

## Model of Ecological Ethics for Environmental Conservation for Undergraduate รูปแบบจริยธรรมทางนิเวศเพื่อการอนุรักษ์สิ่งแวดล้อมสำหรับนักศึกษาปริญญาตรี

Tipubon Tippalert<sup>1</sup>, Nongnapas Thiengkamol<sup>2</sup> and Chatchai Thiengkamol<sup>3</sup>

ทิพย์อุบล ทิพลเลิศ<sup>1</sup> นงนภัส เทียงกมล<sup>2</sup> และฉัตรชัย เทียงกมล<sup>3</sup>

<sup>1</sup>Student, Department of Environmental Education

Faculty of Environmental and Resource Studies of Mahasarakham University

<sup>2,3</sup>Lecturers, Department of Environmental Education

Faculty of Environmental and Resource Studies of Mahasarakham University

poppy9999@hotmail.com, mahidol@gmail.com, and send2ohm@gmail.com

### บทคัดย่อ

วัตถุประสงค์การวิจัยเพื่อพัฒนารูปแบบความสัมพันธ์เชิงโครงสร้างของจริยธรรมทางนิเวศและสิ่งแวดล้อมศึกษาที่มีผลต่อพฤติกรรมการอนุรักษ์เพื่อบรรเทาภาวะโลกร้อนผ่านแรงบันดาลใจการอนุรักษ์สิ่งแวดล้อม ประชากรเป็นนักศึกษาปริญญาตรี มหาวิทยาลัยราชภัฏกาฬสินธุ์จำนวน 3,135 คน ใช้แบบสอบถามเป็นเครื่องมือในการเก็บรวบรวมกลุ่มตัวอย่างจำนวน 435 คน ใช้รูปแบบสมการเชิงโครงสร้างในการพิสูจน์รูปแบบ

ผลการวิจัยพบว่า เมื่อพิจารณารูปแบบโครงสร้างของปัจจัยองค์ประกอบเชิงยืนยันของจริยธรรมทางนิเวศ (EcoE) และสิ่งแวดล้อมศึกษา (EE) สามารถอธิบายความแปรปรวนของตัวแปรแฝงภายในแรงบันดาลใจการอนุรักษ์สิ่งแวดล้อม (IEC) ที่มีผลต่อพฤติกรรมการอนุรักษ์สิ่งแวดล้อมเพื่อบรรเทาภาวะโลกร้อนได้ร้อยละ 72.00 และปัจจัยองค์ประกอบเชิงยืนยันของจริยธรรมทางนิเวศ (EcoE) และสิ่งแวดล้อมศึกษา (EE) สามารถอธิบายความแปรปรวนตัวแปรแฝงภายในแรงบันดาลใจการอนุรักษ์สิ่งแวดล้อม (IEC) ได้ร้อยละ 43.00

**คำสำคัญ:** รูปแบบ จริยธรรมทางนิเวศ สิ่งแวดล้อมศึกษา แรงบันดาลใจการอนุรักษ์สิ่งแวดล้อม พฤติกรรมการอนุรักษ์สิ่งแวดล้อม

### Abstract

The objective of this study was to develop a causal relationship model of ecological ethics and environmental education affecting environmental conservation behavior for global warming alleviation through inspiration of environmental conservation. The population was 3,135 undergraduates of Kalasin Rajabhat University. The samples of 435 undergraduates were collected. The questionnaire was used as a tool for data collection. The Structural Equation model (SEM) was used for model verification.

The results revealed that the structural model of confirmatory factors of Ecological Ethics (EcoE) and Environmental Education (EE) were able to explain the variation of endogenous factors of Inspiration of Environmental Conservation (IEC) that cause Environmental Behaviors for Global Warming Alleviation (BEH) with 72.00 percent. Moreover, the confirmatory factors of EcoE and EE were able to explain the variation of IEC with 43.00 percent.

**Keywords :** Mode; Ecological ethics; Environmental education; Inspiration of environmental conservation; Environmental conservation behaviors

## 1. INTRODUCTION

Global warming is primarily a problem of too much carbon dioxide (CO<sub>2</sub>) in the atmosphere. This gas acts as a blanket, trapping heat and warming the planet. Global warming is predictable as critically environmental impacts because of the rising in the average temperature of Earth's atmosphere and oceans. Human activities have been acknowledged as a major cause of global warming. The deforest for pastures and plantations have been claimed as the most important activity and simultaneousness of fossil fuel combustion and damaged biodiversity of ocean by over harvesting fishery. As a result, carbon accumulates and overloads our atmosphere. Certain waste management and agricultural practices make the problem of global warming worse by releasing other potent global warming gases, such as methane and nitrous oxide. The national science academies of all the main industrialized countries accepted this phenomenon and the scientific body of national or international standing did not make an argument [1] [2] [3].

Ecological ethics is the human moral associated to other creatures and their natural environment in terms of knowledge, value, belief and responsibility of people protection, conservation on environment and natural resources. People should use it with standard performance on natural resources and environmental conservation in order to achieve sustainable development with moral or obligation to concern beyond the human species and all living creatures of animal, plant of entire ecosystems. However ecological ethics elicits the right of all the life forms on earth to live with equal opportunity. Therefore, ecological ethics should comprise the rights of non-human animals in our ethical and moral values. Even though the human race is regarded as the principal concern of society, but other living creatures are in no way

less significant. They have a right to get their fair share of existence. The consciousness degree of people may vary in this area, everyone has to have an ecological ethics to be responsible to perform. The solution is to balance concern for environmental problem while maintaining the people requirements [4][5][9][10][11][12]. All ecological studies should embrace an appraisal of the intrinsic value of non-human beings. In reality, establishment on this excessive assumption, a rational article has surveyed lately the opportunity of humans' enthusiastic extermination as a signal toward other beings (Singer, 1991; Kochi and Ordan, 2008). [13] [14].

Concurrently, this research is searching for the prediction of ecological ethics of human in terms of ecological knowledge, ecological belief, ecological value, ecological responsibility, forest ecology, mangrove ecology and sea ecology affecting through inspiration of environmental conservation to environmental behavior for global alleviation in aspects of consumption behavior, energy conservation behavior, waste management behavior, travelling behavior and knowledge transferring for environmental conservation with integration of environmental education principle comprising of environmental knowledge, awareness, attitude, skill and public mind [3][9] [10][11][12][16][17][18][19] [20][21] [22][23].

Inspiration of environment conservation with public mind shouldn't be unnoticed when considering on natural resources and environmental protection. Thiengkamol elucidated that public mind inspiration happens from insight and it is different from motivation since inspiration requires no rewards, money, admirations, and complements. Inspiration of public consciousness or public mind, mainly, if one wants to conserve the natural resources and environment, one needs no any rewards, money admirations or complements because one prefers to perform from one's insight. Consequently inspiration might take place because of impression in a person as a

role model or idol, or impression from events, environment, and media perceiving such as movies, books, magazines, and internet [18][22][24][25][26][28].

It was infrequently operated on environmental behavior for global warming alleviation affecting by ecological ethics and environmental education via inspiration of environmental conservation. Therefore, environmental education includes knowledge and understanding, awareness, attitude, skill, and public mind [3][23][26].

## 2. OBJECTIVE

The objective of this research was to develop a causal relationship model of ecological ethics and environmental education affecting to environmental conservation behavior for global warming alleviation through inspiration of environmental conservation.

## 3. METHODOLOGY

The research design was implemented as the following steps:

3.1 The population was 3,135 undergraduate students of Kalasin Rajabhat University in first semester of academic year of 2013. The Multi-stage simple random sampling technique was employed to collect the sample of 435 undergraduate students from different faculties of Kalasin Rajabhat University.

3.2 The research instrument was the questionnaire with 138 questions and it was used for data collection. The content and structural validity were determined by Item Objective Congruent (IOC) with 5 experts in the aspects of ecological ethics, environmental education, social science and social research methodology and every item  $IOC > 0.50$ . The reliability was done by collecting the sample group of 50 undergraduate students of Rajabhat Mahasarakham University who have similar characteristics to Kalasin Rajabhat University students. The reliability was

determined by Cronbach's Alpha. The reliability of ecological ethics, environmental education, inspiration of environmental conservation, environmental conservation behavior for global warming alleviation and the whole questionnaire were 0.875, 0.942, 0.935 and 0.959 respectively [6][7][8][15].

3.3 The inferential statistics used was Structural Equation Model (SEM) and analyzed with LISREL version 8.30 by considering on Chi-Square value differs from zero with no statistical significant at 0.05 level or Chi-Square/df value with less or equal to 5, RMSEA (Root Mean Square Error Approximation) value and RMR (Root Mean Square Residual) with less than 0.05 including index level of model congruent value, GFI (Goodness of Fit Index) and critical number, and index level of model congruent value, AGFI (Adjust Goodness of Fit Index) between 0.90-1.00 [28].

## 4. RESULTS

The results of this study were as the followings.

### 4.1 General Characteristics of Sample Group

The sample group was 435 undergraduate students of Kalasin Rajabhat University in the first semester of academic year of 2013. Most of them studied at Education Faculty with 292 (67.12%), were female with 327 (75.17%), paid respect to Buddhism with 433 (99.54%), lived outside municipality with 251 (57.70) have their family characteristics as nuclear family with 325 (74.71%). They were first order children with 236 (54.25%) and lived home with 270 (62.07%), traveled to university by motor-bicycle with 314 (72.18%), and studied first year 241 (55.40%). They had the mean grade point average 2.79 and mean of age with 19.66 years and mean of expense per month with 4,146.37 baht

### 4.2 Results of Effect among Variables in Model in Terms of Direct Effect

4.2.1 Confirmatory factors of Ecological Ethics (EcoE) had direct effect to Inspiration of Environmental Conservation (IEC) with statistical significance at level of 0.01 with effect of 0.22 and Environmental Behaviors for Global Warming Alleviation (BEH) with no statistical significance at level of 0.05 with effect of 0.04. Moreover, confirmatory factors in aspect of Ecological Ethics (EcoE) had indirect and total effects to Environmental Behaviors for Global Warming Alleviation (BEH) with statistical significance at level of 0.01 with effect of 0.16 and 0.20.

4.2.2 Confirmatory factors of Environmental Education (EE) had direct effect to Inspiration of Environmental Conservation (IEC) with statistically significant at level of 0.01 with effect 0.22 and Environmental Behaviors for Global Warming Alleviation (BEH) with no statistical significance at level of 0.05 with 0.04. Moreover, confirmatory factors in aspect of Environmental Education (EE) had indirect and total effects to Environmental Behaviors for Global Warming Alleviation (BEH) with statistical significance at level of 0.01 with effect of 0.32 and 0.36.

4.2.3 Confirmatory factors of Inspiration of Environmental Conservation (IEC) had direct effect to Environmental Behaviors for Global Warming Alleviation (BEH) with statistical significance at level of 0.01 with effect of 0.72.

4.2.4 Considering on structural model confirmatory factors of Ecological Ethics (EcoE) and Environmental Education (EE) this could be used to the variation of endogenous factors of Inspiration of Environmental Conservation (IEC) to cause Environmental Behaviors for Global Warming Alleviation (BEH) with 72.00 percent as the following in equation (1).

$$BEH = 0.72*IEC + 0.04*EcoE + 0.04*EE.....(1)$$

$$(R^2 = 0.72)$$

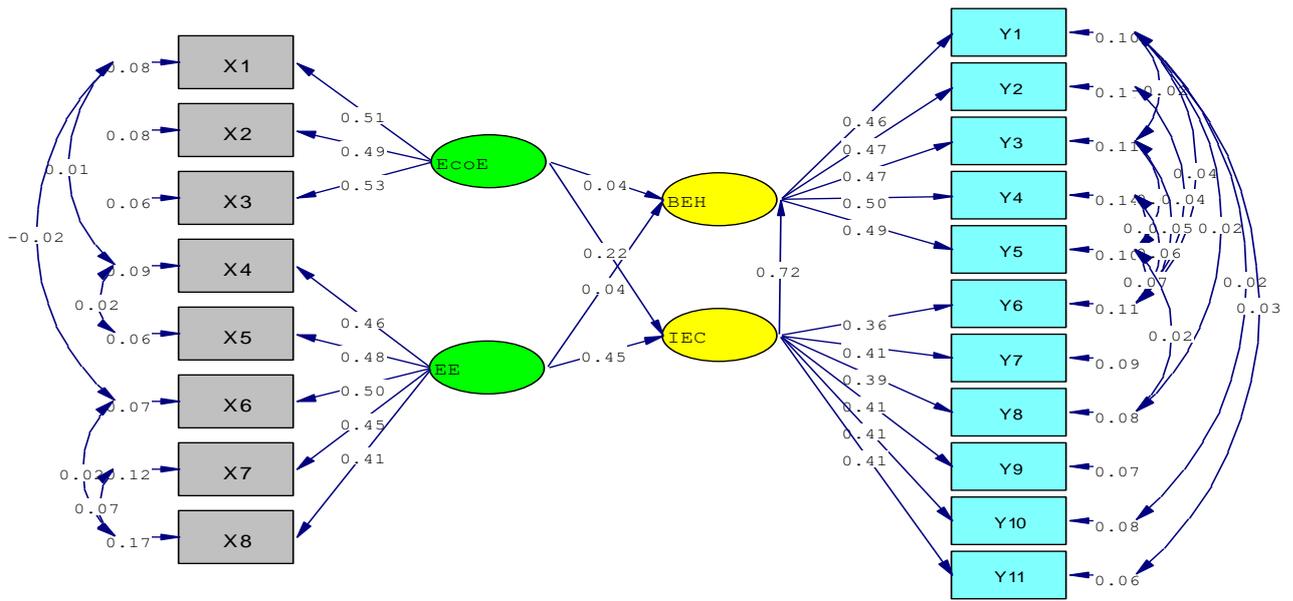
Moreover, confirmatory factors Ecological Ethics (EcoE) and Environmental Education (EE) were able to explain the variation of confirmatory factors of Inspiration of Environmental Conservation (IEC) with 43.00 percents. Therefore, the equation can be written as the following equation (2).

$$IEC = 0.22*EcoE + 0.45*EE.....(2)$$

$$(R^2 = 0.43)$$

Equation (2) factors that had the most effect to Inspiration of Environmental Conservation (IEC) was Environmental Education (EE) with the effect of 0.45 and subsequence was Ecological Ethics (EcoE) with the effect of 0.22. These were able to explain the variation of Inspiration of Environmental Conservation with 43.00 percent.

The results of analysis of causal relationship model and analysis of path effect as presented in figure 1 and table 1.



Chi-Square=231.66, df=129, P-value=0.00000, RMSEA=0.043

Figure 1 Causal Relationship Model of Ecological Ethics for Environmental Conservation

Table 1 Direct, Indirect and Total Effects of EcoE and EE Affecting BEH through IEC

Causal variable	Result variables					
	IEC			BEH		
	TE	IE	DE	TE	IE	DE
EcoE	0.22** (0.090)	-	0.22** (0.090)	0.20** (0.070)	0.16** (0.070)	0.04 (0.051)
EE	0.45** (0.094)	-	0.45** (0.094)	0.36** (0.060)	0.32** (0.060)	0.04 (0.054)
IEC	-	-	-	0.72** (0.063)	-	0.72** (0.063)
$\chi^2 = 231.66; df = 129$		CN = 306.44		$\chi^2 / df = 1.796$		
GFI = 0.95		AGFI = 0.92		RMSEA = 0.043		RMR = 0.013

TE : Total Effect, IE : Indirect Effect, DE: Direct Effect

From table 1, it showed that the EcoE and EE had direct, indirect and total effect to BEH and it also had direct effect to IEC. IEC had direct effect to BEH.

### 5. DISCUSSIONS

The findings indicated that Ecological Ethics (EcoE) had direct effect to Inspiration of Environmental Conservation (IEC) with effect of 0.22 and Environmental Behaviors for Global Warming Alleviation (BEH) with 0.04.

Simultaneously, Environmental Education (EE) had direct effect to Inspiration of Environmental Conservation (IEC) with effect of 0.45 and Environmental Behaviors for Global Warming Alleviation (BEH) with effect of 0.04. Subsequently, Inspiration of Environmental Conservation (IEC) had effect to Environmental Behaviors for Global Warming Alleviation (BEH) with 0.72. These results are congruent to Thiengkamol concept, especially environmental education and inspiration of environmental conservation (Thiengkamol, 2011e;

Thiengkamol, 2011f, and her different studies of Thiengkamol and her colleagues [3][17][19][20][21][23][25][27] that the results illustrated that Environmental Education (EE) influencing through inspiration of environmental conservation to perform better environmental behaviors either consumption behavior, energy conservation behavior, waste management behavior, traveling behavior and knowledge transferring and supporting for environmental conservation when they had real practice through environmental conservation with inspiration of environmental conservation with public mind.

Therefore, the research results of ecological ethics should be introduced into every Thai university in Northeastern region of Thailand where they possess similar culture, beliefs, values and environment with high land of rather drought, particularly, Environmental Education (EE) covered knowledge and understanding on environment and natural resources, universities should raise students awareness, attitude, skill, participation, and responsibility in environmental conservation and solving environmental problems and inspiration of Environmental Conservation (IEC) comprised of person as a role model, impressive event, impressive environment and media receiving. These will lead to reach better environmental behavior of undergraduate students to meet real sustainable development [16][17][18][24][25][28].

However, it might be concluded that EcoE, EE and IEC latent variables play significant roles to cause environmental behaviors of consumption behavior, energy conservation behavior, waste management behavior, traveling behavior and knowledge transferring and supporting for environmental conservation through IEC. Therefore, the model of EcoE and EE influencing through IEC to BEH was verified as the proposed model fitted with all observed variables according to criteria of Chi-Square value differs from zero with no statistical significance at 0.01 level or Chi-

Square/df value with less or equal to 5, RMSEA (Root Mean Square Error Approximation) value with less than 0.05 including index level of model congruent value, GFI (Goodness of Fit Index) and index level of model congruent value, AGFI (Adjust Goodness of Fit Index) between 0.90-1.00 [26][27][28].

From this research, it should introduce all latent variable to implement for undergraduates in order to achieve sustainable development through making them have inspiration of environmental conservation.

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