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\*Corresponding author:  
Nihayatu Aslamatis Solekah,  
Faculty of Economics, UIN  
Maulana Malik Ibrahim  
Malang, Indonesia

E-mail: [aslamatiss\\_1@pbs.uin-malang.ac.id](mailto:aslamatiss_1@pbs.uin-malang.ac.id)

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## Millennials' Deals with Plastic: The Effect of Natural Environmental Orientation, Environmental Knowledge, and Environmental Concern on Willingness to Reduce Plastic Waste

Nihayatu Aslamatis Solekah<sup>1\*</sup>, Tanti Handriana<sup>2</sup>, Indrianawati Usman<sup>3</sup>

**Abstract:** To maintain environmental sustainability can be managed and resolved by changing human behavior, especially by reducing plastic waste. This study investigated whether natural environmental orientation, environmental knowledge, environmental concern, and environmental attitude affect the extent to which millennials avoid or reduce the purchase of single-use plastic tableware, food with plastic packaging, and plastic water bottles called Willingness to Reduce Plastic Waste (WRPW). This study used quantitative using the purposive sampling method. Data collection techniques using online questionnaires were sent to respondents with criteria for educated millennial Muslims at Islamic universities in East Java, Central Java, and West Java. The survey was conducted for three months and obtained 369 respondents. The questionnaire is processed by using SEM analysis with Smart PLS. The results show that environmental knowledge provides a direct and an indirect effect on willingness to reduce plastic waste through environmental attitude. Meanwhile, environmental concern has no direct effect on willingness to reduce plastic waste, yet it has an indirect effect through environmental attitude. This research implies that concern for the environment is not necessarily accompanied by the willingness to reduce the use of plastic. However, adequate knowledge about the environment can increase the willingness to reduce the use of plastic among millennial generations who prioritize logical thinking and adapt to their knowledge.

**Keywords:** environmental knowledge, environmental concern, environmental attitude, natural environmental orientation, willingness to reduce plastic waste

JEL Classification: O13, P36, Q51



Nihayatu Aslamatis  
Solekah

### ABOUT THE AUTHORS

Nihayatu Aslamatis Solekah is lecturer at UIN Maulana Malik Ibrahim Malang and Cand P.hD at the Department of Doctoral Management, Faculty of Economic Business, Airlangga University, Indonesia. Her areas of specializations include consumer behavior, entrepreneurship. She can be reached via [aslamatiss\\_1@pbs.uinmalang.ac.id](mailto:aslamatiss_1@pbs.uinmalang.ac.id)

Tanti Handriana is Professor at the Department of Management, Faculty of Economics and Business, Airlangga University Surabaya, Indonesia. Her areas of specialization include marketing and consumer behavior. She can be reached via [tanti.handriana@feb.unair.ac.id](mailto:tanti.handriana@feb.unair.ac.id)

Indrianawati Usman is lecturer at the Department of Management, Faculty of Economics and Business, Airlangga University Surabaya, Indonesia. Her areas of specialization include management, strategic management, operation and supply chain. She can be reached via [indrianawati-u@feb.unair.ac.id](mailto:indrianawati-u@feb.unair.ac.id)

### PUBLIC INTEREST STATEMENT

Today there is increasing public attention to environmentally friendly behavior, especially to plastic waste. This increase is in line with the government's efforts to handle plastic waste with the 3R (reduce, reuse, and recycle) program. One of the efforts that can be done to reduce the high level of plastic waste is to change consumer behavior to minimize the use of materials that produce plastic waste in all aspects of their lives. This study seeks to reveal how educated millennials are preferred as representative respondents because they are more concerned and responsible for the environment.



## 1. Introduction

Over the past seventy years, plastic has been increasingly produced due to its low cost, durability, and possibility of being easily added with other elements to enhance its properties. In addition, plastic materials are widely used in various industries. Syberg, Hansen, Christensen, and Khan (2018) denote that plastic is now easy to find everywhere, and people commonly use it for daily needs. On the other hand, the mass use of plastic will threaten the environment (Baztan et al., 2014; Eriksen et al., 2013).

Indonesia produce 67.8 million tons of waste in 2020. The Ministry of Environment and Forestry (KLHK) reported that 37.3% of waste in Indonesia comes from household activities, 39.8% is from food waste, and plastic waste has a proportion of 17%. According to the Director of Waste Management at the Ministry of Environment and Forestry, the government has targeted a 30% reduction in waste and 70% waste management by 2025 by limiting plastic waste and recycling inorganic ones (KLH, 2020). In addition, data from the Ministry of Environment and Forestry (KLHK) during the pandemic saw an increase in waste from 27 to 36% of plastic waste, cardboard, styrofoam, and other waste used as package wrappers.



Figure 1. Percentage of types of waste in Indonesia

To meet the target of reducing waste by 2025, good cooperation is needed between the government, industry, and consumers as waste collectors due to their consumption activities. One effort can be made to change their behavior to be more environmentally friendly, especially their behavior towards using various plastic equipment because this is where much waste is generated. Significant contributions may come from the choices of consumers' daily consumption. Once people lower the purchase and use of plastic, they can partially reduce the pressure on the environment. They can support industrial transitions without generating pollution by replacing single-use plastic items with reusable ones, avoiding purchasing products with many packaging, or choosing items with no packaging. Several previous studies have investigated the determinants of consumers' decisions to engage in various pro-environmental behaviors, such as waste recycling behavioral intention (Thi Thu Nguyen, Hung, Lee, & Thi Thu Nguyen, 2018), energy conservation (Dursun, Tümer, & Tuğger, 2019), and consumption of organic food (Pieniak, Aertsens, & Verbeke, 2019).

Tonglet, Philips, and Read (2004) examine recycling behavior determined by a pro-recycling attitude. Likewise, the pro-recycling attitude is influenced by knowledge about recycling itself. Therefore, this study offers how to predict waste reduction behavior with a behavioral change theory approach and add the orientation of the natural environment as a derivative of the concept in Islamic teachings. However, few studies have explicitly focused on avoiding or reducing consumers to plastic items that focus on millennial Muslims.

The urgency of this research is to make a real contribution from the consumer side, especially young educated consumers, in understanding their behavior as individuals towards their waste, especially the plastic waste that they produce a lot. In addition to supporting national and world policies on the Sustainable Development Goals, by

2030, each country must reduce its waste by reducing, reusing, and recycling to obtain sustainable production and consumption patterns.

The current paper attempts to fill this gap by exploring the factors driving consumers to reduce plastic. Some products in our daily life are made of plastic. Plastic waste includes the most common single-use plastics, such as plastic bags, plastic bottles, coffee/juice cups and lids, straws, plastic cutlery, and food packaging (Johnston, 2017). As plastic becomes the largest supplier of waste to the surrounding environment, consumers' willingness to avoid or reduce plastic use will significantly contribute to plastic waste and other related impacts. Therefore, this study is conducted to acknowledge the behavior of young consumers (millennials) towards the willingness to reduce the use of plastic materials.

Natural Environmental Orientation (NEO) is a concept containing various tendencies toward nature, such as a love of nature (Mostafa, 2007). It is a worldview concept consisting of one's beliefs, attitudes, and perceptions gathered from culture (Ewert and Baker, 2001). This concept explains nature-protective behavior, such as human beliefs and relationships with nature. Kals, Schumacher, and Montada (1999) suggest that establishing an emotional bond with nature can be a motivating factor in protecting it. Therefore, NEO positively affects Environmental Knowledge (Mostafa, 2007; Hasnah, 2014). Likewise, NEO positively affects environmental awareness because individuals with an excellent natural environment orientation will increase their level of environmental sustainability issues (Mostafa, 2007; Hasnah, 2014).

Environmental knowledge positively affects environmental attitudes (Singh & Bansal, 2012). In addition, studies show that knowledge usually induces pro-environmental attitudes, which, in turn, inspires environmentally or ecologically responsible consumer behavior (Fisher, Bashyal, & Bachman, 2012).

Bamberg and Moser (2007) argue that awareness of the environment has an indirect effect on pro-environmental intention. According to Gifford and Nilsson (2014), the higher the environmental concern (EC), the higher the active involvement in sustainability or pro-environmental behavior. Overall, the results of this study indicate that the greater the concern, the higher the likelihood of being actively involved in sustainability-oriented behavior (Kaiser, Ranney, Hartig, & Bowler, 1999; Gifford & Nilsson, 2014).

In a study by Wang, Guo, and Wang (2016), attitude positively impacts individual behavior. However, in contrast to Lizin, Van Dael, and Van Passel's (2017) research, attitude is insignificant to battery pack recycling. Furthermore, the study by Khan, Ahmed, and Najmi (2019) concluded that the attitude has an insignificant impact on return/recycling intention.

Young consumers or educated millennials are preferred as the respondents because they are more concerned and responsible for the environment (Martinsons, So, Tin, & Wong, 1997; Connel, Fien, Lee, Sykes, & Yencken, 1999). The millennial generation is more likely to understand the concept and importance of a sustainable environment (Sliwka, Diedrich, & Hofer, 2006). They are also more receptive to new ideas (Ottman, Stafford, & Hartman, 2006). Thus, educated young consumers can be the driving force that can bring about the desired changes in reducing plastic waste. Furthermore, they have a longer life span, ensuring that their changes will last for a more extended period and be passed on to future generations.

From the phenomena and data of previous research, this study aims to identify how their natural orientation influences the pro-environmental behavior of Muslim millennials as human beings, which will also increase their level of knowledge about the environment and increase their environmental awareness, in line with their attitude towards the environment which in the end they show with the desire to behave to reduce plastic waste in their lives. The results of this study are expected to be used as a reference for stakeholders to continuously educate the millennial generation about their unique characters, with the hope of becoming a pilot project for the sustainability of human life in the future.

## **2. Literature Review**

This research focuses on consumer behavior from the decision to reduce the use of plastic objects, which is conceptualized as Pro-Environmental Behavior (PEB). According to Jensen (2002) and Peattie (2010), the term PEB refers to any practices - such as purchase, use, post-use, management, and behavioral activity - that humans consciously undertake to reduce the impact of their behavior on the environment. Klöckner's (2013) meta-analysis shows that research in this field is based mainly on four dominant theories, which are the "theory of planned behavior" (Ajzen, 1991), "norm activation theory" (Schwartz, 1992), "theory of value-belief norm" (Stern, 2000), and "habits" (Verplanken & Aarts, 1999).

Environmental knowledge (EK) is the level of understanding and recognition of environmental problems that encourage individual responsibility for environmental protection (Maurer & Bogner, 2020; Clayton et al., 2019; Otto & Pensini, 2017). It is an essential prerequisite to creating individuals responsible for the environment (Liu, Teng, Han., 2020). Thinking processes that involve self-evaluation (Pace, 2010), placing attachments that show a relationship with nature (Culin, Bielić, Jaksi, 2019) and society (Severo, Guimarães, Dellarmelin, & Ribeiro, 2019) will influence environmental problems, from which awareness and concern on environment emerge. Steg and Vleg (2009) say that attitude is the primary driver of a person's behavior because this drive stimulates individuals to avoid environmental problems, while the notion of pro-environmentally responsible behavior minimizes environmental damage or benefits the environment. Likewise, in reducing plastic waste, PEB involves different targets, such as recycling, reusing, and reducing plastic use, called Willingness to Reduce Plastic Waste (WRPW). Hence, the hypothesis developed in this study is a framework for PEB.

### **2.1 Relationship between Natural Environment Orientation on Environmental Knowledge and Environmental Concern**

Natural Environmental Orientation (NEO) is a concept that embraces various tendencies towards nature as a love of nature (Mostafa, 2007). Intuitively, this construct is appropriate to explain the behavior of protecting wildlife. Some authors claim that building an emotional bond with nature can motivate to watch it (Kals et al. 1999). NEO is a worldview concept consisting of beliefs, attitudes, and perceptions gathered from culture (Ewert & Baker, 2001). This concept explains nature-protection behaviors, such as human beliefs and relationships with nature. Kals et al. (1999) suggest that establishing an emotional bond with nature can be a motivating factor in protecting it. NEO tends to have a direct positive relationship with EK. In other words, consumers with high NEO are expected to process environmental product information analytically. Mostafa (2007) and Chan and Lau (2000) showed positive attitudes towards NEO and a causal relationship between human-nature orientation and environmental knowledge consumers.

NEO can also have a direct positive relationship with Environmental Concerns (EC). Consumers with a high natural environment orientation are expected to be more concerned about environmental issues. Therefore, NEO is an excellent indicator of EC. The positive and significant relationship between NEO and EC underlies the recent examination of Mostafa (2007) and Hamid and Cheng (1995).

### **2.2 Relationship between Environmental knowledge on Environmental Attitude and Willingness to Reduce Plastic Waste**

In addition to the tendency to nature (NEO), Environmental Knowledge (EK) also significantly encourages individual behavior. Empirical research has shown that EK positively impacts environmental attitudes and behavior (Blocker and Eckberg, 1997; Singh & Bansal, 2012). Moreover, many studies have shown that knowledge usually induces pro-environmental attitudes. Likewise, findings from Kaiser and Fuhrer (2003) and Kollmuss and Agyeman (2002) show that when consumers are knowledgeable about particular environmental issues, they are more likely to behave sustainably in certain respects.

The role of knowledge in encouraging behavior usually refers to two different constructions, objective knowledge and subjective knowledge. However, several

studies suggest that subjective knowledge better predicts both pro-environmental intentions and behavior. It is evidenced by the results of previous studies that knowledge affects PEB in different contexts, such as recycling behavior (Ellen, 1994) and energy conservation behavior (Dursun et al., 2019). Situmorang, Liang, and Chang (2020) also find a positive relationship between EK about plastic waste and behavior to reduce plastic waste in everyday life.

### 2.3 Relationship between Environmental concern on Environmental Attitude and Willingness to Reduce Plastic Waste

Several previous studies analyze why consumers are involved or not involved in pro-environmental behavior. The key factors influencing pro-environmental behavior include consumer concerns regarding the environment and health. Environmental concern is the extent to which consumers think about the possible negative consequences of unsustainable consumption patterns on the environment (Coelho, Pereira, Cruz, Simões, & Barata, 2017). In this study, the hypothesis model of a direct causal relationship between EC and EA is also supported by empirical evidence, which finds a positive and significant relationship between the new environmental paradigm and EA (Mostafa, 2007). Furthermore, there is a direct relation between EC and environmentally responsible attitudes and behavior. EC accelerates and leads to a more ecologically caring mentality and behavior. Gifford and Nilsson (2014) show that the higher the environmental concern, the higher the likelihood of being actively involved in sustainability-oriented behavior.

In the market, plastic bags for shopping have been practiced by many consumers. It is a consumer right and a critical commercially appropriate component (Suh et al., 1994). Individual consumers prefer to hold plastic bags because they can easily carry their purchased items without reusable bags, yet improper disposal of plastic bags can harm the environment.

### 3. Conceptual Framework

Based on the empirical studies reviewed above, it is hypothesized that natural environmental orientation affects environmental knowledge and concern, while environmental knowledge and concern affect willingness to reduce plastic waste through environmental attitude. Furthermore, it is hypothesized that environmental attitude affects willingness to reduce plastic waste. The conceptual framework is presented in Figure 2.

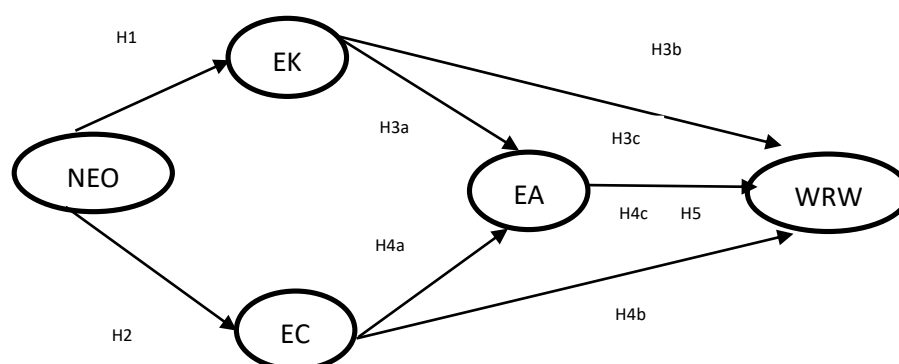


Figure 2. Conceptual Framework

The research hypothesis in this study can be concluded as follows:

- H1: Consumers strongly adhere to the Natural Environment Orientation (NEO) and know more about ecological issues (EK).
- H2: Consumers who strongly adhere to the Natural Environment Orientation (NEO) have stronger concerns with Ecological Issues (EC).
- H3a: Consumers with Environmental Knowledge (EK) have a more positive Environmental Attitude (EA).



- H3b: Consumers with environmental knowledge (EK) have a more vital Willingness to Reduce Plastic Waste (WRPW).
- H3c: Consumers who have environmental knowledge (EK) have a more vital Willingness to Reduce Plastic Waste (WRPW) through Environmental Attitudes (EA).
- H4a: Consumers with positive Environmental Concerns (EC) have more positive Environmental Attitudes (EA).
- H4b: Consumers with positive Environmental Concerns (EC) have a more vital Willingness to Reduce Plastic Waste (WRPW).
- H4c: Consumers with positive Environmental Concerns (EC) have a more vital Willingness to Reduce Plastic Waste (WRPW) through Environmental Attitudes (EA).
- H5: Consumers with a positive environmental attitude (EA) have more Willingness to Reduce Plastic Waste (WRPW).

#### 4. Methods

##### 4.1 Participants

The current study involves Muslim millennial generations as a population. It employs purposive sampling or the judgmental sampling method. In this non-probability sampling technique, the researcher selects units to be sampled based on his existing knowledge or his professional judgment of young Muslim generations at state Islamic universities in Indonesia. According to Vermillion and Peart (2010), this consumer group has the highest environmental awareness. From the results of sending online questionnaires in the google form, carried out three months from February 3, 2020, to April 24, 2020, respondents who sent responses to the questionnaire were 369. Sampling technique using purposive sampling with criteria for educated millennials Muslim at Islamic universities in East Java, Central Java, and West Java.

##### 4.2 Measurement

The construct reliability test can be seen from the Cronbach alpha value. Reliability is a measure of the internal consistency of a variable's indicators that show the degree to which each arrow indicates a general variable. The cut-off value of construct reliability is at least 0.60 (Ghozali, 2014). The variable measurement adopts a Likert scale of 1-7.

Correspondingly, the standardized loading factor is  $\geq 0.70$ . Meanwhile, according to Hair, Black, Babin, and Anderson (2011), regarding the relative importance and significance of each item's factor loading, if the standard factor load is  $> 0.50$ , it is highly significant. Therefore, based on Table 1, the observed variables are valid and reliable.

Table 1. Variables and measurement of constructs

Variable	Operational definition	Item	Loading	Cronbach alpha	Scale
Natural Environment Orientation (NEO) (Kals et al. 1999)	NEO is a concept that embraces various tendencies toward nature, such as love of nature. Intuitively, this construct seems appropriate to explain the behavior of protecting wildlife. Some authors claim that building an emotional bond with nature can motivate to watch it	Humans have been entrusted to manage the earth as servants of God (NEO1)	0.776	0.712	1-7 scale adapted from Mustofa (2007) and Hasnah (2014)
		Humans must live peacefully on earth in harmony with the cosmos and the environment (NEO2)	0.855		
		Humans must master adapting to the environment (NEO3)	0.758		

Table 1. Variables and measurement of constructs (continue)

Variable	Operational definition	Item	Loading	Cronbach alpha	Scale
Environmental Knowledge (EK) (Chekima, 2016)	EK is defined as information individuals have about environmental issues and their ability to understand and evaluate their impact on society and the environment	I know I'm buying environmentally safe products and packages (EK1)	0.709	0.863	1-7 scale adapted Pieniak et al. (2010)
		I know more about recycling than the average person (EK2)	0.831		
		I know I buy products and packages that reduce the amount of waste that ends up in landfills (EK3)	0.817		
		I understand environmental phrases and symbols on product packages (EK4)	0.822		
		I am very knowledgeable about environmental issues (EK5)	0.839		
Environmental Concern (EC)_ (Mustofa, 2007; Hasnah, 2014)	EC is the level of consumer concern about threats to the environment	Plants and animals have the same rights as human existence (EC1)	0.745	0.708	1-7 scale derived from Han, Trang, and Kim (2018)
		Despite our unique abilities, humans are still subject to the laws of nature (EC2)	0.754		
		If things continue on their current track, we will soon experience a significant ecological disaster (EC3)	0.767		
		Earth is like a spaceship with limited space and resources (EC4)	0.645		
Environmental Attitude (EA) (Milfont & Duckitt, 2010)	EA is a psychological tendency expressed by an evaluative response to the natural environment with some degree of like or dislike	When humans interfere with nature, it often results in disastrous consequences (EA1)	0.730	0.761	1-7 scale Adapted from Cavaliere, Pigliafreddo, De Marchi, and Banterle (2020)
		Humans must live in harmony with nature to survive (EA2)	0.716		
		I like the idea of buying eco-friendly products (EA3)	0.721		
		I have a good attitude towards purchasing the eco-friendly version of the product (EA4)	0.659		
		Humans were created to rule the universe (EA5)	0.746		
Willingness to Reduce Plastic Waste (WRWP) (Cavaliere et al., 2020)	WRPP refers to the desire to minimize product packagings that is not environmentally friendly, such as plastic in food and beverage packaging	I will stop using plastic straws (WRWP1)	0.665	0.914	1-7 scale adapted Cavaliere et al. (2020)
		I will use reusable bags (WRWP2)	0.796		
		I will buy food using reusable bags or containers (WRWP3)	0.814		

**Table 1. Variables and measurement of constructs (continue)**

Variable	Operational definition	Item	Loading	Cronbach alpha	Scale
Willingness to Reduce Plastic Waste (WRWP) (Cavaliere et al., 2020)	WRPP refers to the desire to minimize product packagings that is not environmentally friendly, such as plastic in food and beverage packaging	I will stop using plastic straws (WRWP1)	0.665	0.914	1-7 scale adapted Cavaliere et al. (2020)
		I will use reusable bags (WRWP2)	0.796		
		I will buy food using reusable bags or containers (WRWP3)	0.814		
		I will use a reusable bottle or cup for drinking (WRWP4)	0.790		
		I will bring my container to carry everywhere (WRWP5)	0.805		
		I would use refillable metal lighters instead of single-use plastic lighters (WRWP6)	0.738		
		I would rather eat fruit than juice in a plastic bottle (WRWP7)	0.715		
		I will reduce the use of plastic utensils at home (WRWP8)	0.821		
		I will use a razor with replaceable blades, not disposable razors (WRWP9)	0.777		

### 4.3 Analysis

The analysis in this study is divided into two, descriptive and inferential. Descriptive analysis is used to determine the characteristics of the respondents in this study. For inferential analysis using uses SEM with Smart PLS. The steps taken are (1) the measurement model (outer model) measures whether the observed variable represents the latent variable to be measured. The structural model (inner model) measures the power of estimation between latent variables (Ghozali, 2005). After the data was collected, to answer the research objectives and the proposed conceptual framework model, the data were analyzed using PLS-SEM using Smart PLS. Hair, Ringle, and Sarstedt (2011) evaluated the data by inner and outer measurements. After that, hypothesis testing is carried out according to the proposed model

## 5. Findings

### 5.1 Respondent Characteristics

Table 2 shows that the characteristics of the respondents in this study are Among the 369 respondents, the majority were female, about 61%. In contrast, most respondents are 15-25 years, as much as 96.2% or 355 respondents. Based on the respondent's occupation, 94% are students. Respondents in this study were seen from the area of origin of Islamic universities, 59.35% of Universities in East Java. These respondents' characteristics follow the object of research that prioritizes the millennial generation.

**Table 2. Description of Respondents**

	Frequency	Percentage
Gender		
Male	144	39.0
Female	225	61.0
Age		
15-25 years old	355	96.2
26-35 years old	11	3.0
36-45 years old	3	0,8
> 45 years old	-	0.0



**Table 2. Description of respondents (continue)**

Universities	Frequency	Percentage
UIN Maulana Malik Ibrahim Malang (East Java)	165	44.7
UIN Mataram	47	12.7
UIN Sunan Gunung Djati Bandung	17	4.6
UIN Sunan Ampel Surabaya	2	0.5
UIN Sunan Kalijaga Yogyakarta	2	0.5
UIN Walisongo Semarang	65	17.6
INSURI Ponorogo	2	0.5
IAIN Palangkaraya	7	1.9
IAIN Jember	8	2.2
IIK STRADA INDONESIA KEDIRI	32	8.7
IAIN Tulungagung	1	0.3
Other	9	2.4

### 5.2 Convergent Validity

Convergent validity has been checked first in the findings section, and statistics show a high correlation between items and valid convergent validity. According to Chin (1995), a variable is said to have good validity on the construct or latent variable if the Average Variance Extracted (AVE) value is >0.50. While the evaluation of the reliability of the measurement model in PLS can use Composite Reliability (CR) >0.70. Use where the factors that play a role are seen from the highest Loading Factor value, while the most powerful indicator is seen from the highest weight significance value.

**Table 3. Convergent validity**

Variable	Item	AVE	CR
Natural Environmental Orientation	NEO1, NEO2, NEO3	0.636	0.839
Environmental Knowledge	EK1, EK2, EK3, EK4, EK5	0.648	0.902
Environmental Concern	EC1, EC2, EC3, EC4	0.532	0.819
Environmental Attitude	EA1, EA2, EA3, EA4	0.511	0.839
Willingness to Reduce Waste Plastic	WRWP1, WRWP2, WRWP3, WRWP4, WRWP5, WRWP6, WRWP7, WRWP8, WRWP9	0.594	0.929

*Note:* NEO: Natural Environmental Orientation, EK: Environmental Knowledge, EC: Environmental Concern, EA: Environmental Attitude, WRWP: Willingness to Reduce Waste Plastic

The results showed that the CR value of the natural environment orientation was 0.839, while AVE was 0.636. The CR of environmental knowledge value is 0.902, while the AVE is 0.648. The CR value of environmental concern is 0.819, while the AVE is 0.532. The CR of environmental attitude value is 0.839, while the AVE is 0.511. Finally, the CR value of willingness to reduce plastic waste is 0.929, while the AVE is 0.594. the conclusion is that all variables have good validity on the construct or latent variable. These values are shown in Table 3.

### 5.3 Discriminant Validity

Discriminant validity is used to see that in the findings section, there is no high correlation between variables and the validity of discriminant validity. The results show that the Heterotrait Monotrait (HTMT) variables NEO, EK, EC, EA, and WRWP show a ratio that is not greater than 0.90 (Table 4).

Table 4. Heterotrait monotrait ratio

	EA	EC	EK	NEO	WRWP
EA					
EC	0.767				
EK	0.438	0.436			
NEO	0.608	0.607	0.291		
WRWP	0.358	0.326	0.424	0.280	

Note: NEO: Natural Environmental Orientation, EK: Environmental Knowledge, EC: Environmental Concern, EA: Environmental Attitude, WRWP: Willingness to Reduce Waste Plastic

#### 5.4 Contribution of Indicators to Latent Variables

Each indicator has a different contribution to seeing the latent variable. The greater the loading factor on the indicator, the greater the contribution of the indicator to explain the latent variable. From the results of NEO data processing using three indicators. The biggest indicator is NEO2 ("Humans must live peacefully on Earth in harmony with the cosmos and the environment"). EK uses five indicators, and EK5 provides the largest contribution of 0.839 ("I am very knowledgeable about environmental issues"). EC uses four indicators, and the largest in EC3 is 0.767 ("If things continue on their current track, we will soon experience a major ecological disaster"). EA uses five indicators, and the largest loading factor value on EA5 is 0.746 ("Humans were created to rule the universe). While the WRWP variable uses nine indicators, and the largest indicator is WRWP8 0.821 ("I will reduce the use of plastic utensils at home").

#### 5.6 Predictive Relevance of the Model

To see the quality of the inner model depends on the ability to predict the endogenous construct. To assess the inner model, the main criteria are to look at the coefficient of determination ( $R^2$ ) and cross-validated redundancy ( $Q^2$ ). Table 5 shows the value of  $R^2$  which indicates the model's fit. The blindfolding method is used to measure  $Q^2$  square. The value of  $Q^2$  square must be greater than zero. Table 5 shows the value of  $Q^2$ , then confirms the fit model because all values are greater than zero.

Table 5. The predictive power of construct

	R Square	Q Square
Environmental Attitude	0.351	0.348
Environmental Concern	0.194	0.192
Environmental Knowledge	0.052	0.050
Willingness to Reduce Waste Plastic	0.188	0.182

#### 5.6 Hypothesis Effect

The results of structural equation modeling supported the proposed hypotheses H1, H2, H3a, H3b, H3c, H4a, H4c, and H5 endowed with t-value above 1.96. Therefore, it concludes that the endogenous variables affect the exogenous variables. Meanwhile, the t-value of hypothesis H4b is below 1.96, so the endogenous variables of H4b do not affect the exogenous ones.

Table 6. Hypothesis effect

Hypothesis	Beta	t-statistics	P value	Decision
H1 NEO → EK	0.229***	4.248	0.000	Supported
H2 NEO → EC	0.441***	8.707	0.000	Supported
H3a EK → EA	0.187***	3.764	0.000	Supported
H3b EK → WRWP	0.304***	5.325	0.000	Supported
H3c EK → EA → WRWP	0.028**	2.107	0.018	Supported

Note: \*The coefficient is statistically significant at  $p < 0.05$ ; \*\* the coefficient is statistically significant at  $p < 0.01$ ; \*\*\* coefficient is statistically significant at  $p < 0.001$ .

Table 6. Hypothesis effect (continue)

Hypothesis	Beta	t-statistics	P value	Decision
H4a EC→EA	0.502***	11.426	0.000	Supported
H4b EC→WRWP	0.086	1.400	0.081	Not Supported
H4c EC→EA→WRWP	0.076**	2.200	0.014	Supported
H5 EA→WRWP	0.151**	2.302	0.011	Supported

Note: \*The Coefficient is statistically significant at  $p < 0.05$ ; \*\* the coefficient is statistically significant at  $p < 0.01$ ; \*\*\* coefficient is statistically significant at  $p < 0.001$ .

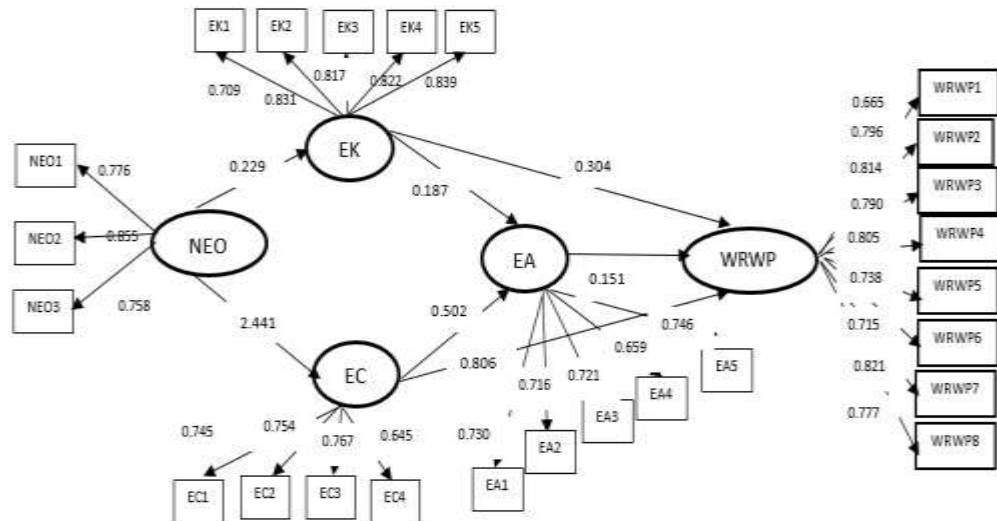


Figure 2. Structural model assessment

For H<sub>1</sub>, a solid adherence to NEO as measured by the indicators that humans have been entrusted to manage the Earth as God's servants (NEO1), humans must live peacefully on earth in harmony with the cosmos and the environment (NEO2), and humans must master adapting with the environment (NEO3) will have more knowledge about ecological problems (EK) with a coefficient of 0.229 (t-value = 4.428;  $p < 0.000$ ). Thus, it supports H<sub>1</sub> that NEO affects EK.

For H<sub>2</sub>, consumers have a strong adherence to NEO as measured by the indicators that humans have been entrusted to manage the earth as a servant of God (NEO1); humans must live on earth in harmony with the cosmos and the environment (NEO2); humans who readily adapt to the environment (NEO3) will have a more substantial concern on ecological problems (EC) with a coefficient of 0.441 (t-value = 8.707;  $p < 0.000$ ). Thus, it supports H<sub>2</sub>. NEO affects Environmental concerns (EC).

For H<sub>3a</sub>, consumers with environmental knowledge (EK) as measured by indicators of the level of knowledge to buy products and packages that are safe for the environment (EK1), the level of understanding of environmental phrases and symbols of product packages (EK2), the level of knowledge about recycling (EK3), the level of understanding on choosing products and packages that reduce the amount of plastic waste around (EK4) and the level of knowledge of the millennial generation about environmental issues (EK5) will have a more positive attitude towards environmentally friendly (EA) with a coefficient of 0.441 (t-value = 8.707;  $p < 0.000$ ). Thus, it supports H<sub>3a</sub>. Furthermore, it indicates that environmental knowledge affected the environmental attitude of the millennial generation.

For H<sub>3b</sub>, consumers who know about the environment (EK) will have a stronger willingness to reduce plastic use (WRWP) with a coefficient of 0.304 (t-value = 5.325,  $p < 0.000$ ). Thus, it supports H<sub>3b</sub>, the positive relationship between knowledge and sustainable behavior to reduce plastic use. Furthermore, millennials with more EK have a higher positive behavior towards reducing plastic waste.

Consumers with high EK will have a stronger desire to reduce plastic use (WRWP) through Environmental Attitudes (EA) with a coefficient of 0.028 (t-value = 2.107;  $p < 0.018$ ), thus supporting H<sub>3c</sub>.

For H<sub>4a</sub>, consumers with positive environmental concern (EC) will have a more positive attitude towards environmentally friendly products (EA) with a coefficient of 0.502 (t-value = 11.426;  $p < 0.000$ ). Thus, it supports H<sub>4a</sub> that environmental awareness will improve millennials' attitudes towards the environment.

For H<sub>4b</sub>, the higher environmental concern (EC) consumer has, the stronger the willingness to reduce plastic waste (WRPW) with a coefficient of 0.086 (t-value = 1.400;  $p > 0.001$  with a value of 0.081), so it does not support H<sub>4b</sub>.

For H<sub>4c</sub>, consumers with positive EC have a more vital WRPW through EA with a coefficient of 0.076 (t-value = 2.200;  $p > 0.001$  with a value of 0.014). Therefore, it supports H<sub>4c</sub> that the environmental concern of the millennial generation does not directly affect the willingness to reduce plastic waste but indirectly affects WRPW through environmental attitude.

For H<sub>5</sub>, consumers who have a positive attitude towards the environment will have a more vital willingness to reduce plastic waste (WRPW) with a coefficient of 0.151 (t-value = 2.302;  $p > 0.001$  with a value of 0.011). Thus, it supports H<sub>5</sub> that environmental attitude affects the willingness to reduce plastic waste (WRPW).

## 6. Discussion

This study aims to identify how their natural orientation influences the pro-environmental behavior of Muslim millennials as human beings, which will also increase their level of knowledge about the environment and increase their environmental awareness, in line with their attitude towards the environment, which in the end they show with the desire to behave to reduce plastic waste in their lives. The results of this study are expected to be used as a reference for stakeholders to continuously educate the millennial generation about their unique characters, with the hope of becoming a pilot project for the sustainability of human life in the future.

The results showed that natural environmental orientation affected environmental knowledge. These results indicate that Muslim millennials who are aware of their existence on earth as managers or leaders and their orientation to living in harmony with nature, and orientation that humans are part of nature will increase the information and knowledge of Muslim millennials about facts, concepts related to nature and primarily to the ecosystems in which they live. This result supports the study of Hasnah (2014), Mostafa (2007), and Chan and Lau (2000). Natural Environment Orientation is a concept that embraces various tendencies towards nature as a love of nature. Intuitively, this construct seems appropriate to explain the behavior of protecting wildlife. Schwarte (2003) said that NEO is deeply rooted in Islamic culture as the first Caliph Abu Bakr gave his army commanders the following orders: "do not destroy palm trees, do not burn houses or wheat fields, never cut down fruit trees, and kill cows. only when you need to eat it." Therefore, it can increase the information that individuals have, in this case, the millennial generation, regarding environmental issues and their ability to understand and evaluate their impact on society and the environment (Brahim, Wafa, & Wafa, 2016).

NEO, which is a concept that embraces various tendencies towards nature, such as the love of nature in the Muslim millennial generation in this study, has a positive effect on increasing their concern about threats to the environment. When a person as an individual instinctively feels that they must live in peace on earth by keeping their life in harmony with the cosmos and the environment, it will increase their concern for the surrounding environment. The current results support the study of Hasnah (2014) that NEO is an excellent indicator of EC. Steg and Vlek (2009) mention several factors that influence behavior change, one of which is cognitive processes. It can be obtained through the level of information about the environment. The results of this study also support the theory of behavior change that the increase in knowledge will increase environmentally friendly attitudes that lead to pro-environmental behavior, precisely the willingness to reduce plastic use (Steg and Vleg, 2009). It also supports the research of Situmorang et al. (2020) regarding behavioral differences in students majoring in environmental and social sciences. They find significant differences in behavior to reduce plastic use, which appears in the conduct of buying products with plastic packaging, preparing shopping bags, using return plastic bags, picking up own lunch boxes, and having food on-site to reduce single-use

plastic packaging. Correspondingly, Fisher et al. (2012) and Moisaner (2007) showed that knowledge usually induces pro-environmental attitudes, which inspires environmentally or ecologically responsible consumer behavior.

The results show that when individuals have perfect knowledge of the environment, it will increase their attitude to living in harmony with the environment. In addition, information about the environment will increase their attitude not to damage the surrounding nature because they are very aware of the future consequences on environmental sustainability. It goes in line with the research of Blocker and Eckberg (1997), and Singh and Bansal's (2012) that knowledge about the environment positively impacts environmental attitudes and behavior, Révolo Acevedo et al. (2022) that there is a relationship between environmental knowledge and attitude.

In the theory of behavior change, knowledge is one of the variables influencing it. This can be applied in various social fields. The research proves that the knowledge of the millennial Muslim generation that is quite good on the environment can improve their pro-environmental behavior, especially in reducing waste use. With their character to know more, supported by easy access to information, they can show environmentally friendly behavior in their place of residence. As the highest indicator of WRWP8 where they will reduce the use of plastic utensils starting at home. This result also supports the behavioral change theory that when knowledge increases, environmentally friendly attitudes that lead to pro-environmental behavior also increase (Steg & Vleg, 2009). This result also supports how specific environmental knowledge influenced pro-environmental behavior (Genovaite & Mykolas, 2019).

Furthermore, the results show that as individuals, the Muslim millennial generation, if they have good environmental awareness, will increase their attitude to behave environmentally friendly. This is inseparable from their level of awareness that it is getting better, that everything on earth that does not work according to the roles and rules of nature will have consequences for ecological disasters (see EC3). These results support several previous studies, such as Kim and Sejung Marina (2005); Milfont and Duckitt (2004); Ramayah, Lee, and Mohamad (2010); Hidalgo-Crespo et al. (2022), there is a strong influence of environmental concern in pro-environmental behaviors and attitudes. It shows that environmental awareness conceptualized by the millennial generation's level of concern about threats to the environment will increase their attitude toward the idea of buying environmentally friendly products. In addition, the millennial generation's respect for the environment also increases attitudes in understanding the potential for environmental damage caused by some products, so they do not buy them. The millennial generation enacts the form of an ecologically friendly attitude by reducing the use of environmentally unfriendly products (Milfont & Duckitt, 2010).

The result indicates that EC with indicators of attention of the millennial generation about the rising ecological problems due to the use of plastic immediately improves their pro-environmental attitude. It contradicts the previous research results. Cavaliere et al. (2020) found a positive relationship when consumers are concerned about the possible adverse effects of plastic contamination on the environment and their health. They are more likely to avoid purchasing single-use plastic objects, water bottles, and products with plastic packaging.

It agrees with the idea of Mostafa (2007), Singh and Bansal (2012), and Smith et al. (2006). Willingness to Reduce Waste Plastic (WRPW) with indicators of willingness - to stop using plastic straws, to use reusable product bags, to buy food using reusable bags or containers, to use reusable bottles or cups for drinking, to bring their containers around, to use refillable metal lighters instead of single-use plastic lighters, to eat fruit instead of juice in plastic bottles, to use less plastic utensils at home, to use razors with replaceable blades instead of disposable razors - is not influenced by cognition in the form of care and attitude but more influenced by the information rationality they know about the environment. It is in line with the Indonesian government's commitment to ban the use of single-use plastics nationally by January 1, 2030, according to the Regulation of The Minister of Environment and Forestry Republic of Indonesia (2019). Prohibited single-use plastics include plastic sachets, plastic straws, plastic bags, single-use containers, and cutlery (Minister of Environment and Forestry Republic of Indonesia, 2019).



The limitation of this research does not explicitly lead to individual behavior in handling plastic waste. Thus, a direct examination of the behavior of individuals upon handling waste using 3R (Reduce, Reuse, Recycle) is highly recommended for further study.

## 7. Conclusions

The results of this study indicate that the Natural Environmental Orientation of Muslim millennials can increase their knowledge of environmental consequences and that the natural orientation of the environment can also increase their environmental awareness. Furthermore, the increase in the level of information they have also increased their ecological attitude and led to an increased desire to reduce the use of plastic appliances at home.

While the results of the study also show that increasing environmental awareness of Muslim millennials can also improve their ecological attitude. However, it turns out that the increasing environmental awareness of the millennial generation does not directly affect the willingness to reduce plastic equipment. This is because they prioritize rationality in thinking when they are going to do something. And from the results of this study, millennial Muslim environmental concerns indirectly affect the desire to reduce the use of plastic equipment through their ecological attitude. Finally, the ecological attitude of Muslim millennials affects the willingness to reduce the use of plastic equipment.

## 8. Recommendation

Considering that this research was conducted during the covid pandemic, where respondents were mostly at home, it also affected their behavior. Therefore, there should be more information about the dangers of plastic on social media, which is a cheap, easy, and appropriate facility to influence the behavior of the millennial or educated younger generation. The results of this study can also be developed by examining the actual behavior of millennials in managing plastic waste, either by recycling or reusing plastic waste.

The government can allocate its policy focus to this young generation because it has been proven that they are faster to accept any information about the negative effects of individual behavior if they are not in harmony with nature. And the government's task for environmental sustainability can collaborate with this young generation of Muslim millennials.

The current study implies that environmental concern is not necessarily accompanied by the willingness to reduce plastic waste. Adequate environmental knowledge can increase the wiliness to reduce plastic waste among the millennial generation, which prioritizes logic in thinking and applies their knowledge. Besides, it promotes better waste management efforts with the initial individual initiative at home by instilling a smart mindset into all family members, especially the younger generation. There must be a good mindset upon buying an item, and whether or not the item will continue to produce waste should be considered.

## Citation information

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## References

- Ajzen, I. (1999). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179-211. doi: [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)
- Bamberg, S., & Möser, G. (2007). Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour. *Journal of Environmental Psychology*, 27,

- 14-25. doi:  
<https://doi.org/10.1016/j.jenvp.2006.12.002>
- Baztan, J., Carrasco, A., Chouinard, O., Cleaud, M., Gabaldon, J.E., Huck, T., Jaffres, L., Jorgensen, B., Miguelez, A., Paillard, C., & Vanderlinden, J. P. (2014). Protected areas in the Atlantic facing the hazards of micro-plastic pollution: first diagnosis of three islands in the Canary Current. *Marine Pollution Bulletin*, 80, 302-311. doi:  
<https://doi.org/10.1016/j.marpolbul.2013.12.052>
- Blocker, T. J., & Eckberg, D. L. (1997). Gender and environmentalism: results from the 1993 general social survey. *Social Science Quarterly*, 78(4), 841-858.
- Brahim, C., Wafa, S. A., & Wafa, S. K. W. (2016). Examining green consumerism motivational drivers: does premium price and demographics matter to green purchasing. *Journal of Cleaner Production*, 112(1137), 3436-3450. doi:  
<https://doi.org/10.1016/J.JCLEPR.2015.09.102>
- Cavaliere, A., Pigliafreddo, S., De Marchi, E., & Banterle, A. (2020). Do Consumers Really Want to Reduce Plastic Usage? Exploring the Determinants of Plastic Avoidance in Food-Related Consumption Decisions. *Sustainability*, 12(22), 9627. doi:  
<https://doi.org/10.3390/su12229627>
- Chan, R. Y., & Lau, L. B. (2000). Antecedents of green purchases: a survey in China. *Journal of Consumer Marketing*, 17(4), 338-357. doi:  
<https://doi.org/10.1108/07363760010335358>
- Clayton, S., Bexell, S. M., Xu, P., Tang, Y. F., Li, Wen J., & Chen, L. (2019). Environmental literacy and nature experience in Chengdu, China. *Environmental Education Research*, 25(7), 1105-1118. doi:  
<https://doi.org/10.1080/13504622.2019.1569207>
- Coelho, F., Pereira, M. C, Cruz, L., Simões, P., & Barata, E. (2017). Affect and the adoption of pro-environmental behaviours: A structural model. *Journal of Environmental Psychology*, 54, 127-138. doi:  
<https://doi.org/10.1016/j.jenvp.2017.10.008>
- Connell, S., Fien, J., Lee, J. Sykes, H., & Yencken, D. (1999). If it doesn't directly affect you, you don't think about it: a qualitative study of young people's environmental attitudes in two Australian cities. *Environmental Education Research*, 5(1), 95-113. doi:  
<https://doi.org/10.1080/1350462990050106>
- Culin, J., Bielić, T., & Jakšić, C.K. (2019). Suggestions for improving the effectiveness of environmental education in the maritime sector. *Scientific Journal of Maritime Research* 33, 232-237. doi:  
<https://doi.org/10.31217/p.33.2.13>
- Dursun, I., Tümer Kabadayı, E., & Tuğger, A.T. (2019). Overcoming the psychological barriers to energy conservation behaviour: The influence of objective and subjective environmental knowledge. *International Journal of Consumer Studies*, 43, 402-416. doi: 10.1111/ijcs.12519
- Ellen, P. S. (1994). Do we know what we need to know? Objective and subjective knowledge effects on pro-ecological behaviors. *Journal of Business Research*, 30, 43-52. doi:  
[https://psycnet.apa.org/doi/10.1016/0148-2963\(94\)90067-1](https://psycnet.apa.org/doi/10.1016/0148-2963(94)90067-1)
- Eriksen, M., Maximenko, N., Thiel, M., Cummins, A., Lattin, G., Wilson, S., Hafner, J., Zellers, A., & Rifman, S. (2013). Plastic pollution in the South Pacific subtropical gyre. *Marine Pollution Bulletin*. 68, 71-76. doi:  
<https://doi.org/10.1016/j.marpolbul.2012.12.021>
- Eze, U. C., & Ndubisi, N. O. (2013). Green Buyer Behavior: Evidence from Asia Consumers. *Journal of Asian and African Studies*, 48(4), 413-426. doi:  
<https://doi.org/10.1177%2F0021909613493602>
- Febianto, R. (2021, Feb 16). Jumlah sampah melonjak selama pandemi covid-19, ini beberapa penyebabnya. Retrieved from <https://www.liputan6.com/health/read/4483554/jumlah-sampah-melonjak-selama-pandemi-covid-19-ini-beberapa-penyebabnya>

- Fisher, C., Bashyal, S., & Bachman, B. (2012). Demographic impacts on environmentally friendly purchase behaviors. *Journal of Targeting, Measurement and Analysis for Marketing*, 20 (3/4), 172-184. doi: <https://link.springer.com/article/10.1057/jt.2012.13>
- Genovaite, L., & Mykolas, S. P. (2019). The importance of environmental knowledge for private and public sphere pro-environmental behavior: modifying the Value-Belief-Norm theory. *Sustainability* 11(12), 3324. doi: <https://doi.org/10.3390/su11123324>
- Ghozali, I. (2005). *Multivariate Application with SPSS Program (Aplikasi Multivariate dengan Program SPSS)*. Semarang(ID): Universitas Diponegoro
- Ghozali, I. (2014). *Structural Equation Modeling Metode Alternatif Dengan Partial Least Squares (PLS) Edisi 4*. Semarang(ID): Universitas Diponegoro
- Gifford, R., & Nilsson, A. (2014). Personal and social factors that influence pro-environmental concern and behaviour: A review. *International Journal of Psychology*, 49, 141-157. doi: <https://doi.org/10.1002/ijop.12034>
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2011). *Multivariate Data Analysis*: Pearson New International Edition. Essex: Pearson Education Limited.
- Hamid, P. N., & Cheng, S. T. (1995). Predicting antipollution behavior: the role of molar behavioral intentions, past behavior, and locus of control. *Environment and Behavior*, 27(5), 679-698. doi: <https://psycnet.apa.org/doi/10.1177/0013916595275004>
- Han, H., Lee, J. S., Trang, H. L. T., & Kim, W. (2018). Water conservation and waste reduction management for increasing guest loyalty and green hotel practices. *International Journal of Hospitality Management*, 75, 58-66. doi: <https://doi.org/10.1016/J.IJHM.2018.03.012>
- Hasnah, S. H. (2014). The role of Islamic values on green purchase intention. *Journal of Islamic Marketing*, 5(3), 379-395. doi: <https://doi.org/10.1108/JIMA-11-2013-0080>
- Hidalgo-Crespo, J., Coello-Piscoa, S., Reyes-Venegasa, H., Bermeo-Garayc, M., Amayad, J. L., Soto, M., & Hidalgo-Crespo, A. (2022). Understanding citizens' environmental concern and their pro-environmental behaviours and attitudes and their influence on energy use. *Energy Report*, 8, 103-109. doi: <https://doi.org/10.1016/j.egy.2022.01.116>
- Jensen, B. B. (2002). Knowledge, action and pro-environmental behaviour. *Environmental Education Research*, 8(3), 325-334. doi: <https://doi.org/10.1080/13504620220145474>
- Johnston, I. (2017). Dumping of Billions of Tonnes of Plastic Waste Is 'Uncontrolled Experiment' on Planet Earth, Scientists Warn (July 19). Retrieved from <https://www.independent.co.uk>
- Kaiser, F. G., & Fuhrer, U. (2003). Ecological behavior's dependency on different forms of knowledge. *Applied Psychology*, 52, 598-613. doi: <https://psycnet.apa.org/doi/10.1111/1464-0597.00153>
- Kaiser, F. G., Ranney, M., Hartig, T., & Bowler, P. A. (1999). Ecological Behavior, Environmental Attitude, and Feelings of Responsibility for the Environment. *European Psychologist*, 4, 59-74. doi: <https://psycnet.apa.org/doi/10.1027/1016-9040.4.2.59>
- Kals, E., Schumacher, D., & Montada, L. (1999). Emotional affinity toward nature as a motivational basis to protect nature. *Environment and Behavior*, 31(2), 178-202. doi: <https://psycnet.apa.org/doi/10.1177/00139169921972056>
- Khan, F., Ahmed, W., & Najmi, A. (2019). Understanding consumers' behavior intentions towards dealing with the plastic waste: perspective of a developing country. *Resources, Conservation and Recycling*, 142, 49-58. doi: <https://doi.org/10.1016/j.resconrec.2018.11.020>
- Kim, Y., & Sejung Marina, C. (2005). Antecedents of green purchase

- behavior: an examination of collectivism, environmental concern, and PCE. *Advances in Consumer Research*, 32(1), 592-599.
- Klöckner's, C. A. (2013). A comprehensive model of the psychology of environmental behaviour—A meta-analysis. *Global Environmental Change*, 23(5), 1028-1038. doi: <https://doi.org/10.1016/j.gloenvcha.2013.05.014>
- Kollmuss, A., & Agyeman, J. (2002). Mind the Gap: Why do people act environmentally and what are the barriers to pro-environmental behavior?. *Environmental Education Research*, 8, 239-260. doi: <https://psycnet.apa.org/doi/10.1080/13504620220145401>
- Liu, P., Teng, M., & Han, C. (2020). How does environmental knowledge translate into pro-environmental behaviors?: The mediating role of environmental attitudes and behavioral intentions. *Science of The Total Environment*, 728, 138126. doi: [10.1016/j.scitotenv.2020.138126](https://doi.org/10.1016/j.scitotenv.2020.138126)
- Lizin, S., Van Dael, M., & Van Passel, S. (2017). Battery pack recycling: behavior change interventions derived from an integrative theory of planned behaviour study. *Resources Conservation Recycling*, 122, 66-82. doi: <https://doi.org/10.1016/j.resconrec.2017.02.003>
- Martinsons, M. G., So, S. K., Tin, C., & Wong, D. (1997). Hong Kong and China: emerging markets for environmental products and technologies. *Long Range Planning*, 30(2), 277-156. doi: [10.1016/S0024-6301\(96\)00119-7](https://doi.org/10.1016/S0024-6301(96)00119-7)
- Maurer, M., & Bogner, F. X. (2020). Modelling environmental literacy with environmental knowledge, values and (reported) behaviour. *Studies in Educational Evaluation*, 65, 100863. doi: <https://doi.org/10.1016/j.stueduc.2020.100863>
- Milfont, T. L., & Duckitt, J. (2004). The structure of environmental attitudes: a first- and second-order confirmatory factor analysis. *Journal of Environmental Psychology*, 24(3), 289-303. doi: <https://psycnet.apa.org/doi/10.1016/j.jenvp.2004.09.001>
- Minister of Environment and Forestry of The Republic of Indonesia. (2019). Regulation of The Minister of Environment and Forestry of The Republic of Indonesia, Number P.75/Menlhk/Setjen/Kum.1/10/2019 Concerning A Road Map of Waste Reduction by Manufacturers (Peraturan Menteri Lingkungan Hidup dan Kehutanan Republik Indonesia, Nomor P.75/Menlhk/Setjen/Kum.1/10/2019 Tentang Peta Jalan Pengurangan Sampah Oleh Produsen). Retrieved from [https://jdih.go.id/files/146/P\\_75\\_2019\\_PETA\\_JALAN\\_SAMPAH\\_menlhk\\_12162019142914.pdf](https://jdih.go.id/files/146/P_75_2019_PETA_JALAN_SAMPAH_menlhk_12162019142914.pdf)
- Moisander, J. (2007). Motivational complexity of green consumerism. *International Journal of Consumer Studies*, 31(4), 404-409. doi: <https://doi.org/10.1111/j.1470-6431.2007.00586.x>
- Mostafa, M. M. (2007). A hierarchical analysis of the green consciousness of the Egyptian consumer. *Psychology and Marketing*, 24(5), 445-473. doi: <https://doi.org/10.1002/mar.20168>
- Ottman, J. A., Stafford, E. R. and Hartman, C. L. (2006). Avoiding green marketing myopia: ways to improve consumer appeal for environmentally preferable products. *Environment and Policy for Sustainable Development*, 48(5),22-36. doi: <http://dx.doi.org/10.3200/ENVT.48.5.22-36>
- Otto, S., & Pensini, P. (2017). Nature-based environmental education of children: Environmental knowledge and connectedness to nature, together, are related to ecological behavior. *Global Environmental Change*, 47, 88-94. doi: <http://dx.doi.org/10.1016/j.gloenvcha.2017.09.009>
- Pace, P. (2010). Self-evaluation as a tool in developing environmental responsibility. *Journal of Teacher Education for Sustainability*, 12, 5-26. doi: <https://psycnet.apa.org/doi/10.1016/j.jenvp.2004.09.001>



- <http://dx.doi.org/10.2478/v10099-009-0043-0>
- Pieniak, Z., Aertsens, J., & Verbeke, W. (2010). Subjective and objective knowledge as determinants of organic vegetables consumption. *Food Quality and Preference*, 21, 581-588. doi: 10.1016/j.foodqual.2010.03.004
- Ramayah, T., Lee, J. W. C., & Mohamad, O. (2010). Green product purchase intention: some insights from a developing country. *Resources, Conservation and Recycling*, 54(12), 1419-1427. doi: <http://dx.doi.org/10.1016%2Fj.resconrec.2010.06.007>
- Révolo Acevedo, R. H., Quispe Reymundo, B.J., Huamán Huamán, C. W., Álvarez Orellana, J. C., Berrocal, E. O., Jauregui Ofracio, J. D., Velarde, Z. S., Quispe Quezada, U. R., Salas, W. R., & Álvarez Montalvan, C. E. (2022). Knowledge, Attitude and Eco-Efficiency Urban Environment in the Inhabitants of the District of Chilca - Peru. *Journal of Educational and Social Research*, 12(1), 204. doi: <https://doi.org/10.36941/jesr-2022-0017>
- Rizaty, M. A. (2021, July 29). The majority of national waste from household activities in 2020 (Mayoritas sampah nasional dari aktivitas rumah tangga pada 2020). Retrieved from <https://databoks.katadata.co.id/datapublish/2021/07/29/mayoritas-sampah-nasional-dari-aktivitas-rumah-tangga-pada-2020>
- Schwarte, C. (2003). Environmental protection in islamic law: an overview on potential influences for legal developments in Iraq. *In Local Environment*, 8(5), 567-577.
- Severo, E. A., Guimarães, J. C. F., Dellarmelin, M. L., & Ribeiro, R. P. (2019). The Influence of Social Networks on Environmental Awareness and the Social Responsibility of Generations. *Brazilian Business Review*, 16(5), 500-518. doi: <https://doi.org/10.15728/bbr.2019.16.5.5>
- Singh, A. K., & Bansal, M. (2012). Green marketing: a study of consumer attitude & environmental concern. *Indian Journal of Commerce*, 65(2) 273-283.
- Situmorang, R. O. P., & Liang, T. C., & Chang, S. C. (2020). The difference of knowledge and behavior of college students on plastic waste problems. *Sustainability*, 12(19), 7851. <http://dx.doi.org/10.3390/su12197851>
- Sliwka, A., Diedrich, M., & Hofer, M. (2006). *Citizenship Education*, Waxmann Verlag, Munster.
- Smith, S. M., Haugtvedt, C. P., & Petty, R. E. (2006). Attitudes and recycling: does the measurement of affect enhance behavioral prediction?. *Psychology and Marketing*, 11(4), 359-374. doi: <https://doi.org/10.1002/mar.4220110405>
- Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. *Journal of Environmental Psychology*, 29, 309-317. doi: <http://dx.doi.org/10.1016/j.jenvp.2008.10.004>
- Stern, P. C. (2000). New environmental theories: Toward a coherent theory of environmentally significant behaviour. *Journal of Social Issues*, 56(3), 407-424. doi: <https://doi.org/10.1111/0022-4537.00175>
- Suh, J. H., Dass, K. K., Pagliacci, o L., Taylor M. E., Saxton, J. P., Tan, M., & Mehta, A. C. (1994). Endobronchial radiation therapy with or without neodymium yttrium aluminum garnet laser resection for managing malignant airway obstruction. *Cancer*, 73(10), 2583-2588. doi: [https://doi.org/10.1002/1097-0142\(19940515\)73:10%3C2583::aid-cnrcr2820731020%3E3.0.co;2-h](https://doi.org/10.1002/1097-0142(19940515)73:10%3C2583::aid-cnrcr2820731020%3E3.0.co;2-h)
- Syberg, K., Hansen, S. F., Christensen, T. B., & Khan, F. R. (2018). Risk perception of plastic pollution: importance of stakeholder involvement and citizen science. 58, 1-23. doi: <https://doi.org/10.1007/978-3-319-61615-5>.
- Thi Thu Nguyen, H., Hung, R.J., Lee, C. H., & Thi Thu Nguyen, H. (2018). Determinants of Residents' E-Waste Recycling Behavioral Intention: A Case Study from Vietnam. *Sustainability*, 11(1),



164. doi:  
<http://dx.doi.org/10.3390/su11010164>
- Tonglet, M., Phillips, P. S. and Read, A. D. (2004). Using the Theory of Planned Behaviour to investigate the determinants of recycling behaviour: a case study from Brixworth, UK. *Resources, Conservation and Recycling*, 41(3), 191-214. doi:  
<https://doi.org/10.1016/j.resconrec.2003.11.001>
- Vermillion, L. J., & Peart, J. (2010). Green marketing: making sense of the situation. *Allied Academies International Conference: Proceedings of the Academy of Marketing Studies*, 15 (1), 68-72.
- Verplanken, B., & Aarts, H. (1999). Habit, attitude, and planned behavior: is habit an empty construct or an interesting case of goal-directed automaticity?. *European Review of Social Psychology*, 10, 101-134. doi:  
<http://dx.doi.org/10.1080/14792779943000035>
- Wang, Z., Guo, D., & Wang, X. (2016). Determinants of residents'e-waste recycling behaviour intentions: evidence from China. *J. Clean. Prod*, 137, 850-860. doi:  
<https://doi.org/10.1016/j.jclepro.2016.07.155>