# **Causal Model of Environmental Conservation Be** haviors of Praboromarajchanok Institute Students

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## Abstract

This research aims to: 1) study the direct and indirect influences of factors affecting the environmental conservation behaviors of Praboromarajchanok Institute students; and 2) develop a causal relationship structure model of the environmental conservation behaviors of students in Praboromarajchanok Institute by identifying elements from the theories of planned behavior, protection motivation theory, and value-belief-norm theory. The sampling for this survey research comprises 480 students from 8 colleges of the Praboromarajchanok Institute, which were obtained by multi-stage sampling. The research variables consisted of 7 latent variables, namely, attitude toward environmental behaviors, perceived efficacy in environmental behavior control, perceived threats to environmental behaviors, personal values, subjective norms, environmental behavior intention, and environmental conservation behaviors. All latent variables were measured from 24 observed variables using a questionnaire. The statistics used in data analysis were frequency, percentage, mean, standard deviation, and causal relationship structure model analysis.

The research revealed that level of environmental conservation awareness of the Praboromarajchanok Institute students was high, and the results of the analysis of the causal structure relationship for the environmental conservation behaviors of students in the empirical data could explain 78% of the variance in environmental conservation behaviors of students under Praboromarajchanok Institute (PBRI). Personal value had the highest effect on the environmental conservation behavior of the students, followed by environmental behavior intention, subjective norms, perceived environmental behavior control, perceived threats to environmental behaviors, subjective norms, and perceived threats to environmental behaviors directly influenced environmental behavior intention. The perceived efficacy of environmental behavior control directly influenced environmental behaviors through perceived efficacy in environmental behavior control, attitude toward environmental behavior students to environmental behavior threats to environmental conservation behaviors. For personal values, there was an indirect effect on environmental behaviors, subjective norms, subjective normon, and environmental behavior control, attitude toward environmental behaviors, subjective norms, and environmental behavior control, attitude toward environmental behaviors, subjective norms, and environmental behavior control, attitude toward environmental behaviors, subjective norms, perceived efficacy in environmental behavior control, attitude toward environmental behaviors, subjective norms, perceived threats to environmental behavior intention. Furthermore, environmental behavior intention was found to have a direct influence on environmental conservation behaviors.

Keywords: Causal models, Environmental conservation behaviors, Praboromarajchanok institute (PBRI)

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## 1. Introduction

The rapid population growth coupled with accelerated economic development in the country, driven by a lack of caution and disregard for the environment, has led to the degradation of natural resources. This, in turn, has resulted in various consequences such as global warming, greenhouse gas emissions, water scarcity, water pollution, air pollution, soil erosion, deforestation, and loss of biodiversity [1, 2]. Paying attention to environmental behavior is crucial because human behavior contributes to environmental issues. Environmental problems can be mitigated through the promotion of environmentally friendly behavior [3, 4, 5]. Addressing environmental issues depends on understanding human behavior. Individual actions can reduce environmental problems if the majority of people are concerned about the environment. This concern can extend to individual actions for environmental conservation. Environmental conservation is a positive intentional behavior toward the environment, influenced by values, beliefs, and norms, which collectively contribute to environmental conservation behaviors [6]. From the Sustainable Development Goals (SDGs), goal 12 promotes sustainable consumption and production, friendly to the environment, for sustainable development. Additionally, in the National Economic and Social Development Plan, Version 13, 2566-2570 [7], the sustainable dimension of natural resources and the environment has been addressed. Target 10 emphasizes the importance of waste and waste management for recycling and utilization, while Target 11 aims to reduce risks and impacts from natural disasters and climate change by promoting envi-

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ronmentally friendly production and consumption. All of these emphasize the significance of caring for the environment for sustainable development. Everyone must cooperate in preserving and behaving in an environmentally responsible manner. The concept and approaches to addressing environmental issues focus on instilling environmental conservation in youth and students. Promoting environmentally friendly behavior in individuals requires studying causal factors and using theories to explain environmental behaviors influenced by important factors. Examples include an individual's attitudes, subjective norms, perceived behavior control, and behavior intention in the Theory of Planned Behavior (TPB) [8]. The personal can be derived from Value-Belief-Norm Theory [9]. They specify the relevant values in three formats: biospheric value, egoistic value, and altruistic value. When individuals change the prioritization of their values, it affects the beliefs they hold about environmental behavior [10]. Perceived threats and their effects on environmental behavior can be derived from the Protection Motivation Theory, which aims to prevent disease [11]. Studying causal factors that influence environmental behavior is beneficial for practical applications in promoting higher levels of environmental behavior, especially among students [12].

Therefore, the research focus is to develop a causal model of factors influencing environmental conservation behavior among Praboromarajchanok Institute students. This group of young people plays a crucial role in promoting and maintaining environmental quality, particularly in the field of environmental health, and as role models for environmental care, to improve the quality of life for the public. Therefore, it is necessary to study and understand various factors that influence environmental conservation behavior. A causal model that aligns with empirical data can explain the relationships and influences of these factors on environmental conservation behavior, which will be beneficial for various educational institutions in guiding policies, instructional development, and activities to enhance students' environmental conservation behavior. Moreover, it will serve as a foundation for transitioning towards a sustainable green university in the future. Accordingly, this study aims to study the direct and indirect influences of factors affecting the environmental conservation behavior of Praboromarajchanok Institute students. In addition, to develop a causal relationship structure model of the environmental conservation behaviors of the students under the Praboromarajchanok Institute. This study hypothesizes that the causal relationship model of the environmental conservation behaviors of students at Praboromrajjanok Institute developed from this research is consistent with the empirical data.

## 2. Materials and Methods

## 2.1 Population and sample group

The sample size is based on the concepts proposed by Schumacker and Lomax [13], indicating that an appropriate sample size is 20 times the number of variables within the framework of this study. The current study includes 24 observed variables. Hence, this sample size is considered suitable for analysis using the AMOS software to ensure accurate estimation and representativeness of the population for this research, comprising a total of 480 samples. The population was 16,521 students at Praboromarajchanok Institute in the academic year 2021. The multi-stage sampling approach was employed in this research. In the first step, they were categorized at Praboromarajchanok Institute into two faculties: Nursing Faculty (30 colleges) and the Public Health and Allied Health Sciences Faculty (9 colleges). The sampling began with simple random sampling within the two faculties, resulting in 5 colleges from the Nursing Faculty and 3 colleges from the Public Health and Allied Health Sciences Faculty. In the next step, stratifiedrandom sampling was conducted to determine sample sizes within each collegebased on proportions calculated from the students of the 8 selected colleges. Finally, simple random sampling was employed to select specific sample groups according to the calculated proportions from each college, making a total of 480 students. The sample groups were not collected by year of study.

## 2.2 Research tools

The data collection tools of this study were questionnaires consisting of 8 questions about general information, 20 questions about attitudes toward environmental behaviors, 19 questions about perceived behavioral control,14 questions about personal values, 9 questions about subjective norms, 11 questions about perceived threats, 5 questions about behavioral intention, and 46 questions about environmental conservation behaviors.

The quantitative study in this step was conducted based on a survey research design. The questionnaire was used to collect data from 480 students under Praboromarajchanok. In the aspects of attitudes toward environmental behaviors, perceived behavioral control, personal values, subjective norms, perceived threats, behavioral intention, and environmental conservation behaviors. The collected data were used in a structural equation model analysis (SEM) and statistical analysis.Both causal models and structural equation models deal with relationships between variables; causal models are more specifically concerned with cause-and-effect relationships, while SEM is a broader framework that incorporates complex relationships, latent variables, and measurement aspects.



Figure 1: Research Conceptual Framework.

## 2.3 Research Tools Validity Test

The instruments used in the research were examined for the validity of the content by 5 experts. The attitudes toward environmental behaviors questionnaire, the perceived behavioral control questionnaire, the personal values questionnaire, the subjective norms questionnaire, the perceived threats questionnaire, the behavioral intention questionnaire, and the environmental conservation behaviors questionnaire received an I-CVI (Item Content Validity Index) of 0.80 -1.00, and the coefficient of alpha Cronbach was calculated. The confidence values were .95, .98, .92, .96, .95, .94, and .98, respectively. The item-total correlations range from .32 to .94

## 2.4 Research Ethics

This research has been certified in human research ethics by the Sirindhorn College of Public Health, Yala SCPHYLIRB-037/2565. Regarding the protection of information providers' rights, the researcher explained the research objectives, the right to answer or not answer any questions, the right to terminate cooperation, and confidentiality to not immediately disclose confidential information or information that could damage and destroy raw data upon completion of the data analysis. Once the informant was willing to participate in the research, a consent form was signed.

#### 2.5 Data collection

The researcher submits research ethics for humans at Sirindhorn College of Public Health, Yala. After the review process, a formal letter was sent to the college of the selected sample group to establish communication and coordinate data collection with the designated personnel. The selected students, who voluntarily agreed to participate in the research activities and had the option to withdraw at any time during the study, were scheduled for appointments by the assigned personnel. The researcher explained the research objectives and the benefits derived from the study. Questionnaires were distributed to the selected students as part of the sample group, accompanied by instructions on how to complete them in each section. Any questions or concerns were addressed and clarified. The researcher conducted a thorough assessment of the questionnaires' completeness to ensure their validity.

## 2.6 Data analysis

The descriptive statistics employed were frequency, percentage, mean, and standard deviation. The Structural Equation Model (SEM) was used for model verification with AMOS (Authorization Code AMOS: d906c39e041a204b4243) by considering whether the Chi-Square value differs from zero with no statistical significance at the 0.05 level or if the Chi-Square/df value is lesser or equal to 2, the P-value with no statistical significance at the 0.05 level, the RMR (Root Mean Square Residual) value is less than 0.05, the RMSEA (Root Mean Square Error Approximation) value is less than 0.05, the GFI (Goodness of Fit Index), NFI (Normed Fit Index), CFI (Comparative Fit Index), and TLI (Tucker - Lewis Index) value higher than 0.95 [13].

## 3. Result and discussion

## 3.1 The direct and indirect influences of factors affecting environmental conservation behaviors of Praboromarajchanok Institute students

The general characteristics of the sample were 92.50% female, with a 20-year-old age of 31.00%. Most studied at the Faculty of Nursing (60.62%), 46%

had average grades 3.01-3.50, and 33.80% had an average income between 5001-10,000 baht per month. For attitudes toward environmental behaviors, perceived behavioral control, personal values, subjective norms, perceived threats, behavioral intention, and environmental conservation behaviors, all were at high levels of 4.00, 3.85, 3.76, 3.90, 4.10, 4.05, and 3.80, respectively.

The results of the linear correlation analysis among the latent variables in the causal relationship model of environmental conservation behavior among students at Praboromarajchanok Institute, consisting of 7 variables, were examined to determine the preliminary agreement of the structural equation model analysis. There were 21 pairs showed a statistically significant positive correlation with correlation coefficients of .01. The positive correlation coefficients between each latent variable in the model ranged from .554 to .775, all below 0.80. This indicates that the variables exhibit a reasonable level of correlation without any multicollinearity issues (Table 1).

Based on the elements of the model from direct and indirect variables affecting environmental conservation behaviors of students at Praboromrajchanok Institute, it was concluded that the causal structure model was able to co-describe environmental conservation behaviors by 78%. The model elements from direct and indirect variables affecting the environmental conservation behaviors of students at Praboromrajchanok Institute, it was concluded that the causal structure model was able to co-describe environmental behavior intention by 74%. The personal values were able to describe attitudes toward environmental behaviors, subjective norms, perceived threats, and perceived efficacy in environmental behavior control by 56%, 75%, 64%, and 77%, respectively (Table 2).

The personal values had a direct positive influence on attitude toward environmental behaviors, subjective norms, perceived threats, and perceived efficacy in environmental behavior control ( $\beta = .75, p < .05$ ;  $\beta = 0.87, p < .05; \beta = .80, p < .05; \beta = 0.88,$ p < .05, respectively), and an indirect positive influence on environmental behavior intention and environmental conservation behaviors ( $\beta = .81, p < .05$ ;  $\beta = .77, p < .05$ , respectively). The attitude toward environmental behaviors had a direct positive influence on environmental behavior intention ( $\beta = .19$ , p < .05), and an indirect positive influence on environmental conservation behaviors ( $\beta = .13, p < .05$ ). The subjective norms had a direct positive influence on environmental behavior intention ( $\beta = .50, p < .05$ ) and an indirect positive influence on environmental conservation behaviors ( $\beta = .34, p < .05$ ). The perceived threats had a direct positive influence on environmental behavior intention ( $\beta = .18, p < .05$ ), and an indirect positive influence on environmental conservation behaviors ( $\beta = .12, p < .05$ ). The perceived efficacy of environmental behavior control had a direct positive influence on environmental behavior intention and environmental conservation behaviors ( $\beta = .10$ ,  $p < .05; \beta = .18, p < .05$ , respectively) and an indirect positive influence on environmental conservation behaviors ( $\beta = .07, p < .05$ ). The environmental behavior intention had a direct positive influence on environmental conservation behaviors ( $\beta = 0.68$ , p < .05). The environmental conservation behavior is caused by the combined influence of personal values (TE = .77), environmental behavior intention (TE= .68), subjective norms (TE = .34), perceived efficacy in environmental behavior control (TE = .32), attitude toward environmental behaviors (TE = .13), and perceived threats (TE = .13), respectively. Therefore, the causal relationship structure model of environmental conservation behaviors among students at Praboromrajchanok Institute was harmonized with empirical data and could theoretically explain the relationship between the variables. This is following the research hypothesis as shown in Figure 2.

# 3.2 The causal model analysis examining environmental conservation behaviors among students at Praboromrajchanok Institute

In this research, the researcher used path analysis of the structural equation. The model was adjusted to be consistent with the empirical data. The results of an index analysis were used to verify the consistency and harmony of the model with the empirical data. The results of the harmonization assessment were  $\chi^2 = 115.91$ , df = 96, relative  $\chi^2 = 1.21$ , p = 0.08, RMSEA = 0.02, RMR = 0.01, GFI = 0.98, NFI = 0.99, TLI = 0.99, and CFI = 1.00.

Regarding the method of parameter estimation, the composition weight of related variables in the causal relationship model of environmental conservation behavior among students at Praboromarajchanok Institute was found. The intention towards environmental behavior, which can be measured by five observable variables, including the intention to participate in environmental conservation activities (INT1) ( $\beta = 0.856$ , p < .05), the intention to consume environmentally friendly products (INT2) ( $\beta = 0.867, p < .05$ ), the intention to manage waste (INT3) ( $\beta = 0.884, p < .05$ ), the intention to conserve energy (INT4) ( $\beta = 0.819$ , p < .05), and the intention to use resources efficiently (INT5) ( $\beta = 0.862, p < .05$ ), has a direct positive influence on environmental conservation behaviors. It indicates that students with higher intentions or motivations to act for the environment are more likely to exhibit high levels of environmental conservation behaviors. Furthermore, students' intentions to display environmental behaviors occur when they have evaluated that the outcomes of their actions are positive. The behavior is a result of the students' intention or willingness to act or not act under their own selfcontrol and is not determined by emotions or a lack of consideration before making decisions, in line with

Table 1. The linear relationship between latent variables in the causal relationship model of environmental conservation behavior of students under the Praboromrajchanok Institute

	ATTITUDE	CONTROL	VALUE	NORM	THREAT	INTENSION	BEHAVIOR
ATTITUDE	1						
CONTROL	.729**	1					
VALUE	.554**	.673**	1				
NORM	.602**	.744**	.661**	1			
THREAT	.573**	.654**	.646**	.711**	1		
INTENSION	.627**	.697**	.672**	.775**	.673**	1	
BEHAVIOR	.602**	.705**	.679**	.775**	.611**	.771**	1
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\*\* Statistically significant at the level .01

Table 2. Statistical values of the influence analysis of variables and the conformity index in the causal model of environmental conservation behaviors of students under Praboromrajchanok Institute

Variable	Attitu	ıde		Norm	ı		Threa	at		Cont	rol		Inten	tion		Behav	vior	
	DE	IE	TE	DE	IE	ТЕ	DE	IE	ТЕ	DE	IE	TE	DE	IE	TE	DE	IE	TE
Value	0.75		0.75	0.87		0.87	0.80		0.80	0.88		0.88		0.81	0.81		0.77	0.77
Attitude													0.19		0.19		0.13	0.13
Norm													0.50		0.50		0.34	0.34
Threat													0.18		0.18		0.12	0.12
Control													0.10		0.10	0.25	0.07	0.32
Intention																0.68		0.68
R-Square		0.56			0.75			0.64			0.77			0.74			0.78	

 $X^{2} = 115.91, df = 96, relative X^{2} = 1.21, p = 0.08, RMS EA = 0.02, RMR = 0.01, GFI = 0.98, NFI = 0.99, TLI = 0.99, CFI = 1.00$ 



Figure 2: The result of examining the consistency of the linear structural relationship model of environmental conservation behaviors of students under the Praboromrajchanok Institute.

Ajzen's theory (2006). The stronger and more certain individuals' intentions are, accompanied by sufficient information and great efforts, the higher the likelihood of them engaging in environmental behaviors. Consistent with the previous studies [14, 15, 16], it was found that intentions have a direct positive influence on environmental behaviors.

The attitudes toward environmental behaviors can be measured through three observable variables. These variables, which include the affective variable (ATT1) ( $\beta = 0.911$ , p < .05), the sacrifice behavioral variable (ATT2) ( $\beta = 0.934$ , p < .05), and the cognitive variable (ATT3) ( $\beta = 0.941$ , p < .05), have no direct influence on environmental conservation behavior. However, they have an indirect influence through the mediation of environmental and behavioral intentions. This suggests that for students to exhibit environmentally friendly behavior, they need to undergo developmental interventions that promote attitudes toward environmental behavior. These interventions aim to raise students' awareness of the value of engaging in environmental behavior, which in turn stimulates their intention and determination to act on environmental conservation behaviors. This is following the planned behavior theory, which states that attitudes are the cause of behavior. A person's behavior is de-

**Table 2.** Statistical values of the influence analysis of variables and the conformity index in the causal model of environmental conservation behaviors of students under Praboromrajchanok Institute

Observed variable		Latent	tent Variable					
		S.E.	C.R.	R2				
Personal Values								
Egoistic values (VAL1)	0.497*	0.057	11.269	0.247				
Altruistic values (VAL2)	0.841*	0.028	34.939	0.707				
Biospheric values (VAL3)	0.854*			0.729				
Attitude toward Environmental Behaviors								
Affect (ATT1)	0.911*	0.025	36.117	0.830				
Willing to sacrifice Behavior (ATT2)	0.934*	0.023	9.186	0.872				
Cognitive (ATT3)	0.941*			0.886				
Perceived efficacy in environmental behavior control								
Self-efficacy (CONT1)	0.944*	0.023	40.186	0.892				
Response-efficacy (CONT2)	0.901*	0.026	34.205	0.813				
Controllability (CONT3)	0.982*			0.964				
Subjective Norm								
Family (NORM1)	0.949*			0.900				
Friend (NORM2)	0.913*	0.030	32.766	0.834				
Social (NORM3)	0.887*	0.038	23.961	0.786				
Perceived threats								
Perceived severity (THR1)	0.959*	0.026	38.266	0.920				
Perceived vulnerability (THR2)	0.955*			0.911				
Environmental behaviors intention								
Intention to participate in environmental conservation	0.856*			0.732				
activities (INT1)								
Intention to consume environmentally friendly products	0.867*	0.039	25.341	0.751				
(INT2)								
Intention to manage waste (INT3)	0.884*	0.039	24.536	0.781				
Intention to conserve energy (INT4)	0.819*	0.042	21.705	0.670				
Intention to use resources effectively (INT5)	0.862*	0.041	23.187	0.743				
Environmental Conservation Behaviors								
Participate in environmental conservation activities (BEH1)	0.849*			0.720				
Consume environmentally friendly products (BEH2)	0.905*	0.034	29.383	0.819				
Waste management (BEH3)	0.833*	0.034	25.895	0.694				
Energy conservation (BEH4)	0.924*	0.041	23.291	0.854				
Effective resource utilization (BEH5)	0.916*	0.044	22.834	0.839				

\*Statistically significant at the level .05

termined by their behavioral intention, and behavioral intention is determined by their attitude [8].Consistent with the previous studies [16, 17], it was found that attitudes towards environmental behaviors have a direct positive influence on intention towards environmental behaviors and that intention towards environmental behaviors has a significant positive effect on behavior that supports the environment.

The subjective norms, which can be measured by three observable variables: family reference group (NORM1) ( $\beta = 0.949, p < .05$ ), friend reference group (NORM2) ( $\beta = 0.913$ , p < .05), and social reference group (NORM3) ( $\beta = 0.887, p < .05$ ). Subjective norms do not have a direct influence on environmental conservation behavior, but they have an indirect influence through the mediation of environmental behavioral intention. Subjective norms have a positive indirect influence on environmental conservation behavior, indicating that students believe or perceive conformity to reference groups, namely family, friends, and society, as desirable for promoting environmental conservation behavior and setting a good example. This motivation leads students to imitate or engage in such behaviors, resulting in environmental conservation behavior that benefits the environment, surrounding individuals, and the students themselves. This aligns with Ajzen's [13] Theory of Planned Behavior, which suggests that following group references is an individual's perception of whether other important individuals desire or do not desire them to engage in certain behaviors. This perception may or may not correspond to reality. To generate this variable, it is necessary to have basic beliefs similar to attitudinal beliefs that affect actions. These are referred to as beliefs about reference groups. When individuals perceive or recognize that influential individuals perform certain behaviors, there is a tendency for them to imitate these behaviors. In this research, the influential individuals or reference groups for students are their families, friends, and the social environment in which they reside, who consistently demonstrate environmental conservation behaviors. Consequently, this leads to the occurrence of imitative behavior, displaying environmental conservation behavior, including participation in environmental conservation activities, environmentally friendly consumption, waste management, energy conservation, and resource conservation. This finding is consistent with previous studies [18, 19, 20], which found that the subjective norm has a positive direct influence on environmental behavioral intention and an indirect influence on environmental conservation behavior.

The perceived environmental behavior control can be measured through three observable variables. These variables include self-efficacy (CONT1) ( $\beta$  = 0.944, p < .05), response efficacy (CONT2) ( $\beta$  = 0.901, p < .05), and controllability (CONT3) ( $\beta$  = 0.982, p < .05), which encompass both direct influence on environmental conservation behavior and indirect influence through the mediation of environmental behavioral intention. This aligns with the concept of behavior theory, which suggests that the perception of control ability plays a crucial role in the intention to act, leading to various environmental behaviors [8], and the protection motivation theory, which states that evaluating problem-solving responses that prevent hazardous situations leads to behavioral adaptation. It assesses whether individuals can change environmental behavior, supported by two factors: the belief that changing behavior can genuinely reduce environmental impacts and confidence in one's ability to change behavior [11]. This finding is consistent with previous studies [16, 21, 22], which found that students with high self-efficacy in showing environmentally responsible behaviors had higher direct effects on environmentally responsible behavior and indirectly affected environmentally responsible behavior through their intention to perform environmentally responsible behavior.

The perceived threats to environmental behaviors can be measured through two observable variables. These variables, including perceived severity (THR1)  $(\beta = 0.959, p < .05)$  and perceived vulnerability (THR2) ( $\beta = 0.955$ , p < .05), have an indirect effect on environmental conservation behavior through the mediation of environmental behavioral intention. This is consistent with Roger's (1997) protection motivation theory, which emphasizes the assessment of threats, including their sources and components, as well as factors influencing resistance to behavior change. Therefore, the perception of violence results in awareness of the dangers of not paying attention to environmental behavior. As for the perceived vulnerability of the impact of environmental behavior, it is a factor that affects students' willingness to show behavior in the environment. This finding is consistent with previous studies [23, 24], which found that the variables of perceived severity and perceived vulnerability directly influence the environmental behavioral intention to engage in environmentally responsible behavior.

The personal Values, which can be measured by three observable variables, including the egoistic values (VAL1) ( $\beta = 0.497$ , p < .05), the altruistic values (VAL2) ( $\beta = 0.841$ , p < .05), and the biospheric values (VAL3) ( $\beta = 0.854$ , p < .05), have a direct positive influence on attitudes towards environmental behaviors, subjective norms, perceived efficacy in environmental behavior control, and perceived threats. Moreover, personal values have an indirect positive influence on environmental behavior and conservation behavior. This research is aligned with the concept of value-beliefs-norms theory, where personal values are associated with individual beliefs and behavioral changes resulting from the perception of societal importance. It leads to awareness of the environmental impact and responsibility for the consequences of one's actions on others. Individuals who exhibit environmental behaviors are likely to have higher biospheric and altruistic values [10]. This finding is consistent with previous studies [25, 26], which found that environmental values have a direct positive influence on environmental attitudes, conformity to reference groups, perceived behavioral control, and an indirect positive influence on environmental behavioral intention and environmental conservation behavior.

The environmental conservation behaviors, which can be measured by five observable variables, include participating in environmental conservation activities (BEH1) ( $\beta = 0.849$ , p < .05), consuming environmentally friendly products (BEH2) ( $\beta = 0.905$ , p < .05), waste management (BEH3) ( $\beta = 0.833$ , p < .05), energy conservation (BEH4) ( $\beta = 0.924$ , p < .05), and effective resource utilization (BEH5) ( $\beta = 0.854$ , p < .05) (Table 3). These findings suggest that students who engage in these specific environmental behaviors are more likely to exhibit a higher level of overall environmental conservation behaviors [21, 26].

## 4. Conclusions

This research examined the level of environmental conservation behaviors among students at the Praboromarajchanok Institute and explored the factors influencing these behaviors. By developing a causal relationship structure model, incorporating elements from various theories, it was revealed that personal values had the strongest impact on environmental conservation behaviors, followed by environmental behavior intention, subjective norms, perceived environmental behavior control, perceived threats to environmental behavior, and attitude towards environmental behaviors. The analysis showed direct influences of attitude, subjective norms, and perceived threats on behavior intention, while the perceived efficacy of behavior control influenced both behavior intention and environmental conservation behaviors. Additionally, personal values indirectly affected conservation behavior through their influence on other variables. Overall, this research contributes to a better understanding of the determinants of environmental conservation behaviors among students, providing insights for developing effective strategies to promote sustainable behaviors.

From the study, it can be seen that altruistic values and biospheric values exert significant influence towards environmental conservation behavior. Therefore, it is essential to promote these two values among students through various activities that have been facilitated by relevant departments within the institution. This approach serves as a channel to encourage students to participate in sustainable environmental conservation behaviors. It is important to promote awareness of environmental behavioral control among students in three dimensions: self-efficacy, response efficiency, and the ability to control. This can be done by creating student experience through environmental activities within the institution. Participating in these activities gives students confidence in their ability to solve environmental problems. These hands-on experiences foster self-confidence and awareness of one's ability to manage the environment effectively. Subjective norms strengthen and foster open dialogue among friends, family, and colleagues about the importance of preserving the environment. Encourage conversations that lead to shared values and a shared commitment to sustainable behavior. Also, behavioral intentions that set concrete goals motivate individuals to set specific, attainable goals for environmental conservation efforts. The developed model can be used to benefit other organizations and educational institutions and serve as a policy framework/plan to develop effective and sustainable environmental conservation behaviors. This is helpful in explaining the factors that influence environmental conservation behavior, which lead to policy outcome, especially self-development, raising awareness of the value and taking responsibility for the consequences of their own and others' actions in the environment with the aim of promoting long-term environmental conservation behavior.

### References

- Y. Azadi, M. Yazdanpanah, H. Mahmoudi, Understanding smallholder farmers' adaptation behaviors through climate change beliefs, risk perception, trust, and psychological distance: Evidence from wheat growers in Iran, Journal of environmental management 250 (2019) doi: 10.1016/j.jenvman.2019.109456.
- [2] F. Lange, S. Dewitte, Measuring pro-environmental behavior: Review and recommendations, Journal of Environmental Psychology 63 (2019) 92 - 100.
- [3] E. A. Akintunde, Theories and concepts for human behavior in environmental preservation, Journal of Environmental Science and Public Health 1(2) (2017) 120-133.
- [4] L. K. Jena, B. Behera, Environmental crisis and human wellbeing: A review. International Journal of Development and Sustainability 6(8) (2017) 561-574.
- [5] M. Dornhoff, J. N. Sothmann, F. Fiebelkorn, S. Menzel, Nature relatedness and environmental concern of young people in Ecuador and Germany, Frontiers in psychology, 10 (2019) doi: 10.3389/fpsyg.2019.00453.
- [6] O. Sapci, T. Considine, The link between environmental attitudes and energy consumption behavior, Journal of Behavioral and Experimental Economics 52 (2014) 29-34.
- [7] Office of the national economic and social development council office of the prime minister, The thirteenth national economic and social development plan 2023 – 2027, 2022.
- [8] I. Ajzen, The theory of planned behavior, Organizational behavior and human decision processes 50(2) (1991) 179-211.
- [9] P. C. Stern, T. Dietz, T. Abel, G. A. Guagnano, L. Kalof, A value-belief-norm theory of support for social movements: The case of environmentalism, Human ecology review 6(2) (1999) 81-97.
- [10] J. I. M. de Groot, L. Steg. Mean or green: which values can promote stable pro-environmental behavior? Conservation Letters, 2(2) (2009) 61-66.
- [11] R. W. Rogers, A protection motivation theory of fear appeals

and attitude change1. The journal of psychology 91(1) (1975) 93-114.

- [12] S. Khowtrakul, Educational Psychology, 12th edition, Chulalongkorn University Printing House, Bangkok, 2016.
- [13] R. E. Schumacker, R. G. Lomax, A Beginner's Guide to Structural Equation Modeling, 3rd edition, Routledge Taylor and Francis Group, New York 2010.
- [14] N. Onyon, W. Yoonisil, P. Dechakupt, Development of a linear structural relationship model of responsible environmental behaviors of upper primary students, Phuket Rajabhat University Academic Journal, 14(2) (2018) 20-41.
- [15] P.Liu, M.Teng, C.Han, How does environmental knowledge translate into pro-environmental behaviors: The mediating role of environmental attitudes and behavioral intentions. Science of the total environment, 728 (2020)doi:10.1016/j.scitotenv.2020.138126.
- [16] N. H. N. Mat, M. Mohamed, O. Fawehinmi, M. Y. Yusliza, J. Saputra, Investigating the Antecedents of Students Pro-Environmental Behaviour in the Malaysian Public University, Journal of Talent Development and Excellence 12(3) (2020) 1953-1969.
- [17] A. O. Banwo, J. Du, Workplace pro-environmental behaviors in small and medium-sized enterprises: an employee level analysis, Journal of Global Entrepreneurship Research 9(34) (2019) doi:10.1186/s40497-019-0156-4.
- [18] P. Sritharet, S. Punyasiri, Causal structure of factors that influence green behavior of green hotel's employees in Thailand, RMUTSB Academic Journal 4(2) (2019) 122-139.
- [19] V. K. Verma, B. Chandra, An application of theory of planned

- [20] X. Qi, and A. Ploeger, Explaining consumers' intentions towards purchasing green food in Qingdao, China: The amendment and extension of the theory of planned behavior. Appetite 133 (2019) 414-422.
- [21] T. Yimtanom, Development of a causal model of environmentally responsible behaviors of secondary school students in Bangkok, Journal of Research Methodology 27(1) (2011) 1-24.
- [22] D. H. Fadzil, M. Y. Yusliza, A. H. Ngah, Determinants of proenvironmental behavior among students. Journal of Undergraduate Research 3(2) (2021) 89-98.
- [23] S. O. Almarshad, Adopting sustainable behavior in institutions of higher education: a study on intentions of decision makers in the MENA region, European Journal of Sustainable Development 6(2) (2017) 89-110.
- [24] Y. Wang, J. Liang, J. Yang, X. Ma, X. Li, J. Wu, G. Yang, G. Ren, Y. Feng, Analysis of the environmental behavior of farmers for non-point source pollution control and management: An integration of the theory of planned behavior and the protection motivation theory, Journal of environmental management 237 (2019) 15-23.
- [25] H. Ateş, Merging theory of planned behavior and value identity personal norm model to explain pro-environmental behaviors. Sustainable Production and Consumption, 24 (2020) 169–180.
- [26] P. Wongpinpech, Antecedents of pro-environmental behavior of undergraduate students at universities in Bangkok. Suthiparithat Journal 32(101) (2018) 121-133.