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The influence of environmental values and attitude on student's intentions to participate in take-back programs

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Abstract

One goal of a take-back program is to preserve the environment. Consumers' participation in take-back programs enables the collection process, the first step in reverse logistics. This research uses structural equation modelling to investigate the intentions of consumers, specifically university students, to participate in mobile phone take-back programs, and explores the influence of students' environmental values and attitudes on those intentions. A survey was conducted on 184 university students in Indonesia. Results showed that environmental values had a positive and significant effect on environmental attitudes, but environmental attitude did not in turn significantly affect students' intentions to participate in mobile phone take-back programs. Mobile phone companies may reference these findings when attempting to implement a suitable take-back program, especially one targeted at university students.

Keywords : *Environmental attitude, Environmental values, Structural Equation Modeling (SEM), Student intentions, Take-back program.*

1. Introduction

The number of mobile phone users in Indonesia has been increasing continuously over the years. Reference [1] states that mobile phone users from 2014 to 2015 increased by 9%, and Indonesian mobile phone users in 2015 reached 308.2 million when the total population of Indonesia was 255.5 million; meaning that year, the number of mobile phone users exceeded the number of inhabitants.

Growth in mobile phone users has impacted the rate of increase in mobile phone waste, known as e-waste. Inadequate disposal of e-waste can harm the environment, but if it is managed properly, e-waste can be profitable. Reference [2] argues that the increasing volume of e-waste is not only an environmental problem, but also an economic opportunity.

A survey conducted by Nokia [3] found persistently, low public awareness regarding opportunities to participate in a take-back program for mobile phone

recycling. The survey showed that 70 percent of mobile phone users were not familiar with the mobile phone recycling program. Meanwhile, 3 to 4 percent of people who had previous knowledge about the program had not even considered recycling their phones. About 88 percent of the survey respondents were Indonesian.

Research previous to the Nokia survey had also noted low response rates to the mobile phone take-back program. A survey by [4] showed that no respondents had participated in the program. This low-response phenomenon may be one obstacle for the successful implementation of the mobile phone take-back program in Indonesia.

According to the Theory of Planned Behaviour (TPB), a person's behaviour is guided by values that he believes in [5]. These values will affect his attitude, which will in turn influence his intentions and behaviour. This study aims to apply the TPB theory in determining the effect of environmental values and attitude on university students' intentions to participate in mobile phone take-back programs. University students were selected as respondents for this study in order to understand specifically the intentions of educated people toward mobile phone take-back programs.

A literature review was performed to identify previous studies that have investigated the environmental behaviour of educated people as related to factors such as environmental values and attitudes. Findings from the literature review show that most existing environmental behaviour models applied to surveying educated people have had a focus on green product buying behaviour, as well as pro-environmental behaviour (PEB).

The literature review did not find any studies focusing on the environmental behaviour of educated people as associated with take-back programs.

Models of educated peoples' intentions and behaviours toward buying green products have been presented by [6], [7], [8], and [9]. Reference [6] conducted a study to identify the factors that influence Indonesian university students' behaviour in purchasing green products and found that environmental attitude had no significant effect on behaviour. Reference [7] analyzed the purchasing behaviour, especially of post graduate and doctoral students in India, toward environmentally friendly products. This study's findings were presented in terms of the TPB and showed that environmental values had influence on environmental attitude, and environmental attitude in turn affected behaviour. References [8] and [9] examined purchasing intentions and attitudes toward green electronic products. Both studies used Universiti Sains Malaysia lecturers as respondents, but the two studies differed in the exogenous variables employed. Reference [8] utilized perceived government legislation as an exogenous variable, whereas [9] employed self-efficacy. In addition, [8] used environmental attitude as a mediating variable, whereas [9] made environmental attitude a consequent variable. Meanwhile, neither study investigated environmental values. Findings from [8] showed that environmental attitude did not act as a mediating variable between independent variables and purchasing intention.

Reference [10] identified influential factors in green purchasing behaviour for university students in Bandung, Indonesia, and [11] developed a mod-

el of environmentally conscious purchasing behaviour for university students in Turkey. Meanwhile, [12] investigated Iranian students' intentions toward purchasing organic food. Results from [10], [11], and [12] showed that environmental attitude affected purchasing intentions and behaviours. In addition, [11] also found that environmental values influenced environmental attitude.

Studies on PEB were conducted by [13]-[21]. Reference [13] developed a model that described behaviours relating to environmental sustainability for students at the Middle East Technical University of Turkey. Reference [14] conducted a study comparing business students in the USA and Chile in terms of their intentions toward conducting pro-environmental behaviour. Reference [15] described the impact of students' background on certain environmentally responsible behaviours. The study was conducted on university students in Turkey. Reference [16] explored the relationship between Malaysian university students' knowledge, attitude, and environmental practices. Reference [17] assessed environmental attitudes in relation to responsible environmental behaviour among students pursuing their B.Ed. degree from the University of Calcutta, India. Reference [18] studied the influence of environmental knowledge on pro-environmental behaviour among university students from the USA, Spain, Mexico, and Brazil. Reference [19] examined differences among first, third, and sixth year engineering students in their attitude and behavioural values. This study was conducted at a Chilean University. Reference [20] investigated USA university students' attitudes and other variables' influence on intentions and

behaviours regarding environmental sustainability. Reference [21] expounds upon the relationship between environmental attitude, environmental responsibility, environmental concern, and environmental knowledge, as well as outdoor activities. Respondents in the study were university students attending Middle East Technical University (METU), Ankara, Turkey. Findings from [21] were unique relative to the other studies described above in that they showed environmental knowledge influencing environmental attitude. Meanwhile, [13], [19], [20], and [21] found that environmental attitude influenced environmental intentions and behaviours.

Reference [22] studied PEB among business students in the USA and Chile to compare three theories: Ajzen and Fishbein's theory of reasoned action, Schwartz's norm activation theory, and the values-beliefs-norms theory created by Stern, Dietz, Abel, Guagnano, and Kalof. The study showed that USA students' environmental attitude affected their behavioural intentions, whereas Chilean students' environmental attitude did not significantly affect their behavioural intentions. References [23] and [24] conducted studies on PEB, specifically regarding recycling behaviour. Reference [23] identified factors influencing recycling behaviour by collecting data from students enrolled at COMSATS Institute of Information Technology, Pakistan, whereas [24] investigated the main internal factors that influenced recycling activities among university students in Spain. Findings from [23] showed that environmental knowledge affected environmental attitude, and environmental attitude in turn impacted recycling behaviour, whereas findings from

[24] showed that environmental attitude did not affect recycling behaviour.

A study investigating students' PEB activity, especially concerning their intentions to use bioenergy, was conducted by [25] on high school students in Finland and India. Reference [26] predicted American and Korean students' intentions to participate in activities that could help mitigate climate change, and [27] compared the influence of implicit and explicit attitudes on environmental behaviour among undergraduate students at Washington University. Findings from [24], [25], and [26] showed that environmental attitude had a significant influence on PEB.

The literature review regarding environmental behaviour of educated people found no previous research discussing take-back programs in relation to educated peoples' behaviour, thus confirming a need for further study. Moreover, findings from [3], which show that few people in Indonesia are aware of or participate in the nation's take-back

program, suggest a need to investigate how environmental values and attitudes influence Indonesian university students' (educated peoples') participation in the take-back program.

2. Materials and methods

2.1 Research model and hypotheses

The research model used to investigate the influence of environmental values and attitude on students' intentions to participate in take-back programs is shown in Figure 1. The effects of environmental values on environmental attitude and the influence of environmental attitude on behavioural intentions are discussed in detail in [28]. The hypotheses of this study were:

H1: Environmental values have a positive and significant effect on environmental attitude.

H2: Environmental attitude has a positive and significant effect on students' intentions to participate in mobile phone take-back programs.

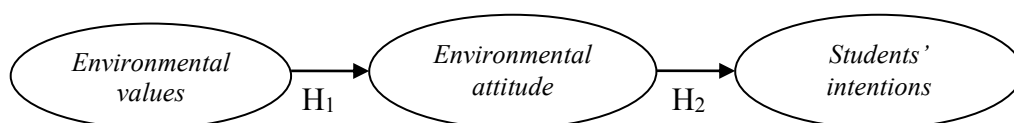


Figure 1. Research model

2.2 Research methods

Research stages included: (1) Distribution of the initial questionnaire to students; (2) Performance of a validity and reliability test of the initial questionnaire using SPSS 16; (3) Distribution of the formal questionnaire to students; (4) Confirmatory factor analysis (CFA) using AMOS 19; and (5) Model development of structural equation modelling (SEM) using AMOS 19.

Questionnaire development regarding environmental values was drawn from [29], whereas parts of the questionnaire relating to environmental attitude were retrieved from Kilbourne and Pickett (2008) in [30], and items relating to students' intention were adapted from [5].

3. Results

The questionnaires were distributed in May 2014. Initial questionnaires were distributed to 70 respondents in order to test the questionnaires' validity and reliability. Once confirmed to be valid and reliable, the questionnaires were distributed widely to reach a sufficient number of respondents. Finally, the total number of respondents for this study was 184 university students from a variety of majors.

3.1 Reliability and validity

Reliability and validity tests were conducted using 70 respondents. The reliability test was conducted to confirm internal consistency, i.e. the consistency of the questionnaire items in measuring latent variables. As suggested by [31], if the Cronbach α value according to the reliability test was less than 0.6, then the latent variable should be removed. The results of the reliability test showed Cronbach's α coefficient for the 3 latent variables to be greater than 0.6, signifying that all the factors were reliable.

The validity test determined whether the items of the questionnaire would be able to measure what the researcher intended. This test was performed by comparing the "item-to-total" value with the product-moment coefficient (r) in the table of critical values. For $N = 70$, the product-moment coefficient (r) at the 5% significance level is 0.235. The results of the validity test showed that the "item-to-total" value for the 2nd item related to environmental values was less than

0.235, so this item was invalidated. All other items were shown to be valid.

3.2 Confirmatory factor analysis (CFA) results

There is no general agreement in determining a factor loading cut off value for a CFA [32]. The factor loading cut off value for this study was determined to be more than 0.4. The CFA model fit statistics for exogenous variables were $p=0.540$; $\chi^2=1.232$; $GFI=0.997$; and $RMSEA=0.000$. Results showed that the 1st item related to environmental values should be deleted.

The CFA model fit statistics for endogenous variables were $p=0.356$; $\chi^2=34.350$; $GFI=0.964$; and $RMSEA=0.021$. This test determined that two items should be removed from the environmental attitude portion of the model, including the 3rd and 4th items.

3.3 Structural model results

The model achieved an overall fit, with values of $p=0.099$; $\chi^2=60.970$; $GFI=0.935$; and $RMSEA=0.042$. The model output is shown in Figure 2. The regression weights and the squared multiple correlations are presented in Tables 1 and 2, respectively. Table 1 shows that environmental values had a positive and significant impact on environmental attitude at a level of 0.01 ($\beta_{H1}=0.374$; $p=0.008$), confirming H1. Meanwhile, the influence of environmental attitude on students' intentions to participate in a mobile phone take-back program was statistically insignificant ($\beta_{H2}=0.047$; $p=0.787$), leaving H2 unsupported.

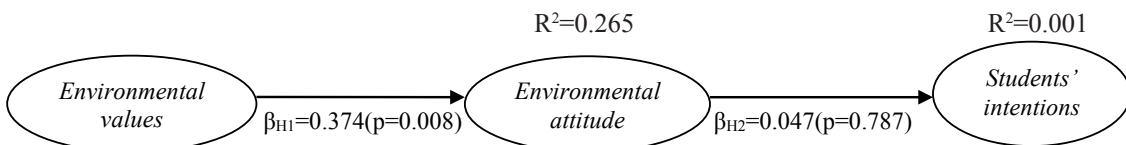


Figure 2. Model output

Table 1 Regression Weights

			Estimate	S.E.	C.R.	P	Label
Environmental_ attitude	<---	Environmental_ values	.374	.142	2.639	.008	par_9
Students'_ intentions	<---	Environmental_ attitude	.047	.174	.270	.787	par_10

Table 2 Squared Multiple Correlations

	Estimate
Environmental_attitude	.265
Students'_intentions	.001

Table 2 shows that environmental values play a 26.5% role in shaping environmental attitudes. Meanwhile, environmental attitude as a determinant of students' intentions plays a 0.1% role.

4. Discussion

The positive and significant impact of environmental values on environmental attitude signifies the importance of students' understanding of environmental values, as this is able to influence students' attitude toward the environment. This finding is consistent with the TPB, which posits that the values one adheres to encourage a certain attitude guided by those values [5]. This finding is also consistent with research by [7], [11], [21], and [23].

The finding that environmental attitude did significantly influence students' intentions to participate in mobile phone take-back programs signifies the incapacity for students' environmental attitudes to push them in their intent to join a mobile phone take-back program.

This finding does not correspond with the TPB, which proposes that a person's attitude affects his/her intended behaviour [5]. It is also inconsistent with research by [7], [10]-[13], [19]-[21], [22] (specifically findings that applied to USA students), [23],

and [25]-[28]. On the other hand, the finding is consistent with studies by [6], [17], [18], [22] (specifically findings that applied to Chilean students), and [24]. These studies showed environmental attitude having no significant effect on environmental behaviour. Vermeir and Verbeke [18] show that this finding is not surprising, as according to their research, environmental attitude is not a good predictor for environmental behaviour. Likewise, it can be observed from this current study that the role of environmental attitude in shaping students' intentions is very small ($R^2 = 0.001$), so it is possible that there are other factors affecting students' intentions.

One could infer from this study's findings that there is a possibility students assume mobile phone take-back programs have no relevance to the preservation of the environment, thinking instead that the program is merely a matter of business. Given this possibility, it is necessary for mobile phone companies implement-

ing a take-back program to inform their consumers about its benefits in relation to environmental sustainability. This could be accomplished by working with the government to promote environmental conservation activities that involve college students.

Meanwhile, the low values of the squared multiple correlations of environmental attitude and students' intentions imply that there are other factors which help to form environmental attitudes and students' intentions. Further research is necessary in order to explore other factors that may influence environmental attitudes and students' intentions to participate in the mobile phone take-back program.

5. Conclusions

In conclusion, environmental values had a significant, positive effect on environmental attitude. Meanwhile, environmental attitude had no significant effect on students' intentions to participate in a mobile phone take-back program. So, even though environmental values may affect students' environmental attitude, because a student's environmental attitude does not drive their intentions to participate in a take-back program, it is necessary to conduct further research in order to investigate other factors that may affect students' intentions.

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7. References

- (1) [wwf.or.id](http://www.wwf.or.id/?10080/daur-ulang-ponsel-dan-aksesori-bekas) [Internet]. Daur Ulang Ponsel dan Aksesori Bekas [updated 2009 Sept 2; cited 2011 August 20]. Available from: <http://www.wwf.or.id/?10080/daur-ulang-ponsel-dan-aksesori-bekas>.
- (2) [id.techinasia.com](https://id.techinasia.com/laporan-pengguna-website-mobile-media-sosial-indonesia) [Internet]. Berapa jumlah pengguna website, mobile, dan media sosial di Indonesia? [updated 2015 Jan 21; cited 2016 Feb 15]. Available from: <https://id.techinasia.com/laporan-pengguna-website-mobile-media-sosial-indonesia>.
- (3) Dixit S, Vaish A. Sustaining environment and organisation through e-waste management: a study of post consumption behaviour for mobile industry in India. *International Journal of Logistics Systems and Management* 2013;16(1):1–15.
- (4) Budijati SM, Subagyo, Wibisono MA, Masruroh NA. A Study of Consumers' Post Consumption Behaviour for Mobile Phone in Indonesia. In: Gen M, Kim KJ, Huang X, Hiroshi Y, editors. *Industrial Engineering, Management Science and Applications 2015*. Berlin Heidelberg: Springer; 2015. p. 563-573.

- (5) Ajzen I [Internet]. Constructing a TpB Questionnaire: Conceptual and Methodological Considerations [updated 2006 Jan; cited 2013 Feb 25]. Available from: <http://www.uni-bielefeld.de/ikg/zick/ajzen%20construction%20a%20tpb%20questionnaire.pdf>.
- (6) Irawan R, Darmayanti D. The influence factors of green purchasing behavior: a study of University Students in Jakarta. Proceedings of 6th Asian Business Research Conference; 2012 Apr 8-10; Bangkok, Thailand. p. 1-11.
- (7) Kumar B. A Theory of Planned Behaviour Approach to Understand the Purchasing Behaviour for Environmentally Sustainable Products. Working Paper Series, W.P. No. 2012-12-8, Indian Institute of Management Ahmedabad, India.
- (8) Qader IKA, Zainuddin Y. Intention to Purchase Green Electronic Products: The Consequences of Perceived Government Legislation, Media Exposure and Safety & Health Concern and the Role of Attitude as Mediator. International Journal of Innovation, Management and Technology 2010;1(4):432–440.
- (9) Qader IKA, Zainuddin Y. The Influence Of Media Exposure, Safety And Health Concerns, And Self-Efficacy On Environmental Attitudes Towards Electronic Green Products. Asian Academy of Management Journal 2011;16(2):167-186.
- (10) Widodo A, Rubiyanti N, Nandary T. Factors Influencing Green Purchasing Behavior (Study on University Student in Bandung). Proceedings of 2nd International Conference on Global Trends in Academic Research GTAR-2015; 2015 Apr 20-21, Bandung, Indonesia. Vol.2, p.775-785.
- (11) Arslan T, Yilmaz V, Aksoy HK. Structural Equation Model for Environmentally Conscious Purchasing Behavior. Int. J. Environ. Res 2012;6(1):323–334.
- (12) Yazdanpanah M, Forouzani M. 2015, Application of the Theory of Planned Behaviour to predict Iranian students' intention to purchase organic food. Journal of Cleaner Production 2015;107: 342-352
- (13) Sahin E, Ertepinar H, Teksoz G. University students' behaviors pertaining to sustainability: A structural equation model with sustainability-related attributes. International Journal of Environmental & Science Education 2008;3(3):459-478.
- (14) Cordano M, Welcomer S, Scherer R, Pradenas L, Parada V. Understanding cultural differences in the antecedents of pro-environmental behavior: a comparative analysis of business students in the United States and Chile. The Journal of Environmental Education 2010; 41(4):224–238.

- (15) Erdogan M, Akbunar S, Asik UO, Kaplan H, Kayir CG. The effects of demographic variables on students' responsible environmental behaviours. *Procedia-Social and Behavioral Sciences* 2012;46:3244-3248.
- (16) Ahmad J, Noor SM, Ismail N. Investigating Students' Environmental Knowledge, Attitude, Practice and Communication. *Asian Social Science* 2015;11(16):284-293.
- (17) Lahiri S. Assessing the Environmental Attitude among Pupil Teachers in Relation To Responsible Environmental Behavior: A Leap towards Sustainable Development. *Journal of Social Sciences* 2011;7(1):33-41.
- (18) Vicente-Molina MA, Fernández-Sáinz A, Izagirre-Olaizola J. Environmental knowledge and other variables affecting pro-environmental behaviour: comparison of university students from emerging and advanced countries. *Journal of Cleaner Production* 2013;61: 130-138.
- (19) Heyl M, Díaz EM, Cifuentes L. Environmental attitudes and behaviors of college students: a case study conducted at a Chilean university. *Revista Latinoamericana de Psicología* 2013;45(3):489-502.
- (20) Swaim JA, Maloni MJ, Napshin SA, Henley AB. Influences on Student Intention and Behavior Toward Environmental Sustainability. *Journal Business Ethics* 2014;124:465-484.
- (21) Teksoz G, Sahin E, Tekkaya-Oztekin C. Modeling Environmental Literacy of University Students. *Journal of Science Education and Technology* 2012;21(1);157-166.
- (22) Cordano M, Welcomer S, Scherer RF, Pradenas L, Parada V. A Cross-Cultural Assessment of Three Theories of Pro-Environmental Behavior: A Comparison Between Business Students of Chile and the United States. *Environment and Behavior* 2012;43(5): 634-657.
- (23) Ahmad MS, Bazmi AA, Bhutto AW, Shahzadi K, Bukhari N. Students' Responses to Improve Environmental Sustainability Through Recycling: Quantitatively Improving Qualitative Model. *Applied Research Quality Life* 2016;11:253-270.
- (24) Izagirre-Olaizola J, Fernández-Sainz A, Vicente-Molina MA. Internal determinants of recycling behaviour by university students: a cross-country comparative analysis. *International Journal of Consumer Studies* 2015;39:25-34.
- (25) Halder P, Pietarinen J, Havu-Nuutinen S, Pöllänen S, Pelkonen P. The Theory of Planned Behavior model and students' intentions to use bioenergy: A cross-cultural perspective. *Renewable Energy* 2016;89:627-635.
- (26) Kim S, Jeong SH, Hwang Y. Predictors of Pro-Environmental Behaviors of American and Korean Students: The Application of the Theory of Reasoned Action and Protection Motivation Theory. *Science Communication* 2013;35(2):168-188.

- (27) Levine DS, Strube MJ. Environmental Attitudes, Knowledge, Intentions and Behaviors Among College Students. *The Journal of Social Psychology* 2012;152(3):308-326.
- (28) Budijati SM, Subagyo, Wibisono MA, Masruroh NA. The influence of environmental attitude on consumers' intentions to participate in a take-back program. *Int. J. Logistics Systems and Management* (in press).
- (29) Qi-yan W, Yan-li L. Research on Status and Influence Factors of Citizen's Environmental Behaviors in Beijing. *Energy Procedia* 2011;5:2103-2107.
- (30) Leonidou LC, Leonidou CN, Kvasova O. Antecedents and outcomes of consumer environmentally-friendly attitudes and behaviour. *Journal of Marketing Management* 2010; 26(13-14):1319-1344.
- (31) Barr S, Gilg AW. A Conceptual Framework for Understanding and Analyzing Attitudes towards Environmental Behaviour. *Geografiska Annaler. Series B, Human Geography* 2007;89(4): 361-379.
- (32) Doll WJ, Raghunathan TS, Lim JS, Gupta YP. A confirmatory factor analysis of the user information satisfaction instrument. *Information Systems Research* 1995;6(2):177-188.