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# Factors affecting pro-environmental behaviour of Indonesian university students

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**ABSTRACT**
Environmental damage is a negative effect of human activities. The young generation is saddled with the burden of environmental damage left by the previous generations and must take on a role as an agent of change in improving the environment. This study analyses the pro-environmental behaviour of Indonesian students, the factors affecting such behaviour, and efforts to improve those behaviours. This research uses a quantitative approach with survey methods. Four hundred seventy (470) students in the department of geography and department of geography education from various public and private universities in Indonesia have participated as research respondents. The research instrument used was a questionnaire employing the Likert scale. The research variables were environmental knowledge (X1), environmental responsibility (X2), value–belief–norm (X3), environmental education (X4), and pro-environmental behaviour (Y). Data were analysed using path analysis through partial least squares structural equation modelling (PLS-SEM) software version 3. Findings revealed high levels of pro-environmental behaviour, affected by environmental knowledge, environmental responsibility, value-belief-norm, and environmental education having convincing positive effects on forming environmental behaviour.

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## Introduction

Environmental damage has been the topic of many discussions by governments, researchers, and local and international organisations. Their concerns have mostly been waste, pollution, deforestation, extreme climate change, global warming, ozone depletion, the greenhouse effect, and acid rain. Human behaviour dramatically impacts the environment (Gifford & Nilsson, 2014; Steg &

Vlek, 2009). Most environmental damage happens due to human activities; the damage will affect our ecosystem now and in the future.

Awareness of environmental problems and efforts to preserve the environment are indispensable to prevent further damage to our only planetary home; this can be done through inculcating pro-environmental behaviour. Pro-environmental behaviour refers to conscious efforts to minimise the negative impact of human activities on the environment (Kollmuss & Agyeman, 2002). Pro-environmental behaviour can also be defined as actual or perceptual actions contributing to environmental conservation (Kurisu, 2015). The United Nations Commission on Sustainable Development (UN CSD) International Work Programme defines pro-environmental behaviour as the use of products and services to fulfil primary needs and bring about a better quality of life while minimising the use of natural resources and reducing hazardous materials, waste, emission, and other pollutants (Jensen, 2002; Steg & Vlek, 2009).

Education is essential in raising awareness of environmental behaviour (Zilahy & Huisingh, 2009; Zsóka et al., 2013). Previous studies suggest that people with higher educational levels tend to care more about the quality of the environment and are motivated to be directly involved in environmental preservation due to their greater awareness of damage potential (Lozano & Vallés, 2007; Ramos et al., 2015). Universities play a crucial role in directing students to develop environmental awareness in both the social and physical environments (Meyer, 2016).

University students are intelligent young people who will become the nation's next intelligentsia—they must accordingly exhibit pro-environmental behaviour. Universities in Indonesia assist students in improving their pro-environmental behaviour through a course named *Pendidikan Lingkungan Hidup* (Environmental Education). The course is also provided to students majoring in Geography Education. The course teaches students the importance of the environment, environmental issues, and tangible actions to preserve the environment. Integrating this course into the curriculum will likely increase pro-environmental behaviour. Even though the effect of knowledge has not been ascertained precisely, some studies show that learning plays a crucial role in increasing pro-environmental behaviour; it also helps individuals to have alternative perspectives through the formation of arguments to support their beliefs and behaviour (Larson et al., 2015).

This aligns with the role of universities as effective agents of change. A study by mentions that specific policies, programmes and courses on the environment can affect student conceptions related to the environment because the students have more knowledge and skills for environmental preservation (Jurdi-Hage et al., 2019; Meyer, 2016). The research question in this research is: What factors affecting the pro-environmental behaviour of Indonesian University Students. The present study aims to analyse the pro-environmental behaviour of Indonesian students, the factors affecting such behaviour, and the efforts to improve those behaviours.

## Literature Review

Pro-environmental behaviour can be construed as actions that show concern for the environment in everyday life. The activities can be repetitive or just occasional. The measures deal with preserving natural resources and the environment, such as preserving specific natural resources (water, soil and air), reducing energy consumption (electricity, oil and gas), recycling (recycling paper, plastics, and others), and preserving life (animals and plants) (Erdogan & Ozsoy, 2007). Pro-environmental behaviour also refers to any actions to minimise environmental damage or to improve the environment (Scannell & Gifford, 2010). Pro-environmental behaviour includes recycling, which means reusing or remanufacturing what has been used.

### *Environmental Knowledge*

Environmental knowledge means knowledge and awareness of environmental problems and their solutions. The most crucial thing in any individual's environmental awareness is environmental

knowledge, values, willingness to act, and actual behaviour that is influenced by several factors, including elements of intention and situation (Jensen, 2002; Latif et al., 2013).

Environmental knowledge is a process of acquiring values and concepts and developing skills. It is a necessary medium to understand and appreciate the interaction between humans and their culture and the physical environment (Latif et al., 2013; Zareie & Navimipour, 2016). Awareness of the environment is needed to recognise environmental problems and issues. Environmental knowledge can be held formally or informally by families, communities, governments and schools (P. Liu et al., 2020).

Knowledge can influence students' attitudes and behaviour toward the environment. Students with high environmental knowledge will be aware of the need to preserve their environment. According to (Otto & Pensini P, 2017) students' awareness of the environment will shape responsible environmental attitudes and behaviours. Based on the results of research by (Janmaimool & Khajohnmanee, 2019) there is a positive correlation between students' awareness of and attitudes toward the environment, so if students have a lot of knowledge about environmental issues, then they will become more aware of environmental issues that are happening and this awareness encourages them to act responsibly towards the environment. According to (Jensen, 2002), behaviour based on knowledge will last longer than behaviour that is not based on knowledge. Research conducted by (Latif et al., 2013) found that factual knowledge is a variable that correlate with pro-environmental knowledge.

### *Environmental Responsibility*

Fettahlıoğlu & Aydoğdu, (2020) revealed that environmentally responsible behaviour seeks to preserve the environment and look for environmental problems. environmentally responsible citizenry refers to individual or group action aimed at doing the right thing to protect the environment in everyday life, such as recycling, energy conservation and reducing littering. According to (Kaiser, Ranney, et al., 1999), environmentally responsible behaviour contains several dimensions: recycling, avoiding purchases to minimise environmental impact as a form of green consumerism, being politically active in communities to influence decisions that impact the environment, and educating oneself about environmental awareness.

Singh & Gupta, (2013) argues that environmentally responsible behaviour measures a person's readiness to protect the environment actively. That’s mean environmentally responsible behaviour is an environmental protection mechanism to reduce and prevent damage to environmental resources.

### *Value-Belief-Norm*

Young people are the key to facing environmental issues today and so on (Stern et al., 1999). A conceptual framework that can explain the relationship between environmental beliefs and pro-environmental behaviour is the Value Belief Norm (VBN) Theory. (Stern et al., 1999) explained, variables such as value orientation, New Ecological Paradigm (NEP), awareness of consequences, beliefs to be able to act, and individual norms are variables that can influence pro-environmental behaviour. VBN theory combines value, NEP, and norm-activation theories as causal chains that lead to pro-environmental behaviour. Several previous studies conducted by (Liobikienė & Poškus, 2019; Oreg & Katz-Gerro, 2006) have shown a positive relationship between VBN and pro-environmental behaviour.

### *Environmental Education*

Environmental education is an educational programme to encourage children as learners to exhibit rational and responsible understanding, awareness, attitudes, and behaviours about the mutual influence between residents and the environment in various aspects of human life (Kollmuss & Agyeman, 2002; Zsóka et al., 2013). Environmental education seeks to change behaviour and attitudes aiming to increase people's knowledge, skills, and awareness of environmental values and

environmental issues, which in turn can move the community to play an active role in environmental conservation and safety efforts for the benefit of current and future generations. environmental education is about internalisation, directly or indirectly.

Pro-environmental behaviour refers to conscious efforts to minimise the negative impact of one's action on nature (both natural and artificial ecosystems), such as reducing natural resources and consumption, toxin, waste, and so forth (Kollmuss & Agyeman, 2002). Several factors affecting pro-environmental behaviour, environmental commitment and awareness, green lifestyle, and green self-efficacy positively affect the pro-environmental behaviour of young people (Yusliza et al., 2020). Holistic and systemic perspectives on the environment are crucial in promoting pro-environmental behaviour (P. Liu et al., 2020; X. Liu et al., 2018). Pro-environmental behaviour also increases with factors, including knowledge, awareness, and understanding of environmental damage (Soares et al., 2021). Social norms and lifestyle contribute to pro-environmental behaviour. There is also a difference in pro-environmental behaviour between the younger and older generations (Alzubaidi et al., 2021). The novelty of this study compared to several previous studies lies in determining how environmental knowledge, environmental responsibility, value-belief-norm, and environmental education influence pro-environmental behaviour in Indonesian university students.

## Methods

### Research Design

This research uses a quantitative approach with survey methodology. The survey method is a research method that takes samples from a population using questionnaires as a data collection tool (Creswell & Creswell, 2017; Hoy & Adams, 2015). The survey aims to get a general picture of the characteristics of the population that can be seen from attitudes, values, beliefs, opinions, habits, behaviours, and others. In this study, the picture/information researchers want to get from respondents is pro-environmental behaviour seen from environmental knowledge, environmental responsibility, value–belief–norm, and environmental education.

### Data Collection

The respondents in this study were students of geography and geography education programmes from various public and private universities in Indonesia. The reason for choosing students of these programmes is the presence of environmental education courses in this study programme. Four hundred seventy (470) students participated as research respondents. The universities included Universitas Lambung Mangkurat, Universitas PGRI Kanjuruhan, Universitas Khairun Ternate, Universitas Samudra, Universitas Negeri Makasar, Universitas Negeri Malang, IKIP PGRI Pontianak, Universitas Al Muslim, Universitas Widya Dharma, Universitas Hamzanwadi, Universitas Negeri Padang, Universitas Muhammadiyah Mataram, STIKIP Kei Raga Ternate, Universitas Tadulako, USK, Universitas Halu Oleo, Universitas Siliwangi, IKIP PGRI Palangkaraya, Universitas Nusa Cendana Kupang, Amikom Yogyakarta, and Universitas Negeri Jember. Data collection in this study used questionnaires filled out online through Google form and shared via WhatsApp group.

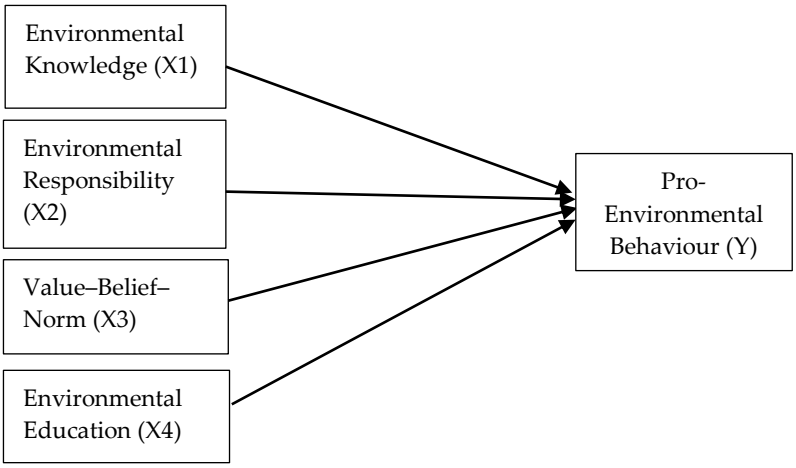
### Data Analysis

The Smart PLS 3.0 Program was used to check our instruments' validity by looking at each construct indicator's loading factors. The outer model was used to check the validity and reliability of the model (Hair et al., 2020). The standard requirement to test the validity of research instruments is that the loading factor must be more significant than 0.70 (Chan & Lay, 2018; Zürich et al., 2005). Reliability was tested by calculating the composite reliability—the range is 0.6 to 0.7 (Chan & Lay,

2018; Rasoolimanesh, 2022). The research variables were environmental knowledge (X1), environmental responsibility (X2), value–belief–norm (X3), environmental education (X4), and pro-environmental behaviour (Y).

**Figure 1**

*Theoretical Framework*




Data were analysed using the Structural Equation Modelling (SEM) Partial Least Square (PLS). SEM-PLS is a causal model explaining the effect of variables on the constructed variable (Chan & Lay, 2018).

**Table 1**

*Research Variables*

| Variable | Indicator |
|---|---|
| Environmental knowledge (X1) | 1. Knowing daily environmental problems |
| | 2. Knowing the causes of environmental problems |
| | 3. Learning the solutions to solve environmental problems |
| | 4. Understanding the dependency of human beings on the environment |
| | 5. Knowing renewable energy |
| Environmental responsibility (X2) | 1. No littering |
| | 2. Keeping the environment clean |
| | 3. Using environmentally friendly energy and resources |
| | 4. Greening the surrounding areas |
| Value–belief–norm (X3) | 1. Believing that everything on earth is God's creation |
| | 2. Being thankful for what is available on earth |
| | 3. Sticking to the concept of cleanliness in doing religious rituals |
| | 4. Practicing religious advice to protect the environment |
| Environmental education (X4) | 1. Increasing understanding of environmental problems |
| | 2. Improving acceptance, assessment, organization, and personality characteristics in managing life in harmony with nature |
| | 3. Growing a love of the environment |
| | 4. Increasing interest in the environment |

| | |
|---|---|
| Pro-Environmental Behaviour (Y) | 1. Participating in events/seminars/workshops on environmental issues<br>2. Reducing the use of plastic<br>3. Replacing disposable drinking bottles with tumblers<br>4. Replacing food wrapping paper with lunch boxes<br>5. Buying items with a recyclable sign<br>6. Reusing usable things<br>7. Using rechargeable batteries<br>8. Sorting waste<br>9. Reusing things that are still suitable for use<br>10. Disposing of phone batteries or electronic device batteries properly<br>11. Turning off electronic devices that are not in use<br>12. Using electronic devices with energy-saving features<br>13. Turn off the lights during daytime<br>14. Using water wisely<br>15. Using a water storage tank |

Our research hypotheses are as follows:

Hypothesis 1

H0: Environmental Knowledge of students does not have a positive and significant correlation with

Pro-Environmental Behaviour

Hypothesis 2

H0: Environmental Responsibility of students does not have a positive and significant correlation with

Pro-Environmental Behaviour

Hypothesis 3

H0: Environmental Education of students does not have a positive and significant correlation with Pro-

Environmental Behaviour

Hypothesis 4

H0: Value-belief-norm of students does not have a positive and significant correlation with Pro-

Environmental Behaviour

## Findings

### Outer Model

Before hypothesis testing to predict the relationship between latent variables in a structural model, we first evaluated the outer model to verify indicators and latent variables for further analysis. The validity test evaluates the ability of research instruments to measure what they are intended to measure (Hair et al., 2017; Hair Jr et al., 2020). The reliability test evaluates the consistency of a measurement instrument in measuring a concept or the character of research respondents in answering questionnaire items or research instruments. The result is presented in discriminant validity (outer loadings), Cronbach's alpha, composite reliability, and Average Variance Extracted (AVE).

**Table 2**

*Structural Model*

| Construct | Items | Loading Factors | Cronbach's alpha | Composite Reliability | Average Variance Extracted (AVE) |
|---|---|---|---|---|---|
| Environmental knowledge | X1.1 | 0.855 | 0.903 | 0.928 | 0.720 |
| | X1.2 | 0.866 | | | |
| | X1.3 | 0.857 | | | |
| | X1.5 | 0.837 | | | |
| | X1.5 | 0.826 | | | |
| Environmental responsibility | X2.1 | 0.855 | 0.874 | 0.914 | 0.726 |
| | X2.2 | 0.878 | | | |
| | X2.3 | 0.845 | | | |
| | X2.4 | 0.829 | | | |
| Value–belief–norm | X3.1 | 0.831 | 0.868 | 0.910 | 0.715 |
| | X3.2 | 0.866 | | | |
| | X3.3 | 0.838 | | | |
| | X3.4 | 0.848 | | | |
| Environmental education | X4.1 | 0.869 | 0.881 | 0.918 | 0.737 |
| | X4.2 | 0.844 | | | |
| | X4.3 | 0.874 | | | |
| | X4.4 | 0.846 | | | |
| Pro-Environmental Behaviour | Y1 | 0.747 | 0.924 | 0.934 | 0.505 |
| | Y2 | 0.670 | | | |
| | Y3 | 0.614 | | | |
| | Y4 | 0.663 | | | |
| | Y5 | 0.678 | | | |
| | Y6 | 0.731 | | | |
| | Y7 | 0.744 | | | |
| | Y8 | 0.749 | | | |
| | Y9 | 0.758 | | | |
| | Y10 | 0.755 | | | |
| | Y11 | 0.737 | | | |
| | Y12 | 0.746 | | | |
| | Y13 | 0.672 | | | |
| | Y14 | 0.670 | | | |

Table 2 shows that measuring discriminant validity through outer loadings ensures that each concept of the latent model is different from other variables. An indicator is reliable if it has a correlation value of more than 0.70. An indicator is valid if its outer loading is between 0.50 – 0.60, so its presence is acceptable (Hair et al., 2020).

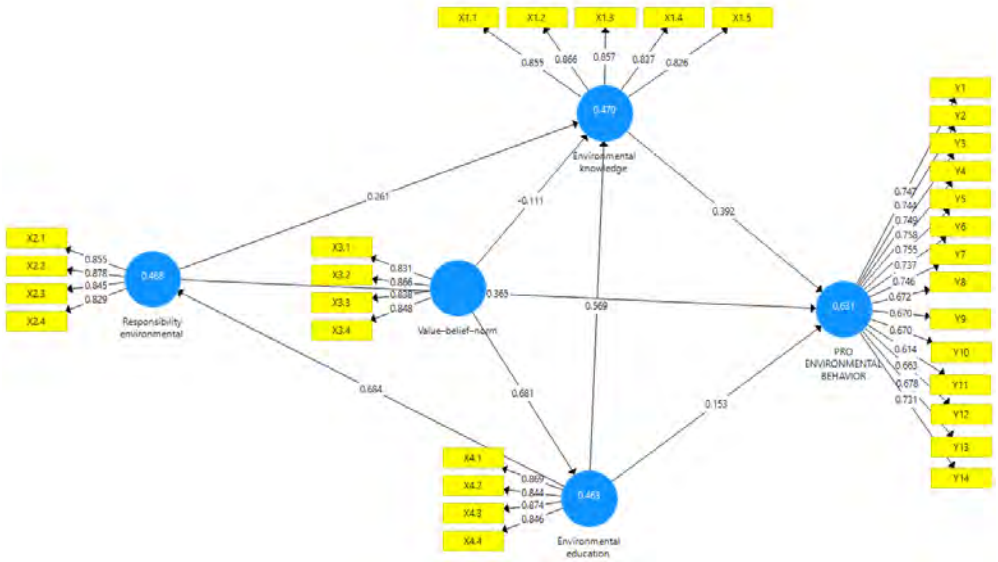
Table 2 shows that all indicators of the latent variables are valid and reliable because their outer loading values are between 0.60 and 0.70. Thus, all latent variables could explain the variable of each indicator that measured them. Discriminant validity can be determined using AVE for each construct or latent variable. The model has better discriminant validity if the AVE square root for each construct is greater than the correlation between the two constructs in the model.

Table 2 shows that the AVE value for all constructs is > 0.50. Therefore, convergent validity in the model being tested is acceptable. The Cronbach Alpha and composite reliability values for all

constructs are also > 0.60, which means that all constructs have very good reliability. Figure 2 shows that the variables environmental knowledge, environmental responsibility, values-beliefs-norms, and environmental education have a high influence on Pro-Environmental Behaviour. This is proven by the loading factor value for each construct indicator being in the range of 0.6 – 0.7. The results of the outer model analysis are presented in Figure 2.

**Figure 2**

*Model Pro-Environmental Behaviour of University Students in Indonesia*




## Measuring the Structural Model (Inner Model)

### *Coefficient of Determinant (R-square)*

The R-square value is used to assess the extent of influence certain independent latent variables have on the dependent latent variable. Using SmartPLS 3.0 software, we obtained the following results.

**Table 3**

*Coefficient of Determinant (R-square)*

| | R-square | R-square Adjusted |
|---|---|---|
| Environmental education | 0.463 | 0.462 |
| Environmental knowledge | 0.479 | 0.476 |
| Pro-environmental behaviour | 0.631 | 0.629 |
| Environmental responsibility | 0.468 | 0.466 |
| Value–belief–norm | 0.430 | 0.433 |

Table 3 shows the R-square value for environmental education is 0.463; this shows that environmental education has an influence of 46.3% on pro-environmental behaviour. The R-square value for environmental knowledge is 0.479; this indicates that environmental knowledge has a 47.6% influence on pro-environmental behaviour. The R-square value for environmental responsibility is 0.468; this shows that environmental responsibility has a 46.8% influence on pro-environmental behaviour. The R-square value for the value-belief-norm is 0.430; this indicates that Value-belief-norm

has a 43.0% influence on pro-environmental behaviour. The R-square value for pro-environmental behaviour, which indicates that environmental education, environmental knowledge, value-belief-norm, and environmental responsibility factors influence pro-environmental behaviour by 40%.

## Hypothesis Testing

The p-value is set at a significance level ($\alpha$) of 5% or 0.05 to determine whether the hypothesis is accepted or rejected. If the p-value < 0.05, H0 is rejected, meaning an effect exists. Conversely, if the p-value > 0.05, H0 is accepted, indicating no effect exists. Table 4 presents the results of evaluating the structural model of the hypothesis test using the PLS method obtained from the SmartPLS 3.0 Bootstrapping Report.

**Table 4**

*Path Coefficients*

| | Original Sample (O) | Sample Mean (M) | Standard Deviation (STDEV) | T Statistics (\|O/STDEV\|) | P Values |
|---|---|---|---|---|---|
| Environmental education-> Pro-environmental behaviour | 0.153 | 0.154 | 0.059 | 2.611 | 0.009 |
| Environmental knowledge-> Pro-environmental Behaviour | 0.392 | 0.395 | 0.046 | 8.618 | 0.000 |
| Environmental responsibility -> Pro-environmental behaviour | 0.365 | 0.365 | 0.052 | 7.043 | 0.000 |
| Value–belief–norm-> Pro-environmental behaviour | 0.430 | 0.433 | 0.033 | 13.234 | 0.000 |

Table 4 shows that environmental education has a positive relationship with pro-environmental behaviour, with a p-value of 0.009 (p < 0.05). Environmental knowledge has a positive relationship with pro-environmental behaviour, with a p-value of 0.000 (p < 0.05). Environmental responsibility has a positive relationship with pro-environmental behaviour, with a p-value of 0.000 (p < 0.05). Value–Belief–Norm has a positive relationship with pro-environmental behaviour, with a p-value of 0.000 (p < 0.05).

# Discussion

## Factors Affecting Pro-Environmental Behaviour of University Students

Environmental knowledge has a significant and positive relationship with pro-environmental behaviour, evidenced by a t-statistic value of 2.611 and a p-value of 0.009 (p < 0.05). Most students were already concerned about the environment, such as environmental problems and the causes of such problems. Students also knew solutions to environmental problems and about renewable energy to overcome the problems. Renewable energy sources are environmentally friendly, do not pollute the environment, and do not contribute to climate change and global warming because the energy comes from sustainable natural sources, such as sunlight, wind, water, biofuels, and geothermal.

Knowledge is crucial to determining behaviour. Students with environmental knowledge tend to change their behaviour due to education; this aligns with the view that environmental knowledge affects pro-environmental behaviour (Gifford & Nilsson, 2014).

Developing students' environmental knowledge is important, especially on campus. A study in Canada reveals that more than 60% of the study respondents agree that one factor hindering pro-

environmental behaviour is a lack of knowledge (Kennedy et al., 2009; Kennedy & Kmec, 2018). Other studies also confirm that more profound and broader knowledge of environmental issues and solutions to such issues will increase the possibility of individuals taking-action to protect the environment (Farrukh et al., 2022; Jensen, 2002; Kaiser, Ranney, et al., 1999; Kaiser, Wölfing, et al., 1999; Kollmuss & Agyeman, 2002; Latif et al., 2013). Individuals with sound knowledge of environmental issues tend to show pro-environmental behaviour. Previous studies show that knowledge relates to actions and becomes a predictor of actions (Neolaka, 2020). To sum up, individuals with sound knowledge of environmental issues and solutions to such issues tend to show pro-environmental behaviour to protect the environment.

P. Liu et al., (2020) find a significant relationship between the level of knowledge and the pro-environmental behaviour of students—the higher the level of environmental knowledge, the better the pro-environmental behaviour of students and vice versa. Fawehinmi et al., (2020) reveal a positive and significant relationship between environmental knowledge and attitudes towards environmental sustainability. If environmental knowledge increases, attitudes towards environmental sustainability will also increase, and vice versa.

Ardoin et al., (2020) provide an opinion that people with better environmental knowledge will be better aware of the environment and environmental issues. Thus, they will be motivated to act responsibly toward the environment. Developing environmental awareness through education has always been critical in building pro-environmental behaviour. Knowledge of people will guide them to determine whether their actions will be good or bad for the environment. Environmental knowledge can be in the form of knowledge of environmental issues, causes, effects, solutions, and how to become an environmentally responsible agent of change related to the problems (Fawehinmi et al., 2020).

The path coefficient analysis presented in Table 3 for testing the second hypothesis shows that H0: Environmental Responsibility of students has no positive and significant correlation with Pro-Environmental Behaviour is rejected. This means that environmental responsibility has a significant and positive relationship with pro-environmental behaviour, evidenced by a t-statistic value of 7.043 and a p-value of 0.000 ($p < 0.05$). Environmental responsibility is an action motivated by one's willingness to prevent environmental damage or preserve the environment. Our findings showed that the students had good environmental responsibility. They did not litter, cared for environmental cleanliness, used recyclable goods, and did greening of their surrounding areas. Environmental responsibility is closely related to the ascription of responsibility. Initially, the ascription of responsibility is defined as a feeling of responsibility from the negative consequences of not behaving in a pro-social manner. This theory is widely applied in green behaviour because most people behave green based on their altruistic feelings, such as recycling, energy policies, and other green behaviours in general.

Increased awareness and understanding of changing environmental issues and improved skills for environmentally responsible actions can be developed through environmental education (Jurdi-Hage et al., 2019). This is consistent with the university's role as an effective agent of change.

Building awareness to be environmentally responsible aims to preserve the environment, so human beings not only take benefit of the environment for their lives but also take care of and be accountable for preserving the environment. Individuals with high environmental awareness can improve pro-environmental behaviour (Zareie & Navimipour, 2016). In addition, students with higher environmental awareness show more pro-environmental behaviour (S.-C. Liu & Lin, 2015; S. Liu & Guo, 2018). As previously indicated, specific environmental awareness can lead to better predictability of environmentally responsible behaviour if certain pro-environmental behaviours are assessed.

As formal education institutions, universities must implement pro-environmental behaviour (Usaini et al., 2015). People are not born with pro-environmental behaviour—the behaviour is taught

and shaped along with their developmental stages. Increased environmental responsibility will finally lead to positive changes toward pro-environmental behaviour.

The path coefficient analysis presented in Table 4 for testing the third hypothesis shows that H0: Environmental Education of students does not have a positive and significant correlation with Pro-Environmental Behaviour is rejected. This means that environmental education has a significant and positive relationship with pro-environmental behaviour, evidenced by a t-statistic value of 2.611 and a p-value of 0.009 ($p < 0.05$). Our findings confirmed that the students received environmental education, proven by increased environmental knowledge and understanding that they refused to damage the environment at any cost.

Education is crucial in forming pro-environmental behaviour (Iswari & Kusuma, 2022). Human behaviour greatly impacts the environment. Environmental knowledge gained through education is positively and significantly important to preserve the environment (Azhar et al., 2015; Erdogan & Ozsoy, 2007; Sontay et al., 2015). Environmental education teaches students the importance of preserving the environment—it increases students' awareness, directs students, and shapes their attitudes toward preserving the environment (Hassan & Pudin, 2011; Mulyana, 2009; Özalemdar, 2021). Environmental education aims to increase people's understanding and concern and is oriented toward preventing environmental damage and finding solutions to environmental issues.

The findings align with (Meyer, 2016), stating that specific policies, programmes and courses on the environment can affect the preferred construction of students related to the environment because the students have more knowledge and skills for environmental preservation.

The fourth hypothesis testing shows that H0: Value-belief-norm of students does not have a positive and significant correlation with Pro-Environmental Behaviour is rejected. This means the value-belief-norm has a significant and positive relationship with pro-environmental behaviour, evidenced by a t-statistic value of 13.234 and a p-value of 0.000 ($p < 0.05$). Our findings showed that students had good value-belief-norm for pro-environmental behaviour, as seen from the willingness of students to protect the environment and support policies to preserve the environment. This aligns with (Mahat et al., 2020; Whitley et al., 2018), revealing that biosphere and altruistic values make students more willing to be involved in pro-environmental activities, such as supporting policies to protect the environment.

The value-belief-norm theory is proposed by (Stern et al., 1999), stating that value orientation can, directly and indirectly, affect pro-environmental behaviour. The theory assumes three value orientations related to environmental concerns relevant to understanding pro-environmental attitudes, preferences, and behaviour: altruistic, egoistic, and biosphere value orientations (Oreg & Katz-Gerro, 2006; Stern et al., 1999). Our findings strengthen the theory since the results show a direct contribution of value orientation toward pro-environmental behaviour.

Norms inform a person about acceptable and unacceptable behaviour. Norms are the rules of society regarding good and bad attitudes and actions that are permissible and not permissible. There are three types of norms: habits, prohibitions, and conventions (Kaiser et al., 2005, 2006). Personal norms are moral ethics and obligations towards something related to orientation in creating something. An ethical approach to dealing with environmental problems is needed. This approach is intended to determine attitudes, actions, and ethical perspectives and appropriately manage environmental care and its ecosystem (Hassan & Pudin, 2011; Liobikienė & Poškus, 2019).

The principle of respect for nature deals with a moral responsibility towards nature. This responsibility is individual and collective (Stern et al., 1999). Moral responsibility requires humans to take concrete initiatives, efforts, policies, and actions to protect the universe and everything in it. This means the preservation and destruction of nature is a shared responsibility of all humankind. This responsibility also manifests in warning, prohibiting, and punishing those who damage and endanger nature (Kurisu, 2015; Stern et al., 1999).

Building students' positive environmental values in educational institutions are essential as it should help solve environmental problems and improve environmental quality (Chen, 2015). This will help to create a knowledgeable society about environmental issues that will play a significant role in preserving the environment.

### Efforts to Improve Pro-Environmental Behaviour

Improving pro-environmental behaviour, especially among the younger generation, can be done through education. Building a character of caring for the environment through education is an effort the government of Indonesia takes to preserve the environment. Such character is manifested in attitudes and actions of preventing environmental damage and taking steps to repair the already-happen environmental damage. Some activities to form pro-environmental behaviour are: (1) caring for the environment, (2) reducing plastic use, (3) sorting waste, (4) reducing carbon emission, and (5) saving energy. Actions to repair environmental damage include (1) planting trees, (2) reusing goods, and (3) using environmentally friendly technology. Caring for the environment must be inculcated from an early age through fun learning. This is in line with the research results (Yüzüak & Erten, 2022), which suggest that environmental education be included in various disciplines and raise environmental awareness among individuals should become one of national education's primary objectives.

Other efforts to increase public awareness of the importance of protecting the environment can be carried out through informational and structural strategies. Informative strategies refer to interventions through campaigns to increase knowledge to minimise environmentally damaging behaviour. For example, the reduce, reuse, and recycle (3R) campaign and creating eco-points for residential communities to collect metal, paper, glass, and organic waste for recycling. In addition to reducing waste, the 3R programme can also be a means of earning income in which people can deposit their waste to waste banks or recycling facilities.

Efforts to increase public awareness through structural strategies can be made through behavioural changes that affect behavioural decisions. This strategy focuses on external environmental planning that can support pro-environmental behaviour—for example, providing easily-accessible bins to avoid littering.

Governments, companies and other organisations can also improve people's pro-environmental behaviour through appropriate environmental policies primarily aimed at increasing self-motivation from the community to behave pro-environmentally. This can be done through activities including providing infrastructure that makes it easier for people to adopt pro-environmental behaviour, such as providing environmentally friendly objects at lower prices, providing pro-environmental education to students as early as possible, developing an in-depth understanding of waste recycling efforts through various media, and supervising the public in subsidy programs for people with pro-environmental behaviour and fines for violators of environmental policies.

## Conclusion and Implications

It is significant for everyone, especially the young generation, to behave pro-environmentally to reduce environmental problems. Our findings confirm that environmental knowledge has a significant and positive relationship with pro-environmental behaviour, evidenced by a t-statistic value of 2.611 and a p-value of 0.009 ($p < 0.05$). Environmental responsibility has a significant and positive relationship with pro-environmental behaviour, evidenced by a t-statistic value of 7.043 and a p-value of 0.000 ($p < 0.05$). Environmental education has a significant and positive relationship with pro-environmental behaviour, evidenced by a t-statistic value of 2.611 and a p-value of 0.009 ($p < 0.05$). The value-belief-norm has a significant and positive relationship with pro-environmental behaviour, evidenced by a t-statistic value of 13.234 and a p-value of 0.000 ($p < 0.05$). That means students in

university exhibit excellent pro-environmental behaviour where factors of environmental knowledge, environmental responsibility, environmental education, and values influence this behaviour.

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