Pesisir Barat is an area with a high level of natural disaster risk. During the 2011–2013 period, this area experienced various disasters such as floods, landslides, tidal waves,

tornadoes, and droughts. The combination of these various factors significantly contributes to the high poverty rate in Pesisir Barat, which in turn reinforces its status as an underdeveloped region (Bappeda Provinsi Lampung 2017).

Condition of Underdeveloped Regions

Human Development Index (HDI)

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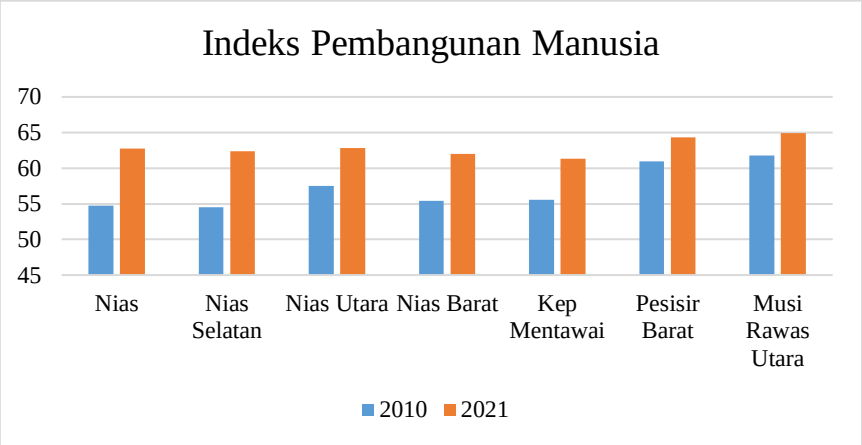


Figure 5 Human Development Index (HDI) of Underdeveloped Regions in Sumatra Island, 2010 and 2021

The Human Development Index (HDI) is a measure of the extent to which the population has access to development outcomes in terms of obtaining income, health, education, and other aspects. The HDI is constructed based on three components: (1) a long and healthy life; (2) knowledge; and (3) a decent standard of living. The HDI serves as a benchmark for each region to measure success in efforts to improve the quality of human life. Figure 5 shows that, overall, there has been an increase in the HDI across all regencies in the underdeveloped regions of Sumatra Island. The highest and lowest increases in HDI occurred in South Nias Regency and North Musi Rawas Regency, respectively.

Road Infrastructure

Infrastructure is one of the supporting indicators for economic growth and a driver of development in a region or country. Infrastructure, as a facility for the community, influences the marginal productivity of private capital at the macro level and reduces production costs at the micro level. Therefore, infrastructure can be categorized as a basic necessity for every region. Economic improvement is supported by the availability of infrastructure facilities; this availability encourages the community to have high mobility and productivity.

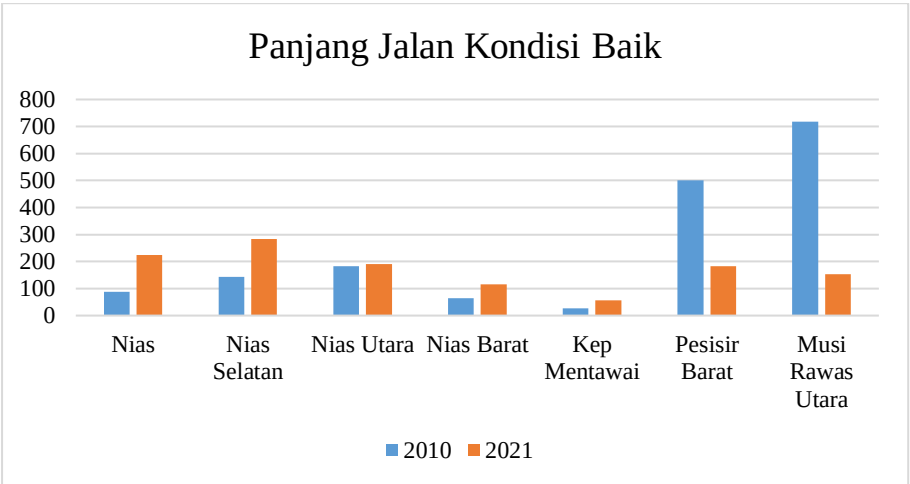


Figure 6 Length of Roads in Good Condition in Underdeveloped Regions of Sumatra Island, 2010 and 2021

One type of infrastructure that influences productivity is highways. Highways are crucial as they connect one region to another and link various production centers with their market areas, thereby enhancing the economy of a region, particularly the length of roads in good condition.

There was an increase in the length of roads in good condition across all seven underdeveloped regions in Sumatra Island between the 2010 and 2021 periods. Based on Figure 6, it can be seen that significant increases in road length in good condition occurred in Nias Regency, South Nias Regency, and West Nias Regency. North Nias Regency and Mentawai Islands Regency also experienced increases, but not significantly. Meanwhile, Pesisir Barat Regency and North Musi Rawas Regency experienced a decrease in the length of roads in good condition. This was caused by road damage and the fact that the road length in 2010 was an accumulation from the parent regency's road length before being divided into the current regency.

Social Assistance Expenditure

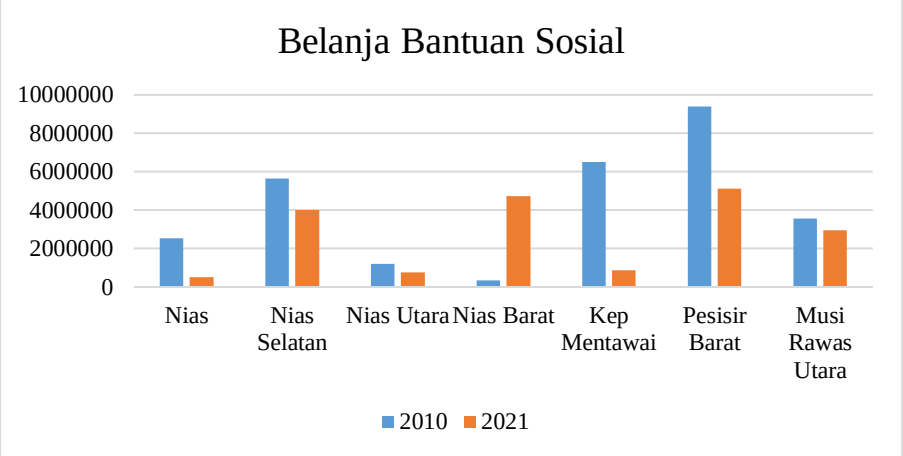


Figure 7 Realization of Social Assistance Expenditure in Underdeveloped Regions of Sumatra Island, 2010 and 2021

Social assistance is a program aimed at improving community welfare by reducing poverty. This program is not based on contributions from the beneficiaries. Social assistance is provided directly in the form of cash transfers (in-cash transfers) and in the form of goods and services (in-kind transfers). Government expenditure policy is part of fiscal policy or one form of economic intervention, and social assistance expenditure is one part of government expenditure instruments. This is then implemented at the regional level. The realization of social assistance expenditure in the underdeveloped regions of Sumatra Island can be seen in Figure 7. The realization of Social Assistance Expenditure tends to decrease in 2021 compared to 2010. This occurs because the perceived need for social assistance is considered less urgent, and funds are reallocated to other budgets. However, despite this, there is one regency that experienced an increase in the realization of social assistance expenditure, namely West Nias Regency.

Gross Regional Domestic Product (GRDP)

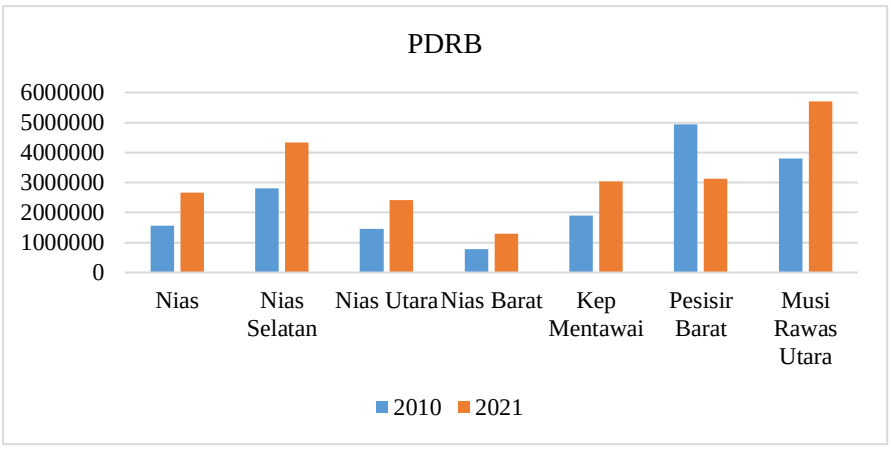


Figure 8 GRDP of the Seven Underdeveloped Regions in Sumatra Island, 2010 and 2021

Figure 8 shows the GRDP condition of the underdeveloped regions in Sumatra Island at the beginning and end of the study period. Relatively, it can be observed that all regencies experienced an increase in GRDP over the given time span, except for Pesisir Barat Regency. Pesisir Barat experienced a decline because the initial year data was taken from its parent regency, West Lampung, which has a very wide scope. Therefore, it is reasonable to see a decrease in GRDP from the beginning to the end of the study period.

Capital Expenditure

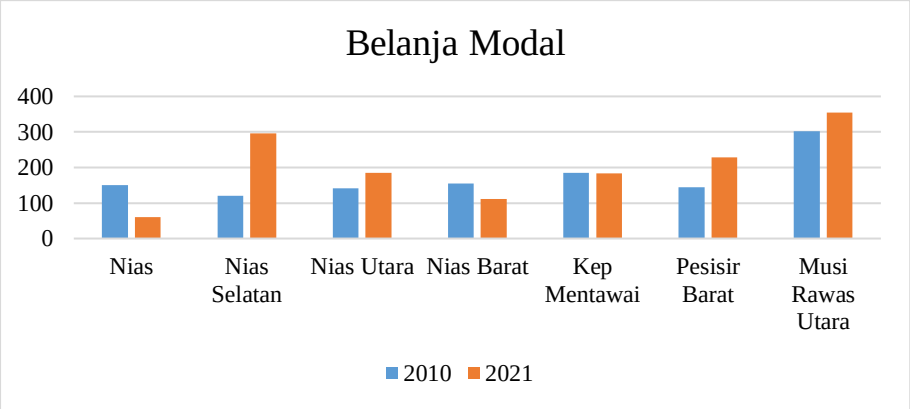


Figure 9 Capital Expenditure of Underdeveloped Regions in Sumatra Island, 2010 and 2021

Capital expenditure is fundamentally an outlay made to provide benefits extending beyond a single fiscal year. This expenditure is typically allocated to the development of various infrastructures such as roads, bridges, channels, machinery, buildings, and others. The Capital Expenditure for the seven underdeveloped regions can be seen in Figure 9. Capital expenditure in 5 out of the 7 regions experienced a budget increase, namely in South Nias Regency, North Nias Regency, Mentawai Islands Regency, Pesisir Barat Regency, and North Musi Rawas Regency. Meanwhile, the remaining 2 regencies—Nias and West Nias—experienced a decrease in their capital expenditure budget.

Open Unemployment Rate (TPT)

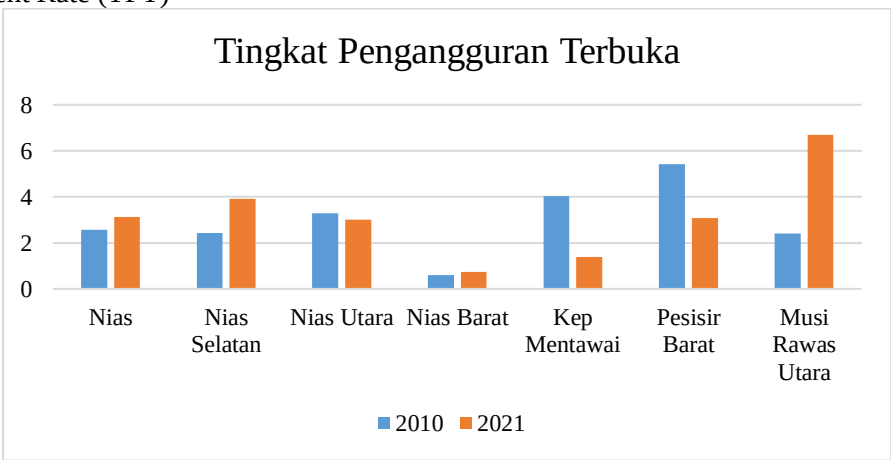
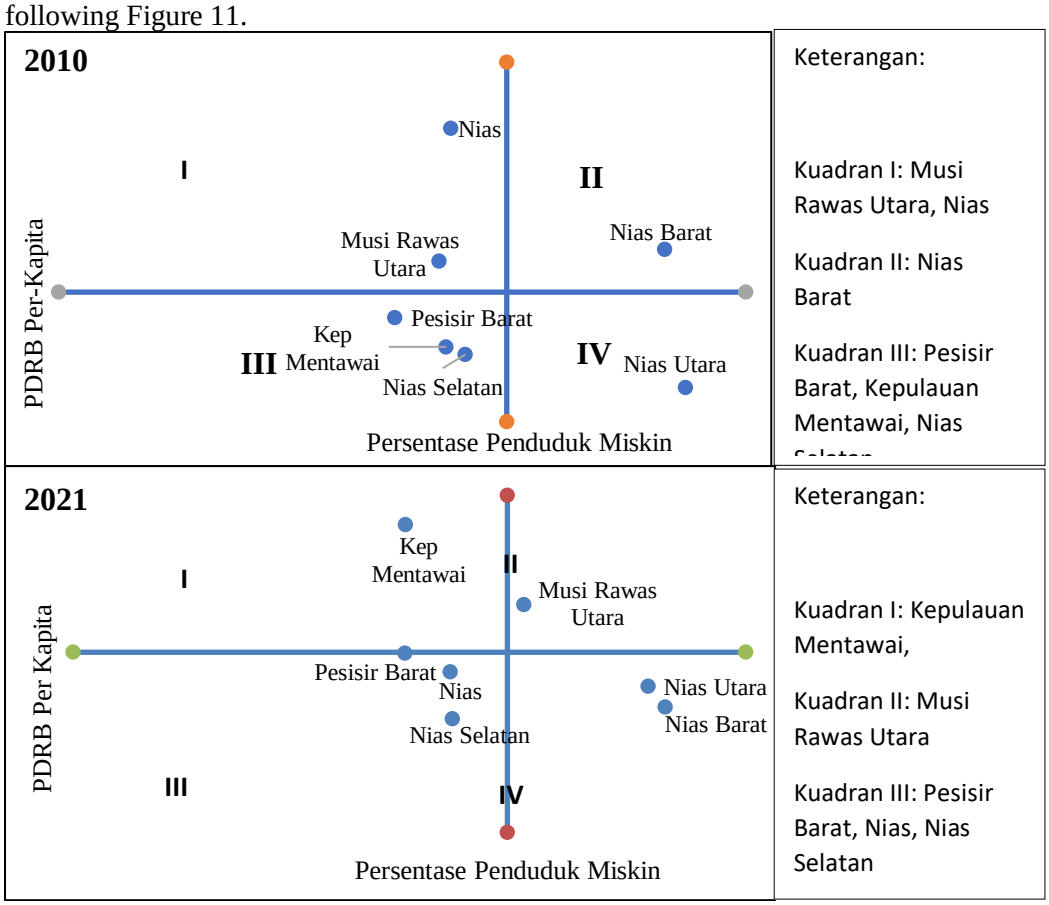


Figure 10 Open Unemployment Rate of Underdeveloped Regions in Sumatra Island, 2010 and 2021

The Open Unemployment Rate (TPT) is a measurement indicating the proportion of the working-age population that is unemployed. The open unemployment rate is measured as the percentage of the number of unemployed persons to the total labor force. According to Kuncoro (2013), the utility of this open unemployment rate can serve as a reference for the government in creating new job opportunities. The opening of new job opportunities will reduce the number of poor people in a region. Figure 10 reveals that 4 out of the 7 regencies experienced an increase in the TPT when compared between the beginning of the study period (2010) and 2021. These are Nias Regency, South Nias Regency, West Nias Regency, and North Musi Rawas Regency. Meanwhile, North Nias Regency, Mentawai Islands Regency, and Pesisir Barat Regency experienced a decrease in their TPT. Poverty Condition Mapping of Underdeveloped Regions in Sumatra Island

Poverty mapping is a beneficial practice for conducting a more in-depth exploration of poverty. One method for mapping poverty conditions is through Klassen typology. The results of poverty mapping for the seven underdeveloped regions in Sumatra Island in this study, conducted using Klassen typology, are presented in the following Figure 11.



The top panel of Figure 11 shows the mapping of underdeveloped regions in 2010, while the bottom panel shows the mapping in 2021. Based on Figure 11, it can be seen that during the study period there were shifts in the positions of the underdeveloped regions in Sumatra Island, illustrated across the four quadrants. Figure 11 shows that there was a change in the positions among the underdeveloped regions in Sumatra Island between the beginning and end of the study period. In 2010, the average percentage of poor population was 22.82% and the average GRDP was Rp 4,318,636. Meanwhile, in 2021, the average percentage of poor population was 19.36% and the average gross regional domestic product was Rp 32,060,471. This caused a shift in quadrants for several regencies. Underdeveloped regions in Quadrant I are those with high per capita GRDP and a relatively low percentage of poor population. In 2010, the underdeveloped regions in Quadrant I were North Musi Rawas and Nias. By 2021, there was a change in Quadrant I, with only Mentawai Islands Regency remaining. Underdeveloped regions in Quadrant II are those with high GRDP but also a high percentage of poor population. In 2010, the region in this quadrant was West Nias Regency, but by 2021 there was a positional change, with North Musi Rawas now in Quadrant II.

Underdeveloped regions in Quadrant III are those with low GRDP accompanied by a relatively low percentage of poor population. In 2010, Mentawai Islands, South Nias, and Pesisir Barat were in this quadrant. By 2021, there was a positional change, with Quadrant III now containing Pesisir Barat Regency, Nias Regency, and South Nias Regency. Underdeveloped regions in Quadrant IV are those with low GRDP accompanied by a relatively high percentage of poor population. In 2010, North Nias Regency was the only regency in this quadrant. However, by 2021, there was a positional shift for one region, West Nias, into Quadrant IV. Therefore, in 2021, Quadrant IV contains North Nias and West Nias. Based on this mapping, there is an increase in the number of regions falling into the category of low per capita GRDP and high poor population (Quadrant IV). Initially, only North Nias was in this category at the start of the study, but by the end, it included both North Nias and West Nias. Therefore, poverty alleviation priority should be emphasized on North Nias and West Nias regencies. In fact, if

selecting the top priority region for intervention, it should be North Nias, which has consistently remained in the quadrant of low per capita GRDP and high poor population percentage throughout the entire 11-year study period. Factors Influencing Poverty in Underdeveloped Regions of Sumatra Island

Selection of the Best Model

The selection of the best model was conducted through two stages of testing. First, the Chow test was performed to determine the better model between Ordinary Least Squares (OLS) and the Fixed Effects Model (FEM). Based on the Chow test results, the probability value was less than the 5% significance level (0.0000), which indicates the rejection of H0; therefore, the better model is FEM. Subsequently, the Hausman test was conducted to determine the best model between the Random Effects Model (REM) and FEM. Based on the Hausman test results, the probability value was less than the 5% significance level (0.0000), which also indicates the rejection of H0; thus, the best model is the Fixed Effects Model (FEM).

Results of Classical Assumption Tests

1. Normality Test
   The normality test is used to examine whether the error term is normally distributed or not. This can be identified through the Jarque-Bera test by observing its probability value. Data is considered good when the residuals are normally distributed. Based on the normality test results using the Jarque-Bera method, a probability value of 0.1741 was obtained, meaning the probability is greater than the 5% significance level. Therefore, the hypothesis is accepted, indicating that the residuals in the study are normally distributed and meet the assumption of normality.
2. Autocorrelation Test
   The autocorrelation test was performed by examining the values of du, dl, and the Durbin-Watson statistic. In this model, the Durbin-Watson (DW) value was found to be 1.1657, while the dl value is 1.4800 and the du value is 1.8008. The result indicates positive autocorrelation because DW < dl. To address this, weighting was applied to the model.
3. Heteroscedasticity Test
   A heteroscedasticity test can be conducted by comparing the sum of squared residuals (SSR) when using weighted statistics. The result showed that the SSR after weighting was 168.1686, while the unweighted SSR was 197.8792. This indicates that the weighted SSR is less than the unweighted SSR, signifying the presence of heteroscedasticity. However, this issue was resolved by applying Generalized Least Squares (GLS) weighting.

Model Estimation Results

The results of the FEM estimation are presented in Table 3. It shows that GRDP per capita, Road Length, Open Unemployment Rate, Capital Expenditure, and the Human Development Index have a significant influence on poverty in the underdeveloped regions of Sumatra Island. In contrast, Social Assistance Expenditure does not have a significant influence on poverty in these regions. The coefficient of determination (R-squared) value in the attached model is 0.964053, indicating that 96.40% of the variation in the dependent variable can be explained by the independent variables, while the remaining 3.60% is explained by other variables outside the model.

Table 3 Estimation Results of Factors Influencing Poverty in Underdeveloped Regions of Sumatra Island

Variabel	Koefisien	Probabilitas
IPM	- 0.49385	0.0000***
LOG(PJL)	- 0.78556	0.0044***
LOG(BLJ)	0.17852	0.1571
LOG(PDRB)	- 0.05165	0.0984*
LOG(BLM)	- 0.74850	0.0522*
TPT	0.25525	0.0087***
Weighted Statistic		
R-squared		0.96405
Adj- R-squared		0.95761
Prob (F-statistic)		0.00000

Sum square resid		168.1686
Durbin-Watson Stat		1.417124
Unweighted Statistics		
R-squared		0.92612
Sum square resid		197.8792
Durbin-Watson Stat		1.165798

Note: *) significant at the 10% level; **) significant at the 5% level; ***) significant at the 1% level
The Influence of the Human Development Index on Poverty in Underdeveloped Regions of Sumatra Island The estimation results show that the HDI has a proven significant negative influence on the poverty level in the seven underdeveloped regions of Sumatra Island in this study. This finding aligns with research by Hidayat (2008), Prastiwi (2017), Kurniawati (2017), Zuhdiyati (2017), Amaluddin et al. (2018), Ross (2019), Hasanah et al. (2021), and Lestari et al. (2021). A negative coefficient of 0.49385 can be interpreted to mean that every one-unit increase in the Human Development Index (HDI) will cause a decrease in poverty by 0.49 percent. Fajnzylber and Lederman (2002) state that the HDI influences poverty and crime. A low HDI leads to high poverty in an area because it fails to create community welfare and can trigger criminal acts. A low human development index is a problem that must be solved (Lamba et al., 2020). The HDI is also the first main component usually considered to represent the overall index of development achieved (Vyas and Kumaranayake, 2006; Lindman and Sellin, 2011). In the context of economic development in a region, the HDI is established as one of the main measures included in the basic pattern of regional development. A high HDI means high levels of education and health among the population. When education and health levels are high, they can obtain decent jobs, making it possible to earn high incomes. High incomes, in turn, will improve community welfare and reduce poverty levels.

The Influence of Road Length on Poverty in Underdeveloped Regions of Sumatra Island Infrastructure plays a crucial role in poverty reduction. One of the most critical types of infrastructure is roads. Roads are closely related to economic access. Based on the results of the panel data linear regression estimation above, it can be seen that Road Length has a significant negative influence on poverty in the underdeveloped regions of Sumatra Island at the 5% significance level (probability value 0.0044), with a regression coefficient of -0.78556. This indicates that a 1 percent increase in road length will decrease poverty by 0.78 percent, ceteris paribus. This finding aligns with research by Suryahadi et al. (2015), which found that access to good transportation and communication infrastructure contributes to reducing poverty levels in Indonesia. Other research by Laksono et al. (2019) shows that increased access to health and sanitation infrastructure plays a role in reducing poverty in rural areas of Indonesia.

Recent literature reveals that the impact of improvements in the provision of rural roads and transport services is broadly positive in terms of effects on income, poverty reduction, employment, agricultural yields and sales, education, health, traffic volume, transport services, transport costs, and general economic indicators. Furthermore, road infrastructure facilitates economic mobility by enabling the efficient movement of outputs from one area to another, which ultimately increases economic growth and is followed by a decrease in poverty (Nurmala, 2018). The considered findings also support research discussed by Hine et al. (2016). Improved rural access has been found in several studies to promote village structural transformation by facilitating non-farm employment and enabling migration to urban areas. There is also a small but growing body of evidence reporting negative environmental impacts from rural access (Yamauchi, 2016; Asher and Novosad, 2016, 2018; Shamdasani, 2016; Nguyen et al., 2017; Aggarwal, 2018; Wagale et al., 2019; and Nakamura et al., 2019). The Influence of Social Assistance Expenditure on Poverty in Underdeveloped Regions of Sumatra Island Social assistance expenditure does not have a significant influence on poverty in the underdeveloped regions of Sumatra Island. This is indicated by a probability value exceeding the 1%, 5%, and 10% significance levels, specifically 0.1571. This statement indicates that Social Assistance Expenditure does not affect poverty in the underdeveloped regions of Sumatra Island. Referring to previous research, social assistance should be able to reduce poverty rates by ensuring access to basic needs and increasing opportunities to earn income through providing access to payments/credit and fostering labor market formation, thereby increasing community income and reducing poverty.

However, the estimation results of this study align with research by Sendouw, Rumate, and Rotinsulu (2017), Susanti & Sartiyah (2018), and Ayu (2021). The lack of influence of social assistance on poverty could be caused by inaccurate targeting in determining beneficiaries, leading to misdirected assistance distribution. This makes social assistance expenditure ineffective in reducing poverty levels within the community. The Influence of GRDP per Capita on Poverty in Underdeveloped Regions of Sumatra Island. The estimation results of poverty determinants above indicate that GRDP has a negative and significant influence with a coefficient of -0.05165 and a probability of 0.0984, which is less than the 10% significance level. This shows that a 1 percent increase in GRDP will reduce the poverty level by 0.05 percent, ceteris paribus. This aligns with research conducted by Septiani W T, Zamzami, and Mustika (2019), which analyzed the influence of per capita income and capital expenditure on poverty levels in Sumatra Island, finding that per capita income has a significant and negative influence on poverty levels in Sumatra Island.

This is because one measure of prosperity in each region is per capita income. Higher income indicates greater purchasing power of the population. High purchasing power drives community welfare and improves the community's economy, including the poor. Thus, increasing per capita income will reduce poverty levels. However, as a note, findings by Bergstrom (2020) and Cerra, Lama, and Loayza (2021) indicate that the impact of growth on poverty and inequality depends on how growth is distributed between the rich and the poor. The Influence of Capital Expenditure on Poverty in Underdeveloped Regions of Sumatra Island Capital expenditure significantly influences poverty at the 10% significance level, as seen in the probability value of 0.0522, with a coefficient of -0.748. This means that a one percent increase in capital expenditure will reduce poverty by 0.74 percent, ceteris paribus. This result aligns with research by Sugiono & Purbadharmaja (2021), which analyzed the influence of Regional Original Revenue (PAD) and Capital Expenditure on poverty levels and HDI in Bali. Government capital expenditure is generally allocated for public interests in poverty alleviation by designing infrastructure expected to increase economic activity, ultimately driving an increase in community income and reducing poverty.

This study yields estimates consistent with research by Hasan and Zikriah (2009), which concluded that an increase in capital expenditure allocation will impact the poor because the availability of good infrastructure is the downstream positive effect of increased and realized government capital expenditure, making it easier for the community to carry out economic and social activities. The Influence of the Open Unemployment Rate on Poverty in Underdeveloped Regions of Sumatra Island The Open Unemployment Rate (TPT) is the percentage of unemployed persons relative to the labor force. Open unemployment consists of those who do not have a job and are looking for work, those who do not have a job and are preparing a business, those who do not have a job and are not looking for work because they feel it is impossible to get a job, and those who already have a job but have not started working (BPS, 2015). Theoretically, if people are not unemployed, they have jobs and income, and the income earned from work is expected to meet their living needs. Based on the estimation results in this study, a significant influence was found between the Open Unemployment Rate and poverty in the underdeveloped regions of Sumatra Island, with a p-value of 0.0087. The estimation result is positive at 0.25525, indicating that a 1 percent increase in the Open Unemployment Rate will increase poverty by 0.25 percent, ceteris paribus. This finding aligns with Permana and Arianti (2012) and Lestari et al. (2021), which also found that unemployment has a direct and significant impact on poverty. Sukirno (2004) and Zhu, Bashir, and Marie (2022) state that the negative impact of unemployment is the reduction in community income, which ultimately lowers the level of prosperity an individual can achieve. The decline in community welfare due to unemployment will certainly increase their chances of falling into poverty because they have no income.

CONCLUSION

Poverty Mapping of Underdeveloped Regions in Sumatra Island, 2010 & 2021

Poverty mapping for the seven underdeveloped regions in Sumatra Island for the years 2010 and 2021 is grouped into four quadrants. Quadrant I indicates regions with a low percentage of poor population and high GRDP per capita. Quadrant II shows regions with a high percentage of poor population but also high GRDP per capita. Quadrant III depicts regions with low poverty and a low poverty percentage, while Quadrant IV indicates regions with a high poverty percentage coupled with low GRDP per capita. It was found that the majority of the underdeveloped regions experienced a change in quadrant position. Nias Regency shifted from Quadrant I to Quadrant III. West Nias Regency changed position from Quadrant II to Quadrant IV. North Nias Regency remained in Quadrant IV. South Nias Regency and Pesisir Barat Regency also did not change quadrants, staying in Quadrant III. Mentawai Islands Regency changed from Quadrant III to Quadrant I. Meanwhile, North Musi Rawas Regency

moved from Quadrant I to Quadrant II by the end of the study period. These positional changes indicate that the poverty conditions and per capita income in the underdeveloped regions underwent changes during the study period.

North Nias and West Nias Regencies require more intensive attention as they are located in Quadrant IV.

Based on the panel regression results, five factors were identified as determinants of the poverty condition across the seven regions during the study period. The length of roads in good condition, capital expenditure, the Human Development Index (HDI), and GRDP per capita have a significant negative influence on poverty. In contrast, the Open Unemployment Rate (TPT) has a positive impact on poverty in the underdeveloped regions of Sumatra Island. Meanwhile, social assistance expenditure does not influence poverty in these underdeveloped regions.

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