What Makes Society Happy? Exploring Factors Influencing Happiness in Indonesia

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Article Information	Abstract
	Happiness is a crucial aspect in evaluating development, as it reflects both the output and outcome for society. This study aims to examine the influence of the environmental quality index (IKLH), human development index (HDI), economic growth, and government expenditure on the happiness index in Indonesia and its 34 provinces. A panel data regression model is employed to identify the factors influencing Indonesia's happiness index, while Geographically Weighted Panel Regression (GWPR) is applied explicitly to 34 provinces in Indonesia. This model combination introduces a novel methodology for happiness studies by providing a comprehensive perspective. Both models yield consistent relationships and significant variables: IKLH exhibits a significant negative relationship, while HDI and economic growth show significant positive relationships; however, government expenditure is not significant. Specifically, the GWPR indicates that happiness in Kalimantan Island, parts of Sumatra, South Sulawesi, and Bali is influenced solely by HDI. HDI and economic growth drive the happiness of most provinces in Sumatra and the Nusa Tenggara Islands. Meanwhile, all provinces in Java Island, Lampung, North Maluku, and most of Sulawesi Island have happiness influenced by HDI and IKLH. Ultimately, in the majority of eastern Indonesian provinces, happiness is influenced by the HDI, IKLH, and economic growth.

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INTRODUCTION

In general, a country's development, progress, and welfare are commonly assessed using conventional economic indicators, most notably Gross Domestic Product (GDP). GDP represents the total monetary value of goods and services produced within a country's borders, typically calculated on an annual basis. It is frequently used to measure economic growth, defined as an increase in the production of goods and services, which is generally assumed to contribute to improvements in societal welfare.

Despite its widespread use, GDP and economic growth measures have significant limitations. These indicators are unable to adequately capture the welfare or prosperity of the population as a whole, particularly because they fail to reflect the distribution of income within society (Diener & Seligman, 2004; Easterlin & Sawangfa, 2010). Moreover, GDP does not account for wealth inequality, household production, or environmental degradation, all of which are essential components in assessing population welfare (Fleurbaey, 2009).

The shortcomings of conventional economic indicators, which have long served as the foundation for development planning and evaluation, have encouraged the development of alternative measures that more accurately reflect societal welfare, particularly subjective well-being or happiness (Frey, 2018). One widely recognized measure of well-being is the Happiness Index, which has been promoted by the United Nations (UN) since 2011 through the General Assembly and subsequently adopted by various countries.

The Wellbeing Research Centre publishes the Happiness Index at the University of Oxford. It estimates national happiness levels based on several key indicators, including GDP per capita, social support, healthy life expectancy, generosity, freedom to make life choices, and perceptions of corruption. According to the World Happiness Report, Indonesia has consistently ranked sixth among Association of Southeast Asian Nations (ASEAN) countries and 80th globally from 2021 to 2024, as detailed in Table 1.

Table 1. Ranking of ASEAN Countries in the World Happiness Report

No.	ASEAN Countries	2021	2022	2023	2024	Average
1	Singapore	32	27	25	30	29
2	Thailand	54	61	60	58	58
3	Philippines	61	60	76	53	63
4	Malaysia	81	70	55	59	66
5	Vietnam	79	77	65	54	69
6	Indonesia	82	87	84	80	83
7	Laos	100	95	89	94	95
8	Cambodia	114	114	115	119	116
9	Myanmar	126	126	117	118	122

Source: World Happiness Report (2025)

Indonesia also has a happiness index issued by the Central Statistics Bureau (Badan Pusat Statistik; BPS) in 2014, 2017, and 2021, with a value scale of 0-100, measured on a scale ranging from 0 to 100. The Happiness Index compiled by BPS is derived from the Happiness Measurement Survey *(Survei Pengukuran Tingkat Kebahagiaan*, SPTK). It is based on three core dimensions: life satisfaction, affective experience, and meaning of life (eudaimonia). However, specifically in the calculation of the 2014 happiness index, only one dimension is used, namely life satisfaction.

The progression of Indonesia's Happiness Index indicates a general improvement in population well-being over time. Between 2014 and 2017, the index increased by 2.41 points, followed by an additional 0.8-point

increase between 2017 and 2021 (Figure 1). In addition to national-level estimates, BPS also reports provincial Happiness Index scores. The Riau Islands recorded the highest Happiness Index in 2014 (72.42), while North Maluku achieved the highest scores in both 2017 (75.68) and 2021 (76.34). In contrast, Papua consistently recorded the lowest Happiness Index in 2014 (60.97) and 2017 (67.52). In 2021, Banten emerged as the province with the lowest Happiness Index, with a score of 68.08.

In several developed countries, happiness indicators have been increasingly recognized as a critical component in the formulation of public policies aimed at achieving national development objectives. A comprehensive understanding of the benefits associated with improved population happiness can elevate happiness as a central

consideration in public policy design and enhance evaluation frameworks for existing development policies (Dolan & White, 2007; Pavot & Diener, 2004; Veenhoven, 2004). Consequently, a growing number of countries have begun integrating happiness metrics into their national development assessments. Moreover, happiness indicators are increasingly prioritized alongside, and in some cases, over conventional economic welfare measures that predominantly emphasize material prosperity (OECD, 2011). At both societal and individual levels, population happiness plays a significant role in national development and social progress, serving as a broader framework for evaluating social development outcomes (Forgeard et al., 2011).
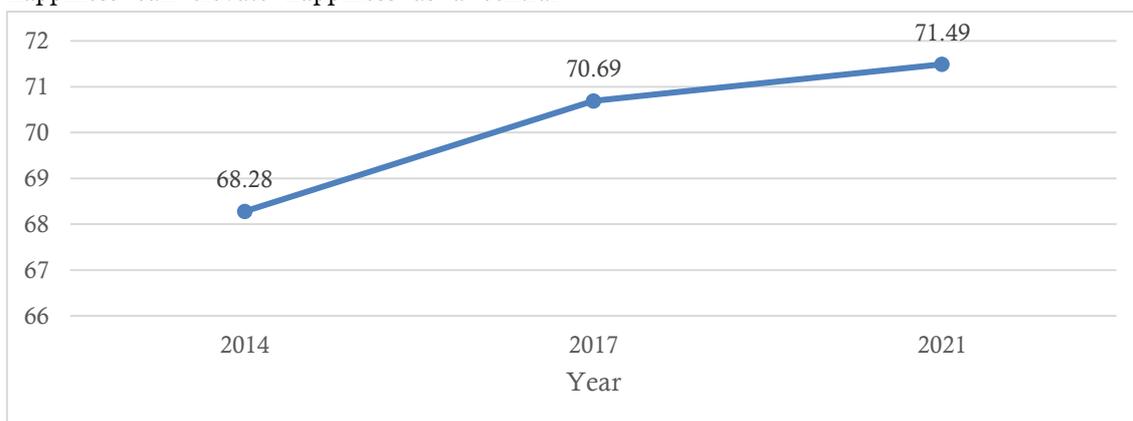

Figure 1. Progress of Indonesia's Happiness Index
Source: Central Bureau of Statistics (BPS)

Happiness is inherently difficult to define due to its subjective nature, as perceptions of happiness vary across individuals. The *Big Indonesian Dictionary* (*Kamus Besar Bahasa Indonesia*, KBBI) defines happiness as a state of joy and tranquility that encompasses both physical and spiritual aspects of life. According to the Authentic Happiness theory, happiness consists of three essential components: a pleasant life, a good life, and a meaningful life. The theory asserts that genuine happiness can only be achieved when all three components are fulfilled (Seligman, 2002). In addition, Helliwell et al. (2022) argue that external and environmental factors shape individuals' overall life

circumstances, which ultimately determine their levels of happiness or suffering.

Richard Easterlin's research on income and happiness led to the Easterlin Paradox, which suggests that income comparison (relative income) influences individual happiness (Easterlin, 2001). This view is supported by Blanchflower and Oswald (2004), who emphasize that relative income, rather than absolute income alone, is crucial in enhancing subjective well-being. Ball et al. (2005) further demonstrate that both absolute and relative income have a positive effect on happiness, although the influence of relative income is more substantial. Nevertheless, the impact of income remains smaller than that of

non-financial factors, such as social relationships, employment status, and health conditions.

Economic growth is commonly associated with improvements in societal well-being, as it represents a central objective of national development. It reflects an increase in the production of goods and services, which in turn raises aggregate and household income levels. Empirical evidence on the relationship between economic growth and happiness, however, remains mixed. Sacks et al. (2010) found a positive relationship between economic growth and happiness. However, AL (2017) reported no significant relationship between economic growth and the happiness index.

Meanwhile, a more recent study, conducted by Febriantikaningrum et al. (2021) using data from 34 provinces in Indonesia, found that economic growth has a positive influence on happiness. Furthermore, GDP per capita remains the primary determinant of the happiness index in ASEAN countries, including Indonesia. Thus, the government should prioritize economic growth to enhance societal prosperity and happiness (Giansyah et al., 2024).

The Human Development Index (HDI) measures three fundamental dimensions: health, education, and standard of living. According to Rahayu (2016), income, education level, and perceived health status positively influence happiness. This implies that higher levels of income, education, and health are associated with greater happiness. Furthermore, research by Febriantikaningrum et al. (2021) and Purwanti (2022) confirms that the HDI has a positive impact on the happiness index.

The happiness index has been introduced as an alternative indicator for evaluating government spending and its alignment with development outcomes (Paleologou, 2022). Rostow and Musgrave link patterns of public expenditure to stages of economic development. In the early stage, governments prioritize basic infrastructure, such as education and health. In the intermediate stage, public spending remains important, but the private sector becomes more dominant. In the advanced stage, governments focus on social protection, public health services, and elderly welfare (Dumairy, 1996). A cross-country study of 132 nations by Kasmaoui and Bourhaba (2017) finds that government expenditure has a positive influence on happiness. However, Rodríguez-Pose and Maslauskaite (2012) argue that misallocated or indirectly related spending can negatively affect well-being.

The Environmental Quality Index (EQI) measures regional environmental conditions. Suparta and Malia (2020) found that better environmental quality enhances happiness by preventing diseases and fostering comfort. A high-quality environment prevents various diseases and fosters a sense of comfort and security, thereby contributing to higher levels of overall well-being and happiness. However, a study by Anwar et al. (2022), which analyzed 2,218 articles over a two-decade period, found that much of the research within the Environmental Kuznets Curve (EKC) framework focuses on developing regions that face the dual challenge of achieving economic growth while maintaining environmental sustainability. This suggests economic growth may increase happiness at the cost of environmental quality.

Spatial aspects influence people's happiness. Rampichini & D'Andrea (1997) argue that individuals from the same region tend to share the same socio-economic, political, and cultural environment, which shapes their characteristics and life satisfaction or happiness. Therefore, regional aspects are important in understanding happiness. People from similar regions tend to have similar access to education, economic opportunities, self-development, and social interactions, all of which influence their perspectives and overall happiness. Aslam & Corrado (2012) make it clear that it is not only individual interactions that have a significant effect on happiness, but also regional factors. Studies on happiness in Indonesia also show that the spatial model using Geographically Weighted Regression (GWR) has a significantly higher coefficient of determination (76.2%) compared to the ordinary linear regression model, which accounts for only 15.7%.

Previous studies on economic growth, HDI, government expenditure, and IKLH in relation to happiness still exhibit several limitations. Most do not examine Indonesia comprehensively, focusing only on selected provinces or using outdated data. Furthermore, to the best of our knowledge, no study on Indonesia's happiness index had employed panel data while incorporating spatial considerations, such as inter-provincial variations, up to the time this research was conducted. Existing research predominantly uses cross-sectional analysis, which cannot capture temporal dynamics and provides limited insight into spatial heterogeneity. Therefore, this study addresses these gaps by employing the latest panel data on happiness indices for 34 Indonesian provinces across three periods and by applying Geographically Weighted Panel Regression (GWPR). By adopting a spatially sensitive and temporally inclusive approach, this research offers a novel contribution. It provides deeper insights into the key determinants of happiness across Indonesia's 34 provinces and at the national level.

Thus, this study formulated two questions: (1) Do IKLH, HDI, economic growth, and government expenditure influence the happiness index in Indonesia? (2) Do IKLH, HDI, economic growth, and government expenditure influence the happiness index across Indonesia's 34 provinces?

The happiness index plays a crucial role in measuring and serving as a reference for improving societal welfare, so it is necessary to understand the factors that affect it. Identifying its key determinants at both national and provincial levels provides a broader understanding of happiness in Indonesia. By analyzing regional interactions, this study provides a comprehensive perspective, categorizing influential factors based on the unique characteristics of each province.

RESEARCH METHODS

This study employs a quantitative analysis using secondary data from BPS, including economic growth, HDI, government expenditure, and the happiness index. Meanwhile, the environmental dataset, represented by IKLH, is sourced from the Ministry of Environment and Forestry (KLHK). The collected data on economic growth, HDI, government expenditure, IKLH, and the happiness index cover 34 provinces in Indonesia and span the years corresponding to the BPS Happiness Index publications, namely 2014, 2017, and 2021, forming a panel dataset. Due to data unavailability, North Kalimantan's 2014 IKLH and happiness index use East Kalimantan's data, its parent province. Longitude and latitude coordinates, representing each province's central point, are sourced from Indonesia Geospatial.

The first model employed in this study is panel data regression, which is used to answer the question of which factors influence societal happiness at the national level, specifically in Indonesia. Panel data regression is a regression technique that utilizes panel data, allowing for a broader scope of observations by combining cross-sectional and time-series data (Gujarati, 2003). Generally, three approaches are commonly applied in estimating panel data regression models: the common effect model (CEM), the fixed effect model (FEM), and the random effect model (REM).

Table 2. Operational Definition

Variable	Operational Definition	Unit of Measurement	Data Source
Happiness Index	Happiness index is defined as a feeling of satisfaction, joy, and tranquility in life, as measured in 2014, 2017, and 2021. The index is constructed based on three dimensions: life satisfaction, affect, and life achievement (eudaimonia). However, in the 2014 calculation, the happiness index was measured solely in terms of the life satisfaction dimension.	Ratio (0-100)	BPS

Variable	Operational Definition	Unit of Measurement	Data Source
Economic Growth	Economic growth refers to the percentage increase in the total value of goods and services, as measured by GDP, in 2014, 2017, and 2021.	Percent (%)	BPS
Human Development Index (HDI)	HDI is a measure of development quality constructed from three dimensions: longevity and healthy living (health), knowledge (education), and a decent standard of living (economy), as measured in 2014, 2017, and 2021.	Ratio (0-100)	BPS
Government Expenditure	Government expenditure represents the total spending on goods and services carried out by the Indonesian government in 2014, 2017, and 2021.	Thousand Rupiah (Rp 000)	BPS
Environmental Quality Index (IKLH)	IKLH is an index measuring environmental management performance, composed of three components: the Air Quality Index (IKU), the Water Quality Index (IKA), and the Land Cover Index (IKTL). As of 2014, 2017, and 2021, these components are evaluated.	Ratio (0-100)	KLHK

Source: Data processed (2025)

The CEM is an approach that establishes relationships between variables without accounting for differences across time and individuals. As a result, it resembles classical linear regression using the Ordinary Least Squares (OLS) method. The model equation is:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon \ldots\ldots\ldots(1)$$

Where Y represents the happiness index, and α is the intercept. The independent variables X_1, X_2, X_3, X_4 correspond to economic growth, HDI, government expenditure, and IKLH, respectively. Furthermore, $\beta_1, \beta_2, \beta_3, \beta_4$ denote the coefficients derived from the model estimation process, while ε represents the error term.

The FEM is an approach that allows each province in the dataset to have a distinct intercept, although the intercept for each unit remains constant over time. This model assumes that the intercept varies across cross-sectional units, while the coefficients of the independent variables remain constant. The FEM equation is:

$$Y_{it} = \alpha_i + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + e_{it} \ldots\ldots\ldots\ldots\ldots\ldots(2)$$

Where Y_{it} is the happiness index for province i at time t, and α_i is the intercept that differs across cross-sectional locations. The independent variables X_{1it}, X_{2it}, X_{3it}, X_{4it} represent economic growth, HDI, government expenditure, and IKLH

for province i at time t. Similarly, $\beta_1, \beta_2, \beta_3, \beta_4$ denote the variable coefficients, and e_{it} is the error term for province i at time t.

The REM is an approach that considers differences across locations as random components, thereby incorporating randomness into the model (Gujarati, 2003). The REM equation is:

$$Y_{it} = \alpha + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + u_{it} + e_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Where Y_{it} is the happiness index for province i at time t, and α is the intercept. $X_{1it}, X_{2it}, X_{3it}, X_{4it}$ represent economic growth, HDI, government expenditure, and IKLH for province i at time t. The coefficient $\beta_1, \beta_2, \beta_3, \beta_4$ measure the impact of independent variables, while u_{it} represent the random component and e_{it} is the error term for province i at time t.

After estimating the three panel data regression models, model selection tests (the Chow test, Hausman test, and Lagrange Multiplier test) are conducted to identify the most suitable model. The chosen model then undergoes classical assumption tests, such as normality testing (Jarque-Bera test), multicollinearity assessment (Variance Inflation Factor or VIF), autocorrelation testing (Ljung-Box test), and heteroscedasticity testing (Glejser test). Subsequently, statistical hypothesis testing is performed, including partial testing (t-test),

simultaneous testing (F-test), and determining the coefficient of determination (R^2), followed by an interpretation of the selected model.

The second model employed in this study is the Geographically Weighted Panel Regression (GWPR), which is designed to examine factors influencing societal happiness at the local level across Indonesian provinces. GWPR extends both the panel data regression model and Geographically Weighted Regression (GWR). GWR accounts for spatial heterogeneity by incorporating the geographical location of each observation (Fotheringham et al., 2002), recognizing that the same variables may have varying effects depending on location-specific factors.

GWPR integrates spatial and temporal dimensions in estimating the parameters of a spatial model. The estimation of parameters in the GWPR model applies the Weighted Least Squares (WLS) approach, similar to the GWR model, by assigning different weights to each observation based on its location. If the Fixed Effects Model (FEM) is selected in the panel data regression process, a within transformation (or within estimator) is applied to eliminate heterogeneity in the intercept (Wooldridge, 2002). This transformation standardizes data by converting it into deviation values for each location. Therefore, the first model (panel data regression) can be interpreted using both the coefficients and the relationships among variables. In contrast, the second model (GWPR) can only be interpreted in terms of the relationships, as the data have been transformed using the within estimator. The GWPR model equation is:

$$Y_{it} = \alpha(u_i, v_i) + \beta_1(u_i, v_i)X_{1it} + \beta_2(u_i, v_i)X_{2it} + \beta_3(u_i, v_i)X_{3it} + \beta_4(u_i, v_i)X_{4it} + e_{it} \quad ....(4)$$

Where Y_{it} is the happiness index for province i at time t, and α is the intercept. X_{1it}, X_{2it}, X_{3it}, X_{4it} represent economic growth, HDI, government expenditure, and IKLH for province i at time t. The coefficient $\beta_1(u_i, v_i), \beta_2(u_i, v_i), \beta_3(u_i, v_i), \beta_4(u_i, v_i)$ represent variable coefficients at location (u_i, v_i). Additionally, (u_i, v_i) are the coordinates of the observation location (longitude, latitude), and e_{it} is the error term at location i and time t.

Spatial aspect testing is necessary as a consideration step when using the GWPR model, which accounts for spatial aspects. The purpose of spatial aspect testing is to determine whether the same explanatory or independent variables yield different responses in different locations, thereby indicating spatial heterogeneity in a region (Caraka & Yasin, 2017). The spatial heterogeneity test is conducted using the Breusch-Pagan test (Febrianti et al., 2023).

After passing the spatial aspect test, the next step involves selecting the optimal bandwidth or the most appropriate spatial weighting function based on the smallest Akaike Information Criterion (AIC) and the highest R² value. This study selects the optimal weighting function from three alternatives: adaptive kernel Gaussian, adaptive kernel bisquare, and adaptive kernel exponential. These spatial weighting functions are applied to estimate the regression equation for each province in Indonesia. The estimated model can then be extracted and analyzed for partial tests (t-test), simultaneous tests (F-test), and local R^2 (each province in Indonesia), and global R^2 (overall).

Happiness is a state of mind characterized by feelings of satisfaction, joy, and tranquility. In this study, the happiness variable is measured using the Happiness Index of 34 provinces in Indonesia for the years 2014, 2017, and 2021, as published by BPS. The Happiness Index is structured around three dimensions: life satisfaction, affect (emotions), and life achievement (eudaimonia). However, the 2014 Happiness Index calculation was based solely on the life satisfaction dimension.

Economic growth refers to an increase in the total value of goods and services, as measured by GDP. In this study, the economic growth variable is derived from BPS publications, which cover economic growth data for 34 provinces in Indonesia for the years 2014, 2017, and 2021.

The Human Development Index (HDI) is a measure that represents human development in terms of assessing the quality of life. HDI consists of three dimensions: longevity and healthy life

(health), knowledge (education), and a decent standard of living (economy). The HDI variable in this study is based on BPS publications, utilizing HDI data from 34 provinces in Indonesia for the years 2014, 2017, and 2021.

Government expenditure refers to the total spending on goods and services by the government. The government expenditure variable in this study is sourced from BPS publications, which represent regional government expenditure data for 34 provinces in Indonesia for the years 2014, 2017, and 2021, measured at constant 2010 prices in million rupiahs.

The environment encompasses everything around us, including physical, biological, social, and cultural elements that influence human life and interactions, as well as other living beings. The environmental variable in this study is represented by the Environmental Quality Index (IKLH) of 34 provinces in Indonesia for the years 2014, 2017, and 2021, as published by the Ministry of Environment and Forestry of the Republic of Indonesia. The IKLH is an index measuring environmental management performance, composed of three components: the Air Quality Index (IKU), the Water Quality Index (IKA), and the Land Cover Index (IKTL).

RESULTS AND DISCUSSION

Based on the collected data, three panel data regression models were estimated: CEM, FEM, and REM. Model selection was carried out using the Chow test, which yielded a p-value of 2.009e-11, leading to the rejection of H0 and indicating that FEM is preferable to CEM. The Hausman test yielded a p-value of 2.2e-16, leading to the rejection of H0, which suggests that FEM is also preferable to REM. Consequently, the Lagrange Multiplier test was not conducted since the FEM model was selected.

After selecting the FEM, classical assumption tests were performed, including tests for normality, multicollinearity, autocorrelation, and heteroskedasticity. The normality test, using the Jarque-Bera test, resulted in a p-value of

0.9254, indicating that H0 could not be rejected and suggesting that the residuals are normally distributed. The multicollinearity test, conducted using the base model (CEM), showed that the VIF values for IKLH, HDI, economic growth, and government expenditure were all below 10, indicating no multicollinearity issues. The heteroskedasticity test using the Glejser test showed that no independent variable significantly influenced the absolute residual values (p-value > 0.05), indicating no heteroskedasticity issues (Gujarati, 2003).

The autocorrelation test produced a p-value of 0.0002129, rejecting H0 and indicating the presence of autocorrelation. This is likely because the dataset is panel data with time-based information (t = 3 years). Additionally, happiness tends to be influenced by past skills and resources built over time during positive moods, meaning that happiness at one point in time is affected by previous happiness levels (Lyubomirsky et al., 2005).

Table 3. Partial Test Results (t-Test) in Fixed Effect Model (FEM)

Independent Variables	Coefficient	Significance
Environmental Quality Index (IKLH)	-0,0667	0,048787
Human Development Index (HDI)	1,3152	< 2e-16
Economic Growth	0,1393	0.018855
Government Expenditure	-8.02e-09	0.642171

Source: Data Processed, 2025

The statistical results from the selected panel regression model (FEM) provide insights from partial tests (t-tests), simultaneous tests (F-tests), as well as R^2 and adjusted R^2 values. Table 3 presents the partial test results of the four independent variables on the happiness index, revealing that three out of the four independent variables are significant at the 5% level. The IKLH has a significant negative relationship with the happiness index. The HDI is positively

significant, while economic growth is also positively significant. However, government expenditure is not statistically significant. Furthermore, since this study utilizes a very short time dimension (2014, 2017, and 2021; t = 3), its interpretive implications are limited, particularly in terms of capturing temporal dynamics, reflecting current conditions, and establishing causal inference.

The simultaneous test (F-test) resulted in a p-value < 2.22e-16 (p-value < 0,05), leading to the rejection of H0, indicating that the independent variables significantly influence the dependent variable, as reflected in an R^2 value of 0,78584 (78,584%) and an adjusted R^2 value of 0,66203 (66,203%). Additionally, the FEM model generated 34 constant values, each representing one of the 34 provinces in Indonesia.

The FEM results state that the influence of IKLH on the Happiness Index is significant, with a coefficient of -0.0667 (negative relationship). This negative relationship explains that, in the context of Indonesia, environmental degradation (a decline in IKLH) can contribute to increased happiness or life satisfaction among the population. The increase in environmental degradation is a consequence of efforts to boost economic value, ultimately leading to greater happiness among the people.

A study conducted in China by Tian et al. (2022) revealed a pattern similar to this research, showing a significant positive relationship between air pollution and happiness. China is recognized as a developing country with rapid economic growth, but it is also characterized by severe environmental damage. In the early stages of economic development, the presence of air pollution is often exchanged for economic growth, which leads to an increase in individual income at the micro level thus compensating for the disadvantages of air pollution for the population which then increases people's comfort and psychological well-being (Apergis & Ozturk, 2015; Zoundi, 2016; Chen et al, 2019; Sarkodie & Strezov 2019).

This study is also consistent with Fanning and O'Neill (2019), who argue that countries experiencing declines in per capita consumption, especially when measured by consumption-based carbon footprints, exhibit significant reductions in average happiness across approximately 120 countries during the 2005–2015 period. This finding highlights that reductions in carbon-intensive activities, unless accompanied by alternative sources of welfare improvement, may have an adverse effect on subjective well-being. At the same time, it is widely acknowledged that income growth remains closely coupled with increasing carbon emissions, which poses serious risks to the climate system and may push it toward a more unstable and hostile state (Tapia Granados et al., 2012; Knight and Schor, 2014; Steffen et al., 2015). This tension highlights the central challenge faced by many countries, particularly developing economies, where economic activity and carbon-intensive consumption remain essential for sustaining happiness, rendering "green growth" a complex and challenging policy objective.

This causal factor is reinforced by Indonesia's status as a developing country with abundant natural resources, particularly in the mining sector, which includes oil and gas, various minerals, and coal. A study by Rahma et al. (2021) found that provinces with abundant mining resources tend to face a greater "resource curse" phenomenon compared to those with fewer extractive resources. On the one hand, dependence on and exploitation of mining activities boost Indonesia's economic value, which subsequently leads to increased life satisfaction and happiness, despite the environmental consequences.

This phenomenon aligns with the Environmental Kuznets Curve (EKC) concept, which describes how pollution and environmental degradation initially rise but later decline as per capita income increases (Todaro & Smith, 2020). Once a certain income threshold is reached, the negative environmental impacts from earlier development stages begin to decrease, and society starts to invest in environmental restoration as economic conditions improve (Bozkurt & Akan, 2014).

The FEM results indicate a significant positive relationship between HDI and the happiness index, with a coefficient of 1.3152. This implies that a one-point increase in HDI raises the Happiness Index by 1.3152. In Indonesia, this relationship highlights the crucial importance of enhanced education, healthcare, and economic conditions in fostering societal well-being. Expanding access and improving the quality of education and healthcare optimizes individual potential, creating greater opportunities for a fulfilling life. Additionally, a higher per capita income enables people to meet their basic needs, including quality education and healthcare, ultimately fostering greater life satisfaction and overall happiness.

The findings align with previous research, which suggests that a decent standard of living or income has a positive influence on happiness (Firmansyah, 2017), health status also positively affects happiness (Rahayu, 2016), and education impacts happiness both directly and indirectly (Cuñado & de Gracia, 2012). Additionally, studies by Febriantikaningrum et al. (2021) and Purwanti (2022) confirm that HDI has a positive effect on the happiness index. Higher human development levels contribute to greater societal happiness, as HDI provides a holistic measure encompassing economic well-being, education, and healthcare. Therefore, improvements in HDI are likely to enhance overall well-being and happiness.

This study is similar to Roka (2020), which provides cross-country evidence from 120 countries over the 2008–2016 period, showing a strong and statistically significant positive relationship between the HDI and happiness. The findings suggest that improvements in education, health, and living standards substantially enhance subjective well-being. This supports our findings, suggesting that human development is a significant determinant of happiness across diverse national contexts.

The FEM results indicate a significant positive relationship between economic growth and the Happiness Index, with a coefficient of 0.1393. This implies that a 1% increase in economic growth raises the Happiness Index by 0.1393 points. In Indonesia, this relationship suggests that economic growth enhances welfare and happiness by increasing income and expanding access to goods and services. The positive relationship reflects high-quality economic growth, as the rise in income and the availability of goods and services are accessible to the wider population, rather than being concentrated in specific groups, thus fostering greater societal happiness.

These findings align with those of Sacks et al. (2010), who found that individual income or national GDP has a positive influence on life satisfaction. Similarly, Febriantikaningrum et al. (2021) confirmed that economic growth increases the Happiness Index. Moreover, Wijaya (2021) found that happiness and HDI have a significant and positive effect on economic growth, suggesting a reciprocal relationship. Conversely, economic growth enhances societal happiness, and greater happiness also fosters economic growth.

Similar findings from 120 countries over the 2008–2016 period also indicate that economic growth and income are positively associated with happiness, highlighting the role of expanding economic opportunities in improving well-being (Roka, 2020). Increased economic activity enhances material welfare and individuals' capacity to meet basic needs, which contributes to higher happiness levels. This evidence is consistent with our provincial-level findings, reinforcing the relevance of economic growth in shaping subjective well-being, particularly in developing economies.

The FEM results state a negative but insignificant relationship between government expenditure and the happiness index, which may be attributed to two possibilities. First, government expenditure may influence happiness indirectly, making its effects difficult to reflect in the FEM results. This is supported by the positive correlation (0.4108) between HDI and government expenditure in the dataset, indicating that increased public spending is associated with overall improvement in HDI. Palayukan (2019) also found that enhancing HDI requires increased allocations for public sector

spending, particularly education and healthcare, to support infrastructure and services. Additionally, Kogoya (2022) found that government spending has a significant and positive impact on economic growth in Papua Province, further underscoring its potential indirect role in enhancing societal well-being.

The second possibility is that government expenditure has not been effective and efficient in increasing public happiness. According to the 2021 Corruption Perception Index (CPI), Indonesia ranked 96 out of 180 countries, lower than Singapore, Malaysia, Timor-Leste, and Vietnam (Transparency International, 2022). This ranking reflects a high risk of budget misallocation due to widespread corruption. The potential for budget waste and misdirected programme implementation exacerbates this. Misdirected government spending can significantly reduce happiness by eroding public trust in the government (Rodríguez-Pose & Maslauskaite, 2012).

The spatial heterogeneity test yielded a p-value below the 5% significance level, leading to the rejection of H0 and confirming the presence of spatial heterogeneity. Consequently, the GWPR model was applied. Additionally, since the selected panel data regression model is FEM, a data transformation stage using the within transformation concept was conducted. The data was then used to determine the optimal bandwidth as a weighting value for spatial aspects, based on the smallest Akaike Information Criterion (AIC) and the highest R^2 among the three spatial weighting functions, namely the Adaptive Kernel Exponential.

The partial test (t-test) results indicate that the GWPR model identifies three significant variables (IKLH, HDI, and economic growth), while government expenditure remains insignificant (Table 4). These significant variables align with those in the panel data regression model. However, the GWPR model provides more detailed province-specific insights: HDI is significant in all 34 provinces, IKLH in 16 provinces, and economic growth in 10 provinces, whereas government expenditure is not significant in any province.

The simultaneous test (F-test) indicates a significant influence of the overall independent variables on the dependent variable. The local R^2 values across 34 provinces vary considerably, ranging from 0.759459473 in Aceh to 0.919103478 in Papua. The overall goodness-of-fit for the GWPR model is indicated by an R^2 of 0.8377475 and an adjusted R^2 of 0.7923275. However, the coefficients and intercepts from the GWPR model cannot be directly interpreted due to the data transformation; therefore, the analysis focuses on the relationship between the variables.

Table 4. Partial Test Results (t-Test) GWPR Model

Independent Variable	Relationship	Total Significant	Provinces
Environmental Quality Index (IKLH)	Negative	16 Provinces	Lampung, DKI Jakarta, West Java, Central Java, DI Yogyakarta, East Java, Banten, North Sulawesi, Central Sulawesi, Southeast Sulawesi, Gorontalo, West Sulawesi, Maluku, North Maluku, West Papua, and Papua
Human Development Index (HDI)	Positive	34 Provinces	All Provinces in Indonesia (34 Provinces)
Economic Growth	Positive	10 Provinces	Aceh, West Sumatra, Jambi, South Sumatra, Bengkulu, West Nusa Tenggara, East Nusa Tenggara, Maluku, West Papua, and Papua
Government Expenditure	Positive dan Negative	Tidak Ada	-

Source: Data processed (2025)

Figure 2. Provinces with Significant IKLH
Source: Data processed, 2025

The GWPR results indicate that the effect of the IKLH variable on the happiness index is significant in 16 out of 34 provinces, as shown in Figure 2. Each of these significant provinces exhibits a negative relationship. This negative relationship suggests that, in the context of 16 provinces, environmental degradation (a decrease in the IKLH) can lead to a decrease in people's happiness or life satisfaction. These 16 significant provinces are Lampung, DKI Jakarta, West Java, Central Java, DI Yogyakarta, East Java, Banten, North Sulawesi, Central Sulawesi, Southeast Sulawesi, Gorontalo, West Sulawesi, Maluku, North Maluku, West Papua, and Papua.

On average, provinces where the IKLH variable is significant have lower IKLH values (indicating lower environmental quality) compared to provinces where IKLH is not significant. Furthermore, this environmental quality is reflected in the fact that the average government expenditure in provinces with significant IKLH is more than twice that in those where IKLH is not significant (Table 5). This is generally due to high regional income, which is influenced by massive economic activity in these provinces. In addition, the average economic growth in provinces with significant IKLH is also higher. It has a greater economic growth potential (a wider range of economic growth) than in provinces where IKLH is not significant. These findings suggest that poorer environmental conditions have been traded off for higher government expenditure and economic growth, which are two factors that can explain the phenomenon observed in this study.

Table 5. Comparison of Significant and Non-Significant IKLH Provinces

Metrics	Provinces with Significant IKLH	Provinces with Non-Significant IKLH
Average IKLH	66,87	69,33
Average Government Expenditure (million IDR)	34.095.217,12	15.009.435,87
Average Economic Growth (%)	5.79	4.35
Range of Economic Growth (%)	-0,51 until 16,79	-2.46 until 8.18

Source: Data processed, 2025

Provinces in the western and Java parts of Indonesia are well known for their mining and quarrying activities, as well as their significant economic activity. Lampung Province has areas engaged in non-metallic mineral mining (Baskara & Hidayat, 2023), while DKI Jakarta faces high levels of plastic waste (Halidi & Varwati, 2020), and DI Yogyakarta has sand mining activities (Salsabil et al., 2024). According to BPS, steam power plants (PLTU) in 2021 were heavily concentrated on the island of Java, with the top four provinces—Banten, East Java, Central Java, and West Java accounting for nearly 80% of Indonesia's total PLTU electricity production. As a high-emission, non-renewable energy source, PLTUs contribute significantly to environmental degradation. Java's large population further intensifies waste production, reliance on non-renewable electricity, and extensive infrastructure development. Additionally, industrialization, including food and beverage factories, textile industries, and other manufacturing sectors, is concentrated on the island of Java.

Sulawesi Island is rich in natural resources. North Sulawesi Province has abundant mineral and coal resources (Mustafa, 2024). In Central Sulawesi, around the Poboyo-Palu community, gold mining has also contributed to environmental pollution (Wawo et al., 2017). Southeast Sulawesi is known for its nickel mining activities, with the construction of nickel smelters contributing Rp—85.23 trillion to the economy and creating 8,100 new jobs (Haryadi, 2016). Traditional gold mining is also prevalent in Gorontalo Province (Mahmud et al., 2017). Additionally, the mining and quarrying sector, which includes energy and gas processing, is the primary sector of Mamuju Regency, West Sulawesi Province (Mesrawaty et al., 2023).

In eastern Indonesia, the IKLH variable is significant in the provinces of Maluku, North Maluku, West Papua, and Papua. Maluku Province has gold mining activities in Mount Botak, Buru Regency, where mercury is used in the mining process (Sudiro et al., 2016). Bernadus & Rorong (2021) further highlight mercury contamination in the Tiabo waters near the illegal mining area (PETI) in Bakun Pantai village, North Maluku Province, revealing pollution across upstream, middle, and downstream river points. Meanwhile, West Papua's economy is heavily driven by the manufacturing sector (25.31%) and the mining and quarrying sector (17.69%). Similarly, in Papua Province, the mining and quarrying sector has been the most significant economic contributor, averaging 37.38% between 2017 and 2021; however, it has also led to significant environmental damage, including acid mine drainage (Amalia, 2023).

Mining and other economic activities generate significant benefits, including increased foreign exchange, job creation, and boosted Regional Original Revenue (PAD). However, these economic gains come at the cost of environmental degradation. This phenomenon is evident in 16 provinces, where the IKLH variable has a negative effect on happiness, while the HDI variable has a significant positive effect. This suggests that the environmental damage has been offset by improvements in human development, resulting in enhanced societal welfare and, ultimately, greater overall happiness.

The GWPR results indicate that the effect of the HDI variable on the happiness index is significant and positive across all 34 provinces (as shown in Figure 3). This positive effect suggests that, in the Indonesian context, improvements in education, health, and economic conditions provide greater opportunities for a prosperous and meaningful life, thereby contributing to higher levels of happiness.

Figure 3. Provinces with Significant HDI
Source: Data processed, 2025

Quality education provides individuals with greater opportunities for decent employment, improved living standards, and a better understanding of health. Expanding and strengthening health services enhances quality of life by reducing risks and increasing life expectancy, ultimately contributing to future happiness. Additionally, higher income levels provide financial security and greater life satisfaction, thereby enhancing people's overall welfare and happiness.

The study conducted by Suparta & Septian (2023) also states that HDI has a positive and significant relationship with the happiness index in Sumatra Island. Improvements in healthcare and educational facilities are crucial for enhancing public well-being, which in turn impacts the life satisfaction of people across Indonesia's 34 provinces. Economic growth, as reflected in the decent standard of living variable, also helps increase access to education, healthcare, and a higher quality of life, ultimately contributing to greater societal happiness.

The GWPR results indicate that economic growth has a significant impact on the happiness index in 10 out of 34 provinces, as shown in Figure 4. In these provinces, the relationship is consistently positive, suggesting that economic growth enhances welfare and happiness by increasing the availability of goods and services, thereby improving income levels and increasing purchasing power.

The 10 significant provinces are Aceh, West Sumatra, Jambi, South Sumatra, Bengkulu, West Nusa Tenggara, East Nusa Tenggara, Maluku, West Papua, and Papua. On average and median, the 10 provinces with significant economic growth (0.3542 and 0.3455) have smaller Gini ratios than the 24 provinces with insignificant economic growth (0.3645 and 0.3657). These 10 provinces have lower inequality or reflect relatively better equitable development efforts than provinces with insignificant economic growth, thus encouraging an increase in overall societal happiness.

Lamanele et al. (2024) found that economic growth in West Papua has a positive and significant impact on public welfare. Similarly, Najmi (2019) confirmed that economic growth has a significant positive impact on the HDI across districts and cities in Aceh, while Primandari (2019) reported the same relationship in North Sumatra. These findings suggest that economic growth in these 10 provinces enhances public welfare, ultimately contributing to a higher happiness index.

Figure 4. Provinces with Significant Economic Growth
Source: Data processed, 2025

The GWPR model suggests that the impact of regional government expenditure on the happiness index is not statistically significant, which may be attributed to two possible reasons. First, government expenditure may indirectly affect happiness, as the GWPR results do not capture this relationship. The 0.4108 correlation between HDI and government expenditure suggests that higher expenditure improves HDI, which in turn positively influences happiness. Palayukan (2019) found that increasing public budget allocations for the public sector is a key strategy for improving HDI. Similarly, Kogoya (2022) found that government expenditure has a significant impact on economic growth in Papua Province. Thus, government spending can influence both HDI and economic growth, which subsequently impacts overall happiness.

The second possibility is the inefficiency of government spending due to corruption, waste, and poorly targeted programs, which erodes public trust and reduces its impact on overall happiness. According to UU No. 1 Year 2022, the general explanation indicates that regional expenditure is dominated by apparatus and routine operational expenditure, which is managed less efficiently due to inadequate management capabilities. Moreover, minimal allocation for public infrastructure limits its role in supporting development and regional economic growth. Thus, it fails to effectively drive development outcomes (happiness) and regional economic growth, consequently hindering significant improvements for the society.

Table 6. Significant Variable Groups

Group	Significant Variables	Provinces
1 (11 provinces)	HDI	North Sumatra, Riau, Riau Islands, Bangka Belitung Islands, Bali, West Kalimantan, Central Kalimantan, South Kalimantan, East Kalimantan, North Kalimantan, and South Sulawesi.
2 (7 provinces)	HDI, Economic Growth	North Sumatra, Riau, Riau Islands, Bangka Belitung Islands, Bali, West Kalimantan, Central Kalimantan, South Kalimantan, East Kalimantan, North Kalimantan, South Sulawesi.
3 (13 provinces)	HDI, IKLH	Lampung, DKI Jakarta, West Java, Central Java, DI Yogyakarta, East Java, Banten, North Sulawesi, Central Sulawesi, Southeast Sulawesi, Gorontalo, West Sulawesi, and North Maluku.
4 (3 provinces)	HDI, IKLH, Economic Growth	Maluku, West Papua, and Papua.

Source: Data processed, 2025

The significance test (t-test) identified IKLH (16 provinces), HDI (34 provinces), and economic growth (10 provinces) as significant variables, while government expenditure was not. The results are categorized into four groups as shown in Table 6. Group 1 has significant variables, including HDI, with a total of 11 provinces. Group 2 consists of 7 provinces and exhibits significant variations in HDI and economic growth. Group 3 has significant variables of HDI and IKLH and consists of 13 provinces. In addition, there is Group 4, which comprises three significant variables: HDI, IKLH, and economic growth, but only includes 3 provinces. Each province has distinct social and economic characteristics, leading to variations in the factors that influence the happiness index.

Figure 5 illustrates the tendency of neighboring provinces to have similar variables influencing the happiness index. Group 1 (HDI) predominantly includes provinces in central Indonesia, such as those on the central Sumatra Island, Kalimantan Island, southern Sulawesi Island, and Bali Island. Group 2 (HDI and economic growth) mainly consists of provinces in Sumatra and the Nusa Tenggara islands. Meanwhile, Group 3 (HDI and IKLH) has provinces in Java Island, southern Sumatra Island, and is dominant in Sulawesi and North Maluku. Finally, Group 4 (HDI, IKLH, and economic growth) is primarily composed of provinces located in the eastern part of Indonesia.

In particular, provinces with significant economic growth variables are dominant on the island of Sumatra and in Eastern Indonesia, such as Papua Island and the Nusa Tenggara islands. This illustrates that the province produces inclusive economic growth compared to other provinces, resulting in public happiness. In addition, the significant variable of IKLH is dominant in Java Island, Sulawesi Island, Eastern Indonesia, and southern Sumatra Island. This suggests that environmental damage has been mitigated through increased welfare, ultimately contributing to greater societal happiness. Therefore, GWPR modelling can identify the spatial diversity of the happiness index in 34 provinces of Indonesia.
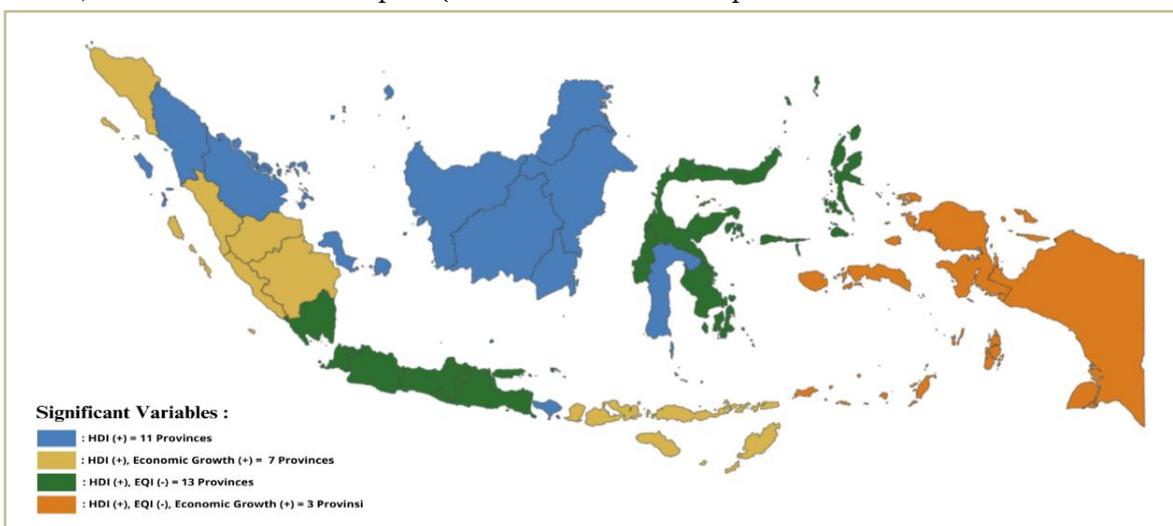

Figure 5. Grouping of Significant Variables of Happiness Index
Source: Data processed (2025)

CONCLUSION

The GWPR model outperforms the panel data regression (fixed effects model), as indicated by its higher R^2 value. The GWPR model achieves an R^2 of 83.77475% and an Adjusted R^2 of 79.23275%, whereas the fixed effects regression model only has an R^2 of 78.584% and an Adjusted R^2 of 66.203%. However, both models provide complementary insights. The panel data regression model provides a broad national overview (Indonesia) with uniform coefficients across provinces, making interpretation more straightforward. In contrast, the GWPR model accounts for spatial variations,

offering a more detailed, province-specific analysis.

The IKLH has a significant negative effect on happiness both nationally and in 16 provinces. This relationship suggests that environmental degradation paradoxically increases public happiness, as it is often accompanied by economic growth, improved public facilities, and other factors that contribute to welfare and ultimately to overall happiness. Conversely, the HDI and economic growth have a positive impact on happiness in Indonesia, with the HDI being significant in all 34 provinces and economic growth in 10 provinces. Improvements in economic conditions, healthcare, education, and purchasing power contribute to greater welfare and happiness. However, government expenditure shows no significant effect on happiness at either the national or provincial level.

Panel data regression and GWPR yield consistent findings: IKLH has a significant negative effect on happiness, HDI, and economic growth have positive effects, and government expenditure shows no significant impact. Moreover, the panel data regression results can be directly interpreted through their coefficients. In contrast, GWPR cannot be interpreted through coefficients due to the within-estimator transformation; therefore, the findings are grouped into four categories based on the significance of the relationship. The pattern formed shows that neighbouring provinces tend to have similarities in variables that influence the happiness index. This suggests that the GWPR model employed in this study can identify the presence of spatial diversity in the determinants of happiness.

The findings of this study suggest that an increase in environmental damage may actually lead to an increase in societal happiness. The government needs to develop strategic policies to harmonise the improvement of public welfare and happiness without significantly sacrificing the environment. This is particularly important given the current global issues surrounding efforts to mitigate the impacts of climate change

on Indonesia's sustainable development goals (SDGs).

The government needs to promote the development of infrastructure, healthcare facilities, and educational institutions to improve the HDI, which in turn enhances overall happiness. The quality of economic growth also needs improvement by ensuring that growth is widely distributed, characterized by low inequality, and equitably spread across all regions of Indonesia. Government budgets allocated for development and governance require intensive evaluation to ensure the efficiency and effectiveness of public spending, particularly given this study's findings that government expenditure does not significantly influence development outcomes or public happiness.

Future research is expected to explore various other variables that influence societal happiness in Indonesia. Researchers can also apply different spatial analysis methods to broaden the range of results and further develop studies on aggregate happiness in Indonesia, which remains limited, as input for government policymaking. Additionally, updating the research dataset is necessary to track developments and the latest conditions regarding public well-being and happiness, considering that, at the time this study was conducted, the most recent Happiness Index data for Indonesia was only available up to 2021.

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