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Role of Knowledge, Subjective Norms, Perceived Behavior Control, and Attitudes in Predict Pro-Environmental Behavior

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ABSTRACT

Background: One of the public universities as the green campus that prioritizes reforestation to overcome environmental issues. All stakeholders including students are expected to behave pro-environmentally.This study aimed to explain whether or not there is an influence of knowledge, subjective norm, perceived behavior control, and attitude towards pro-environmental behavior (plastic waste) for university students.

Methods: This research was conducted under a quantitative approach with 5 valid and reliable variables. In addition, regression tests and structural equation models are used. The respondents of this study were 399 university students from all faculties of Hasanuddin University.

Results: Perceived Behavior Control has the greatest effect on pro-environmental behavior compared to other variables. However, environmental knowledge has the smallest effect on subjective norms, perceived behavior control, and attitude.

Conclusion: All variables affect predict pro-environmental behavior.

Keywords: University student; knowledge; subjective norms; perceived behavior control attitude

Introduction

One thing that gets the spotlight on students and environmental problems is plastic waste. The number of students and activities affect the use of plastic waste. The number of students has the potential to increase the amount of plastic waste. Individuals should develop pro-environmental behavior in their lives, so that they are able to maintain the sustainability of the ecosystem. Pro-environmental behavior is another form of pro-social behavior. This is shown by individuals to reduce negative impacts on the environment caused by activities to achieve needs or in other words to improve environmental quality [1,2].

There are several obstacles explained that in developing pro-environmental behavior [3]. First, there is a difference between personal *interest (individual interest)* and social desire *(collective interest)*. *Collective interest* directs individuals to prioritize the environment. This is based on the view of the environment as something that needs to be taken care of together. One way is to consume pro-environmental products. However, *individual interest is* not like that. *Individual interest* prioritizes personal comfort over the environment. This causes individuals to tend to use products that are not pro-environmental, which has a negative impact on the environment.

To predict pro-environmental behavior, some experts have looked with *Theory of Planned Behavior.* TPB to examine the antecedents of pro-environmental behavior [4,5,6]. TPB is used to explain motivational factors in individual behavior [7,8]. The theory proposes that human behavior is determined by behavioral intentions. Behavioral intentions are influenced by *attitude*, *subjective norm*, and *perceived behavioral control* [9]. All of these variables are examined to determine the appropriate intervention, so that pro-environmental behavior can be improved. Furthermore, environmental preservation can also be achieved. However, the research results obtained are different.

Pro-environmental behavior is influenced by attitudes. That attitude is an individual's positive or negative evaluation of an object [10]. This makes attitudes can affect behavior. Generally, when individuals get information, their attitudes will change and that makes their behavior also change. This is supported by another research that attitudes influence on the behavior of reducing waste production in the Terban community. Individuals who obtain information about the environment and are supported by a positive attitude will behave to reduce waste production [11].

The *subjective norm* has a role in pro-environmental behavior. *Subjective norm* is a personal perception of a behavior that is influenced by others [12,13]. *Subjective norms* increase the likelihood of recycling for people who exhibit positive experiential attitudes. Subjective norms motivate people with limited knowledge about the benefits of recycling to practice recycling behavior [14].

Perceived control behavior has an important role in pro-environmental behavior. Perceived control behavior is the individual's perception of his ability to engage in certain behaviors [15]. Individuals can

behave in a certain way when there is such a perception in them [4]. The behavior management process is assumed to be substantially leading to action [16].

In addition to these three variables, the influence of *knowledge is* also calculated for its influence on these three variables and also pro-environmental behavior. The results shown are different. Based on the results of research by Abrauw, Yunus, and Giyarsih (2011) in Papua, it is explained that the level of behavior in processing inorganic waste in Papua is moderate (95%) [17]. Whereas the Papuan people have sufficient knowledge about environmental conditions through education organized by the government. However, this knowledge does not encourage individuals to behave pro-environmentally. Based on this research, one of the factors that influence knowledge that does not have a significant impact on pro-environmental behavior is the low score of attitudes and habit factors owned by the subjects in the study. This study aims to determine the effect of Knowledge, Subjective Norm, Perceived Behavior Control, and Attitude towards Pro-Environmental Behavior (Plastic Waste) on university students. The practical benefits of this research are as follows:

Find a model of the relationship between variables related to PEB for University students that can be used as the basis for policies (social intervention) from the University Leaders (Rector) or Faculty Leaders (Deans) to develop PEB for University students that support the creation of a beautiful campus environment "Green Campus" which supported by "Green Behavior" from University students in particular and the academic community in general. For individuals, as a consideration in behavior that can have an impact on the environment.

Methods

The type of research used is quantitative research. This type of quantitative research was chosen by considering that quantitative research can collect objectively measurable data based on the research variables to be studied, namely *knowledge*, *subjective norms*, *perceived behavior control*, and *attitude*, as well as pro-environmental behavior (plastic waste).

The population of this study came from all students of Hasanuddin University who are actively studying. Based on the population, the researcher will take part of the population to be sampled in this study. The number of samples of this research is 399 samples. This number has met the results of the sample size estimation through the application *G*Power* 3.1, named 89 samples with a *medium effect size* of 0.15, *error probability* of 0.05, the *statistical power* of 0.95. In addition, the number of samples of 200 is considered sufficient to test the validity and reliability. This research lasted for three months.

Techniques of Data Collection

Knowledge

The measuring tool knowledge consists of 10 true and false statement items related to plastic waste

compiled by the authors. Participants were asked to determine whether the statement was true or not. Each question is based on scientific sources. If a participant answers correctly for a true statement, then the participant will get a value of 1. Conversely, if there are participants who answer incorrectly for a true statement, then the participant will get a value of 0.

Through exploratory factor analysis, 8 items were declared valid and 2 items were declared invalid because <0.03. The eight items have validity ranging from 0.659-0.815. In addition, the six items have the reliability of 0.848, so it can be said that the reliability is >0.5.

Tabel.1
Explanatory Factor Analysis

Aitem	*Factor loading*
Aitem 1	0.724
Aitem 2	0.795
Aitem 4	0.659
Aitem 5	0.712
Aitem 6	0.780
Aitem 7	0.815
Aitem 9	0.785
Aitem 10	0.804

N=399 (male=90; female=309); Factor Loading=large correlation between the indicator and its latent construct

Subjective Norm

The measuring tool is a subjective norm composed of 6 statements compiled by Zainal & Hassan (2019). Participants are welcome to choose the answer strongly disagree, disagree, neutral, agree, and strongly agree. Through confirmatory factor analysis, 4 items were declared valid and 2 items were declared invalid because <0.03. The four items have validity ranging from 0.560-0.693. In addition, the six items have reliability of 0.721, so that it can be said to be reliable > 0.5.

Tabel.2
Confirmatory Factor Analysis

Items	*Standardized Loading Factor*
Aitem 1	0.621
Aitem 2	0.693
Aitem 5	0.560
Aitem 6	0.637

N=399 (male=90; female=309); Factor Loading=large correlation between the indicator and its latent construct

Perceived Behavior Control

The measurement tool for perceived behavior control is composed of 6 statements compiled by Zainal & Hassan (2019). Participants are welcome to choose the answer strongly disagree, disagree, neutral, agree, and strongly agree. Through confirmatory factor analysis, 5 items were declared valid and 1 item was declared invalid because <0.03. The five items have validity ranging from 0.381-0.554. In addition, the six items have reliability of 0.496, so it can be said that the reliability is >0.5.

Tabel 3
Confirmatory Factor Analysis

Items	*Standardized Loading Factor*
Aitem 1	0.554
Aitem 2	0.435
Aitem 4	0.451
Aitem 5	0.381
Aitem 6	0.547

N=399 (male=90; female=309); Factor Loading=large correlation between the indicator and its latent construct

Attitude

The measurement tool is *attitude* composed of 15 statements Zainal & Hassan (2019). Participants are welcome to choose the answer strongly disagree, disagree, neutral, agree, and strongly agree. Through *confirmatory factor analysis*, 11 items were declared valid and 4 items were declared invalid because <0.03. The five items have validity ranging from 0.384-0.550. In addition, the six items have reliability of 0.810, so it can be said that the reliability is >0.5.

Tabel.4
Confirmatory Factor Analysis

Items	*Standardized Loading Factor*
Aitem 1	0.673
Aitem 2	0.514
Aitem 3	0.331
Aitem 4	0.533
Aitem 5	0.392
Aitem 6	0.486
Aitem 7	0.453
Aitem 8	0.729
Aitem 9	0.500
Aitem 10	0.457
Aitem 11	0.514

N=399 (male=90; female=309); Factor Loading=large correlation between the indicator and its latent construct

Pro-Environmental Behavior (Less Use of Plastic Waste)

The measuring tool for pro-environmental behavior is composed of 8 statements compiled by the authors. Participants are invited to choose never, rarely, sometimes, often, and always based on statements

regarding the behavior of using plastic waste.

Through *confirmatory factor analysis*, 6 items were declared valid and 3 items were declared invalid because <0.03. The eight items have validity ranging from 0.330 to 0.700. In addition, the six items have reliability of 0.848, so it can be said that the reliability is >0.5.

Tabel.5
Confirmatory Factor Analysis

Items	Factor Loading
Item 1	0.117
Item 2	0.330
Item 3	0.354
Item 4	0.641
Item 5	0.700
Item 6	0.517

N=399 (male=90; female=309); Factor Loading=large correlation between the indicator and its latent construct;

Data Analysis
Descriptive Analysis

This study uses descriptive analysis to obtain a description of the state of the variables to be studied and matters relating to these variables based on the data obtained. Data in the form of numbers will be processed by adding, comparing, and so on until a percentage is obtained. Furthermore, the data is interpreted in the form of a conclusion sentence.

Hypothesis Test

The hypothesis in this study will be tested using correlation analysis techniques. Statistical analysis techniques used are multiple regression and linear regression. As for testing the hypothesis using the help of SPSS 23.0 for windows

Result

In this study, the researcher first tested the assumptions. The assumption test consists of residual normality, linearity, heteroscedasticity, and multicollinearity tests. The residual normality test was obtained through the Kolmogorov-Smirnov value of 0.200. This means that the data is normally distributed.

The linearity test was obtained through knowledge, subjective norm, perceived behavior control, subjective norm, and attitude towards pro-environmental behavior (plastic waste). Overall it can be said to

be linear because the value is linearity <0.05 and the deviation from linearity is >0.05

Heteroscedasticity test (Glejser) obtained by knowledge, *subjective norm*, *perceived behavioral control*, *subjective norm, and* attitude towards environmentally friendly behavior (plastic waste). In general, it can be said that there is no heteroscedasticity problem because the significance value is > 0.05.

Table.6
Heteroscedasticity test

Variable	Significance
Knowledge	0.868
Subjective Norm	0.395
Perceived Control Behavior	0.436
Attitude	0.052

Multicollinearity test obtained by knowledge, *subjective norm*, *perceived behavioral control*, *subjective norm, and* attitude towards environmentally friendly behavior (plastic waste). In general, it can be said that there is no multicollinearity problem because the *tolerance value is* < 1,000 and VIF < 10,000.

Tabel.7
Multicollinearity test

Variable	*Tolerance*	VIF
Knowledge	0.981	1.019
Subjective Norm	0.643	1.555
Perceived Control Behavior	0.696	1.436
Attitude	0.753	1.327

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Regression Test

Independent Variable	Dependent Variable	*R Square*	Asymp. sig
Knowledge	Pro-environmental behavior (Plastic Waste)	0.017	0.009
Subjective Norm	Pro-environmental behavior (Plastic Waste)	0.140	0.000
Perceived Behavior Control	Pro-environmental behavior (Plastic Waste)	0.183	0.000
Attitude	Pro-environmental behavior (Plastic Waste)	0.117	0.000
Knowledge, subjective norm, perceived behavior control, and attitude	Pro-environmental behavior (plastic Waste)	0.243	0.000

N=399 (male=90; female=309);R Square= coefficient of determination that can explain how far the dependent data can be explained by independent data.

Based on the results of the linear regression test, it can be seen that each independent variable can affect the dependent variable. It is because the value of Asymp.sig <0.05. The magnitude of the influence between variables can be observed through R Square. Knowledge has the smallest effect on pro-

environmental behavior (plastic waste), compared to subjective norms, perceived behavior control, and attitude, which is 0.017 or 1.7%. On the other hand, perceived behavior control has the greatest influence on pro-environmental behavior (plastic waste), which is 0.183 or 18.3%,

Tabel.9
Structural Equation Modeling

Path	Path coefficient	p-value	z-value
Perceived Behavior Control - Pro-environmental Behavior	0.222	0.000	4.285
Attitude - Pro-environmental Behavior	0.352	0.000	7.015
Perceived Behavior Control - Attitude	0.326	0.000	9.142
Subjective norm - Attitude	0.553	0.000	17.670
Subjective norm -Perceived Behavior Control	0.463	0.000	12.526

N=399 (male=90; female=309); Path Coefficient=the direct effect of the variable determined as the cause on the variable determined as the effect; p-value=significance level; z-value=determine the number of standard deviations above or below the mean

Tabel.10
The Goodness of Fit Model

Goodness of Fit Model	Value
P-Value of Chi-Square	0.181
RMSEA	0.044
NFI	0.996
CFI	0.998
GFI	0.997
AGFI	0.977
SRMR	0.012

N=399 (male=90; female=309); value=measure the accuracy of the sample regression function in estimating the actual value

Discussion

Through the results obtained in linear regression, it can be said that environmental knowledge (plastic waste), subjective norms, perceived behavior control, and attitude affect pro-environmental behavior. However, environmental knowledge has the smallest effect on subjective norms, perceived behavior control, and attitude. In addition, perceived has the greatest effect on pro-environmental behavior compared to other variables.

These results are in line with the explanation that subjective norms, perceived behavior control, and

attitude affect pro-environmental behavior based on TPB [9,15,18]. Perceived behavior control has a significant impact on commitment across various actions [19,20,21]. The results of this study show different results from research by Aziz et al., (2021) that the attitude of university employees directly affects the intention to behave in pro-environmental behavior. Human attitudes are strong predictors of subsequent behavior [22]. This notion also applies to the study of environmental behavior [23]. In this study, attitude is not the variable with the greatest influence, but perceived behavior control.

Furthermore, the effect of knowledge on pro-environmental behavior is the smallest. This is also explained through the research of Ajzen et al. (2011) that good information is a prerequisite for effective action to produce the desired results. In Study 1 (N = 79), environmental knowledge did not affect energy conservation, and in Study 2 (N = 79), alcohol knowledge was not associated with drinking behavior. Such disappointing correlations can result from an inappropriate focus on the accuracy of the information at the expense of its relevance and support for behavior. Study 3 (N = 85) found a positive correlation between knowledge and pro-Muslim behavior, but Study 4 (N = 89) confirmed the proposition that this correlation arises because responses on knowledge tests reflect underlying attitudes. Study 4 also shows that the correlation can be positive or negative by selecting the right questions for the knowledge test. The theory of planned behavior, with a focus on specific actions, intentions, and predicted behavior in all four studies [7].

Conclusion

This research was conducted on several variables that influence the behavior of using plastic waste, which are knowledge, subjective norms, perceived behavior control, and attitudes. Environmental knowledge (plastic waste), subjective norms, perceived behavior control, and attitude affect pro-environmental behavior. Perceived Behavior Control has the greatest effect on pro-environmental behavior compared to other variables. However, environmental knowledge has the smallest effect on subjective norms, perceived behavior control, and attitude.

Conflicts of Interest

No potential conflict of interest relevant to this article was reported.

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