Democracy, Human Development, Income Distribution and Regional Economic Performance: A Panel Data Analysis of 34 Provinces in Indonesia

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Abstract

Many studies have concluded that the condition of democracy, the level of human development, and income distribution have associations with economic performance as measured by economic growth. However, the results of empirical studies on the relationship between these variables remain inconclusive. The objective of this study is to examine the effects of democracy, human development, and income distribution on economic growth in Indonesia's 34 provinces between 2012 and 2020. This study uses panel data analysis conducted using a Fixed Effect Model (FEM) approach. The findings reveal that human development (as measured using the Human Development Index) significantly affects gross regional domestic product (GRDP) growth. Meanwhile, democracy (measured through the Democracy Index) and income inequality (measured using the Gini Coefficient) are not statistically affected by GRDP growth. The findings have policy implications for provincial governments in developing policies that encourage strategic investment in human resources. The provincial government can implement policies that enhance the association between human development and economic development. Such policies are essential due to the strong relationship between human development and regional economic growth, necessitating an integrated strategy to enhance human and economic development.

Keywords:
democracy; human development; income distribution; economic growth

Introduction

Studies of economic performance, as measured through economic growth, have focused primarily on economic variables (Ameur & Seffih, 2021; Baklouti & Boujelbene, 2018). However, non-economic variables also contribute importantly to national and local economies (Appiah et al., 2019; Klaus & Gründler, 2016). Previous studies (for example, those of Obobisa et al., 2021; Ciftci & Durusu-Ciftci, 2022) have explored the influence of economic variables on regional economic growth in great detail. However, the influence of non-economic factors such as democracy, human development, and income inequality has not received a similar level of attention (Ameur & Seffih, 2021; Kabir & Alam, 2021).

A few empirical studies emphasize the importance of these factors. For example, Acemoglu et al. (2019) indicate that the condition of democracy in a nation plays an important role in creating a conducive climate wherein all institutions, including financial ones, can function optimally. Democracy affects economic growth because it provides an environment wherein economic activities may be freely and effectively undertaken, thereby creating growth (Nosier & El-Karamani, 2018).

Also vital in economic growth is human resource development (Hamdan et al., 2020).

Human resources contribute significantly to economic growth, as the quality of available human resources correlates positively with workplace productivity (Aljarallah, 2020). Productivity, in turn, has a positive impact on human development. The two are thus mutually supportive (Rahman et al., 2020). As such, it is necessary to ascertain the link between human resources and economic performance. Also influencing economic performance is income (in)equality (Ameur & Seffih, 2021). In unequal societies, certain elements of society are stifled by poverty and thus unable to contribute to economic growth (Touitou, 2021).

Researchers have frequently investigated the influence of macroeconomic and monetary variables on economic growth. However, studies of democracy, human resource development, and income inequality (including at the provincial level) have been limited. This study thus seeks (1) to analyse the influence of democracy on economic growth in Indonesia's 34 provinces, (2) to analyse the influence of human resources on economic growth in Indonesia's 34 provinces, and (3) to analyse the influence of income inequality on economic growth in Indonesia's 34 provinces. Equation 3 is employed to address the three research objectives.

Before delving deeper into the literature on the variables of democracy, human resource development, and income inequality and their association with economic growth, it is necessary to first present trends in the related data. This discussion will provide a contextual discussion of the aforementioned variables in Indonesia's 34 provinces. Between 2012 and 2020, regional economic growth in Indonesia trended negative, from 6.03% to -2.07%. By region, the highest gross regional domestic product (GRDP) growth occurred in Eastern Indonesia in 2015 (8.29%), while the lowest economic growth occurred in Java in 2020 (-2.28%). The negative economic growth in Indonesia throughout 2020 is attributed to the COVID-19 pandemic.

Trends in human resource development are also important to discuss. Figure 1 shows the trends in the Human Development Index (HDI) in Indonesia's 34 provinces between 2012 and 2020. Overall, human development
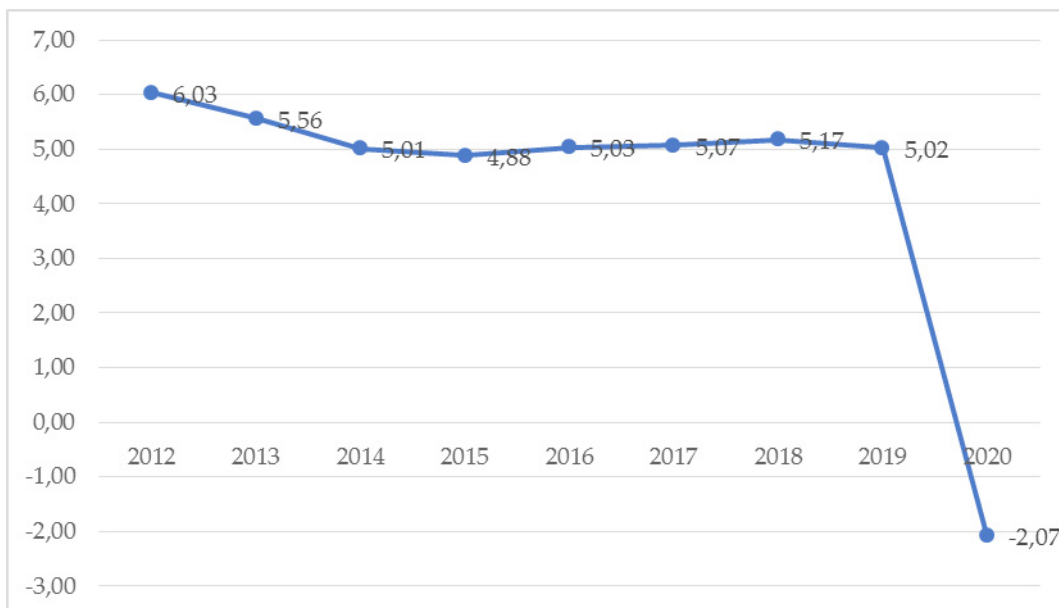
Figure 1. The Growth of Gross Regional Domestic Product (Average, %)

Source: Statistics Indonesia (BPS – Badan Pusat Statistik), calculated by author.

Figure 2. Human Development Index (Average)

Source: Statistics Indonesia (BPS – Badan Pusat Statistik), calculated by author.

Figure 3. Human Development Index by Main Islands, 2012-2020 (Average)

Source: Statistics Indonesia (BPS – Badan Pusat Statistik), calculated by author.

showed positive growth over this eight-year period, indicating that development activities have been successful.

Figure 3 maps the average HDI for Indonesia's provinces between 2012 and 2020. The highest score, 79.41, was found in the Jakarta Capital Region, where extensive physical development occurred over the decades, and residents exhibited high levels of self-sufficiency. Meanwhile, the lowest average score was found in Papua Province (58.25%), indicating that the province lagged behind other parts of the nation.

In Figure 4, trends in the Gini Coefficient of Indonesia's 34 provinces for 2012–2020 are presented. From 2012 to 2019, the average Gini Coefficient decreased from 0.412 to 0.380. This indicates a decrease in income inequality

Figure 4. Gini Index of 34 Provinces, 2012-2020 (Average)
Source: Statistics Indonesia (BPS – Badan Pusat Statistik), calculated by author.
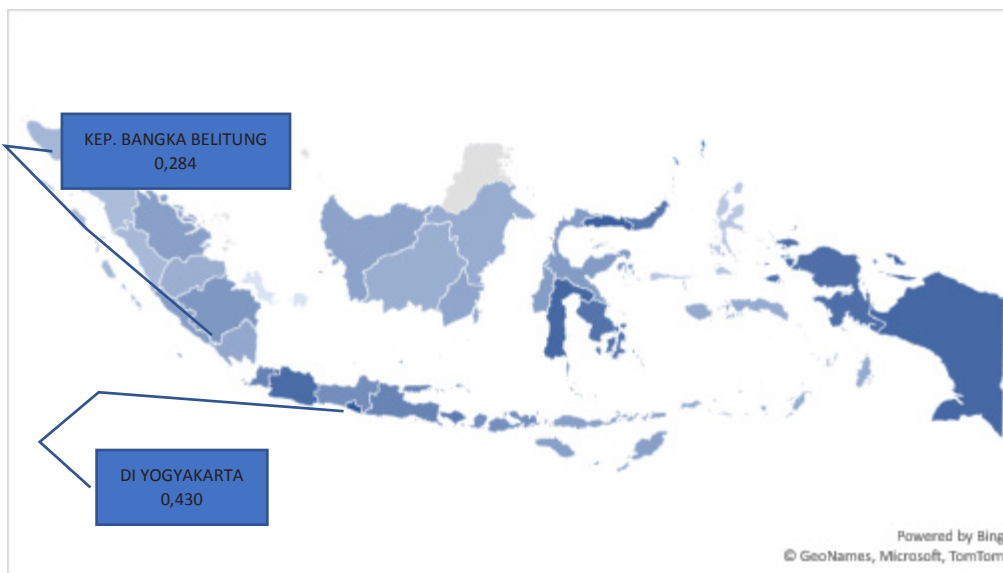
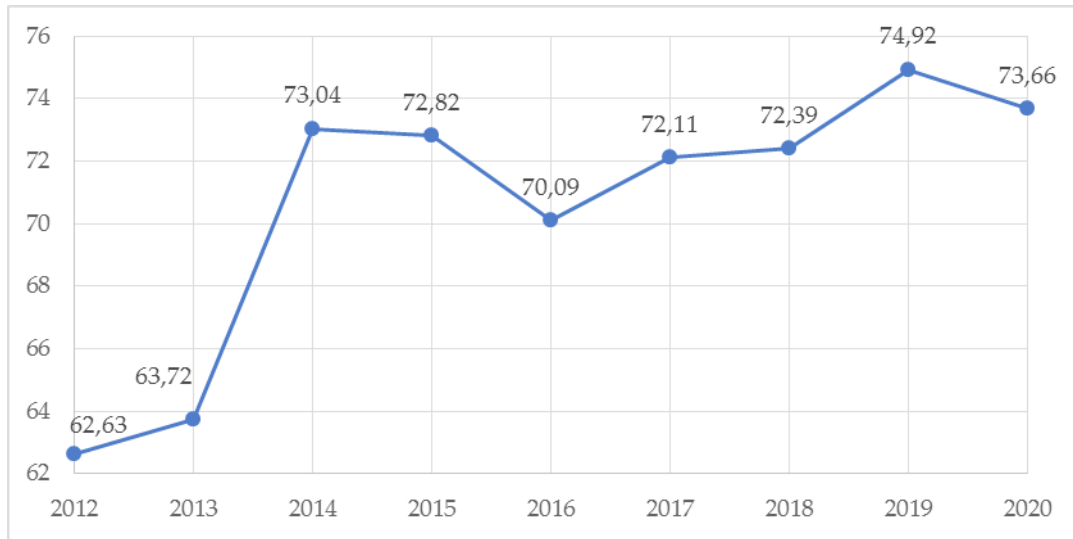**Figure 5. Gini Index of 34 Provinces, 2012-2020 (Average).**
Source: Statistics Indonesia (BPS – Badan Pusat Statistik), calculated by author.

in Indonesia. However, in 2020, the Gini Coefficient increased again to 0.383, indicating increased inequality.

The average Gini Coefficient for each of Indonesia's provinces between 2012 and 2020 is presented in Figure 5. The highest Gini Coefficient (0.430) was found in the Special Administrative Region of Yogyakarta. This indicates that Yogyakarta had the highest level of income inequality in Indonesia.

Meanwhile, the lowest Gini Coefficient (0.284) was found in the Bangka–Belitung Islands Province.

Figure 6 illustrates the Indonesian Democracy Index for the 2012–2020 period. Between 2012 and 2019, the index generally trended upwards, reaching its peak in 2014 (when it reached 73.04, from 63.72 in 2013). Between 2014 and 2016, the trend dipped, though the index had recovered to 73.66 by

Figure 6. Democracy Index of 34 Provinces, 2012-2020 (Average)
Source: Statistics Indonesia (BPS – Badan Pusat Statistik), calculated by author.

2019. In 2020, the Indonesian Democracy Index dropped by 1.26 again.

Figure 7 shows the average score for Indonesia's provinces between 2012 and 2020. The evidence indicates a positive association between the HDI and the Democracy Index. However, it is essential to note that regional differences suggest that democracy is just one of several factors that impact human development. Democracy alone may not suffice to support growth without substantial investment in education, health, infrastructure, and inclusive economic policies. This analysis highlights the significance of adopting a comprehensive strategy in development policy that considers political and socio-economic factors of human development. The provinces of DKI Jakarta (HDI 79.41, Democracy Index 81.90) and DI Yogyakarta (HDI 78.19, Democracy Index 80.39) demonstrated a positive association between a high degree of human development and a high democracy score. It signifies effective governance, accountability, and extensive civic engagement in the democratic system, fostering human well-being and progress.

Conversely, provinces like East Nusa Tenggara had a comparatively low HDI of 63.23 but a relatively high Democracy Index of 76.87. Such findings imply that while democracy may operate effectively regarding institutions and procedures, other variables such as unfavourable economic conditions, lack of education, and inadequate healthcare can still pose significant barriers to human development. The presence of democracy does not always ensure a high HDI. North Kalimantan's HDI (69.60) was lower than its Democracy Index score (80.16), suggesting that factors beyond democratic institutions played a role in influencing human development, such as the allocation of resources, regional policy, or historical and geographical circumstances.

Literature Review and Hypothesis Development
Democracy and Economic Growth

Democracy provides an institutional framework that facilitates the supremacy of law, free and competitive elections involving multiple political parties, accountability, civil and political rights, and the right to survive and prosper (Okolie et al., 2021). Democracy reflects economic freedom, which includes personal choice, voluntary exchange, competition, and protection (Ciftci & Durusu-Ciftci, 2022). From another perspective, Prinos and Manley
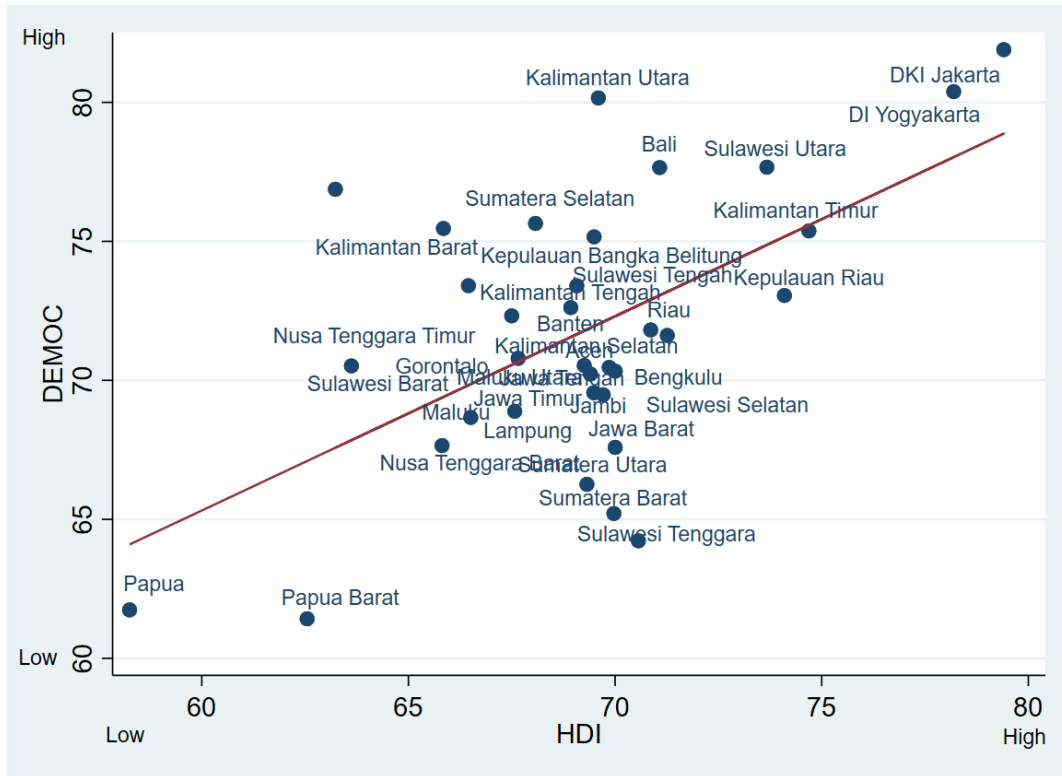
Figure 7. Democracy Index of 34 Provinces, 2012-2020 (Average)

Source: Statistics Indonesia (BPS – Badan Pusat Statistik), calculated by author.

(2022) and Zhao (2021) understand political democracy as reflecting economic democracy, wherein the local socio-economic institutions are influenced by the principles of democracy.

Empirical studies have long shown a link between political conditions, democratization, and economic development. The stronger the democracy in a nation, and the fewer the political risks, the better the economic growth (Liu et al., 2021). The principles of democracy are reflected, for example, in responsive and accountable leadership as well as strong and sustained growth. As such, democracy facilitates states in their efforts to navigate external and internal challenges (Ahmed & Trabelsi, 2022).

Previous studies have shown that democracy correlates positively with economic growth and development. Acemoglu et al. (2019) investigated the link between democracy and GDP using panel data covering 175 countries between 1960 and 2010 and found

that democratization correlated positively with economic growth, averaging a 20% per capita increase over the long term. Their findings indicated that democratization contributed to GDP by promoting investment, improving access to education, driving educational reform, increasing the procurement of public goods, and reducing social turmoil. Klaus and Gründler (2016) investigated the link between democracy and economic growth by using panel data covering 185 countries between 1981 and 2011. Klaus and Gründler (2016) employed the Support Vector Machines Democracy Index, which uses mathematical algorithms to identify patterns and measure democracy, to show a positive correlation between democracy and economic growth. They concluded that democracies tend to have better-educated populations, experience greater investment, and have lower fertility rates.

A study by Nosier and El-Karamani (2018) examined the indirect effect of democratisation

on economic growth. Using Three-Stage Least Square (3SLS), they examined a dataset covering 17 countries in the Middle East and North Africa from 1990 to 2015 and explored the effect of democratisation on economic growth through several channels: education, health, the accumulation of physical capital per labourer, government conception, and trade freedom. They revealed that democratisation stimulated economic growth through the health sector. However, the economic effects of democratisation through education and capital accumulation depended on the country, while government consumption and trade freedom showed a negative influence. After controlling for indirect influences, they found that democracy had a positive effect on affluent economies but a negative effect on poorer economies and vulnerable democracies.

Strong democratic institutions will enable developing countries to better weather external threats and challenges. Ahmed and Trabelsi (2022) used a duration model to estimate the extent to which democracy influences economic growth, drawing on panel data covering 96 developing countries between 1965 and 2015. They found that democracy played a paramount role in enabling countries to navigate external challenges. They also proved that institutional democracy, as reflected in political participation and egalitarianism, can result in sustained economic growth.

Political democracy is correlated with economic freedom (Ciftci & Durusu-Ciftci, 2022). Studies have shown that political democracy, which promises economic freedoms to all, is reflected in (i) the supremacy of law (ownership rights, effective courts, and government integrity), (ii) government size (tax burdens, government expenditures, and fiscal health), (iii) regulatory efficiency (business burdens, labour freedoms, and monetary freedoms), and (iv) market openness (trade freedoms, investment freedoms, and financial freedoms). These aspects are analysed within the context of economic growth. Ciftci and Durusu-Ciftci (2022) proved reciprocal causality between market openness and economic growth in countries such as Canada, Mexico, Sweden, and Britain. Market freedom was also found to influence economic growth in Brazil, France, India, and Spain.

Prinos and Manley (2022), using the Preston Model, investigated the link between local economic development and democracy, environmental sustainability, and social cohesion (including the maintenance of social values through public-private partnerships). They focused primarily on economic democracy and solidarity, providing a theory of social and organisational identity that linked it with democratic participation and the processes that make social change possible. Their study showed that economic democracy and solidarity can emerge organically and may provide a democratic model of economic development that reflects local values, social justice, and collaboration, increasing productivity and stimulating economic growth.

Democracy plays a significant role in shaping development and increasing per-capita income (Kabir & Alam, 2021). This conclusion was supported by an empirical study using panel regression data collected from 115 countries between 2006 and 2018, which found a significant and positive correlation between the quality of democracy and per capita income. However, not all scholars have supported the idea that democracy inexorably promotes growth and improves economic performance. As shown by Okolie et al. (2021), democracy increases public expenditures. For example, when government leaders are re-elected every four years, funds that should be used for the public good are allocated to cover the cost of elections. In Nigeria, for example, public funds are used for "democratic" activities that are prioritised over the public interest, thereby exacerbating income inequality and detrimentally affecting economic growth.

This condition has also been observed in Indonesia. In the electoral system in Indonesia, particularly democracy at the grassroots level, the phenomenon of money politics is prevalent. The populace widely perceives it as customary (Ar et al., 2023). Accordingly, elections in Indonesia are frequently marked by money politics, which involves swaying voters through financial means (Aminuddin & Attamimi, 2019). Money politics is influenced by economic conditions and high poverty rates. Therefore, it is necessary to alleviate poverty and develop the economy to overcome money politics and establish a responsible democracy (Adlin et al., 2022).

Referring to these empirical studies and extant literature on democracy and economic growth, the following hypothesis is offered. *H1: Democracy affects economic growth.*

Human Development and Economic Growth

The Human Development Index (hereafter HDI) has played an increasingly important role in successful economic development (Fleurbaey, 2009; Rahman et al., 2020). Human resources consist of the knowledge, ability, and skills needed to contribute to and promote economic growth (Neeliah & Seetanah, 2015). Aggregate cognitive skills have been shown to have a strong and positive collection with economic growth (Hanushek, 2021), and human resource development has been found to provide individuals with the capacity for innovation and capital they need to promote economic growth. The quality of human resources differs between regions, as so does the level of innovation and technology (Appiah et al., 2019). The economic importance of human resource development is indicated by the fact that human resources provide individuals with the ability to accumulate capital and expand their economic activities (Baptista & Mendonça, 2010). Consequently, high-quality human resources lead to economic growth (Mthanti & Ojah, 2018). Human resources is the combination of several factors, including education, experience, training, intelligence, habits, integrity, and initiative, all of which influence the productivity of the workforce (Zaman, 2012). Thus, human resources are foundational for productivity, and investment in human capital improves productivity (Mankiw et al., 1992).

The United Nations developed HDI to statistically quantify the social and economic development of countries worldwide (Nayak, 2009; Rahman et al., 2020). HDI considers three indicators, namely life expectancy, education, and income per capita. Health and longevity are indicative of a high quality of life, as measured by life expectancy. Meanwhile, education—as measured by years of education expected of children and enjoyed by adults—is indicative of the access to knowledge available to the public. The final dimension is quality of life, as measured through per capita income (UNDP, 1996).

Studies of the link between human development and economic growth have been common. Neeliah (2016) evaluates the effect of human development on economic growth by using an aggregate index that combines education, health, and nutrition as indicators of human capital. They found that human capital contributes significantly to economic growth, being a key driver in both short and long terms. Uddin et al. (2021) investigated the link between institutions, human capital, and economic growth in developing nations using panel data from 120 developing nations collected between 1996 and 2014. According to their study, while human and institutional development has a positive and significant effect on economic growth in developed countries, their correlation is a negative one in developing countries. As available institutions are weak and dysfunctional, further investment in human development will negatively affect economic growth, as funds are frequently diverted to social and rent-seeking activities.

Hoa et al. (2016) analysed the link between human development and other factors that affect economic growth (i.e., physical capital, social capital, employment, economic freedom, inflation, government expenditures, and a dummy variable). Using the pooled regression, fixed effect, and random effect models, they analysed panel data covering 30 countries between 1999 and 2014. They concluded that human development, physical capital, and employment rate are positively correlated with a country's economic development, with human development exerting the strongest influence.

Likewise, Öztürk and Suluk (2020), using Norwegian data from 1990 to 2017, found a strong unilateral link between human development and economic growth. They argued that the three aspects of human development (education, income, and healthcare) contributed significantly to the country's economic growth. Nair (2018) argues that economic activities follow a cycle wherein human development influences economic growth and vice versa. Nair further explored the link between economic growth, human development, and the success of policies that allocate funds for public services. In Kerala, India, for example, comprehensive policies were strongly associated with infrastructure and social development. Nair argues that the sustainability and success of economic development are informed by government policies designed to strengthen the link between human development and economic growth.

In Sudan, Awad et al. (2014) tested the hypothesis that a strong bilateral relationship exists between economic growth and human development using time series data from 1960 to 2012. They hypothesised that a reciprocal relationship exists between human development and economic growth. They analysed the long-term cointegration between the Autoregressive Distributed Lag (ARDL) and Error Correction Model to identify the short-term dynamics of human development and economic growth. They found that, over the long term, human development positively influences economic growth through education and labour performance. Economic growth is also positively affected by the availability of education and involvement in economic activities.

Taking the case of Africa, Appiah et al. (2019) investigated the effects of human development on economic growth in Kenya, Tanzania, Rwanda, Ghana, and Cote d'Ivoire between 1990 and 2015. They used human development as an independent variable, with GDP as a dependent variable and inflation, capital, investment, and labour as control variables. They suggested that human development had a positive and significant impact on economic growth in those African nations.

Drawing from previous empirical studies on human development and GDP growth, the following hypothesis is formed. *H2: Human development affects economic growth.*

Income Equality and Economic Growth

Income distribution has been widely debated in the literature (Siami-Namini & Hudson, 2018; Adeleye et al., 2020), as unequal distribution results in income inequality. These gaps, which tend to be larger in developing nations than in developed nations, are measured using the Gini Coefficient. Using this metric, inequality can be quantified (Touitou, 2022; Adeleye et al., 2020).

There is no clear agreement among scholars regarding the relationship between income equality and economic growth. Mdingi and Ho (2021) conducted a comprehensive review of the literature on income inequality and economic growth. In the theoretical literature, studies have not produced any conclusive evidence; it may be positive or negative. In developed nations, economic

growth reduces income inequality. However, in developing countries, it exacerbates inequalities (Siami-Namini & Hudson, 2018).

Using data from 1980 to 2015, a study by Ameur and Seffih (2021) investigated the effect of income inequality on economic growth in Algeria. This study employed an ARDL model to investigate long-term effects and an error correction model to explore the short-term effects of the variables being studied. They found a significant and negative link between income inequality, as measured using the Gini coefficient, and GDP. They found that the wider the gap, the slower the economic growth.

Drawing on the experiences of Brazil's states between 1994 and 2014, Besarria et al. (2018) investigated the effects of inequality and economic growth using a two-stage empirical model. During the first stage, a short-term analysis of panel data was conducted by using the fixed effect, random effect, and instrumental variables. During the second stage, the error correction model was used with cointegrated panels. This study found that income equality and education were the main factors determining state-level economic growth in Brazil.

Siami-Namini and Hudson (2018) believe that it is important to consider the study conducted by Jianu et al. (2021). They found that the effects of income inequality may be positive or negative, depending on the country's level of development. In the European Union, for example, they found that income inequality positively affects economic growth. Meanwhile, in member states categorised as "developing", the effect was negative. These findings used data for the 2010–2018 period. Also investigating the European case, Topolewski (2020) sought to ascertain whether economic inequality was positively or negatively correlated with economic growth. Taking data from 32 European nations, covering the period from 2010 to 2018, Topolewski used several control variables—including

school registration rates, school registration rates for girls, government expenditures, and gross capital formation. This study found a significant and negative correlation between income inequality and economic growth in its sample group.

In Indonesia, Simangunsong and Kuang-Hui (2018) investigated the high levels of inequality experienced in the country's decentralisation. Analysing data from 33 Indonesian provinces from 2005 to 2015, they found a positive correlation between income inequality and economic growth. At the same time, however, they concluded that income inequality did not restrict economic growth. As such, the impact of income inequality on economic growth is uncertain.

Inequality has a causal relationship with growth, as suggested by Touitou (2021) in a study that examined the link between governance, economic growth, inequality, and poverty. This study conducted a structural analysis of panel data from 81 countries (divided into three categories, i.e., low-income, medium-income, and high-income), covering the period from 2000 through 2016. The findings showed that growth, inequality, and poverty are both positively and negatively correlated. In low-income countries, the best means of reducing poverty is redistributing wealth to accelerate economic growth and reduce inequality.

Based on the discussion above, the following hypothesis is developed: *H3: Income inequality affects economic growth.*

Methods

This study employs panel data from Indonesia's 34 provinces, covering the period from 2012 to 2020. Associational analysis between the dependent and independent variables was conducted using panel regression. Panel data consists of a series of observations collected over a certain length of time (Greene, 2008). Panel analysis has several strengths (Hsiao, 2006; Baltagi, 2008). First, panel data can mitigate the influence

of heterogeneity, as data are collected over time and cover broad cross-sections; as such, they make more varied information available, thereby mitigating the potential effects of collinearity and offering greater freedom. Panel data analysis is best suited to detecting and quantifying subtle trends, as it provides in-depth information while providing researchers with greater freedom and efficiency (Brereton, 2015). According to Hsiao (2006) and Baltagi (2008), the primary benefits of panel data analysis are (1) more accurate model parameters, which are made possible because panel data provides researchers with greater freedom and more varied samples that increase the efficiency of econometric estimation, (2) the ability to use cross-sectional and time-series data to better capture the complexities of human behaviour, (3) calculations and statistical inferences are simpler, as panel data facilitates these processes by combining cross-sectional and time-series data.

Empirical Model, Variables, and Data

This study uses the growth-regression model offered by Barro (1991), Bhargava et al. (2001) and Hamdan et al. (2020), as follows:

$$Y_i = \alpha + \gamma X + \varepsilon_i \qquad (1)$$

where $i = 1,2,3 \ldots n$ is the cross-section index (province), Y_i is the dependent variable (i.e., the regional economic growth of i), X is the independent variable (i.e., the vector determining growth), and ε_i is the stochastic error term. Formula (1) may be written as follows:

$$Y_{i,t} = \mu_i + \gamma X_{i,t} + u_{i,t} \qquad (2)$$

where $i = 1,2,3 \ldots n$ is the cross-section index (province), $t = 1,2,3\ldots$ is the time-series index, μ_i is the provincial-specific effect that accounts for cross-sectional heterogeneity, and $u_{i,t}$ is the error value for unit i at time t. For this study, Formula (2) is presented as:

$$GRDP_{i,t} = \beta_0 + \beta_1 DEMOC_{i,t} + \beta_2 HDI_{i,t} + \beta_3 GINI_{i,t} + u_{i,t} \qquad (3)$$

where $Y_{i,t}$ is the GRDP, the dependent variable, i.e., GRDP growth in province i at time t, $\beta 0$ is the intercept, β_1- β_3 is the coefficients of regression, $u_{i,t}$ is the error value for province i at time t, and DEMOC, HDI, and GINI are independent variables. The number of cross-sections — (i) = (1,2 … 34) — represents the number of provinces in Indonesia (a list of all thirty-four is presented in the appendix). Each cross-section is presented in nine iterations — time-series (t) = (2012–2020). As such, 306 units of analysis are considered.

This study uses panel or longitudinal data (a combination of cross-sectional and time-series data), a maximum of $t = 9$ (time series) and $i = 34$ (cross-section). The units being analysed are the provinces of Indonesia. As the number of data units is the same for each period, the panel data used in this study is balanced (Greene, 2008; Karadžić & Đalović, 2021; Lal et al., 2021). The multivariable regression model is used to answer the research question by identifying the factors that contributed to economic growth in Indonesia's 34 provinces between 2012 and 2020. The dependent variable in this study is the growth of the real GRDP — the total value of all products and services produced within a territory within a certain period — of each of Indonesia's 34 provinces. Table 1 presents a list of used variables. GRDP is indicative of the production levels within a region and thus is widely accepted as an indicator of economic well-being. As independent variables, meanwhile, this study takes the Democracy Index, HDI, and Gini Coefficient. Data for the independent variables were collected from Statistics Indonesia (BPS), while all computations were conducted using EViews 10.

Results
Descriptive Statistics

Table 2 presents descriptive statistics of 306 observations. It also shows the mean values for each variable; 4.797320 for GRDP, 69.14752 for HDI, 0.363224 for GINI, and 71.70873 for

Table 1.
Variables Definition

Variable Name	Definition/Unit of Measurement	Expected Sign
Gross Regional Domestic Product (GRDP), a measure of Regional Economic Growth	GRDP growth is shown in the percentage change in provincial GRDP per year (growth rate of real $GRDP_t = GRDP_t - GRDP_{t-1}$). (%)	
Democracy (DEMOC)	This Democracy Index is a composite indicator that shows the level of development of democracy in Indonesia. The level of achievement is measured based on the implementation and development of three aspects of democracy, namely Civil Liberty (Civil Liberty), Political Rights (Political Rights), and Democratic Institutions (Institution of Democracy). The value of the Demographic Index is on a scale of 1-100, 1 indicates the lowest performance, and 100 is the highest performance. The classification of democracy levels is grouped into three categories, namely "good" (index > 80), "moderate" (index 60–80), and "bad" (index < 60).	Positive (+)
Human Development Index (HDI)	HDI is a composite index to measure the achievement of the quality of human development based on three indicators: a long and healthy life, knowledge, and a decent standard of living (%).	Positive (+)
Gini Index (GINI)	The Gini shows a cumulative expenditure curve that compares the distribution of a particular variable (e.g., income) with a uniform distribution that represents the cumulative percentage of the population. The Gini coefficient ranges from 0 to 1. If the Gini coefficient is 0, it means perfect equality, while if it is 1, it means perfect inequality.	Negative (-)

Source: Statistics Indonesia (BPS – Badan Pusat Statistik), calculated by author.

DEMOC. The standard deviation for these variables is lower than the mean, indicating that there are no outliers or extremes in the variables analysed. Further analysis was conducted to identify the skewness in the analysed data. For the GRDP growth, HDI, and Democracy Index variables, this analysis produced a result that was less than zero, indicating an asymmetric negative distribution. Meanwhile, for the GINI variable, the skewness was greater than 0, indicating an asymmetric positive distribution. For the GRDP variable, the kurtosis value was 11.31651 > 3, indicating a leptokurtic distribution; a similar distribution was also found for the HDI variable (3.990594 > 3). For the GINI (2.342631 < 3) and DEMOC (2.740486 < 3) variables, the values were less than three, indicating a platykurtic distribution (Westfall, 2014).

Multicollinearity

For any regression analysis, multicollinearity—a linear correlation between multiple variables—may be a problem. Collinearity occurs when two variables present as a nearly perfect combination (Greene, 2008). Multicollinearity may result in variance being higher than estimated and thus poorly suited to identifying causal links between the variables under investigation. In this study, Pearson's correlation coefficient was used to investigate the collinearity of the independent variables (Table 3). Pearson's correlation coefficient shows that the independent variables have a correlation value of < 0.9 (Greene, 2008). It may thus be concluded that no multicollinearity exists between independent variables.

Panel Regression Model

Panel data analysis can be conducted using either the Fixed Effect Model (FEM) or the Random Effect Model (REM). FEM assumes that the coefficient slope is fixed, though the intercept value may differ between individuals and over time. REM, meanwhile,

Table 2.
Descriptive Statistics

	GRDP	HDI	GINI	DEMOC
Mean	4.797320	69.14752	0.363224	71.70873
Median	5.345000	69.17500	0.360250	72.27500
Maximum	21.76000	80.77000	0.442500	89.21000
Minimum	-15.74000	55.55000	0.259500	52.61000
Std. Dev.	3.386500	4.295836	0.039024	6.957711
Skewness	-0.819319	-0.000384	0.044606	-0.271403
Kurtosis	11.31651	3.990594	2.342631	2.740486
Observations	306	306	306	306

Source: Author's calculation using Eviews 10.

Table 3.
Pearson Correlations Coefficients among the
Independent Variables

	DEMOC	HDI	GINI
DEMOC	1.000000	0.492601	-0.077396
HDI	0.492601	1.000000	0.067902
GINI	-0.077396	0.067902	1.000000

Source: Author's calculation using Eviews 10.

assumes that the unit and time differences can be accommodated within the model (Baltagi, 2008; Plumper & Troeger, 2019).

The formula for FEM may be written as follows:

$$Yi,t = \beta1Xit + \alpha i + u_{it} \qquad (4)$$

where Yi,t is the dependent variable for cross-section i at time t, αi ($i=1....n$) is the unknown intercept for every entity (n), Xit is the independent variable, $\beta1$ is the regression coefficient for the independent variable, and uit is the error term.

In FEM, a disturbance term ($u_{i,t}$) is held to cross-sectionally influence the dependent variable ($Y_{i,t}$). It may be written as follows:

$$u_{it} = \mu_i + v_{i,t} \qquad (5)$$

where μ_I is the specific individual effect and $v_{i,t}$ is the time-varying disturbance term.

In REM, variations between entities are assumed to be random and uncorrelated with the independent variable. It may be written as follows:

$$Y_{i,t} = \beta_1 X_{i,t} + \alpha + u_{it} + \varepsilon it \qquad (6)$$

In panel data analysis, the decision to use FEM or REM depends on the correlation between the effect units and the independent variables. This decision should be made after testing the fixedness of the correlation by identifying the endogeneity of the independent variables (Hausman, 1978). Hausman testing was conducted using one model of panel data regression. This test serves to ascertain whether any links exist between errors within the model. Several hypotheses are offered: the null hypothesis (H0): the Random Effect Model is preferable, and the alternative hypothesis (H1): the Fixed Effect Model is preferable.

Hausman testing was conducted through the probability value (F) and Chi-square, with the assumption that, if the probability (F) and Chi-square value are greater than 5%, panel regression analysis should be conducted using the Random Effect model. Conversely, if the probability (F) and Chi-square value are less than 5%, panel regression analysis should be conducted using the Fixed Effect model (Ranger & Much, 2020). In other words, H0 is rejected if the P-value is less than the α value (set at 5%), and H0 is accepted if the P-value is larger than the α value. As shown in Table 4, the chi-square probability value (0.0000) is not statistically significant at the 0.05 level (i.e., less than 0.05). As such, H0 is rejected and H1 is

Table 4.
The Hausman Test Result

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	33.732046	3	0.0000

Source: Author's calculation using Eviews 10.

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accepted; the FEM model is best suited to this study.

Results of FEM Panel Regression

The Hausman testing showed that the FEM model was best suited to this analysis. As a result, the panel data regression employed was FEM (see Table 5). To anticipate and prevent heteroscedasticity, panel regression was conducted using the robust covariance matrix estimator (Yoon & Galvao, 2021). Table 6 presents the results of fixed effect (FE) estimation using the dependent variable (GRDP growth) and independent variables (Democracy Index, HDI, and Gini coefficient) as written in Equation 4. FEM estimation indicated that the dependent variable was affected by every individual change in the independent variables. This table contains 206 observations, covering Indonesia's 34 provinces between the years 2012 and 2020. Through t-testing, with a significance of 5%, degree of freedom (n-k, 306-4) = 3-2, two-tailed test, a t-table of 1.649 was produced. FEM regression testing of the independent variables indicated that only HDI had a statistically significant influence on regional economic growth. This test produced a t-statistic value of -5.314, indicating that every 1% decrease in HDI would lead to an approximately 5.31% decrease in GRDP growth, holding that other factors remain the same.

DEMOC, a key proxy for democracy development at the provincial level, likewise is positively correlated with economic growth (β=0.014), though its effect is not statistically significant (t-statistic = 0.350 < 1,649). Likewise, GINI is correlated with GRDP growth with a t-statistic of 0.572. Based on these findings, only Hypothesis 1 is supported by a panel analysis of Indonesia's 34 provinces between 2012 and 2020. At the same time, however, the Democracy Index, HDI, and Gini Coefficient are all shown to simultaneously affect the dependent variable (GRDP growth). An f-statistic value of 3.752

was returned, with an f-table value of 2.620 and a goodness-of-fit determination of 0.245. Together, these values indicate that the three independent variables (HDI, Democracy Index, and Gini Coefficient) can explain 24.5% of the GRDP growth in Indonesia's provinces. The remaining 75.5% is explained by other variables that have not been explored here.

Table 5.
Panel Fixed Effect Model Results
Dependent Variable: Provincial Economic Growth (GRDP)

Hypothesis	Relationship	Coefficients	t-value
H1	DEMOC → GRDP	0.014	0.350
H2	HDI → GRDP	-0.889*	-5.314
H3	GINI → GRDP	7.110	0.572
	Adjusted R² = 0.245		
	F-value = 3.752		
	Obs = 306		

* Significant at the 5% critical value.

Source: Author's calculation using Eviews 10.

Provinces were also categorized by island/archipelago (i.e., Sumatra, Java, Bali and Nusa Tenggara, Sulawesi, Kalimantan, Maluku and Papua). FEM estimation for these categories was hoped to provide spatial insight into the effect of the Democracy Index, HDI, and Gini Coefficient at the regional level. These estimates, presented in Table 7, indicate that the Democracy Index does not have a statistically significant effect on GRDP growth at the regional level.

HDI, meanwhile, was found to have a statistically significant effect on GRDP growth in Sumatra, Java, and Sulawesi. In Sumatra, HDI was found to be significantly and negatively correlated with regional economic growth, with β = -0.678 and a t-statistic of -2.893. In Java (β = -1,759) and Sulawesi (β = -1.161), HDI was also found to be significantly and negatively correlated with GRDP growth. As with DEMOC, GINI was found to not have a statistically significant effect on GRDP growth at the regional level. For the three

Table 6.
Panel Fixed Effect Model Results
Dependent variable: Provincial Economic Growth (GRDP) by Main Islands

Hypothesis	Relationship	Coefficients (t-statistics)					
		Sumatra	Java	Bali & Nusa Tenggara	Kalimantan	Sulawesi	Maluku, & Papua
H1	DEMOC → GRDP	0.034 (0.627)	-0.023 (-0.268)	0.232 (0.667)	0.0117 (0.115)	0.053 (0.534)	-0.092 (-0.495)
H2	HDI → GRDP	-0.678 (-2.893)*	-0.767 (-2.131)*	-1.759 (-1.454)	-0.605 (-1.543)	-1.161 (-3.173)*	-0.834 (-1.307)
H3	GINI → GRDP	25.476 (1.364)	19.123 (0.591)	9.575 (0.134)	26.670 (1.033)	-18.819 (-0.703)	6.791 (0.129)
R^2		0.426	0.247	0.136	0.380	0.381	0.232
F-value		4.765	1.850	0.662	3.250	3.462	1.468
Obs		90	54	27	45	54	36

Source: Author's calculation using Eviews 10.

aforementioned islands, HDI was found to be negatively correlated with economic growth, indicating a negative correlation between the variables.

Discussion

The link between political conditions and economic performance has long been studied (Khodaverdian, 2022). This study adds to the body of literature by providing empirical evidence that democracy does not have a statistically significant effect on GRDP growth in Indonesia's 34 provinces. This holds at the island/archipelago level as well. The analyses of provinces in Sumatra, Java, Bali and Nusa Tenggara, Kalimantan, Sulawesi, and Maluku and Papua) indicated that democracy does not influence economic growth. As such, H1 is not supported. In its finding that democracy does not have a statistically significant influence on economic performance, be it measured in GRDP growth or GRDP per capita. This study supports earlier work by Khodaverdian (2022), Barro (1991), Rachdi and Saidi (2015), Nayebyazdi (2017) and Collier and Hoeffler (2009).

The finding that the Democracy Index has no significant influence on economic growth may be explained by several factors. In countries without a mature and developed democracy,

this political system does not significantly influence economic growth, in part because rampant corruption continues to hinder growth (Rachdi & Saidi, 2015; You, 2015). During the period of this study (2012–2020), the average provincial score on the Indonesian Democracy Index was 71.1, too low to have a significant and positive effect on economic performance. Another argument is that democracy cannot influence economic growth when provincial leaders concern themselves primarily with the politico-economic concerns of particular groups. Once elected, local leaders are expected to make economic decisions that advance the interests of the groups who elected them; as such, they have little independence in their policymaking (Narayan et al., 2011).

One surprising result is that, although HDI has a statistically significant effect on economic growth in the 34 provinces, the two are negatively correlated. When broken down by island/archipelago, HDI was also found to have a statistically significant effect on GRDP in Sumatra, Java, and Sulawesi.

Both the literature and the current empirical study provide insight into this negative correlation. The nexus between economic growth and human development may be seen from two perspectives. Economic growth serves to advance human development,

and human development seeks to promote economic growth (Alenda-Demoutiez, 2022). Though the link between them does not exist automatically, it is well-accepted that economic growth and human development are mutually influential (UNDP, 1996). When the link between them is strong, these variables complete and reinforce each other. Conversely, when the link between them is weak, economic growth and human development can be mutually detrimental. As shown by Ranis and Stewart (2001), certain nations have high levels of human development but little economic growth, as the link between these variables is weak. Such a situation may also exist within the provincial governments of Indonesia.

The Gini Coefficient did not have a significant effect on economic growth in Indonesia's 34 provinces during the period analysed. Although this finding is surprising, possible explanations are provided in the literature. Meanwhile, a positive regression coefficient was obtained for the Gini Coefficient. Cingano (2014) and Alenda-Demoutiez (2022) explain that income inequality may have a positive or negative effect on economic growth. Income inequality may detrimentally affect economic growth by leading voters to distrust the government as well as the taxation levels and regulations it has imposed. Income inequality may also create political instability and unrest, thereby disrupting economic growth (Cengano, 2014).

On the other hand, high levels of income inequality may also promote growth, as the disparities experienced may incentivise labourers to work harder, invest more, and take greater risks (Cengano, 2014). Another argument that income inequality does not have a significant effect on economic growth is offered by Bouincha and Karim (2018). Based on an analysis of developing countries, they argue that there is no significant association between economic growth and income inequality.

As a developing country, Indonesia experiences many of the conditions identified by Bouincha and Karim (2018). Furthermore, Yumna et al. (2015) note that income inequality does not always affect macroeconomic variables such as employment; its effects only become apparent after a certain threshold is reached. Looking at the Gini Coefficient for the 34 provinces analysed, the average for the 2012–2020 period was 0.36. The gap between the lowest and highest coefficients was not particularly large, ranging from 0.26 in Bangka Belitung to 0.44 in Papua, West Papua, Yogyakarta, South Sulawesi, and Gorontalo. This may explain why the panel data analysis indicated that income inequality had no significant effect on economic growth.

Conclusion

Studies of regional economic growth in Indonesia tend to highlight economic factors. This study, thus, provides a novel contribution to the literature by providing a model that investigates regional economic growth—as measured by the GRDP for each of Indonesia's 34 provinces—in conjunction with three economic and non-economic variables, namely democracy, human development, and income inequality. Three hypotheses were investigated herein using the Fixed Effect Model (FEM) of panel analysis. FEM analysis was conducted twice, first using an aggregate of Indonesia's 34 provinces, then with data being disaggregated by island.

Based on this study's empirical analysis, it was found that only human development has a significant effect on regional economic growth in Indonesia. This confirms that human development is a key indicator of economic development within polities, including sub-national ones. Data disaggregation by island shows that HDI significantly influences economic growth in Sumatra, Java, and Sulawesi. This finding indicates that, to promote regional economic growth, local governments must create policies that promote effective investment in human resources.

Such policies should seek to ameliorate all three dimensions of human resources, i.e., income, education, and health. According to the research conducted by Syaban and Appiah-Opoku (2023), relocating the country's capital to Kalimantan Island has the potential to create lucrative prospects, particularly for the private sector. This can be achieved through strategic investments in infrastructure, real estate, and various facilities, stimulating growth in central and eastern parts of Indonesia. Unexpectedly, a negative correlation between HDI and GRDP; such a correlation was also found by UNDP (1996) and Ranis and Stewart (2001). When the link between economic growth and human development is weak, these variables will affect each other detrimentally. As such, this study recommends that local-level policymakers strengthen the mechanisms that reinforce the ties between economic development and human development programs (including those that make resources available). As human development and regional economic growth are strongly correlated, it is necessary to develop an integrated strategy that serves to reinforce the link between them.

This analysis found that democracy does not have a significant influence on regional economic growth. One potential reason for the observed negative link between democracy and regional economic growth is that a significant cost is needed to maintain a high level of democracy. This, in turn, may limit the resources available to stimulate economic activity (Trinugroho et al., 2023). In addition, implementing regional autonomy in Indonesia has led to the emergence of labour-intensive industries as a means for local governments to generate income through taxation. Consequently, numerous agricultural lands have been transformed into these industries. However, it is worth noting that the success of these labour-intensive industries in the regions has been limited (Trinugroho et al., 2023). Economic inequality, as measured by the Gini Coefficient, was expected to show the economic gaps between provinces. However, it is also recognised that the Gini Coefficient is severely limited by its focus on income inequality. Consequently, it may be beneficial for future studies to use other means of quantifying inequality. One of the study's shortcomings is quantifying the impact of the democracy index on regional economic growth. Although previous research has found a link between political conditions, as proxied by the democracy index, and economic performance, this study did not identify a direct link between GRDP growth and the democracy index, which can be considered in future related studies. Another limitation is that the influence of the COVID-19 pandemic in 2020 may cause the regional economic growth rate in 2020 to appear unnatural.

Future studies should also incorporate a robustness check, for instance by using different samples as well as control variables. By incorporating such elements, future research will further enhance the results obtained in this study. Apart from that, Indonesia's geographical condition as an archipelagic country with diverse provincial characteristics can be studied more deeply, for example, by comparing provinces on different islands.

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