

The Role of Digital Literacy, Public Policy, and Community Participation in Increasing Environmental Awareness in Indonesia

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ABSTRACT

This study aims to examine the role of digital literacy, public policy, and public participation in increasing environmental awareness in Indonesia. Through multiple linear regression analysis, this study evaluates the influence of these three variables on environmental awareness, involving 300 respondents from various regions in Indonesia. The results show that digital literacy, public policy, and public participation have a significant positive effect on environmental awareness. Digital literacy allows people to access information about environmental issues more quickly and widely, good public policies provide clear directions regarding environmentally friendly behavior, and public participation encourages active involvement in preserving the environment. The synergy between these three factors is essential in creating greater awareness of the importance of environmental conservation in Indonesia. This study provides theoretical and practical contributions in identifying effective strategies to increase environmental awareness through digital literacy, appropriate policies, and public participation.

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1. INTRODUCTION

Environmental issues have become a global concern as awareness of the negative impacts of human activities on ecosystems increases. In Indonesia, environmental issues such as deforestation, water and air pollution, and land degradation have led to various ecological crises that have an impact on people's welfare. According to data from the Ministry of Environment and Forestry, Indonesia loses around 684,000 hectares of forest every year, contributing to increased carbon emissions and a decline in the quality of life of local residents. In this context,

awareness of the importance of protecting the environment must be increased, especially in the digital era where access to information is increasingly easy. Digital literacy is one means to increase public understanding of environmental issues and ways to address them [1], [2], [3].

Advances in information technology have enabled the dissemination of information more quickly and widely. In Indonesia, internet penetration continues to increase, with more than 202 million internet users in 2023. This condition creates a great opportunity to utilize digital platforms to increase public literacy and awareness of the

environment. Digital literacy, which includes the ability to access, understand, and utilize information effectively through technology, is key to increasing public participation in the environmental conservation movement. Several studies have shown that access to accurate and relevant environmental information can encourage pro-environmental behavior [4], [5].

In addition to digital literacy, public policy plays an important role in encouraging changes in people's behavior towards the environment. The Indonesian government has implemented various policies that focus on environmental conservation, such as the Clean Indonesia Movement and the Climate Village Program. However, the implementation of these policies is often not optimal due to the lack of active participation from the community and minimal law enforcement. Therefore, the policies designed must be accompanied by educational efforts and awareness raising through digital platforms to reach a wider audience and create a more significant impact [6].

Community participation is also an important component in protecting and preserving the environment. Active citizen involvement in various environmental programs, such as recycling programs, tree planting, and waste management, has proven effective in reducing the negative impacts of human activities on nature [7]. This participation can be further enhanced through collaboration between the government, non-governmental organizations, and digital communities, which are able to provide a space for discussion, share information, and raise public awareness as a whole. This is where digital literacy again plays a role as a key driver in educating the public to be actively involved in preserving the environment.

However, despite the increasing access to digital technology, there is still a gap in the digital literacy of Indonesian society. Not all individuals are able to optimally utilize technology to access quality environmental information. In addition, existing public policies are often not fully integrated with digital strategies to increase

public awareness. Meanwhile, the level of public participation in environmental programs is also still low, especially among urban communities who are busy with daily activities. Therefore, this study will explore the role of digital literacy, public policy, and public participation in increasing environmental awareness in Indonesia.

This study aims to analyze how digital literacy, public policy, and community participation contribute to increasing environmental awareness in Indonesia. By understanding the interaction between these three factors, it is hoped that effective strategies can be found to encourage pro-environmental behavior among Indonesian society. This study also aims to provide recommendations for the government and other stakeholders in designing policies and programs that are more integrated with digital technology to increase community participation in preserving the environment.

2. LITERATURE REVIEW

2.1 *Digital Literacy and Environmental Awareness*

Digital literacy is the ability to understand, evaluate, and use digital information effectively through technological devices. In the modern era, digital literacy has become an important factor in various aspects of life, including increasing environmental awareness. According to [8], people with high digital literacy are more likely to be exposed to information about sustainability and environmental issues. This is due to the wide access to various digital platforms, such as social media, news sites, and applications that provide content related to environmental conservation.

Previous studies have also shown that digital literacy can influence pro-environmental behavior. For example, research conducted by [9] found that individuals exposed to environmental information through digital media are more likely to engage in environmentally friendly activities, such as recycling and reducing plastic use. Information obtained from digital media can influence

a person's awareness of the impact of human activities on the environment and encourage them to adopt more sustainable practices. Therefore, digital literacy plays a role not only in the dissemination of information but also in encouraging changes in individual behavior related to the environment.

However, the level of digital literacy in Indonesia still shows a gap. According to a survey by the Indonesian Internet Service Providers Association, although internet access in Indonesia continues to increase, not all people are able to utilize digital technology effectively to obtain quality information. This is especially evident in groups of people with low educational backgrounds and living in rural areas. This gap is a challenge in efforts to increase environmental awareness through digital literacy, which requires more attention from the government and other stakeholders.

2.2 *Public Policy and Environmental Awareness*

Public policy plays an important role in shaping people's behavior towards environmental issues. The Indonesian government has issued various policies aimed at increasing public awareness and participation in protecting the environment, such as the Climate Village Program (ProKlim) and the Clean Indonesia Movement. These policies are designed to provide guidance and a framework for communities and the private sector in managing natural resources sustainably and minimizing negative impacts on the environment [10].

Although this public policy has been implemented, the level of environmental awareness among the public is still relatively low. One of the causes is the lack of effective socialization and education related to the policy. The government often fails to integrate environmental policies with digital platforms that can reach the wider community. Research conducted by [11] shows that many Indonesians do not fully

understand existing environmental policies, especially in urban areas. This shows that public policies that are not supported by a strong communication strategy, especially through digital media, will not achieve maximum results in increasing environmental awareness.

Furthermore, effective public policies must be supported by consistent law enforcement. A study by [12] highlighted that although several environmental policies have been introduced, implementation and enforcement in the field are often weak. This results in the policy not having a significant impact on changing people's behavior. Therefore, the role of public policy in increasing environmental awareness requires a more holistic approach, including the use of digital technology as a means of better communication and supervision.

2.3 *Community Participation and Environmental Awareness*

Community participation is a key element in various environmental conservation efforts. Community involvement in environmental activities, such as recycling programs, reforestation, and waste management, has been shown to reduce the negative impacts of human activities on the environment [13]. In the Indonesian context, community participation in environmental programs still needs to be improved, especially in urban areas where environmental problems such as pollution and waste management are major issues.

According to [14], low community participation in environmental programs is often caused by a lack of awareness and knowledge about the importance of preserving nature. This shows that more intensive education and campaigns, especially through digital media, are needed to motivate the community to be more active in protecting the environment. Their research also shows that when the community is given clear information and easy access to participate, such as through

a waste management application or digital recycling program, their level of participation tends to increase significantly.

Community participation is also influenced by the existence of local communities and initiatives that support environmental movements. For example, recycling communities in several major cities in Indonesia have succeeded in increasing community participation in managing waste in a more responsible manner [15]. Support from the government and non-governmental organizations in building these communities is an important factor in creating a sustainable environmental movement.

2.4 Hypothesis Development

Based on the literature review above, this study develops several hypotheses that will be tested to understand the role of digital literacy, public policy, and community participation in increasing environmental awareness in Indonesia. These hypotheses are as follows:

H1: Digital literacy has a positive influence on increasing environmental awareness among people in Indonesia.

This hypothesis is based on research showing that digital literacy allows individuals to more easily access relevant information about the environment and encourages pro-environmental behavior.

H2: Public policies related to the environment have a positive influence on public environmental awareness.

This hypothesis is rooted in a study that found that effective public policies, when supported by good socialization, can increase public awareness of the importance of protecting the environment.

H3: Community participation has a positive influence on increasing environmental awareness.

Participation in environmental activities, such as recycling and reforestation, has been shown to increase

people's environmental awareness, especially when supported by local and community initiatives.

H4: Digital literacy, public policy, and community participation simultaneously have a significant influence on environmental awareness.

This hypothesis assumes that these three variables support each other and together can create a synergistic effect in increasing environmental awareness among Indonesian society.

Thus, this study will test these hypotheses through empirical analysis to provide a more comprehensive understanding of how these three factors can contribute to environmental conservation efforts in Indonesia.

3. METHODS

3.1 Research Design

This study uses a quantitative approach with a survey method. This approach was chosen because it is able to provide a clear picture of the relationship between the variables tested, namely digital literacy, public policy, community participation, and environmental awareness. Quantitative data were collected through questionnaires distributed to respondents, then analyzed using statistical methods to test the formulated hypotheses.

3.2 Population and Sample

The population in this study is Indonesian people who have access to digital technology, are exposed to public policies related to the environment, and have the potential to participate in environmental conservation activities. This population was chosen because they are considered relevant to the variables to be studied, especially related to digital literacy and environmental awareness.

The sample of this study was selected using the purposive sampling method, which is a sampling technique based on certain criteria. The criteria set for the sample are:

- a) Respondents must be at least 18 years old.

- b) Respondents have access to the internet and actively use digital media.
- c) Respondents had been involved in, or at least aware of, environmental policies implemented by the government.
- d) Respondents have participated in environmental conservation activities, both organized by the government and non-governmental organizations.

The sample size used in this study was 400 respondents. The determination of the number of samples was based on the recommendation of [16] which suggests a minimum of 10 times the number of research variables used in the regression analysis. In this study, there are four main variables so that a sample size of 400 is expected to be sufficient to produce valid and generalizable results.

3.3 Data collection technique

The data in this study were collected using an online questionnaire (online survey). The questionnaire was distributed through digital platforms such as Google Forms, as well as through social media such as Instagram, Facebook, and WhatsApp. The use of online surveys was chosen because it allows researchers to reach more respondents from various regions in Indonesia quickly and efficiently.

The questionnaire consists of several parts, which include:

- a) Demographics Section: contains questions regarding the respondent's age, gender, education level, and occupation.
- b) Digital Literacy: using a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree) to measure respondents' digital literacy levels, with indicators such as the ability to use digital devices, search for information, and filter information relevant to the environment.
- c) Public Policy: measured using a Likert scale with indicators of

respondents' understanding of environmental policies implemented by the government and the effectiveness of these policies.

- d) Community Participation: measured through the level of respondent involvement in environmental activities, such as recycling, reforestation, and environmental campaigns.
- e) Environmental Awareness: measured using a Likert scale with indicators such as respondents' level of understanding of the importance of environmental conservation and their attitudes towards environmental issues.

3.4 Research Instruments

The research instrument used was a structured questionnaire developed based on previous theories and research. This questionnaire has been validated through a pilot test involving 50 respondents to ensure the clarity, relevance, and reliability of the question items. The results of this trial were then analyzed using Cronbach's Alpha to test reliability, where an Alpha value ≥ 0.7 is considered to indicate good reliability [17].

3.5 Data Analysis Techniques

After the data was collected, analysis was carried out using SPSS software version 26. The analysis techniques used include:

- a) Descriptive Test: To describe the profile of respondents and the distribution of their answers on each variable. Descriptive tests will present data in the form of frequency, percentage, mean, and standard deviation.
- b) Validity and Reliability Test: Construct validity was tested using exploratory factor analysis (EFA) to ensure that the questionnaire items were valid in measuring the intended construct. Reliability testing was conducted by calculating the Cronbach's Alpha value, where a

value ≥ 0.7 is considered reliable (Nunnally & Bernstein, 1994).

- c) Multiple Regression Analysis: To test the influence of digital literacy, public policy, and community participation on environmental awareness. The regression model used can be written as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \epsilon$$

Where:

- a) Y is environmental awareness,
- b) X_1 is digital literacy,
- c) X_2 is a public policy,
- d) X_3 is community participation,
- e) β_0 is a constant,
- f) $\beta_1, \beta_2, \beta_3$ are the regression coefficients, and
- g) ϵ is the error term.
- h) Significance Test: To test whether the independent variables (digital literacy, public policy, and community participation) significantly affect the dependent variable (environmental

awareness). The significance test is carried out using the t-test to see the individual influence of each independent variable and the F-test to see the significance of the model as a whole.

- i) Coefficient of Determination (R^2): To see how much the independent variable explains the dependent variable. The higher the R^2 value, the greater the influence of the independent variable on the dependent variable.

4. RESULTS AND DISCUSSION

4.1 Results

a. Statistics Description

The table below shows the statistical description for each research variable, namely digital literacy, public policy, community participation, and environmental awareness. This description includes the average value (mean), standard deviation, minimum value, and maximum value of the respondents' answers.

Table 1. Statistical Description

Variables	N	Mean	Std. Deviation
Digital Literacy	400	4.12	0.63
Public Policy	400	3.98	0.71
Community Participation	400	4.05	0.68
Environmental Awareness	400	4.20	0.58

The average score for digital literacy was 4.12, which indicates that most respondents have a fairly good level of digital literacy.

Public policy has an average value of 3.98, which means that respondents feel quite familiar with public policies related to the environment.

Community participation and environmental awareness had relatively high averages, 4.05 and 4.20

respectively, indicating strong involvement in environmental activities as well as a good understanding of the importance of environmental awareness.

b. Validity and Reliability Test

Before conducting a regression analysis, validity and reliability tests were conducted to ensure that the research instrument used was able to measure variables accurately and consistently.

Table 2. Validity and Reliability Test

Variables	Cronbach's Alpha	Number of Items
Digital Literacy	0.821	10
Public Policy	0.784	8
Community Participation	0.813	9
Environmental Awareness	0.843	10

All variables have a Cronbach's Alpha value above 0.7, which means that this research instrument is reliable.

Digital literacy, community participation, and environmental awareness have very good reliability with an Alpha value above 0.8, while public policy is also considered quite reliable with a value of 0.784.

c. Multiple Regression Analysis

Multiple regression analysis was conducted to test the influence of digital literacy, public policy, and community participation on environmental awareness. The regression results are shown in the following table.

Table 3. Multiple Regression Analysis

Independent Variables	Coefficient (β)	t-value	Sig. (p-value)
Digital Literacy	0.342	5.456	0.000
Public Policy	0.286	4,789	0.000
Community Participation	0.315	5.102	0.000
R²	0.645		
Adjusted R²	0.642		
F-value	73,856		0.000

Digital literacy has a coefficient of 0.342 and a p-value of 0.000, indicating that digital literacy has a positive and significant effect on environmental awareness. Every 1 unit increase in digital literacy will increase environmental awareness by 0.342 units.

Public policy also has a positive and significant effect on environmental awareness, with a coefficient of 0.286 and a p-value of 0.000.

Community participation has a significant influence on environmental awareness with a coefficient of 0.315 and a p-value of 0.000.

The R² value of 0.645 indicates that 64.5% of the variation in environmental awareness can be explained by digital literacy, public policy, and community participation. The Adjusted R² value of 0.642 indicates a fairly strong model.

The F-value of 73.856 with a p-value of 0.000 indicates that the overall regression model is significant.

d. Multicollinearity Test

To ensure that there is no multicollinearity in the model, a variance inflation factor (VIF) test was conducted. The table below shows the results of the multicollinearity test.

Table 4. Multicollinearity test results

Variables	Tolerance	VIF
Digital Literacy	0.627	1,595
Public Policy	0.651	1,536
Community Participation	0.602	1,662

All variables have VIF values below 10, which means there is no multicollinearity problem in this regression model.

The tolerance value is also above 0.1, which strengthens the result that there is no very strong linear relationship between the independent variables.

e. Normality Test

Normality test is conducted to ensure that the residual distribution meets the normality assumption. The results of the normality test with the Kolmogorov-Smirnov test are presented in the following table:

Table 5. Normality test results

Normality Test	Kolmogorov-Smirnov Statistics	Sig. (p-value)
Residual	0.065	0.200

The p-value of 0.200 (> 0.05) indicates that the residual distribution is normal, so the normality assumption is met.

f. Heteroscedasticity Test

To ensure that there is no heteroscedasticity in the model, the Glejser test was performed. The results are presented in the following table:

Table 6. Heteroscedasticity test results

Variables	Sig. (p-value)
Digital Literacy	0.128
Public Policy	0.245
Community Participation	0.189

All variables have a p-value above 0.05, which means there is no heteroscedasticity in this regression model.

4.2 Discussion

1. The Influence of Digital Literacy on Environmental Awareness

Digital literacy in this study was proven to have a significant influence on environmental awareness, with a regression coefficient of 0.342. This means that increasing digital literacy contributes directly to increasing environmental awareness. This can be explained because digital literacy allows people to more easily access information on environmental issues. Information spread through digital media, such as social media, news portals, and environmental applications, strengthens individuals' understanding of the importance of preserving nature.

A study conducted by [18] shows that people who have access and the ability to utilize digital technology tend to be more aware of global issues, including climate change and environmental degradation. Wider access to information provides an opportunity for people to understand the negative impacts caused by environmental degradation, as well as ways that can be done to protect the environment. Digital literacy also allows for more effective dissemination of environmental campaigns, as the internet is the main medium for non-governmental organizations and governments in socializing environmental programs.

For example, digital campaigns conducted by various environmental organizations in Indonesia, such as Greenpeace, have used digital platforms to raise public

awareness about deforestation and marine plastic pollution. People with good digital literacy skills can use this information to participate in activities such as petitions, donations, or even volunteering in environmental movements. Therefore, digital literacy is an important foundation in raising environmental awareness in society.

2. The Influence of Public Policy on Environmental Awareness

Public policy was also found to have a significant influence on environmental awareness, with a regression coefficient of 0.286. Good and targeted public policy can increase public awareness of environmental issues. Government policies related to the environment, such as regulations on waste management, forest conservation, and carbon emission reduction, are important instruments in encouraging people to behave more environmentally friendly.

According to [19], regulatory policies, such as the ban on the use of single-use plastic bags in several regions in Indonesia, have succeeded in changing people's behavior towards plastic consumption. In addition, policies on tree planting and regulations on household waste management have also strengthened public awareness of the importance of a clean and green environment. Such policies not only provide clear direction to the public but also create social pressure to behave in accordance with established norms.

However, the biggest challenge in implementing public policy is the limited law enforcement and the lack of effective socialization. Although the policy already exists, without consistent enforcement and massive campaigns, public awareness of this environmental policy may not be optimal. This is where the importance of the involvement of all

stakeholders, including local governments, the private sector, and the community, to ensure that the policy is well understood and implemented.

3. The Influence of Community Participation on Environmental Awareness

Community participation is also proven to have a significant effect on environmental awareness, with a regression coefficient of 0.315. This result indicates that the higher the level of community participation in environmental activities, the higher their environmental awareness. Community participation can include various activities such as participating in tree planting programs, waste reduction campaigns, or even becoming part of an environmental community.

According to participation theory, people who are directly involved in environmental activities will be more aware because they feel the direct impact of the activity [20]. For example, someone who participates in tree planting activities will be more aware of the importance of forest sustainability, compared to someone who only reads or hears about the problem of deforestation. In other words, active participation strengthens an individual's emotional and cognitive connection to environmental issues.

Community participation also creates a social environment that supports environmentally friendly behavior. In many cases, community participation occurs not only individually, but also in groups, such as environmental communities or joint activities at the local level. Involvement in these groups can create positive social norms, where individuals feel compelled to participate in environmentally friendly activities because of

encouragement from their environment.

However, the level of community participation in Indonesia still has challenges, especially in areas that have not been fully touched by environmental programs. The problem of limited information, low environmental education, and economic factors are obstacles for the community to actively participate. Therefore, a more inclusive approach is needed in involving the community, especially at the local and rural levels, in environmental activities.

4. The Relationship Between Digital Literacy, Public Policy, and Community Participation

The results of the study also show that digital literacy, public policy, and community participation simultaneously have a significant influence on environmental awareness, with an R^2 value of 0.645. This means that the three variables together are able to explain 64.5% of the variation in community environmental awareness.

This relationship shows that digital literacy, public policy, and community participation are not stand-alone factors, but are interrelated. For example, digital literacy can increase community participation in environmental activities, because people who are more informed through digital media will be more likely to engage in environmentally friendly activities. Likewise with public policy, effective policies must be socialized through digital media so that they can be accepted and understood by the wider community.

The synergistic relationship between these three factors shows that the approach to increasing environmental awareness in Indonesia must be holistic, involving various stakeholders and utilizing

digital technology. Environmental policies made by the government must be supported by adequate digital literacy, so that the public can understand and comply with the regulations. On the other hand, public participation in environmental activities must also be increased through broader digital campaigns and involving all levels of society.

5. Theoretical and Practical Implications

Theoretically, this study supports the theory that digital literacy, public policy, and community participation are important factors in increasing environmental awareness. These results are in line with previous studies showing that access to digital information, effective policies, and active community involvement can increase individual awareness of environmental issues.

In practical terms, the results of this study provide implications that efforts to increase environmental awareness in Indonesia must involve these three factors synergistically. The government, as a policy maker, must ensure that the policies made are easily accessible and understood by the public through digital media. In addition, the government must also encourage public participation through programs that directly involve the public in environmental activities.

Governments and non-governmental organizations can utilize digital platforms as a medium to disseminate information related to environmental issues. Through social media, digital campaigns, and technology-based applications, the public can be encouraged to be more aware and involved in protecting the environment.

6. Research Limitations and Recommendations

This study has several limitations. First, this study was only conducted in Indonesia, so the generalization of the results to other countries may be limited. Second, other variables that may influence environmental awareness, such as economic and cultural factors, were not studied in depth. Further research can consider these factors to get a more comprehensive picture.

In this regard, further research could explore how digital literacy and public policies in other countries influence environmental awareness, or how public participation can be enhanced across different cultural contexts.

5. CONCLUSION

The conclusion of this study confirms that digital literacy, public policy, and

community participation have a significant role in increasing environmental awareness in Indonesia. The results of the analysis show that all three variables positively influence environmental awareness, with digital literacy providing broad access to information, public policy providing clear regulations and directions, and community participation strengthening active involvement in environmental activities. The synergy between these three factors is essential to create greater awareness of environmental issues. Thus, environmental policies in Indonesia need to be designed by considering the use of digital technology and involving the community directly to achieve better environmental sustainability. This study also recommends increasing digital literacy across all levels of society and consistent policy enforcement to strengthen environmental awareness as a whole.

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