The Role of Eco-Education in Shaping Consumer Behavior towards Green Purchasing

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Abstract

Adopting environment-friendly shopping habits is a powerful way to reduce pollution and protect our planet. Education plays a critical role in encouraging consumers to embrace eco-friendly behaviors and make a positive impact. As the world becomes increasingly concerned about climate change, more and more companies are being urged to prioritize sustainability. Plastic pollution is a pressing issue that has been exacerbated by the COVID-19 pandemic. The majority of plastic waste generated worldwide is produced in Asia, making Taiwan a valuable case study for environmental action. To investigate the impact of environmental education on pro-environmental behavior, our study explores how attitudes, knowledge, and intentions have changed as a result of a specific program. We utilized quantitative methodology and data-gathering tools to survey 235 Taiwanese participants from March 1 to April 30, 2023. Our findings may offer valuable insights, suggest avenues for further research, and have important theoretical and practical implications.

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1. Introduction

Over the last twenty years, the world has faced numerous epidemics caused by viruses. In the case of the COVID-19 pandemic, plastic has proven to be an essential material in the creation of necessary items like respirators and personal protective equipment, which are vital in preventing the spread of the SARS-CoV-2 virus. Therefore, plastic is seen as an invaluable tool in the fight against pandemics. However, it's important to note that by 2030, plastic litter is projected to increase twofold, posing a significant threat to natural ecosystems and human health (Silva et al., 2021). Studies indicate that much of the world's plastic waste leakage originates in Asia, primarily due to food and beverage packaging (Borrelle et al., 2020). Additionally, there are differences in environmental behavior between individuals from developed and emerging countries, which may be influenced by cultural and structural factors unique to each country (Vicente-Molina et al., 2013).

Education can significantly impact one's knowledge and attitude, ultimately influencing their intentions and behavior. Education also leads to the creation of diverse societal groups with varying values, interests, and lifestyles. Consumer behavior often hinges on attitudes that weigh expected costs and benefits.

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Environmental education aims to produce informed citizens who understand the biophysical environment and its challenges and are driven to find solutions. The strength of one's environmental attitude plays a pivotal role in pro-environmental behavior regarding a specific event. Pro-environmental behavior involves actions that minimize harm to the environment and support its well-being. Until consumers develop a respectful attitude towards the environment, achieving improvements in the global economy and society's well-being will be a daunting task. As such, raising consumer environmental awareness and emphasizing the importance of environmental knowledge and education is essential in tackling environmental issues.

2. Literature Review

2.1 Eco-Education and Consumer Perception of Environmental Knowledge

In recent years, environmental education has become increasingly integrated into national educational policies, curricular documents, curriculum development projects, and conservation programs. While more information about consumers' environmental knowledge and attitudes is available from the education base than about their educational experiences and preferences, there is a wealth of data available on learning outcomes. Environmental education is seen as a critical means of re-evaluating the relationship between humans and the biosphere, promoting social change toward a sustainable future, and generating interest in and awareness of environmental problems. By participating in environmental education programs, individuals and communities gain a better understanding of the causes and effects of environmental problems and develop a greater respect for the value of natural resources.

Zsóka et al. (2013) discovered a significant link between environmental education and environmental knowledge, with a strong correlation between the level of environmental education and an abundance of environmental knowledge. Therefore, it can be concluded that eco-education is a key factor that enables individuals to understand real-world environmental facts and phenomena and learn how to prevent, halt, or reverse environmental damage. Additionally, environmental education improves knowledge of the natural environment's fundamentals, universal principles, and role (Liu and Guo, 2018). The most critical aspect of environmental education is that it fosters individuals' environmental awareness and appreciation, promoting the pursuit of long-term coexistence with nature. Based on these findings, we propose the following hypothesis.

Hypothesis 1: Eco-education positively and significantly influences the consumer perception of environmental knowledge.

2.2 Encouraging Eco-Friendly Consumerism through Education

The feelings, beliefs, and values an individual holds regarding the environment and their responsibility to protect it are collectively known as their environmental attitude. When discussing environmental attitude, it is important to consider the degree and type of environmental concern or indifference one possesses. This is significant because consumers' attitudes towards the environment can inspire positive changes and encourage others to take an active role in protecting it (Bøhlerengen and Wiium, 2022). To effectively alter consumers' attitudes and knowledge through educational interventions, it is crucial to first understand their environmental attitudes and knowledge. The evolution of environmental education, its challenges, and how it is defined and promoted are all closely related to the changing landscape of

environmental concerns (Tilbury, 1995). Ultimately, understanding environmental attitudes is essential because they are a prerequisite for pro-environmental behavior, which is the ultimate goal of environmental education.

Some academic research suggests that environmental education alone may not be enough to significantly change consumers' attitudes toward the environment. While programs aimed at increasing environmental knowledge have been successful, they may not be sufficient to shift deeply held beliefs. However, education remains a valuable tool for promoting engagement and action on environmental issues. Through critical thinking and problem-solving skills, consumers can better assess opposing viewpoints and make informed decisions. Therefore, we propose the Hypothesis.

Hypothesis 2: Eco-education positively and significantly influences the consumer attitude toward green purchasing.

2.3 Eco-Education and Consumer Intention towards Green Purchasing

Recent studies conducted in the United States, Spain, Mexico, and Brazil have drawn a connection between environmental education and the likelihood of college students supporting the environment through their purchasing decisions (Vicente-Molina et al., 2013). Individuals who have received environmental education are more inclined to act in ways that are pro-environment than those who haven't (Camargo and Shavelson, 2009). There are various circumstances where direct actions can be modified, such as observing students' behaviors with regard to litter reduction and water pollution, assessing students' learning after a stream ecology activity through performance assessment, and monitoring students' disposal of liquids into storm drains. These actions aim to raise people's awareness of environmental issues and encourage pro-environmental behavior. Therefore, we believe that by incorporating environmental education creatively into educational practices, it is possible to increase people's intention to observe, evaluate, and engage in actual environmental activities. As such, we propose the following hypothesis.

Hypothesis 3: Eco-education positively and significantly influences the consumer intention toward green purchasing.

2.4 Eco-Education and ConsumerBehavior towards Green Purchasing

Education is a powerful tool for promoting behavioral change, with the acquisition of general knowledge, self-awareness, and skill development being key components. Effective environmental education employs a range of strategies to enhance environmental attitudes, values, and knowledge, and goes beyond simply providing information (Ardoin, Bowers, and Gaillard, 2000). It also fosters the development of abilities that enable people and communities to take informed environmental action together, leading to positive outcomes for conservation and environmental quality. However, there is debate about whether environmental education programs are structured in a way that encourages behavioral change, as they often prioritize knowledge and awareness over critical thinking and action. Nonetheless, research suggests that environmental education is a crucial tool for increasing public support and engagement in environmental concerns. Therefore, we propose the following hypothesis.

Hypothesis 4: Eco-education positively and significantly influences the consumer behavior toward green purchasing.

2.5 Consumer Environmental Knowledge and Intention of Green Purchasing

There are various theories that explore the relationship between attitudes and

actions, and many of them emphasize the importance of knowledge as a key variable. For instance, people's decision to buy eco-friendly products can be influenced by their understanding of environmental issues and solutions (Indriani, Rahayu, and Hadiwidjojo, 2019). When consumers have a good grasp of the broader environmental challenges, they are more likely to choose green products. In other words, the more environmentally aware people are, the more they tend to prioritize eco-friendly purchases. Several studies have shown that greater environmental awareness can increase people's sense of responsibility toward protecting the planet, either through their motives or their actual behavior. For example, research has found a direct link between environmental awareness and the desire to make green purchases (Joshi and Rahman, 2016). Understanding the environment is also a crucial factor in predicting people's purchasing intentions. However, some researchers argue that environmental information has the least impact on consumers' propensity to buy green products. Given the gaps in the literature, this article aims to conduct further research and test the following hypothesis.

Hypothesis 5: The consumer’s perception of environmental knowledge positively and significantly influences the consumer’s intention toward green purchasing.

2.6 Consumer Attitude and Behavior towards Green Purchasing

Attitude plays a significant role in predicting actions, with psychological factors being key drivers. For customers, environmental attitudes serve as a marker of their responsibility towards the planet. Research suggests that having a positive attitude toward environmental sustainability leads to more environmentally conscious behavior (Okada, Tamaki, and Managi, 2019). Similarly, integrating environmental knowledge into behavior hinges on one's attitude towards the environment. Given that attitude has the greatest impact on purchase intention, it is a powerful predictor of behavior. Since the 1960s, green consumerism has been acknowledged as an eco-friendly practice (Mostafa, 2006). However, it is important to note that consumers can only act in an environmentally responsible manner if they genuinely believe in conservation efforts. A green consumer considers various physical environmental issues such as environmental protection, pollution reduction, and responsible use of non-renewable resources while making purchases. To put it simply, the actions of an environmentalist should be consistent with their support for the environment. Based on these findings, we propose the following hypothesis.

Hypothesis 6: The consumer's environmental attitude positively and significantly influences the consumer’s intention toward green purchasing.

2.7 Consumer Intention and Behavior towards Green Purchasing

The driving force behind a particular conduct is usually the intention, which plays a significant role in decision-making. Individuals strive to act with clear intentions regarding when, where, and how to act. A study examining the difference between ethical purchase intention and actual purchase behavior found that implementation intention influences behavior (Carrington, Neville, and Whitwell, 2010). However, some studies suggest that external obstacles may prevent people from acting in a pro-environmental manner, even if they are sincerely motivated to do so. For example, an individual may struggle to reduce the use of single-use plastics if there are no alternative products available or if recycling facilities are not accessible in their area. Moreover, the relationship between environmental intention and behavior may be influenced by personality, values, and beliefs (Li, Yu, and Su, 2021). When people understand the environmental costs involved in their actions, they may

be more likely to view them as socially desirable and normative. Therefore, we present the following hypothesis.

Hypothesis 7: Consumer intention of environmental behavior positively and significantly influences consumer behavior towards green purchasing.

3. Methodology and Analysis

3.1 Data Collection

We adopt the post-positivism paradigm, which is a philosophical concept that produces and supports objective, patterned, and knowable reality (Leavy, 20174) and which testifies to the assertions of this study, based on the aforementioned literature review and seven Hypotheses that are put forward. To confirm the relationships between variables, this study uses quantitative research that includes measure variables. Structured questions are generally used to collect data for quantitative research methodologies. Thus, to collect a large number of replies and provide easy access to valid samples, we conducted a survey approach using an electronic questionnaire. Between March 1 and April 30, 2023, we distributed 350 questionnaires via Google Form links to friends, family, and chat groups via LINE and WhatsApp to conduct the survey. Of these, 235 were valid samples (Table 1).

In data analysis, information can be classified into numerical and categorical data. Categorical data can further be divided into nominal, ordinal, interval, or ratio categories, while numerical data consists of integers that can be manipulated using basic arithmetic operations (Awang, Afthanorhan, and Mamat, 2016). For our study, an interval scale is utilized, allowing participants to express their level of agreement in accordance with the study's conceptual framework and operational definitions. This is accomplished using a Likert scale, a popular form of interval scale. Respondents can use this psychometric tool to convey their thoughts, opinions, or emotions on a specific issue by selecting from a range of categories. To assess individual behavior through surveys, a five-point Likert scale is employed, where the responses range from strongly disagree (1) to strongly agree (5).

Table1: Demographic Profile

Characteristics	Category	N=235	
		Frequency	Percentage
Age	17-27 years old	149	63.4%
	28-38 years old	48	20.4%
	39-49 years old	10	4.3%
	50-59 years old	19	8.1%
	> 60 years old	9	3.8%
Gender	Male	100	42.6%
	Female	135	57.4%
Education	High School	17	7.2%
	Undergraduate	171	72.8%
	Master Degree	28	11.9%
	PhD	19	8.1%

3.2 Validity and Reliability

The first step in assessing validity is to identify the construct. Convergent validity is then evaluated by examining the value of each indicator. There are two types of validity tests: convergent and discriminant. In this study, we used Confirmatory Factor Analysis (CFA) and Average Variance Extracted (AVE) to test for validity. The variables analyzed were environmental education (EE), environmental knowledge

(EK), environmental attitude (EA), environmental behavioral intention (EBI), and pro-environmental behavior (PEB). Along with standardized loading estimates, validity can also be observed through Average Variance Extracted (AVE). As Table 2 shows, convergent validity measures how closely a test correlates with other tests that measure the same or similar constructs, while discriminant validity measures how distinct or unique a measure is from others. Cronbach's Alpha is the most suitable reliability measurement when using the Likert scale, as it indicates internal consistency (Ghozali, 2017). However, Cronbach's Alpha does not reflect the test's stability or consistency over time. Therefore, Construct Reliability (CR) offers a higher dependability number than Cronbach's Alpha and is used to gauge reliability in this study. If the CR value is greater than 0.7 and the variance extracted value is greater than 0.5, the confirmatory analysis is considered satisfactory.

Table 2: AVE and Discriminant Test Result

	CR	AVE	MSV	MaxR(H)	EE	EK	EA	EBI	PEB
EE	0.947	0.817	0.536	0.952	**0.904**				
EBI	0.942	0.803	0.630	0.945	0.732*	-0.114	**0.896**		
EK	0.967	0.879	0.500	0.974	0.592*	-0.050	0.707*		
EA	0.898	0.688	0.607	0.907	0.568*	-0.065	0.779*	**0.829**	
PEB	0.927	0.762	0.630	0.929	0.726*	-0.113	0..794*	0.629*	**0.873**

3.3 Structural Mode Testing Result

The structural model test is a crucial step in determining the relationship between constructs and the existence of a hypothesis. Before conducting the test, it is important to assess the R-squared value, which indicates the percentage of variability in the dependent variable that can be explained by the independent variable (Hair et al., 2019). In this study, we utilize CR and p-values with a minimum of 1.65 and a maximum of 0.05 for structural testing. If a significant relationship with a value of ± 1.65 is found, it indicates support for the hypothesis. Additionally, evaluating the model fit is essential while conducting a structural model. The results of this evaluation, which includes the R-squared value of each endogenous variable observed from the Squared Multiple Correlations, are displayed in Figure 1.

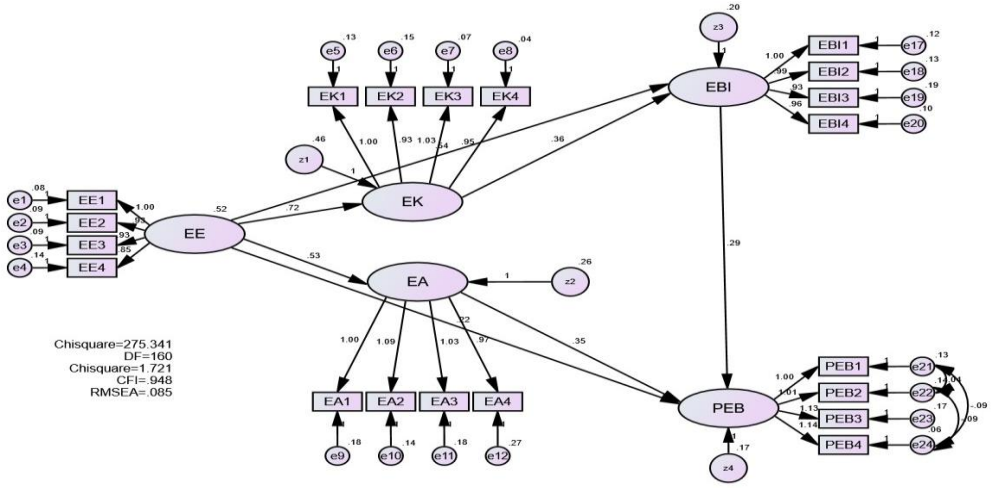

Figure1: Structural Model Testing Result

Table 3: The Result of Hypotheses Testified

Hypothesis	Estimate	Critical Value	P-value	Result
H1	0.717	6.667*	0.000	Supported
H2	0.529	5.999*	0.000	Supported
H3	0.538	5.671*	0.000	Supported
H4	0.222	2.026*	0.000	Supported
H5	0.357	4.573*	0.000	Supported
H6	0.355	3.729*	0.000	Supported
H7	0.001	0.413	0.680	Rejected

Based on the R-square values obtained for the EK variable, it appears that the EE variable is capable of explaining 36.7% of the observed variations (with an R-square value of 0.367). The explanation rates for the EA variable are moderate to medium, with R-square values of 0.494 and 0.36. Similarly, the R-square values for the EBI variable suggest a moderate or higher explanation rate of 0.661. Lastly, the R-square values for the PEB variable indicate higher expatriation rates, with values of 0.61 for Taiwan. These findings are presented in Table 3 as the results of the hypotheses tested in this study.

3.4 Model Fit

Various metrics are used to assess the fit of the model. For large samples, the chi-square test may be employed (Klloway, 1998). The likelihood ratio chi-square statistic is initially used as a measure. Although the value is statistically significant above the 0.05 criterion, the statistics support the claim that the variances between the predicted and actual matrices are negligible, indicating a good fit. However, due to the high sensitivity of the chi-square to sample size, the degree of freedom may be utilized as a criterion for adjustment to determine whether the chi-square is large or small (Taasoobshirazi and Wang, 2016). To assess how well the measurement and structural models simultaneously fit the data collected for this study, several diagnostic methods are employed in the model fit evaluation process.

In order to explore the impact of different data structures and sample sizes on model fit measures, a study was conducted. When describing the fit of structural equation models, fit indexes such as AGFI, GFI, CFI, NFI, IFI, and TLI are commonly reported (Taasoobshirazi and Wang, 2016). Additionally, the SRMR measures the mean absolute correlation residual and is indicative of a good model fit when the value is small (Lee, 2007). A value closer to 1 suggests a better model fit, but this tends to worsen as the number of variables in the model increases. Our developed formal method can be applied to investigate other measures of fit and types of misspecification. However, it's important to note that certain measures, like RMSEA, cannot be calculated for a saturated model. Since a saturated model is the most un-parsimonious possible, parsimony-based fit measures like PNFI and PGFI will always be 0.

With the help of AMOS, it is possible to determine the model fit index during the traditional assumption test. This is a crucial step that enables us to evaluate whether certain items are suitable for the given model, using a sample or observed data. Table 9 presents the model fit index for research conducted in Taiwan and Indonesia. Based on the findings of West et al., a TLI and CFI threshold of 0.95, an RMSEA criterion of

0.06, and an SRMR criterion of 0.08 are recommended (Moisander, 2007). The overall model fit for both studies is good or within an acceptable level, with the exception of RMSEA (Table 4).

Table 4: Model Fit

Model fit index	Perfect fit	Acceptable fit	Taiwan
GFI	≥ 0.95	≥ 0.90 - <0.95	0.948
AGFI	≥ 0.90	≥ 0.85 - <0.90	0.854
CFI	≥ 0.95	≥ 0.90- < 0.95	0.960
NFI	≥ 0.95	≥ 0.90 - < 0.95	0.928
TLI	≥ 0.95	≥ 0.80 - < 0.90	0.954
RFI	≥ 0.90	≥ 0.80 - < 0.90	0.900
RMSR	< 0.08	-	0.047
RMSEA	< 0.06	-	0.107
IFI	≥ 0.95	≥ 0.90 - < 0.95	0.960
PNFI	≥ 0.8	≥ 0.60 - < 0.80	0.666
PGFI	≥ 0.7	≥ 0.50 - < 0.70	0.522

4. Discussion

Now that the research is complete, it's time to delve deeper into the topic. Our findings offer important insights, and we've identified potential implications specific to Indonesia and Taiwan. Given the distinct socioeconomic and cultural differences between the two, it's essential to handle the subject matter with cultural sensitivity. Moreover, we need to factor in stakeholder input, long-term effects, and any possible challenges to environmental education. Let's continue the discussion and explore these issues further.

When compared to Indonesia, Taiwan has made significant strides in promoting pro-environmental conduct. This achievement is largely attributed to Taiwan's explicit laws and policies that address environmental concerns. For example, Taiwan's commitment to environmental sustainability is evidenced by the implementation of laws that facilitate waste separation and regulate the use of single-use plastics in select food and beverage establishments. However, despite the headway made thus far, Taiwan still has ample room to enhance its environmental efforts.

Consequently, Taiwan should prioritize enhancing its pro-environmental behavior by focusing on three key objectives. Foremost, the government must establish a robust monitoring and assessment framework to ensure businesses and other sectors comply with existing regulations. If non-compliance or obstacles arise, the government should be prepared to explore alternative approaches to overcome these challenges and guarantee the realization of the original objectives.

Furthermore, Taiwan should prioritize increasing public involvement and awareness by actively promoting environmental education. By implementing effective educational programs, people will feel more accountable and empowered to take proactive steps towards protecting the environment. This can be achieved through various means, such as organizing impactful awareness campaigns, partnering with educational institutions, and leveraging social media to reach a wider audience. Additionally, Taiwan can simplify the process of participating in workshops and tree-planting initiatives. To further improve environmental education, creative activities like camping trips and beach clean-ups can be introduced to engage children and make learning more enjoyable. Like Indonesia, Taiwan can also collaborate with public figures or celebrities to deliver educational programs on environmental issues, utilizing their influence to reach a larger audience.

Thirdly, it is important for Taiwan to actively promote cooperation among all stakeholders to enhance environmentally friendly behavior. This can be achieved through the creation of public-private partnerships that bring together corporations, government entities, nonprofit organizations, and neighborhood associations to implement sustainable programs. By utilizing the diverse experiences, resources, and information of various stakeholders, Taiwan can foster a collective and synergistic effort towards building a more environmentally conscious society. Furthermore, partnerships with other stakeholders can be pursued to develop environmentally friendly products and processes that companies from different industries can adopt. In the future, Taiwan may explore collaboration with relevant international organizations to exchange information, experiences, and best practices on environmental behavior. Taiwan has a unique opportunity to ramp up its efforts and find practical solutions to environmental issues, while also supporting other nations that struggle to promote pro-environmental behavior by sharing its experiences and promoting global environmental sustainability.

5. Conclusion

This paper details the results of our analysis in light of our findings. We have examined the evidence surrounding seven hypotheses to assess the relationships between environmental education, environmental knowledge, environmental attitude, environmental behavioral intention, and pro-environmental behavior across two regions. Our analysis relied on Structural Equation Modeling to evaluate the interplay between these variables. Our study offers insightful information, shedding light on the current state of consumer pro-environmental behavior. Our research findings may prove useful by providing ideas and answers to improve environmentally conscious shopping behavior. Our evidence suggests that environmental education is an effective means of motivating people to act sustainably, with the key predictors of green behavior being environmental education and intrapersonal characteristics such as knowledge, attitude, and intention.

The study suggests that consumers tend to express pro-environmental attitudes, but this may not necessarily correspond to their behavior in daily life. People generally have a notion of what actions are eco-friendly, leading them to frequently choose "agree" or "very agree" when presented with moral considerations. As a result, there is a shared perception among individuals.

This study also demonstrates that motivation is not always a key element in translating tangible or intangible education into practical conduct. This does not, however, imply that contextual incentive is not significant. Unquestionably, inspiration inspires sustained effort from the person and propels committed initiative and passion. According to earlier studies, motivation cannot develop internally from everyone's heart (intrinsic motivation), and it still requires external support (extrinsic motivation), such as rules set by the Besides, from the perspective of cultural difference, the number of individuals who engage in pro-environmental activity is significantly influenced by the efficiency and accessibility of community environmental services (Liobikienė and Poškus, 2019).

Consequently, environmental organizations may operate in areas where sustainable infrastructure is readily accessible. For instance, individuals may be encouraged to purchase eco-friendly products, but without easy availability, they may not follow through. Depending on location-specific factors such as the availability of environmentally friendly options, regulations, and cultural influences, the characteristics of a nation's pro-environmental consumers may vary. Cultural

disparities in environmental beliefs appear to impact pro-environmental behavior. Through cultural exchange, two case studies, Indonesia and Taiwan, are believed to possess similar environmental knowledge. Thus, this survey reveals minimal differences in consumer purchasing habits between the two locations.

Research has consistently shown that simply being aware of environmental issues does not necessarily translate into eco-friendly actions (Huddart Kennedy et al., 2015). Despite knowing what is harmful to the environment, consumers often opt for more convenient alternatives. Therefore, it is crucial to educate consumers about both local and global environmental concerns, as well as how their actions can impact the environment. One effective approach is eco-centrism, which emphasizes the environment to the public rather than relying on rules, social norms, or celebrities. By tapping into the emotional system, consumers are more likely to adopt pro-environmental behaviors, as they feel a sense of moral responsibility. As a result, many customers are increasingly motivated to engage in environment-friendly actions, driven by a desire to do what is right.

This study offers a significant contribution to the area of environmental psychology and consumer behavior by uncovering the intricate relationship between environmental education and pro-environmental behavior in two diverse socio-cultural contexts in Indonesia and Taiwan. The meticulous methodology employed in this research design demonstrates a comprehensive understanding, and the statistical analysis further bolsters the credibility of our findings, enhancing the robustness of our research. We firmly believe that this approach unquestionably enhances the academic rigor of our study.

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