



Factors Affecting Students' Pro-environmental Behavior for Sustainable Development (A Case Study in An Indonesian University)

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Abstract. Environment is one of three pillars of SDGs in addition to economy and society. Human activities have harmed the environment, which must be remedied by humans engaging in pro-environmental behaviors. University can perform a fundamental role in promoting pro-environmental behaviors for sustainable development. This study aims to verify the factors that affect pro-environmental behaviors among students in an Indonesian university so that the university can encourage pro-environmental behaviors. This study used a quantitative approach to investigate the relationship between personal factors, social factors, and environmental factors on students' pro-environmental behaviors. The results of this study found that there was a positive and significant direct effect between personal factors on pro-environmental behaviors with a coefficient value of 0.307 and p value < 0.05 . This means that an increase in personal factors will increase pro-environmental behaviors by 30.70%. There was also a positive and significant direct effect between social factors on pro-environmental behaviors with a coefficient value of 0.611 and p value < 0.05 . This means that an increase in social factors will also increase pro-environmental behaviors by 61.10%. All factors simultaneously affect pro-environmental behaviors by 54.1%. As implications of this study, some recommendations to the university are suggested.

Keywords: personal factor · social factors · environment factors · pro-environmental behaviors · sustainable development

1 Introduction

Human activities in the last few decades, as a result of technological advancement and globalization, have caused serious environmental and conservation issues, such as pollution, deforestation, species extinction, climate change, and global warming [1]. Studies about environmental problems were emphasized [2–7]. These environmental issues cause a change in the quality or quantity of the earth's system (air, water, soil, etc.) that has an immediate or indirect impact on everything on the planet. A variety of environmental issues transform local issues into regional and global issues, and the issues ultimately affect our entire world [8].

Environmental issues have serious health consequences as well as global economic consequences [9]. If the environment continues to deteriorate, human life will be jeopardized. Air pollution from transportation and mill smoke has increased the amount of toxic gas in the air, causing a variety of illnesses. Humans suffer as a result of water and soil pollution caused by industrial sewage, pesticides, and garbage disposal. These could result in malnutrition, increased morbidity, and premature death [6, 10]. By reducing the quantity and quality of natural resources, environmental degradation predisposes economic development and welfare. The environment provides the economy with natural resources. These natural resources are essential inputs for production in many sectors. A study by World Bank (2013) on monetary losses of environmental sanity and natural resources in India reported the estimation of total cost of environmental damage in India at about US\$80 billion annually. This cost was equivalent to 5.7% of Gross Domestic Product (GDP) in 2009 [11].

Many countries have become more proactive and conscious of environmental issues in their daily lives in recent years as a result of the Sustainable Development Goals (SDGs). In addition to the economy and society, the environment is one of the three SDG pillars [12]. The Environmental Performance Index (EPI) provides a quantitative basis for comparing, reviewing, and capturing the environmental performance of many countries around the world. EPI will score and rank 180 countries in 2022 based on their environmental performance, including climate change performance, environmental health, and ecosystem vitality. Indonesia was ranked 164th in the world in EPI 2022, with a total score of 28,20. This result indicated that Indonesia was still a long way from meeting internationally specified sustainability targets for environmental health, ecosystem vitality, and climate change mitigation. Water pollution from domestic wastes and industrial sewage, air pollution from vehicles and industry in urban areas, and forest fires are all examples of human-caused environmental issues in Indonesia. Forest degradation is also a result of fires and unregulated cutting, which endangers biodiversity.

Higher education institutions, as a part of the nation, can play a critical role in environmental sustainability. Universities can provide environmental education, skilled labor, and knowledgeable experts to address serious environmental issues [14]. Universities become role models of environment preservation and practices for sustainable development [15]. Because environmental degradation is caused by human activities, these issues must be addressed by humans by changing their behavior. It is critical to comprehend the pro-environmental behaviors of university students [16].

Individual actions that contribute to environmental sustainability, such as reducing energy consumption, recycling waste, taking public transportation, and so on, are examples of pro-environmental behaviors [17]. According to Fei et al. (2018) [16], pro-environmental behaviors necessitated consideration of the following factors:

- Personal factors

Personal norms are individuals' moral expectations of how they should behave based on their moral values, which are accommodated by personal factors. These factors compel an individual to take moral responsibility for acting in an environmentally responsible manner.

- Social factors

Social norms and social media are two examples of social factors. Social norms are factors that influence an individual's pro-environmental behavior. Social norms influence behavior through social expectations of what is appropriate or inappropriate. These also provide information about what emerges as the most appropriate behaviors based on the ideas of others. Changes in social norms can lead to shifts in assumptions and behaviors. Meanwhile, social media is a primary source of information for society to learn more about environmental issues.

- Environmental Factors

Environmental factors include environmental knowledge and environmental attitudes. Environmental knowledge is an understanding of an individual towards the human actions that influence the ecosystem. Meanwhile, environmental attitudes come from education and life experiences. Environmental attitudes are the judgements that people make about the action they like or dislike.

Many studies in the field of pro-environmental behaviors have been reviewed by many researchers. Blankenberg & Alhusen (2019) summarized that pro-environmental behaviors are determined by interaction of socio-demographics, psychological, individual, social, and institutional determinants which vary in their intension [18]. Other studies highlighted pro-environmental behaviors in education institutions [19, 14, 16, 20, 15]. Developed Likert-scale questionnaires in order to evaluate environmental attitudes and behaviors of university students. Discussed about a higher education institution's effort to build healthy environment and natural resources preservation in India investigated factors influenced pro-environmental behaviors among university students in Malaysia. Analyzed the lineal effects of personality on pro-environmental behaviors among students. Explained some factors influencing university students' attention and participation in environmental development. This study included students from a Turkish university and a Romanian university. The findings revealed that students' environmental attitudes and behaviors at both universities were comparable, but there were some differences as a result of cross-cultural environmental education.

Based on the research background, it is crucial to get a better understanding about pro-environmental behaviors and factors affecting it. The purpose of this study is to verify the factors that affect pro-environmental behaviors among students in an Indonesian university so that the university can encourage pro-environmental behaviors. The university is in Bandung, West Java. West Java is a region in Indonesia on the westward zone of the island of Java which is known as the most populous province in Indonesia. Bandung is the capital city of West Java which is also one of the most densely populated cities in the world. In West Java, some natural resources including forest, soil, air, and water must be conserved in order to develop sustainability. Furthermore, the Citarum River in West Java is regarded as one of the world's most polluted rivers. Understanding pro-environmental behaviors among students allows universities to develop guidance and direction for resolving environmental issues.

2 Research Method

This study used a quantitative approach to explore the relationship among cause-and-effect variables. Primary data were collected from university students as respondents in this study using questionnaires adapted from [16]. The questionnaires were completed by a total of 119 university students.

Figure 1 depicts a conceptual framework model used in this study to examine the relationship between independent variables (personal factors, social factors, and environmental factors) and dependent variables (pro-environmental behaviors) among university students.

Summary of variables can be seen on Table 1:

The questionnaire consisted of three sections. Section 1 was compiled to obtain demographic characteristics of the respondents such as gender, age, and place of origin. In Sect. 2, independent variables which are factors affecting pro-environmental behaviors was developed. Respondents are asked to select the Likert Scale option ranging from ‘strongly disagree’ to ‘strongly agree’ (1–5) for each item that best reflects their perception. Section 3 consisted of dependent variable which is pro-environmental behaviors as measured by Likert Scale ‘never’ to ‘very often’ (1–5).

Descriptive statistic is used to organize and recapitulate the data from questionnaires into a configuration that easier to understand. The data was also analyzed by verifying the validity and reliability. Validity test was carried out to explain how well the instrument assesses what is intended to be assessed [21]. A convergent validity test was carried out using the outer loadings parameter based on the SmartPLS algorithm. Outer loadings is a table that contains loading factors that demonstrate the relationship between indicators

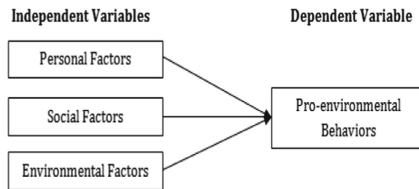


Fig. 1. Conceptual Framework

Table 1. Summary of Variables

Variables	Number of Items	Likert Scale
Personal Factors	4	Strongly Disagree to Strongly Agree (1–5)
Social Factors	7	Strongly Disagree to Strongly Agree (1–5)
Environmental Factor	9	Strongly Disagree to Strongly Agree (1–5)
Pro-environmental Behaviours	14	Never to Very Often (1–5)

and latent variables. When the loading factor value is greater than 0.7, it is said to be valid. Reliability test by using Cronbach's alpha values was conducted to measure internal consistency and stability of the instrument [22]. Furthermore, SmartPLS was used to examine the effects of variables using Partial Least Square.

3 Results

Table 2 showed the demographic characteristics of the respondents.

Subsequently, the results of outer loadings parameter obtained from SmartPLS algorithm can be seen on Table 3.

From Table 3, we can see that all loading factor values > 0.7 . Thus, all variables are valid. Meanwhile, the reliability values which are indicated by Cronbach's alpha value obtained from SmartPLS algorithm can be seen in Table 4.

From Table 4, we can see Cronbach's alpha values on personal factors and pro-environmental ≥ 0.81 . Therefore, the values can be described as robust. Meanwhile, the Cronbach's alpha values on social factors and environmental factors ≥ 0.84 , thus the values can be described as reliable (Taber, 2017).

Descriptive statistics of independent and dependent variables are shown in Tables 5, 6, 7 and 8.

Further analysis was carried out by observing the values of path coefficient that indicate direct effects of exogenous latent variable on endogenous latent variable, which can be seen on Table 9. Path coefficients values range from -1 to + 1. The P values that indicate the level of significant can be seen on Table 10.

According to Tables 11 and 10, there is a positive and significant direct effect between personal factors on pro-environmental behaviors with a coefficient value of 0.307 and p

Table 2. Demographics Characteristics of Respondents

Dimensions	Category	Number of Respondents	Percentage
Gender	Male	36	30%
	Female	83	70%
Age	< 18 years	7	6%
	18–20 years	88	74%
	> 20 years	24	20%
Place of Origin	Sumatera	13	11%
	Jawa	94	79%
	Kalimantan	2	2%
	Sulawesi	1	1%
	Papua	4	3%
	Other	5	4%
Total Number of Respondents		119	

Table 3. Outer Loadings

	Environmental Factors	Personal Factors	Pro. Environmental Behaviours	Social Factors
EF 1	0,758			
EF3	0,764			
EF 5	0,707			
EF 8	0,881			
EF 9	0,800			
PEB10			0,841	
PEB11			0,784	
PEB5			0,797	
PEB9			0,775	
PF1		0,942		
PF2		0,913		
SF1				0,734
SF3				0,748
SF5				0,815
SF6				0,839
SF7				0,786

Table 4. Construct Reliability

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Environmental.Factors	0,873	0,898	0,888	0,615
Personal Factors	0,839	0,861	0,925	0,860
Pro Environmental.Behaviours	0,812	0,814	0,876	0,639
Social.Factors	0,845	0,853	0,889	0,617

value < 0.05. This means that if personal factors increase by 1-unit, pro-environmental behaviors will also increase by 30.70%. In addition, there is also a positive and significant direct effect between social factors on pro-environmental behaviors with a coefficient value of 0.611 and p value < 0.05. This means that if social factors increase by 1-unit, pro-environmental behaviors will also increase by 61.10%. The influence of social factors

Table 5. Descriptive Statistics of Personal Factors

Factor	Statement	Mean	Standard Deviation
Personal Factor 1	It is important to me to assure whether to products I buy are environmentally friendly.	3,97	0,91
Personal Factor 2	If I can choose between environmentally friendly and conventional, I prefer to buy.	4,15	0,82
Personal Factor 3	I feel a moral responsibility to protect the environment.	4,45	0,75
Personal Factor 4	I feel it is important for society in general to protect the environment.	4,71	0,52

Table 6. Descriptive Statistics of Social Factors

Factor	Statement	Mean	Standard Deviation
Social Factor 1	My family members encourage meto preserve the environment.	4,04	0,84
Social Factor 2	My lecturers encourage meto preserve the environment.	4,10	0,86
Social Factor 3	My friends encourage me to preserve the environment.	3,73	0,93
Social Factor 4	I will do so if I see others doing environmental preservation.	4,38	0,71
Social Factor 5	I concern about environmental campaigns through social media (facebook, instagram, youtube, etc.).	3,91	0,90
Social Factor 6	I will watchor read the news or content about environmental issues caused by humans action through social media (facebook, instagram, youtube, etc.).	3,87	0,93
Social Factor 7	I will give my comments about the news or content about environmental issues through social media (facebook, instagram, youtube, etc.).	3,18	1,16

on pro-environmental behaviors is greater than the influence of personal factors on pro-environmental behaviors. Meanwhile, environmental factors have no significant effect on pro-environmental behaviors because p value > 0.05 . This means that an increase or decrease in environmental factors will not affect pro-environmental behaviors. The results do not confirm the study result by Fei (2017) that found all the factors (personal factors, social factors, and environmental factors) have positive significant correlation to pro-environmental behaviors. The study by Fei (2017) also found that the influence of

Table 7. Descriptive Statistics of Environmental Factors

Factor	Statement	Mean	Standard Deviation
Environmental Factor 1	Plants and animals are important to maintain the balance of ecosystem.	4,64	0,65
Environmental Factor 2	The condition of our environments will affect our health.	4,71	0,58
Environmental Factor 3	Forest destruction will cause biological imbalance.	4,70	0,57
Environmental Factor 4	Natural resources should be preserved for future generation.	4,74	0,55
Environmental Factor 5	A country will run out of natural resources in the future if these natural resources are not conserved.	4,76	1,10
Environmental Factor 6	Using public transport can help to reduce air pollution.	4,09	0,94
Environmental Factor 7	Vehicles improperly maintain will cause pollution.	4,32	0,62
Environmental Factor 8	If we disturb the balance of nature, it will result in natural disasters.	4,56	0,63
Environmental Factor 9	Humans must live in harmony with nature in order to survive.	4,57	1,22

personal factors on pro-environmental behaviors is greater than the influence of social factors on pro-environmental behaviors.

The coefficient of determination (R Square) is a manner to appraise how much an endogenous construct can be explained by an exogenous construct. The value of the coefficient of determination (R Square) is supposed to be between 0 and 1. Meanwhile, the Adjusted R Square is the R Square value has been justified based on the standard error value. Adjusted R Square value allows a stronger description than R Square in estimating the potential of an exogenous construct to clarify endogenous constructs. The value of R square can be seen on Table 11.

According to Table 11, all factors simultaneously affect pro-environmental behaviors by 54.1% or it can be said that the exogenous construct factors have medium influence on the endogenous construct (pro-environmental behaviors).

Table 8. Descriptive Statistics of Pro-Environmental Behaviours

Pro-environmental Behavior	Statement	Mean	Standard Deviation
PEB 1	I use public transportation instead of private vehicles to travel.	3,07	1,22
PEB 2	I bring my own drinking bottle instead of buying bottled water when I travel.	3,91	1,20
PEB 3	I walk or cycle for short journey.	3,78	1,02
PEB 4	I dispose of waste by sorting between organic waste and inorganic waste.	3,76	0,94
PEB 5	I like buying organic products.	3,39	0,82
PEB 6	I turn off the light when I leave the room.	4,44	0,85
PEB 7	I turn off electronic equipment when not using it.	4,44	0,85
PEB 8	I recycle plastics, paper, glass and cans.	4,37	1,21
PEB 9	I participate in environmental conservation activities.	2,70	1,27
PEB 10	I talk about the importance of the environments with others.	2,66	1,11
PEB 11	I avoid using products that pollute the environment.	3,37	0,98
PEB 12	I clean up the food waste and cutlery in the foodcourt/restaurant after meals.	3,55	0,85
PEB 13	I prefer to bring lunch from home than buying food when I go to college.	4,18	1,19
PEB 14	I like to use reusable bags for shopping instead of using plastic bags.	3,39	1,11

Table 9. PATH COEFFICIENTS

	Pro Environmental Behaviours
Environmental Factors	-0,208
Personal Factors	0,307
Soacial Factors	0,611

Table 10. P Values

	P Values
Environmental Factors - Pro Environmental Behaviours	0,068
Personal Factors - Pro Environmental Behaviours	0,000
Social Factors - Pro Environmental Behaviours	0,000

Table 11. R Square

	R Square	R Square Adjusted
Pro. Environmental Behaviours	0,552	0,541

4 Conclusion

This study has examined factors affecting pro-environmental practices, namely personal factors, social factors, and environment factors. The results of this study found that there was a positive and significant direct effect between personal factors on pro-environmental behaviors with a coefficient value of 0.307 and p value < 0.05, which means an increase in personal factors will increase pro-environmental behaviors by 30.70%. This could be due to adherence to personal norms related to feelings of pride and guilt towards pro-environmental behaviors (Fei, 2017). There was also a positive and significant direct effect between social factors on pro-environmental behaviors with a coefficient value of 0.611 and p value < 0.05. This means an increase in social factors will also increase pro-environmental behaviors by 61.10%. This could be due to the fact that university students are more likely to actively engage in pro-environmental behaviors as a result of social influences from family members, friends, lecturers, or the campus. Social media as a media of communication for youths today can guide to better pro-environmental behaviors. All factors (personal factors, social factors, and environment factors) simultaneously affect pro-environmental behaviors by 54.1%. The results that showed the influence of social factors is greater than the influence of personal factors, hence the university can make policy that encourage the students to be more responsible in practicing

pro-environmental behaviors. The university may also use social media such as Facebook or Instagram to promote the consciousness of the students about pro-environmental behaviors.

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