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The Influence of Social, Economic, and Ecological Aspects on Village Development Index in Indonesia

Dian Nora Herlina[1], Kikin Windhani[1]

[1]Jenderal Soedirman University, Indonesia

*Corresponding email: dian.herlina@mhs.unsoed.ac.id

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Abstract

Sustainable Development Goals (SDGs) for villages aim to realize inclusive, sustainable development based on community needs. However, the improvement of road infrastructure has not been accompanied by an increase in the quality of village development, as evidenced by the ratio of very underdeveloped and underdeveloped villages being greater than that of advanced or independent villages. This research aims to analyze the influence of social aspects (health, education, access to sanitation, access to the internet), economic aspects (financial services and insurance, road infrastructure), and ecological aspects (air quality, disaster risk) on the Village Development Index in Indonesia for the years 2021-2023. The research method used panel data regression analysis. Research findings indicate that education, sanitation access, internet access, and financial services and insurance have a significantly positive impact, while road infrastructure and disaster risk have a significantly negative impact on the Village Development Index in Indonesia. This implies that both local and central governments need to promote improvements in access to education in particular, ensure the development and maintenance of adequate sanitation facilities, expand internet access, encourage enhancements in microfinance services, improve access to and quality of roads, and enhance anticipation or mitigation of natural disasters in rural areas.

Keywords: Social, Economic, Ecological, SDGs, Village Development Index

Abstrak

Tujuan Pembangunan Berkelanjutan (SDGs) Desa bertujuan untuk mewujudkan pembangunan desa yang inklusif, berkelanjutan, dan berbasis kebutuhan masyarakat. Namun demikian peningkatan infrastruktur jalan tidak diikuti dengan peningkatan kualitas pembangunan desa, hal ini ditunjukkan rasio desa sangat tertinggal dan tertinggal masih lebih banyak dibandingkan desa maju atau mandiri. Penelitian ini bertujuan menganalisis pengaruh aspek sosial (kesehatan, pendidikan, akses sanitasi, akses internet), ekonomi (jasa keuangan dan asuransi, infrastruktur jalan) dan ekologi (kualitas udara, risiko bencana) terhadap Indeks Desa Membangun di Indonesia tahun 2021-2023. Metode penelitian menggunakan analisis regresi data panel. Hasil penelitian menunjukkan pendidikan, akses sanitasi, akses internet, jasa keuangan dan asuransi, berpengaruh positif signifikan, sementara infrastruktur jalan dan risiko bencana berpengaruh negatif signifikan terhadap Indeks Desa Membangun di Indonesia. Implikasinya adalah pemerintah daerah dan pusat perlu mendorong peningkatan akses pendidikan khususnya, memastikan pembangunan dan pemeliharaan kualitas sarana sanitasi layak, memperluas akses jaringan internet, mendorong peningkatan layanan unit keuangan mikro, peningkatan akses dan kualitas jalan, dan peningkatan antisipasi atau mitigasi bencana alam di wilayah pedesaan.

Kata Kunci: Sosial, Ekonomi, Ekologi, SDGs, Indeks Pembangunan Desa

INTRODUCTION

The village is a representation of a geographical area produced from the interplay of physical, social, economic, political, and cultural conditions with other regions (Hasugian et al. 2021). One of the objectives of implementing the Sustainable Development Goals (SDGs) in villages is to realize inclusive, sustainable development that is based on the needs of the community. Rural development objectives are also aimed at reducing the level of urbanization from villages to cities (Manurung & Lubis, 2022). To support the SDGs for villages, the Village Development Index (IDM) aims to increase efforts to meet regional and rural development targets set forth in the National Medium-Term Development Plan 2015-2019 (RPJMN 2015-2019). The use of IDM is intended to assess the development status of villages and as a basis for planning and development policies in villages across Indonesia (Kemendesa, 2015). According to data Kemendesa, (2015) there were 33,592 underdeveloped villages and 174 independent villages. The goal of the Village Development Index is to reduce the number of underdeveloped villages to only 5,000 by 2019 and to increase the number of independent villages by at least 2,000. However, based on the target data, this has not been achieved, as evidenced by the still high number of underdeveloped villages, totaling 17,626, while the number of independent villages stands at only 840. This condition indicates that the IDM has not demonstrated achievements in rural development in accordance with the National Medium-Term Development Plan (RPJMN) 2015-2019. The status of villages categorized by type in Indonesia is presented in Figure 1 as follows.

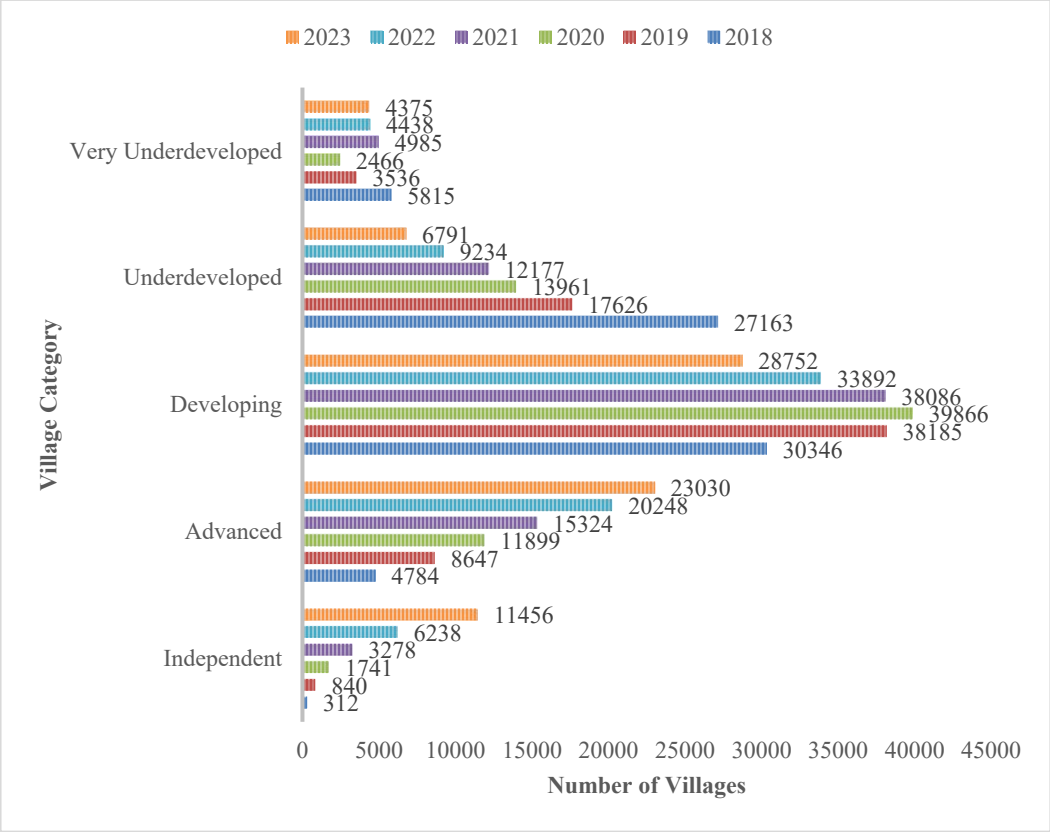

Figure 1.
Number of Villages Based on Village Categories from 2018-2023

Source: Village Development Index (Ministry of Villages, Disadvantaged Regions Development, and Transmigration, 2023)

Figure 1 shows the number of villages based on village categories from 2018-2023, where the majority of villages fall into the developing category and the least in the independent category. In

general, it can be seen that there is an increase in the number of villages in each category, but the majority are in the developing village category with an average IDM score of 0.6466 points. Additionally, the number of villages in the very underdeveloped category tends to fluctuate during the period from 2018-2023. There has been an increase in the number of very underdeveloped villages from 2019 to 2023, initially recorded at 3,536 villages in 2019, rising to 4,375 in 2023. In 2021, the number of villages categorized as very underdeveloped increased significantly from 2,466 in 2020 to 4,985 villages, due to the impact of the Covid-19 pandemic which hindered village development. However, the independent villages category also experienced growth, increasing from 1,741 in 2020 to 3,278 in 2021. Although in 2021 independent villages experienced significant improvements, villages categorized as developing, left behind, and very left behind still have a higher ratio compared to independent and advanced villages. The Covid-19 pandemic caused government programs for village development to be largely redirected towards pandemic recovery and allocations for the health sector (Risal et al. 2023).

The use of village income to support the economic activities of rural communities and improve their living standards is a policy implemented by local governments to reduce the number of underdeveloped villages (Sari & Oktavianor, 2021). The increase in IDM should cover all aspects of village life and be developed to strengthen the objectives of rural development, as an effort to reduce the number of people living in poverty (Khanifah et al. 2020). The equality policy aims to enhance access to infrastructure and facilities that support basic needs such as food, clothing, housing, health, and education, as well as to increase benefits and income for low-income communities (Febrianti & Sunaryono, 2022).

The Village Development Index (IDM) consists of three dimensions: social, economic, and ecological (environmental). The social dimension includes health, education, social capital, and settlement. In 2018, according to the Basic Health Research of Indonesia, 42.4% of the rural population still faced difficulties in accessing hospitals, and 36.8% of them also encountered challenges in obtaining primary health services. The inaccessibility of health services exacerbates the infrastructural constraints that prevent rural communities from accessing available health services (Kemenkes, 2018). Based on the Education Statistics data (BPS, 2023a), the lack of educational facilities available in rural areas makes it difficult for rural residents to access education. Settlements include access to clean and safe drinking water, sanitation, electricity, and information and communication services (Purwanti et al. 2024).

In addition to the social dimension, the indicators in the IDM include the dimension of economic resilience, characterized by the conditions of financial services and insurance as well as road infrastructure. A study by Xaverius, (2021) indicates that villages are considered to lack access to logistics distribution centers, financial institutions, credit facilities, and trading centers. Economically, villages can progress due to closer access to trade and economic centers, as well as better road access conditions. According to the Land Transportation Statistics BPS (2024g) out of a total road length of 543,720 kilometers in Indonesia, roads in good condition account for approximately 43.98 percent, moderate condition for 21.87 percent, damaged for 12.83 percent, and severely damaged for 21.32 percent. The proportion of district/city roads that are damaged or severely damaged is notably high, reaching 38.3 percent, compared to state roads and provincial roads, which have lower levels of damage. The ecological dimension (environment) is an indicator for the formation of the Village Development Index, comprising environmental quality and vulnerability/potential for natural disasters.

Rural areas are a source of inputs for production in urban areas or growth centers. The growth

of economic activity has led to greater exploration of input resources in rural areas. In the long term, this will cause rural areas to experience a more rapid decline in environmental quality. A study by Aprianti et al. (2025) highlights that areas with declining environmental quality or damage will increase disaster risk. In addition, increased economic activity will increase CO2 production, which is one of the factors causing climate change (Chaturvedi et al., 2025). Climate change is one of the main factors causing natural destruction (Chaturvedi et al., 2025). The disaster risk conditions in Indonesia show that eight provinces are classified as high risk, namely Maluku, West Sulawesi, Southeast Sulawesi, Southwest Papua, West Papua, North Maluku, Aceh, and Bengkulu, while the other 30 provinces are classified as medium risk (BNPB, 2024). Based on data from BPS (2024a), eight provinces with high disaster risk, namely West Papua, North Maluku, Southeast Sulawesi, and Maluku, have relatively good economic growth rates above the national level. However, West Sulawesi, Aceh, Bengkulu, and Southwest Papua have economic growth rates below the national level. This indicates that there is no direct correlation between regions with high disaster risk categories and relatively good economic growth. High disaster risk indicates the potential for significant losses caused by disasters, which can hinder economic growth in the long term.

Most previous research related to village development in Indonesia has been sectoral in nature, focusing on economic or infrastructure aspects. Therefore, the contribution of this study is to offer a new approach in understanding village development through the integration of social, economic, and ecological aspects, which has not been widely conducted in Indonesia. Additionally, it employs a different proxy from the composite index IDM established by the Ministry of Village Development within the framework of data from 31 provinces in Indonesia. The findings of this research can serve as a foundation for the formulation of sustainable village development policies. The objective of this study is to analyze the impact of social aspects (health, education, access to sanitation, internet access), economic aspects (financial services and insurance, road infrastructure), and ecological aspects (air quality, disaster risks) on the Village Development Index in Indonesia from 2021-2023.

METHODOLOGY

The type of research is quantitative research, which consists of descriptions in the form of numbers, images, graphs, and schemes regarding the variables studied (Arjuntara & Sudibia, 2021). The research object is 31 provinces in Indonesia from 2021 to 2023, excluding Papua and West Papua due to territorial expansion occurring since December 2022, and IDM data for the province of DKI Jakarta is not available because administratively the entire region has the status of a subdistrict not a village, and IDM is not applied to subdistricts, thus data was not available during the research period (Permendesa PDTT, 2016). The operational definitions of each variable are presented in Table 1 as follows. The operational definitions of each variable are presented in Table 1 as follows.

Table 1.
Operational Definition of Variables

No	Variable	Definition	Unit
1.	Village Development Index	Composite index of social, economic, and ecological/environmental resilience indicators.	Index
2.	Helath	Proportion of households with access to basic health facilities.	Percent
3.	Education	Gross enrollment rate at the senior high school level.	Percent
4.	Sanitation Access	Percentage of households with access to adequate sanitation by village classification.	Percent

No	Variable	Definition	Unit
5.	Internet Access	Percentage of households that have accessed the internet in the last 3 months by village classification.	Percent
6.	Financial and Insurance Services	Gross regional domestic product at constant 2010 prices by financial and insurance services industry.	Billion Rupiah
7.	Road Infrastructure	Total road length by province and level of government authority.	Kilometers
8.	Air Quality	Composite value of air quality parameters in a region at a given time.	Index
9.	Disaster Risk	Composite value of the components of hazard level, vulnerability, and disaster capacity of a region.	Index

The data used was accessed from the Ministry of Villages, Development of Underdeveloped Regions, and Transmigration (Kemendesa PDTT) (https://idm.kemendesa.go.id/), the Central Statistics Agency (BPS) (Badan Pusat Statistik Indonesia), and the National Disaster Mitigation Agency (BNPB) (https://inarisk.bnpb.go.id/irbi). The basic model used in this study is as follows:

$$Y_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \cdots + \beta_n X_{nit} + \varepsilon_{it}$$

The research model used in this study is multiple linear regression of panel data, as shown in the following equation:

$$IDM_{it} = \beta_0 + \beta_1 KES_{it} + \beta_2 DIK_{it} + \beta_3 SAN_{it} + \beta_4 INT_{it} + ln\beta_5 KEU_{it} + ln\beta_6 JLN_{it} + \beta_7 IKU_{it} + \beta_8 IRB_{it} + \varepsilon_{it}$$

Notes:

IDM	=	Village Development Index	IRB	=	Disaster Risk
KES	=	Health	Ln	=	Natural Logarithm
DIK	=	Education	β_0	=	Constant
SAN	=	Sanitation Access	$\beta_{1,\ldots,12}$	=	Coefficients of independent variables
INT	=	Internet Access			
KEU	=	Financial Service and Insurance	i	=	Cross section
JLN	=	Road Infrastructure	t	=	Time series
IKU	=	Air Quality	ε	=	Random error

The stages of data analysis techniques include classical assumption tests, such as normality tests, multicollinearity tests, and heteroscedasticity tests; panel model selection, which includes the Chow test, Hausman test, and Lagrange Multiplier test; and hypothesis testing, which encompasses the determination coefficient (R2), joint tests (F test), and partial tests (t test).

DISCUSSION AND FINDINGS

In the panel data test to analyze the influence of social aspects (health, education, access to sanitation, and access to the internet), economic aspects (financial services and insurance, road infrastructure), and ecological aspects (air quality, disaster risk) on the Village Development Index in Indonesia, there are three models: Common Effect Model, Fixed Effect Model, and Random Effect Model. To select the best model among the three estimation models, the Chow test, Hausman test, and Lagrange Multiplier test can be conducted as follows.

Table 2.
Selection of the Most Suitable Model

Test	Effect Test	Probability	Results
Chow test	Cross-section Chi-square	0,0000	Choosing the Fixed Effect Model
Hausman test	Cross-section random	0,2223	Choosing the Random Effect Model
Lagrange Multiplier test	Breusch-Pagan	0,0000	Choosing the Random Effect Model

Source: Eviews 13, 2025

From the results of the testing, it can be concluded that the most appropriate model to analyze the influence of social aspects (health, education, sanitation access, and internet access), economic aspects (financial services and insurance, road infrastructure), and ecological aspects (air quality, disaster risk) on the Village Development Index in Indonesia is the Random Effects Model. In this research, the selected model is the Random Effects Model or the Generalized Least Squares (GLS) method. Kuncoro, (2013) states that a normality test is mandatory for models that use GLS. The study by Septianingsih, (2022) indicates that the model estimation using GLS does not require a heteroskedasticity test. Therefore, the classical assumption tests that must be employed are multicollinearity and normality tests.

Table 3.
Results of Multicollinearity Assumption Test

Variable	KES	DIK	SAN	INT	LNKEU	LNJLN	IKU	IRB
KES	1.0000	-0.0281	0.3483	0.2979	0.0191	-0.3501	-0.0524	-0.0845
DIK	-0.0281	1.0000	0.1404	-0.0212	-0.4023	-0.1311	0.5791	0.2641
SAN	0.3483	0.1404	1.0000	0.3593	0.0108	-0.1166	0.0364	0.0630
INT	0.2979	-0.0212	0.3593	1.0000	0.1088	-0.0318	0.0436	-0.0939
LNKEU	0.0191	-0.4023	0.0108	0.1088	1.0000	0.6477	-0.6588	-0.4853
LNJLN	-0.3501	-0.1311	-0.1166	-0.0318	0.6477	1.0000	-0.1553	-0.0631
IKU	-0.0524	0.5791	0.0364	0.0436	-0.6588	-0.1553	1.0000	0.1837
IRB	-0.0845	0.2641	0.0630	-0.0939	-0.4853	-0.0631	0.1837	1.0000

Source: Eviews 13, 2025

Table 3 shows that the correlation values between the variables of health (KES), education (DIK), access to sanitation (SAN), access to the internet (INT), natural logarithm of financial services and insurance (LNKEU), natural logarithm of road infrastructure (LNJLN), air quality (IKU), and disaster risk (IRB) are < 0.90, meaning that the model does not have multicollinearity problems in each independent variable.

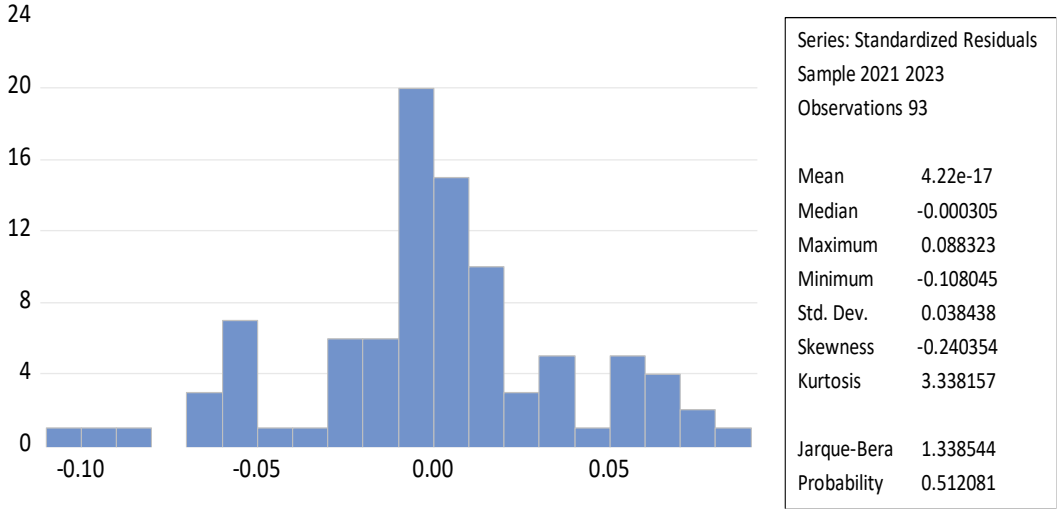

Figure 2.
Results of Normality Assumption Tests
Source: Eviews 13, 2025

Figure 2 shows that the Jarque-Bera probability value of 0.512081 is greater than the significance level (0.05), meaning that the data is normally distributed. The research findings show that the model does not have multicollinearity issues with each independent variable and the data is normally distributed. Based on the estimation results and model selection, it shown that the

Random Effect Model is the best model to use, presented in Table 4 as follows.

Tabel 4.
Results of the Random Effects Model Estimation

Variable	Coefficient	t-Statistic	Probability
C	0.252889	1.327150	0.1881
KES	0.000318	0.635354	0.5269
DIK	0.002316	2.016644	0.0469**
SAN	0.001621	2.876427	0.0051**
INT	0.002270	6.534574	0.0000***
LNKEU	0.028871	2.829676	0.0058**
LNJLN	-0.027835	-1.916391	0.0587*
IKU	0.001986	1.630285	0.1068
IRB	-0.001815	-5.307784	0.0000***
R-squared	0.784799		
Adjusted R-squared	0.764303		
F-statistic	0.000000		
Prob(F-statistic)	38.29149		

Note: ***, **, and * indicate significance levels at 1%, 5%, and 10%
Source: Eviews 13, 2025

Referring to Table 2, the following is the equation from the panel data regression results with the selected model being the Random Effect Model as follows.

$$IDM_{it} = 0.252889 + 0.000318KES_{it} + 0.002316DIK_{it} + 0.001621SAN_{it} + 0.002270INT_{it} + 0.028871KEU_{it} - 0.027835JLN_{it} + 0.001986IKU_{it} - 0.001815IRB_{it} + \varepsilon_{it}$$

The coefficient of determination (R-Squared) test is used to determine the extent to which independent variables can explain the dependent variable and the magnitude of their influence. Referring to Table 2, it shows an adjusted R-squared value of 0.764303, meaning that the variables of health (KES), education (DIK), access to sanitation (SAN), access to the internet (INT), financial services and insurance (KEU), road infrastructure (JLN), air quality (IKU), and disaster risk (IRB) can explain 76.43 percent of the Village Development Index variable. The remaining 23.57 percent is explained by other variables not studied.

The joint test (F-test) is used to jointly test the influence of independent variables on the dependent variable. Referring to Table 2, it shows a probability value of 0.000000 < 0.05, indicating that social aspects (health, education, access to sanitation, access to the internet), economic aspects (financial services and insurance, road infrastructure), and ecological aspects (air quality, disaster risk) collectively influence the Village Development Index. The analysis results show an $F_{statistic}$ value of 38.29149 and an F_{table} value of 2.0506, indicating that $F_{statistic} > F_{table}$, thus H_0 is rejected and H_1 is accepted meaning, that social aspects (health, education, access to sanitation, access to the internet), economic aspects (financial services and insurance, road infrastructure), and ecological aspects (air quality, disaster risk) collectively influence the Village Development Index.

The Influence of Social Aspects (Health, Education, Sanitation Access, Internet Aspects) on the Village Development Index in Indonesia

The Influence of Health on the Village Development Index

Referring to Table 2, it shows a probability value of 0.5269 > 0.10, meaning that health does not have a significant effect on the Village Development Index. The $t_{statistic}$ value of 0.635354 and t_{table} value of 1.6632 indicate that $t_{statsitic} < t_{table}$, thus H_0 is approved and H_1 is denied, meaning that

health does not have a significant effect on the Village Development Index. Therefore, it can be concluded that the health variable does not have a significant Influence on the Village Development Index in Indonesia from 2021 to 2023. The health variable utilizes the proxy data of the proportion of households with access to basic health facilities, indicating that changes in the proportion of households with access to basic health facilities do not affect the Village Development Index.

The results of this study indicate a discrepancy with the hypothesis stating that the proportion of households with access to basic health facilities positively affects the Village Development Index (IDM) in Indonesia. The study by Rodiah et al. (2018) found that health does not influence IDM due to the limited distribution of health development. This is supported by data from the Village Potential Statistics BPS (2024f), indicating the condition of health infrastructure in Indonesia in 2024: there are approximately 3,115 hospitals, around 251 maternity hospitals, about 4,846 inpatient community health centers, roughly 5,730 outpatient community health centers, and approximately 17,445 polyclinics/treatment units, whereas pharmacies are the most available facilities, with 40,731 units or equivalent to 56.48 percent of the total health facilities. The high availability of pharmacies provides easy access for the community to medications, flexible service hours, a perception of lower costs, and a relatively quick service process. However, this condition also poses potential risks regarding self-medication practices that are not based on accurate medical diagnoses. The public tends to communicate subjective complaints to pharmacy staff, who then respond by providing medications based on symptoms rather than through comprehensive examinations. This can increase the risk of medication misuse and hinder the management of diseases that require diagnosis and further treatment. On the other hand, the relatively fewer number of hospitals and community health centers can limit the availability of complex or emergency health services, especially in remote areas, and potentially deepen health access disparities across regions. Although the presence of pharmacies increases accessibility to pharmaceutical services, the strengthening of the role of primary health services remains necessary. Access to health services is the ability of each individual to obtain the health services they need, measured by the availability of resources and the number of people who have insurance to pay for the use of those resources (Megatsari et al. 2018).

The condition of healthcare facility limitations is almost uniform across all provinces in Indonesia. Based on the data from the Village Potential Statistics BPS (2024f), it shows that the average ratio of the number of hospitals, maternity hospitals, community health centers with inpatient services, and community health centers without inpatient services is lower compared to clinics/treatment centers and pharmacies. For example, West Java Province has 433 hospitals, 49 maternity hospitals, 363 community health centers with inpatient services, and 802 community health centers without inpatient services. However, these numbers are fewer compared to the 4,141 clinics/treatment centers and 6,478 pharmacies. Even based on the number of villages/subdistricts in several provinces such as Jambi, Bengkulu, Central Java, West Nusa Tenggara, East Nusa Tenggara, South Kalimantan, North Kalimantan, West Sulawesi, Maluku, North Maluku, West Papua, Southwest Papua, Papua, South Papua, Central Papua, and Papua Mountains, there are no maternity hospitals. Additionally, Riau, DI Yogyakarta, Central Kalimantan, and Gorontalo only have one maternity hospital (BPS, 2024f).

The study conducted by Reza & Safitri, (2022) shows that the limited number of healthcare facilities and the difficulty in accessing these services reflect an uneven level of health welfare in various regions or villages, thereby potentially creating disparities between areas. Good healthcare services, supported by healthcare personnel such as midwives, nurses, and doctors,

along with the availability of healthcare facilities such as hospitals, community health centers, auxiliary community health centers, and mobile health clinics, can improve the health welfare of the population, especially in remote areas where access to healthcare services remains challenging. Another study by Windhani et al. (2023) states that areas with a low availability of healthcare facilities will affect the low quality of human capital. This condition will indirectly also impact the Human Development Index (HDI) of a region.

Research by Xaverius, (2021) indicates that the increasing number of villages experiencing improved access to health services, education and knowledge, social capital, and housing has led to an enhancement in the assessment of social resilience dimensions. A study by Soegijono et al. (2026) states that an increase in the number of villages with good institutions will encourage inclusive and sustainable economic development and improve essential services such as education, health, and sanitation. The study by Nurhaliza et al. (2026) states that there is a link between villages and high rates of primary school dropouts caused by village communities that do not prioritize education or educational infrastructure. In the long term, the high dropout rate at the elementary level in villages reduces opportunities for decent employment in the future and ultimately leads to high poverty rates in villages (Nurhaliza et al. 2026). Another study by Yuan et al. (2025) states that the increase in housing needs in rural areas has led to a decline in the provision of educational infrastructure. Schools in villages not only function as educational institutions, but more as relational infrastructure that maintains socio-cultural resilience. In terms of health, the improved access to and delivery of health services is marked by a reduction in travel time to health facilities, an increase in the number of healthcare personnel, a rise in the number of Family Planning Villages (Kampung KB), and an increase in community participation in the National Health Insurance Program (BPJS Kesehatan).

The Influence of Education on the Village Development Index

Referring to Table 2, it shows a probability value of 0.0469 < 0.05, meaning that education has a significant Influence on the Village Development Index. The $t_{statistic}$ value is 2.016644 and the t_{table} value is 1.9886, indicating that the $t_{statistic} > t_{table}$, then H_0 is denied and H_1 is approved, meaning that education has a significant positive effect on the Village Development Index. Thus, it can be concluded that the education variable has a significantly positive influence on the Village Development Index in Indonesia from 2021 to 2023. The data proxy used for the education variable is the Gross Enrollment Rate (GER) at the senior secondary education level, which means that when the GER at the senior secondary education level increases, the Village Development Index will increase, and vice versa. A high GER reflects that the proportion of the school-age population (16-18 years) enrolled in senior secondary education is greater, indicating a good level of access to and affordability of secondary education in that area. Secondary education becomes crucial as it provides higher critical thinking skills, literacy, and basic skills compared to primary education, thus improving the quality of human resources (HR) in rural areas. Thus, strengthening access and quality of secondary education can be a relevant and effective strategy in accelerating rural development. The results of this research are consistent with the hypothesis stating that the Gross Enrollment Ratio (GER) of senior high school/equivalent education positively affects the Village Development Index in Indonesia.

The research findings are supported by data from the Statistics of Village Potential (BPS, 2021; 2024f), indicating an increase in educational infrastructure, specifically the number of senior high schools/equivalent from 38,599 units in 2021 to 39,842 units in 2024. The addition of schools in a given area can expand educational capacity, thereby encouraging more adolescents to continue their education at the senior high school/equivalent level. Furthermore, the enhancement of

educational facilities availability can contribute to the increase in the gross participation rate in senior high school/equivalent education and has the potential to promote an improvement in the status of village development. This result is further supported by data from the Village Potential Statistics BPS (2024f) regarding the highest level of education completed by Village Heads and Village Secretaries. In 2024, it was found that 57.58 percent of Village Heads have completed their education up to high school or equivalent, while 37.06 percent have completed their education at the Academy or Higher Education level. On the other hand, 49.83 percent of Village Secretaries have completed their education at the high school level or equivalent, and 47.80 percent have completed their education at the Academy or Higher Education level.

Statistical data on education (BPS, 2023a) shows that the national Gross Enrollment Rate (GER) value for senior high school/equivalent education in 2023 is 86.34 percent, but there are several provinces such as North Sulawesi, Central Kalimantan, Jambi, Riau, South Sumatra, South Kalimantan, West Java, DKI Jakarta, Banten, and Papua that have GER values below the national level, while the other 24 provinces are above the national level. The Riau Islands Province is one of the provinces with a rapidly increasing GER value, namely the GER value for senior high school/equivalent education in the Riau Islands Province increased by 4.27 percent from 86.31 in 2021 to 90.58 in 2023, reflecting a growth of approximately 4.95 percent over the last two years. This condition aligns with the increasing Development Index (IDM) of the Riau Islands Province, which rose by 0.042 or 6.29 percent over the past two years, contributing to a change in the IDM status; from 2021, the Riau Islands Province transitioned from developing to advanced status in 2023. In contrast, the Banten Province experienced a decline in the GER for senior high school level education, decreasing by -0.64 percent from 75.66 in 2021 to 75.02 in 2023, representing a contraction of about -0.85 percent over the last two years. This is consistent with the stagnation of the IDM status in Banten Province from 2021 to 2023, which remains classified as a developing village and below the national average.

A research conducted by Akbar et al. (2024) states that improving access to education in villages is one of the essential components in efforts to enhance the Village Development Index. Education serves as a key to unlocking various opportunities and improving the quality of life for rural communities. Through the improvement of accessibility and quality of education, rural communities are expected to develop their potential, enhance their skills, and acquire the knowledge necessary to actively participate in both village and national development. The study by Nadia & Mahi (2023) states that the educational background of village heads in managing Village Funds has a significant influence on the development of village status. The effectiveness of Village Fund management will increase in line with changes in the average IDM score if village heads manage it with an education above high school (D3/S1 and S2/S3). Conversely, effectiveness will decrease when the village head has a high school education or below (elementary school, junior high school, and high school).

Education is the second indicator in the assessment of the Village Development Index. Several aspects that are the focus of evaluation include access to primary and secondary education, non-formal education, and access to information. Development in the education sector in villages, such as improvements in school infrastructure, enhancement of teacher welfare, and the quality of schools, encourages parents to enroll their children in schools in their residential areas. Furthermore, the development of supporting infrastructure such as roads leading to schools can shorten the travel distance for parents and students, thereby improving access to education. The study by Nurhaliza et al. (2026) highlights that improving educational infrastructure in villages reduces the probability of children living in rural areas dropping out of primary school. In the long

term, educational infrastructure will improve individuals' ability to obtain decent jobs with high wages, thereby reducing poverty. Another study by Yuan et al. (2025) concludes that educational infrastructure is one of the means of preserving social and cultural existence. These efforts can directly contribute to the enhancement of the village development status in the region (Tambunan et al. 2020). The study by Gugule & Mesra, (2022) indicates that the enhancement of human resource quality can be achieved through the provision of educational facilities, study assistance, and scholarship programs to complete educational levels. These programs are highly beneficial for the community, particularly for economically disadvantaged groups, as they can help alleviate financial barriers to accessing quality education.

The Influence of Sanitation Access on the Village Development Index

Referring to Table 2, it shows a probability value of 0.0051 < 0.05, meaning that sanitation access significantly affects the Village Development Index. The $t_{statistic}$ value is 2.876427 and the t_{table} value is 1.9886 indicate that the $t_{statistic} > t_{table}$, thus H_0 is denied and H_1 is approved, meaning that sanitation access has a significant positive effect on the Village Development Index. Therefore, it can be concluded that the variable of sanitation access positively and significantly influences the Village Development Index in Indonesia from 2021 to 2023. The proxy data for the sanitation access variable is the percentage of households that have access to proper sanitation classified by village. This implies that when the percentage of households with access to proper sanitation classified by village increases, the Village Development Index also increases, and vice versa. The results of this study are consistent with the hypothesis stating that the percentage of households with access to proper sanitation classified by village positively influences the Village Development Index in Indonesia. The research findings are supported by data from Statistics Indonesia BPS (2024d), which shows that from 2021 to 2023, the percentage of households with access to proper sanitation increased annually, from 80.29 percent in 2021 to 82.36 percent in 2023. The Special Region of Yogyakarta is the province with the highest percentage of households having access to proper sanitation in rural areas compared to other provinces in Indonesia, standing at 97.91 percent in 2023. This condition aligns with the Independence Status (IDM) of Yogyakarta, which falls into the independent village category in 2023, indicating that areas with good sanitation access tend to have better IDM outcomes.

Communities with high economic levels have greater access to sanitation facilities compared to those with low economic levels, thus economic status significantly influences the ownership of healthy latrines (Amelia et al. 2021). The Village Potential Statistics (BPS, 2021; 2024f) indicate that the improvement of access to proper sanitation in villages/subdistrict is supported by data on the availability of healthy latrines. In 2020, approximately 53,150 villages/subdistrict had access to healthy latrines, and this number increased to 57,793 villages/subdistrict by 2023. Furthermore, the number of villages/subdistrict with private latrines also showed an increase, from 75,954 villages/subdistrict in 2021 to 78,127 villages/subdistrict in 2024. Statistical Data on Village Potential BPS (2024f) indicates that in 2024, the majority of villages/subdistrict in Indonesia have utilized sanitation facilities, primarily in the form of private latrines, amounting to approximately 78,127 villages/subdistrict or equivalent to 92.70 percent. This data demonstrates an improvement in the provision of basic sanitation facilities at the village level, contributing to enhanced quality of life and rural development. Clean sanitation is crucial for improving the quality of life and public health, especially for lower-income communities. Sanitation refers to the enhancement of hygiene and the prevention of environmental disease spread. With adequate sanitation, communities can prevent cholera, diarrhea, dysentery, typhoid, and polio, as well as reduce the likelihood of stunting in children (Hargono et al. 2022) and (Pranaka & Agustinus, 2022).

The main obstacles to achieving access to clean water and sanitation include inadequate wastewater treatment capacity, excessive groundwater extraction, rapid population growth, and the negative impact of climate change on water availability and sanitation infrastructure. Strengthening regional institutions, developing climate-resilient infrastructure, and innovative financing models can accelerate progress toward access to clean water and sanitation (Rajendrakumar et al., 2025). Rural areas are most affected by inadequate sanitation services and high rates of open defecation. Most respondents do not use toilets regularly, and no households have safely managed sanitation facilities (Nastiti et al., 2025). The study by Demoze et al. (2025) states that inadequate sanitation facilities remain a serious public health challenge in Sub-Saharan Africa, with significant regional disparities of 48%. Addressing this issue requires targeted government policies, financial support for sanitation infrastructure, improved water supply, hygiene awareness campaigns, increased media exposure, and better sanitation facilities in rural areas.

The Influence of Internet Access on the Village Development Index

Referring to Table 2, it shows a probability value of 0.0000 < 0.01, indicates that internet access has a significant influence on the Village Development Index. The $t_{statistic}$ of 6.534574 and the t_{table} value of 2.6356 state that the $t_{statistic} > t_{table}$, then H_0 is denied and H_1 is approved, meaning that internet access has a significant positive effect on the Village Development Index. Therefore, it can be concluded that the variable of internet access has a significant positive effect on the Village Development Index in Indonesia from 2021 to 2023. The proxy data for the internet access variable is the percentage of households that have accessed the internet in the last 3 months classified by village, which means that when the percentage of households that have accessed the internet in the last 3 months increases, the Village Development Index also increases and vice versa. The research results are consistent with the hypothesis stating that the percentage of households that have accessed the internet in the last 3 months has a positive influence on the Village Development Index in Indonesia. The results of the research are supported by data from the Village Potential Statistics BPS (2024f) concerning villages/subdistrict that have internet signal strength. It indicates that in 2024, the majority of villages/subdistrict in Indonesia have 5G/4G/LTE signal strength, amounting to approximately 73,211 villages/subdistrict or equivalent to 90.21 percent of the rural population being able to access the internet. Furthermore, in terms of communication facilities, in 2024, around 29,950 villages/subdistrict or equivalent to 35.54 percent have internet cafes (warnet). When villages have good internet connectivity and internet cafes, it can support the improvement of access to information and knowledge for the rural community, accelerate digital government services at the village level, and create opportunities for digital economy such as village-based Micro, Small, and Medium Enterprises (MSMEs) that can utilize social media and online platforms.

Data BPS (2024b) indicates that the percentage of households that have accessed the internet in the last 3 months in the village classification of Bangka Belitung Province has increased by 12.37 percent from 78.62 in 2021 to 90.67 in 2023, representing a growth of approximately 15.33 percent over the past two years. This condition is in line with the change in the IDM status of Bangka Belitung Province as it has experienced an improvement; in 2021, the average IDM value was 0.7035 with the status of developing village, which increased to 0.7878 with the status of advanced village in 2023. Thus, a good internet access condition can support the improvement of IDM in a region.

A study conducted by Mashis et al. (2023) states that the lack of adequate network infrastructure or limited connectivity can be an obstacle to the use of digital technology. However, if a village

has adequate digital infrastructure, such as fast internet and the latest technology, the villagers can access digital services and harness the potential of information technology. One aspect of Digital Village emphasizes the comprehensive implementation of digital technology in villages (Yusuf et al. 2021). The concept of Digital Village places greater emphasis on digital transformation, which includes aspects such as empowering individuals with digital skills, obtaining widespread internet access, and utilizing technology to improve public services, local economies, and education (Pitrianti et al. 2023). The study conducted by Herman et al. (2022) states that settlement indicators have the lowest index value for elements related to access to information and communication facilities, due to weak internet networks and low internet access in villages, which can lead to low contribution values for each item to the social resilience composite index (IKS). In addition, improving the status of villages has a significant effect on reducing poverty rates (Sunaryono, 2021).

The Influence of Economic Aspects (Financial Services and Insurance, Road Infrastructure) on the Village Development Index in Indonesia

The Influence of Financial Services and Insurance on the Village Development Index

Referring to Table 2, it shows a probability value of 0.0058 < 0.05, indicates that financial and insurance services have a significant Influence on the Village Development Index. The $t_{statistic}$ value of 2.829676 and the t_{table} value of 1.9886 indicate that the $t_{statistic} > t_{table}$, then H_0 is denied and H_1 is approved, meaning that financial and insurance services have a significant positive effect on the Village Development Index. Therefore, it can be concluded that the financial and insurance services variable has a significant positive Influence on the Village Development Index in Indonesia from 2021 to 2023. The data proxy for the financial and insurance services variable is the regional gross domestic product based on constant prices according to the financial and insurance services sector, which means that when the regional gross domestic product based on constant prices according to the financial and insurance services sector increases, the Village Development Index also increases, and vice versa. The results of this study are in accordance with the hypothesis which states that the regional gross domestic product based on constant prices in the financial and insurance services sector has a positive influence on the Village Development Index in Indonesia.

The financial services and insurance sector reflects the level of economic activity and rural communities' access to financial services such as banks, cooperatives, credit facilities, as well as insurance companies and support companies. According to data from the Village Potential Statistics BPS (2024f), the structure of financial institutions in Indonesia in 2024 is dominated by microfinance institutions and government credit programs in support of financial inclusion for the community. By type of bank, Government Commercial Banks recorded the highest number with 8,345 villages/kelurahan, accounting for 9.90 percent of the total villages/kelurahan that have a bank. Meanwhile, in terms of cooperatives, Savings and Loans Cooperatives are the most dominant type, with a total of 16,080 villages/kelurahan, representing 19.08 percent of the total villages/kelurahan that have cooperatives. In terms of credit facilities, the People's Business Credit (KUR) has become the most accessed program by the community, with a total of 60,963 villages/subdistrict, equivalent to 72.34 percent of the total villages/subdistrict that can access credit facilities. This data indicates that community-based financial institutions and government-subsidized credit programs play an important role in supporting access to financing, particularly for small and medium enterprises in Indonesia. The availability of access to financial services for the community can accelerate the progress of village status.

In accordance with the data from BPS (2024c), indicates that the Gross Regional Domestic Product at Constant 2010 Prices in the financial services and insurance sector of Bali Province

increased by 1,406.8 billion rupiahs, from 6,244.5 in 2021 to 7,651.3 in 2023, reflecting a growth of approximately 22.53 percent over the past two years. This condition is supported by the Statistical Potential of Villages in Bali Province (BPS Bali, 2024) concerning the availability of economic facilities, such as around 2,177 bank units and 2,885 cooperative units. Additionally, villages/subdistrict can access financial institutions, with 68 percent being able to access People's Credit Banks (BPR); 68.50 percent able to access Savings and Loan Cooperatives; and 66.2 percent accessing Microcredit (KUR). Consequently, the availability of financial institutions can support the improvement of the IDM status of Bali Province from developed villages in 2021 to independent in 2023.

The community better understands the basics of financial management and the importance of financial literacy. This can reduce the community's dependence on consumptive loans and encourage them to prefer beneficial formal financial products. The community is also beginning to show better abilities in budgeting, setting up emergency funds, and choosing formal financial products that meet their needs (Sapthu et al. 2024). If financial services are provided effectively and utilized to the fullest by the Indonesian population, it will have a positive impact on enhancing the welfare of Indonesian society. The level of understanding of financial institution products as well as financial literacy levels can also influence savings and credit levels (Prasetyo et al. 2022). Furthermore, the low utilization of banking and non-banking financial institution services results in a lack of awareness about saving, failure to invest, falling victim to illegal loans, not having retirement savings, and possessing low assets (Budiman et al. 2023). A study conducted by Morgan & Long (2020) states that households can take advantage of everyday financial services provided by financial inclusion, such as saving, investing for the future, starting a business, and improving their standard of living. Rural communities can make better decisions about how to manage resources with a better understanding of financial management. A more educated community will be more likely to use formal financial services, which can increase financial inclusion. With better financial management, rural communities can also improve their standard of living through investment and business development (OJK, 2022).

The Influence of Road Infrastructure on the Village Development Index

Referring to Table 2, it shows a probability value of 0.0587 < 0.10, meaning that road infrastructure has a significant influence on the Village Development Index. The $t_{statistic}$ value of -1.916391 and the t_{table} value of 1.6632 indicate that the $t_{statistic} < t_{table}$, then H_0 is denied and H_1 is approved, meaning that road infrastructure has a significant negative effect on the Village Development Index. Therefore, it can be concluded that the road infrastructure variable has a significant negative effect on the Village Development Index in Indonesia from 2021 to 2023. The research data proxy for the road infrastructure variable is the total length of roads, meaning that when the total length of roads increases, the Village Development Index decreases, and vice versa. These research results do not align with the hypothesis which states that the total length of roads has a positive effect on the Village Development Index in Indonesia. The results of the research supported by data from the Land Transportation Statistics (BPS, 2024f) indicate that the total length of roads in good condition has increased while the length of damaged roads has decreased. However, the roads in moderate condition have declined, and the length of severely damaged roads has increased. In 2021, the length of roads in moderate condition was 139,174 kilometers, which decreased to 118,866 kilometers in 2023. This is consistent with the increase in the total length of severely damaged roads, which rose from 86,844 kilometers in 2021 to 115,930 kilometers in 2023, indicating that the increase in the length of roads has not been accompanied by an improvement in road quality.

Data from the Land Transportation Statistics (BPS, 2023b; 2024f) indicate that the total length of roads in the Province of Maluku has decreased by 902 kilometers from 10,266 in 2021 to 9,364 in 2023, representing a decline of approximately 8.79 percent over the past two years. The condition of district/city roads in the Province of Maluku is predominantly in severely damaged condition, accounting for about 45.24 percent, and damaged at 10.54 percent, with the remaining roads classified as in very good and good condition. Similarly, the condition of provincial roads in the Province of Maluku is mostly in severely damaged condition at around 42.53 percent, with damaged roads at 5.02 percent, while the rest are categorized as in very good and good condition. This situation contributes to the stagnation of the IDM status in the Province of Maluku, which remains in the developing village category and below the national average. Consequently, the increase in IDM correlates with a reduction in road length, highlighting the necessity for improvements in road quality.

The theory of rural development states that the utilization of the results of physical development in villages will enhance the lives of rural communities by constructing or improving road infrastructure. By building or upgrading road infrastructure, rural communities will have the capacity to use these roads for various purposes, such as mobility, marketing their agricultural products, and transporting their agricultural goods (Fajri, 2017). The condition of rural roads is crucial, particularly in terms of regional development and the safety of rural areas. Well-maintained roads not only facilitate transportation between regions but also ensure that nearby communities remain safe (Purnomo & Prisilia, 2025). In the economic aspect, regional openness and road quality can stimulate local economic growth. Furthermore, advancements in development across villages can enhance welfare and self-reliance in those regions (Anshar et al. 2024). Paved roads in rural areas can improve transportation services and lead to a significant reallocation of labor from the agricultural sector (Asher & Novosad, 2020). A study by Aggarwal (2021) states that road construction leads to an increase in antenatal visits and deliveries at health facilities, resulting in improved quality of medical services and higher vaccination coverage, with greater benefits for women in terms of access to better healthcare providers.

The Influence of Ecological Aspects (Air Quality, Disaster Risk) on the Village Development Index in Indonesia

The Influence of Air Quality on the Village Development Index

Referring to Table 2, it shows a probability value of 0.1068 > 0.10, indicates that air quality does not have a significant effect on the Village Development Index. The $t_{statistic}$ value of 1.630285 and t_{table} value of 1.6632 indicate that $t_{statistic} < t_{table}$, thus H_0 is approved and H_1 is denied, meaning that air quality does not have a significant influence on the Village Development Index. Therefore, it can be concluded that the air quality variable does not significant influence on the Village Development Index in Indonesia from 2021 to 2023. The proxy data used is the air quality index value, which indicates that when air quality improves, the Village Development Index improves and vice versa. The research results do not align with the hypothesis that suggests that air quality index has a positive effect on the Village Development Index in Indonesia.

The research findings, supported by the Statistical Data on Village Potential BPS (2024f), indicate that the sources of air pollution are predominantly due to the presence of factories/industries/businesses in approximately 2,850 villages/subdistrict, accounting for around 59.95 percent of the total number of villages/subdistrict experiencing air pollution. The Environmental Quality Statistics BPS (2024e) reveal that the air quality index values in the provinces of Banten, Riau Islands, Bali, and Bangka Belitung have decreased over the past two years. However, the status of the IDM in these provinces has improved, with differences in IDM

statuses: Banten Province is classified as developing, while Riau Islands and Bangka Belitung Provinces are classified as advanced, and Bali Province is classified as independent. This indicates that changes in the air quality index do not significantly affect the IDM status. A study by Subekti & Ulfah, (2022) examines environmental quality aspects related to the improvement of air quality, the reduction of air pollution, disaster risk management, environmental sustainability, and climate issue indicators. In the long term, development that does not consider environmental factors will increase carbon emissions, which in turn will lead to a decline in air quality and climate change.

The study by Nasar et al. (2025) states that pollutant concentrations in urban areas are much higher than in rural areas. High levels of urban air pollution are caused by emissions from industrial activities, vehicles, and agriculture, as well as urban heating due to urbanization, land use, and local climate change. A study by Rizi et al. (2019) states that rural areas have many trees, unlike urban areas which are dominated by vehicles, buildings, and so on, so that the air in urban areas tends to be dirtier than the air in rural areas because trees convert carbon dioxide into oxygen. In addition, villages generally have low industrial activity, limited use of motor vehicles, and lower levels of urbanization than cities. Therefore, air quality in villages is relatively stable and good, resulting in little variability between villages. This condition means that the effect of air quality on village development is not statistically significant.

Studies by Bretzel et al. (2016) and Darmawan et al. (2021) indicate that environmental greening has numerous benefits, including reducing air pollution, enhancing environmental aesthetics, improving soil quality, and providing habitats for biodiversity. One of the functions of the availability of Green Open Spaces (RTH) is to act as the lungs of the city, assisting in the reduction of air pollution levels and offering health benefits; the presence of RTH in urban areas is crucial for improving the quality of life for the community. Green spaces enable residents to enjoy fresher air, as they provide children and families with areas to play and interact with one another Fitaloka et al. (2023). With the increased appeal of parks, it is likely that there will be a rise in the number of visits from both out-of-town visitors and local residents. This can provide residents with opportunities to increase their income by establishing small businesses, such as shops or stalls (Putri et al. 2024). Furthermore, the indicators of underdeveloped villages can be seen from the still low index values, and by understanding the management strategies of this index, it is possible to realize a developing village. In hilly areas, the environmental quality remains pristine, with no pollution of water, soil, air, or river waste; the score is 5, indicating that achieving a high score can lead to the realization of a developing village (Muharam & Haviz, 2022).

The Influence of Disaster Risk on the Village Development Index

Referring to Table 2, it shows that the probability value of 0.0000 < 0.01 indicates that disaster risk has a significant influence on the Village Development Index. The $t_{statistic}$ value of -5.307784 and the t_{table} value of 2.6356 indicate that the $t_{statistic} < t_{table}$, then H_0 is denied and H_1 is approved, meaning that disaster risk has a significant negative effect on the Village Development Index. Therefore, it can be concluded that disaster risk has a significant negative effect on the Village Development Index in Indonesia from 2021 to 2023. The proxy data used for the disaster risk variable is the disaster risk index, meaning that when disaster risk increases, the Village Development Index decreases, and vice versa. The results of this study are consistent with the hypothesis which states that the disaster risk index negatively affects the Village Development Index in Indonesia. The research findings are supported by data from the Statistical Potential of Villages BPS (2024f) which indicates that approximately 73.93 percent of the total villages/subdistrict in Indonesia have implemented disaster anticipation/mitigation efforts. The

data shows that around 30,789 villages/subdistrict, equivalent to 49.41 percent, have engaged in activities such as the creation, maintenance, or normalization of disaster control infrastructures such as rivers, canals, embankments, and similar structures. Additionally, other villages/subdistrict have implemented disaster anticipation/mitigation efforts such as safety equipment, early warning systems for natural disasters, signage, and evacuation routes. This indicates that, although the majority of villages have established basic disaster mitigation infrastructure, strengthening early warning systems and evacuation facilities is still necessary, especially in areas with high-risk potential, such as coastal regions vulnerable to tsunamis. Furthermore, the existence of disaster anticipation or mitigation efforts has resulted in a reduction in the percentage of villages or subdistrict experiencing natural disasters, from 37.37 percent in 2020-2021 to 35.02 percent in 2023-2024. This signifies that strengthening disaster mitigation has a significant impact on lowering the level of disaster risk. This illustrates that the mitigation strategies undertaken by villages, such as construction, maintenance, or normalization of rivers, canals, levees, and others; safety equipment; early warning systems for natural disasters; evacuation signs and routes; as well as tsunami early warning systems have made a tangible contribution to reducing vulnerability to disasters at the local level.

The Statistical Data on Village Potensial BPS (2024f) indicates that Central Java Province is the province with the highest number of villages/subdistrict implementing disaster preparedness/mitigation efforts, with approximately 2,773 villages/subdistrict applying early warning systems for natural disasters, 79 villages/subdistrict implementing tsunami early warning systems, 1,880 villages/subdistrict establishing evacuation signs and routes, and 5,069 villages/subdistrict engaged in the construction, maintenance, or normalization of rivers, canals, dikes, and similar structures. Effective disaster mitigation policies align with a decrease in disaster risk index in the region, as indicated by Central Java Province, where the disaster risk index value decreased by 16.72 from 125.73 in 2021 to 109.01 in 2023, representing a reduction of approximately 13.30 percent over the past two years. The good disaster mitigation conditions and the reduction of disaster risk in Central Java Province indicate that the region also has a better IDM, which was classified as developing in 2021 and is set to advance to a more developed status in 2023.

A study by Rasadi et al. (2021) states that disaster mitigation efforts or disaster risk reduction efforts need to be integrated with disaster risk reduction efforts into sustainable development and the integration of disaster risk reduction into village program and activity planning. In other words, disaster risk analysis must be one of the bases for sustainable development planning. The development of facilities and infrastructure for disaster management is also a priority in village development. However, the planning of village infrastructure development that has been carried out has not taken into account the aspect of disaster management. Poor villages have underdeveloped industrial economies, complex natural environmental characteristics, underdeveloped infrastructure, a lack of public welfare facilities, low levels of education, and frequent natural disasters. The spatial overlap between disaster-prone areas and poor areas has become a highly vulnerable area in China's social ecosystem, facing the dual challenges of disaster prevention and reduction as well as poverty alleviation and development. Based on the perspective of resilience theory, by building a disaster resilience system in poor villages, conducting a comprehensive evaluation of the resilience of poor village communities, and adjusting the planning concept for post-disaster recovery and reconstruction in poor villages, it is necessary to promote the transformation of post-disaster recovery and reconstruction in poor villages (Zhang, 2021).

The existence of villages in hilly areas certainly carries a high risk, such as natural disasters like floods, landslides, and wildfires. The achievement value of the disaster vulnerability indicators and actions towards potential natural disasters received a score of 0, due to the absence of disaster response facilities (Muharam & Haviz, 2022). The level of disaster vulnerability is determined by the frequency of disasters such as floods, landslides, and fires (drought) occurring within a year. On the other hand, the presence or absence of early warning systems, evacuation routes, and disaster mitigation procedures contributes to the level of disaster response. Furthermore, the environmental resilience index is based on the likelihood of disasters that may occur in the village. Therefore, village preparedness programs to face disasters are necessary (Bachruddin & Darma, 2020).

CONCLUSION

Conclusion

Based on the results of data analysis and discussion regarding the Influence of Social, Economic, and Ecological Aspects on Village Development, it can be concluded that: 1) The social aspect, namely education, access to sanitation, and internet access, has a significantly positive effect on the Village Development Index, while health does not affect the Village Development Index in Indonesia; 2) The economic aspect, namely financial services and insurance, has a significant positive impact on the Village Development Index, while road infrastructure has a significant negative impact on the Village Development Index in Indonesia; and 3) The ecological aspect, namely air quality, does not affect the Village Development Index, while disaster risk has a significant negative impact on the Village Development Index in Indonesia.

Limitation

The limitations of this research are that it does not take into account the regional expansion policies of 3 new provinces, namely South Papua, Central Papua, and the Papua Mountains, as well as the province of West Papua, which has also undergone regional expansion resulting in 1 new province, namely Southwest Papua. Therefore, during the year of the study, due to regional expansion, the available data is not yet complete.

Suggestion

Based on the research findings, the implications of this study are as follows: 1) both local and central governments need to promote increased access to secondary education in rural areas, particularly in regions with low IDM; 2) local governments or villages need to ensure the development and maintenance of sanitation facilities such as healthy latrines and adequate drainage systems, especially in rural areas; 3) local governments need to expand internet access to remote villages to enhance access to information for rural communities regarding developments in other regions, furthermore, to encourage villages to implement digital information systems for administrative, financial services and management of village potential as part of a move towards green services that support the SDGs for villages 4) Local governments are encouraged to open banking service units/microfinance institutions in villages, such as BUMDesa Mitra Bank, savings and loan cooperatives, and bank agents to enhance financial literacy among rural communities; 5) Local governments need to improve and upgrade road quality to facilitate transportation access between areas to make the distribution of goods, services, and labor easier and more affordable; and 6) Local governments need to enhance disaster preparedness or mitigation efforts by increasing awareness about disaster response among communities in disaster-prone areas and utilizing information technology to address disaster conditions more promptly.

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