Life Cycle Assessment Knowledge and Environmental Education Affecting Environmental Conservation Behavior

การประเมินวัฏจักรชีวิตและสิ่งแวดล้อมศึกษาที่มีผลต่อพฤติกรรมการอนุรักษ์สิ่งแวดล้อม

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Abstract

The research objectives were to study levels of Life Cycle Assessment (LCA) knowledge, environmental education, and environmental conservation behavior, and to study effects of independent variables comprising environmental LCA knowledge, and environmental education affecting environmental conservation behavior. This survey research used questionnaire to collect data from 400 undergraduates with simple random from population of 17,666 undergraduate students of Rajabhat Maha Sarakham University in the second semester of 2014. Multiple Regression Analysis was used to analyze the relationship between independent variables and dependent variable. The results revealed that in LCA knowledge was at moderate level and environmental education, and environmental conservation behavior, were at more levels. Additionally, independent variables of LCA knowledge, and environmental education affecting dependent variable of environmental conservation behavior of undergraduate students with 57.70 percent of power prediction (Adjusted R^2 = 0.577). Environmental education had the most prediction power with 0.772. This implied that environmental education had the highest effect to cause the alteration of environmental conservation behavior, therefore the university should arrange the environmental education subject into all faculties and programs.

Keywords: life cycle assessment, environmental education, environmental conservation behavior

บทคัดย่อ

วัตถุประสงค์ในการวิจัย เพื่อศึกษาระดับความรู้การประเมินตลอดวัฏจักรชีวิต หลักการสิ่งแวดล้อมศึกษา และระดับพฤติกรรมการอนุรักษ์สิ่งแวดล้อมของนักศึกษามหาวิทยาลัยราชภัฏมหาสารคามและศึกษาอิทธิพลของตัวแปรอิสระประกอบด้วย ความรู้การประเมินตลอดวัฏจักรชีวิต และหลักการสิ่งแวดล้อมศึกษา มีอิทธิพลต่อตัวแปรตามคือพฤติกรรมการอนุรักษ์สิ่งแวดล้อมของนักศึกษามหาวิทยาลัยราชภัฏสารคาม ใช้การวิจัยนี้เป็นการวิจัยเชิงปริมาณซึ่งเป็นการวิจัยเชิงสำรวจ เก็บรวบรวมข้อมูลโดยใช้แบบสอบถาม กลุ่มตัวอย่างคือนักศึกษา จำนวน 400 คน จากประชากรนักศึกษามหาวิทยาลัยราชภัฏสารคาม 17,666 คน ประจำปีการศึกษา 2557 ภาคเรียนที่ 2 โดยมีสถิติการถดถอยพหุคูณเชิงเส้นตรงเพื่อทดสอบสมมติฐานของการวิจัย ผลการวิจัย พบว่า ระดับความรู้การประเมินตลอดวัฏจักรชีวิต โดยภาพรวม อยู่ใน

ระดับปานกลาง ส่วนหลักการสิ่งแวดล้อมศึกษา และพฤติกรรมการอนุรักษ์สิ่งแวดล้อม โดยภาพรวม อยู่ในระดับมาก อีกทั้งยังพบว่า กลุ่มตัวแปรอิสระ ซึ่งประกอบด้วย ความรู้การประเมินตลอดวัฏจักรชีวิต และหลักการสิ่งแวดล้อมศึกษา มีอำนาจในการพยากรณ์ พฤติกรรมการอนุรักษ์สิ่งแวดล้อมร้อยละ 57.70 (Adjusted R^2 = 0.577) อย่างมีนัยสำคัญทางสถิติที่ระดับ 0.01 และหลักการสิ่งแวดล้อมศึกษามีอำนาจในการพยากรณ์สูงสุดเท่ากับ 0.772 ซึ่งหมายความว่า ตัวแปรหลักการสิ่งแวดล้อมศึกษามีอิทธิพลสูงต่อการเปลี่ยนแปลงพฤติกรรมการอนุรักษ์สิ่งแวดล้อมของนักศึกษา มหาวิทยาลัยราชภัฏมหาสารคาม ดังนั้นมหาวิทยาลัยจึงควรจัดให้มีสอนวิชาสิ่งแวดล้อมศึกษาในทุกคณะ และทุกหลักสูตร

คำสำคัญ: การประเมินวัฏจักรชีวิต, สิ่งแวดล้อมศึกษา, พฤติกรรมการอนุรักษ์สิ่งแวดล้อม

Introduction

Currently, Life Cycle Assessment (LCA) is an essential instrument to examine the environmental impacts of products, processes or services with production, use, and discard. LCA is a method of measures to gather and determine the inputs and outputs of materials and energy of the production process of each product with the involvement of environmental impacts throughout its life cycle. Thus, the entire life cycle of materials, systems, and the whole building are needed for people consideration when making purchasing decisions. LCA can be used as environmentally friendly representation for quantifying and comparing over their life cycle to get alternatives for humans and society advantages. LCA engages cradle-to-grave of production system analysis and supply comprehensive evaluations of all upstream and downstream of energy inputs and environmental emissions. LCA also enables a producer to evaluate how much energy and raw materials used including how much solid and liquid wastes and gaseous waste generation in each product's life. Nevertheless, LCAs consumes time and money, therefore thus there is a limitation of technique analysis in both the public and private sectors. Streamlined techniques of LCAs conduction are desired to lower the involvement of cost and time and to promote a broader audience to use LCA (Miettinen & Hamalainen, 1997; Joshi, 2000; O'Neill, 2003; New Center, 2008).

At present, the major uses of LCA being improvement of environmental performance from the first stages of product development. A large numbers of factors are considered for each environmental impact assessment; consequently a system is highlighting the most important factors for comparing. resulting in reduced material use and reduced energy costs in transport (Joshi, 2000; O'Neill, 2003).

Additionally, LCA is a crucial technique for all industry in the 21st Century. Manufacturers and suppliers need to express that their actions with responsibility towards the environment for all parts of production by starting at the design phase through consumer use and product disposal. The ISO standards relating to environmental management are also involved for consideration in LCA process, therefore, LCA is the sustainable facilities tool to compare materials with regard to environmental criteria and life cycle costs and the LCA benefits are Quantify environmental effects such as overall energy consumption or air emissions, Recognize inefficient or significant changes in the life cycle phases, reduce overall environmental impact and costs, and Compare alternatives (Keoleian, & Menerery, 1993; Lave, et al., 1995; Miettinen & Hamalainen, 1997; Joshi, 2000; O'Neill, 2003; New Center, 2008).

The LCA knowledge should be cultivated for global citizen in order to awake them to take care of

environmental quality and their health care for better quality of life. Additionally, environmental education principle covers environmental knowledge and understanding, awareness raising, proper attitude, participation and responsibility taking and it is also needed to establish into all levels of education starting from kindergarten to graduate level in educational institute with the integration of LCA knowledge. This is congruent to the anticipated concept in conference of environment and development of United Nation since 1992 that established in Agenda 21 of global action plan mentioned on definition of sustainable development that is development to meet the needs of the present generation without compromising the ability of future generations to meet their own needs (Office of National Economic and Social Development Plan, 2010; WCED, 1987; Volker, 2007; Watkinson, 2009; Thiengkamol, 2011e). This is fundamentally evident that people at present generation should have knowledge, understanding the significance of environmental problems such as environmental damage and ecological imbalance due to production, utilization and waste disposal in their daily activities. They must take responsibility to be aware their activities. Moreover, they should have public mind to conserve the environment and natural resources actively with proper behaviors of consumption behavior, recycling behavior, waste management behavior, energy conservation behavior, traveling behavior and knowledge transferring behavior based on LCA principle (Donkonchum, et al., 2012a; Maporn, et al., 2015).

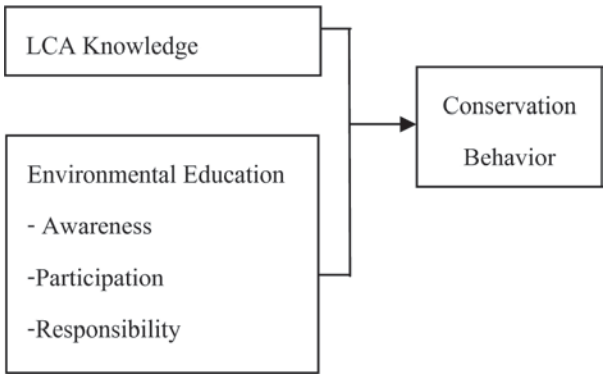
The essence of LCA knowledge and environmental education of undergraduate students, these will make them to understand the environmental impacts of products, processes or services with production, use, and discard. However, understanding the LCA knowledge would assist the young generations to appreciate the significance of LCA knowledge to change their environmental conservation behaviors according to LCA principle by regarding to raw material selection, energy saving for production process and product transportation, friendly environmental packaging, least waste product, product recycling after use, and waste disposal with least impact to environment. Moreover, environmental education in this research includes awareness raising, positive attitude, proper participation and better responsibility for environmental conservation (Hoerisch, 2002; Kamin et al., 2014b; Kaewhao, et al., 2015; Morrasri, 2015; Wongsueb, et al., 2015). Nevertheless, there are numerous studies of Thiengkamol (Thiengkamol, 2011i; Thiengkamol, 2012e; Thiengkamol, 2013g; Thiengkamol, 2013k; and her colleagues (Donkonchum & Thiengkamol, 2012; Donkonchum, et al, 2012a; Kotchakote, et al., 2013a; Mongkonsin, et al., 2013b; Pimdee, et al., 2012a; Saisunantharom, et al., 2013a; Suebsing, et al., 2013b; Udonboon, et al., 2012b; Waewthaisong,, et al., 2012a), that indicated that environmental education principle play an important role human behavior alteration.

Research objective

The research objectives were to study levels of Life Cycle Assessment (LCA) knowledge, environmental education, and environmental conservation behavior, and to study effects of independent variables comprising environmental LCA knowledge, and environmental education affecting environmental conservation behavior of undergraduate students of Rajabhat Mahasarakham University in second semester of academic year of 2014.

Research hypothesis

The independent variables comprising environmental LCA knowledge, and environmental education affecting environmental conservation behavior of undergraduate students of Rajabhat Mahasarakham University.



Methodology

The research method was conducted as the followings:

Population and sample

The populations were 17,666 undergraduate students of Rajabhat Mahasarakham University in second semester of academic year of 2014. The simple random sampling technique was used to collect the sample of 400 undergraduate students from different faculties of Rajabhat Mahasarakham University. The sample number was calculated with confident interval 95% (Yamane, 1973).

Research tool

The content and structural validity of questionnaire were proved by Item Objective Congruent (IOC) from 5 experts in the fields of LCA, environmental education, social science and social research methodology. The reliability was tried out by conducting with the sample group from 40 undergraduate students of Mahasarakham University that had the same characteristics like as sample group. The item selected to use had IOC more than 0.50 (Rovinelli & Hambleton, 1977). The reliability was determined by Cronbach's Alpha formula (Cronbach, 1951). LCA knowledge consisting of 21 items, environmental education covers environmental awareness, attitude, participation and responsibility consisting of 35 items, and environmental conservation behavior consisting of 15 items, and whole questionnaire consisted 71 items. Their reliabilities were 0.863, 0.871, 0.865 and 0.912 respectively.

Data collection

The simple random sampling technique was used for data collection of 400 undergraduate students from different faculties of Rajabhat Mahasarakham University with confident interval at alpha=0.05. The questionnaire was employed as research tool and it was used for data collection.

Data analysis

The descriptive statistics were frequency, percentage, mean and standard deviation. Multiple regression analysis was used for analysis the relationship between independent variables and dependent variable (Hair, et al., 2010).

Results

1. Results of sample characteristics

Sample characteristics of 400 undergraduates, most of them were female with 67.75%, paid respect to Buddhism with 100%, had hometown in Maha Sarakham Province with 44.25%, majority had nuclear family with 61.00%, Lived at dormitory with 83.50%, income of household with average of 4,011.75 baht, average age with 19.58 years, and majority studied at Law Faculty with 22.7%.

2. Results of LCA knowledge level

The results of LCA knowledge level of 400 undergraduate students had total mean score at moderate level with 3.33 while considering on each aspect, it was revealed that problem of environmental toxicity occurs from production of all products was at more level with 3.83 was the highest mean and subsequence were people need to have knowledge to use raw material to save energy and selection of buying products, people follows the modern trend with 3.76, and 3.73 respectively as presented in Table 1.

Table 1

LCA Knowledge Level

	LCA Knowledge Level	$\overline{X}$	SD	Level
1.	People need to have knowledge to use raw material to save environment.	3.33	1.28	moderate
2.	People need to have knowledge to use raw material to save energy.	3.76	1.11	more
3.	People are able to properly use a substituted raw material.	3.16	1.16	moderate
4.	People need to know that what kind of raw material has the least impact to environment.	3.15	1.24	moderate
5.	People know that every production process uses energy.	3.20	1.21	moderate
6	Product process must be assessed environmental impact.	3.03	1.31	moderate
7	Before buying different products, people should regard to how much production process affects the environment.	3.47	1.33	moderate
8.	Problem of environmental toxicity occurs from production of all products	3.83	1.16	more
9.	All products should transport without environmental impact.	3.49	1.24	moderate
10.	During transporting products, it causes effect to soil, water and air.	3.19	1.21	moderate
11.	All products transportation emits the carbon dioxide and carbon monoxide.	3.50	1.13	moderate
12.	Product transportation affects to raise the global temperature.	3.50	1.03	moderate
13.	Knowledge on each product is directly advantage to conserve the environmental quality.	3.39	1.13	moderate
14.	Selection of buying products, people follows the modern trend	3.73	1.18	more
15.	People know about using product residue to produce the new value added product.	3.59	1.30	more
16.	Product residue cannot be reused again.	2.92	1.25	moderate
17.	People pay attention to bring the remained thing to use again for highest benefit.	3.15	1.10	moderate
18.	People want to transform the remained thing because they want to be good idol.	3.09	1.20	moderate
19.	People know to correctly manage the product residues.	2.93	1.26	moderate
20.	After use the sprayed tin, it needs to properly dispose.	3.49	1.16	moderate
21.	People always separate the waste before dispose.	3.13	1.25	moderate
	Total Mean	**3.33**	**1.20**	**moderate**

3. Results of environmental education level

The results environmental education level of 400 undergraduate students covers environmental awareness, attitude, participation and responsibility.

3.1 Environmental awareness had total mean score at more level with 3.56 while considering on each aspect, it was revealed that Every community must participate to set measurement for conserve environment was at more level with 3.90 was the highest mean and subsequence were Everyone must aware to the importance of natural resources and environment conservation and Everyone should have consciousness to conserve environment as obligation with 3.85, and 3.64 respectively as presented in Table 2.

Table 2

Environmental awareness level

	Environmental Awareness Level	$\overline{X}$	SD	Level
1.	People realize to the importance of environmental conservation because they realize that environment is important for living creatures.	3.40	1.40	moderate
2.	Everyone must aware to the importance of natural resources and environment conservation.	3.85	1.06	more
3.	Everyone should know how to valuably use natural resources.	3.57	1.13	more
4.	In present, people should live by regarding to ecological balance.	3.34	1.11	moderate
5.	People need to be cultivated to have good consciousness toward environment.	3.33	1.17	moderate
6	Environment conservation is a duty of everyone.	3.49	1.08	moderate
7	Mass media should promote people to aware the importance of environment conservation.	3.55	1.01	More
8.	Everyone should have consciousness to conserve environment as obligation.	3.64	1.12	more
9.	Every community must participate to set measurement for conserve environment.	3.90	0.99	more
	Total Mean	**3.56**	**1.12**	**more**

3.2 Environmental attitude had total mean score at more level with 3.66 while considering on each aspect, it was revealed that People must be cultivated on environmental conservation was at more level with 4.33 was the highest mean and subsequence were Environment is valuable so everyone should participate to conserve and every sector should have campaign of proper awareness building on environmental conservation with 3.93, and 3.91 respectively as presented in Table 3.

Table 3

Environmental attitude level

	Environmental Attitude Level	$\overline{X}$	SD	Level
1.	Environment is valuable so everyone should participate to conserve.	3.93	0.92	more
2.	Everyone should love and protect the surrounding environment.	3.75	0.95	more
3.	Too good living than basic needs, causes impact to environment.	3.76	0.85	more
4.	Utilization of environment should be properly limited.	3.82	0.89	more
5.	You realize to the importance/benefit of saving natural resources.	3.17	1.21	moderate
6	Everyone get benefit from environmental protection.	3.32	1.24	moderate
7	Everyone should effectively use natural resources for next generations to use it in the future.	3.26	1.56	moderate
8.	Due to the growth of sciences and technologies, the natural resources are used over the basic needs.	3.64	1.63	more
9.	People must be cultivated on environmental conservation.	4.33	0.90	more
10.	Every sector should have campaign of proper awareness building on environmental conservation.	3.91	0.85	more
	Total Mean	**3.66**	**1.13**	**more**

3.3 Environmental participation had total mean score at more level with 3.56 while considering on each aspect, it was revealed that circulation environmental knowledge is a way of participation was at more level with 3.89 was the highest mean and subsequence were everyone should participate in prevention and environmental problem solving and you accept that sharing is an important factor to participate in solving environmental problem with 3.87, and 3.66 respectively as presented in Table 4.

Table 4

Environmental participation level

	Environmental Participation Level	$\overline{X}$	SD	Level
1.	You participate in planning of community environmental problem solving.	3.63	0.84	more
2.	You participate in all environmental activities.	3.59	0.86	more
3.	You participate in environmental problem solving with others in community.	3.22	1.10	moderate
4.	Occurrence of environmental problem, you participate every time.	2.97	1.15	moderate
5.	You directly get benefit from participation of environmental problem solving due to be in good environmental quality.	3.53	0.99	more
6.	Circulation environmental knowledge is a way of participation.	3.89	0.78	more
7.	Living with sufficiency is a mean to decrease environmental problem.	3.45	1.04	moderate
8.	You participate in environmental activities without expectation.	3.45	1.10	moderate
9.	Everyone should participate in prevention and environmental problem solving.	3.87	0.88	more
10.	You accept that sharing is an important factor to participate in solving environmental problem.	3.66	0.96	more
	Total Mean	**3.56**	**0.97**	**more**

3.4 Environmental responsibility had total mean score at more level with 3.82 while considering on each aspect, it was revealed that you are willing to take responsibility for energy conservation at both school and home. was at more level with 4.05 was the highest mean and subsequence were every undergraduate student has duty to devote his/her labor force, money or time for environmental conservation and you intend to work for public about environment conservation with 3.93, and 3.90 respectively as presented in Table 5.

Table 5

Environmental responsibility level

	Environmental Responsibility Level	$\overline{X}$	SD	Level
1.	To devote for environmental conservation is a duty of everyone.	3.83	0.96	more
2.	Every undergraduate student has duty to devote his/her labor force, money or time for environmental conservation.	3.93	0.94	more
3.	Whenever, you see the waste dropped on the ground, you collect it.	3.86	0.90	More
4.	You intend to work for public about environment conservation.	3.90	0.68	more
5.	You are willing to take responsibility for energy conservation at both school and home.	4.05	0.64	more
6	You intend to be a part of social to take a responsibility to look after environment.	3.53	1.21	more
	Total Mean	**3.82**	**0.87**	**more**

4. Results of environmental conservation behavior level

Environmental conservation behavior had total mean score at more level with 4.26 while considering on each aspect, it was revealed that Production process must be assessed on environmental impact was at more level with 4.40 was the highest mean and subsequence were Reuse the material residue is environmental conservation and use the product with natural material package, aids for environmental maintenance with 4.39 and 4.35 respectively as presented in Table 6.

Table 6

Environmental conservation behavior 1evel

	Environmental Conservation Behavior Level	$\overline{X}$	SD	Level
1	The raw material that you use doesn't destroy environment.	4.15	0.87	more
2	You are able to properly use substitute raw material.	4.03	0.83	more
3	You use raw material with least effect to environment.	4.21	0.72	more
4	All production process uses energy.	4.31	0.65	more
5	Production process must be assessed on environmental impact.	4.40	0.68	more
6	All product transportation impacts to environment.	4.27	0.76	more
7	Product transportation always causes impact to soil, water and air.	4.24	0.83	More
8	Use the product with natural material package, aids for environmental maintenance.	4.35	0.74	more
9	Use the product that is able to reuse to produce new product, helps to conserve environment.	4.12	0.81	more
10	Bring the residue product to build new product, conserves the environment.	4.26	0.74	More
11	The best product makes a least waste.	4.33	0.71	more
12	Reuse the material residue is environmental conservation.	4.39	0.69	more
13	Transform the residue thing is a good example for others.	4.28	0.76	More
14	Properly dispose the residue of used product, conserves the environment.	4.30	0.80	more
15	After use spray can, you are able to correctly dispose.	4.26	0.73	more
	Total Mean	**4.26**	**0.76**	**more**

5. Results of LCA knowledge and environmental education affecting environmental conservation behavior

The relationship between independent variables of LCA knowledge and environmental education affecting dependent variable of environmental conservation behavior of undergraduate students as presented in table 7 and 8.

Table 7

Result analysis prediction power of LCA knowledge and environmental education affecting environmental conservation behavior

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.761	0.579	0.577	0.495

a. Predictors: Constant, LCA knowledge and environmental education

b. Dependent variable: Environmental conservation behavior

Table 8

Multiple linear regression analysis between LCA knowledge and environmental education affecting environmental conservation behavior

Model		Sum of Squares	df	Mean Square	F	Sig.
2	Regression	133.841	2	66.920	272.607	0.000**
	Residual	97.457	397	0.245		
	Total	231.298	399			

a. Predictors: Constant, LCA Knowledge, Environmental Education

b. Dependent Variable: Environmental Conservation Behavior

From table 7 and 8 when multiple linear regression was analyzed between independent variable of LCA knowledge and environmental education affecting dependent variable environmental conservation behavior, it was found that regression coefficient equaled to 0.761 (76.10%) and coefficient of R Square was 0.579 (57.90 %) with statistical significance at level of 0.01. After it was adjusted, the coefficient of R Square with power of prediction was 0.577 (57.70%).

Table 9

Relationship between LCA knowledge and environmental education affecting environmental conservation behavior

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		b	Std. Error	Beta		
3	Constant	-0.444	0.211	-	-2.102	0.036
	LCA Knowledge	0.331	0.041	0.329	8.014	0.000**
	Environmental Education	0.772	0.061	0.515	12.558	0.000**

a. Predictors: Constant, LCA Knowledge, Environmental Education

b. Dependent Variable: Environmental Conservation Behavior

From Table 9, linear regression equation, it was revealed that independent variables of LCA knowledge and Environmental Education affecting dependent variable of Environmental Conservation Behavior of undergraduate students, with statistical significance at level of and 0.01. Independent variables of LCA knowledge and Environmental Education are able to predict Environmental Conservation Behavior of undergraduate students, therefore, the equation 1 can be written as the following.

$$y = a+b_1x_1+b_2x_2 \text{ ……..……..... (1)}$$

When

y = Environmental conservation behavior as dependent variable

a = Constant value

b_1 = Coefficient relation of LCA knowledge as independent variable

x_1 = of LCA knowledge as independent variable

b_2 = Coefficient relation of environmental education

x_2 = Environmental education as independent variable

Therefore, the prediction equation of relationship between independent variables of LCA knowledge and environmental education affecting dependent variable of environmental conservation behavior. It can be explained that environmental education was the most effect to environmental conservation behavior with prediction power of 0.772 at statistically significant level of 0.01. Subsequence was environmental education with prediction power of 0.331 at statistically significant level of 0.01 as the following equation 2.

$$Y = -0.444 + 0.331X_1 + 0.772X_2 \text{ ……..……..... (2)}$$

Discussion

The results explicated that the independent variable of environmental education including environmental awareness, attitude, participation and responsibility is play an essential role to affect environmental conservation behavior of undergraduate students of Rajabhat Maha Sarakham University. Therefore, motivating the undergraduate student to alter his/her environmental conservation behavior, the university administrative committee should arrange the curriculum of environmental education subject by holding a sole subject of environmental conservation behavior and integrating the content of environmental education principle covering including environmental awareness, attitude, participation and responsibility.

The finding indicated that environmental education affected to environmental conservation behavior with prediction power of 0.772, this implied that environmental education is an important factor for behavior alteration and this is congruent to various researches of Thiengkamol (Thiengkamol, 2011i; Thiengkamol, 2012e; Thiengkamol, 2013g; Thiengkamol, 2013k; and her colleagues (Donkonchum & Thiengkamol, 2012; Donkonchum, et al, 2012a; Kotchakote, et al., 2013a; Mongkonsin, et al., 2013b; Pimdee, et al., 2012a; Saisunantharom, et al., 2013a; Suebsing, et al., 2013b; Udonboon, et al., 2012b; Waewthaisong, et al., 2012a).

Additionally, the result illustrated that LCA knowledge also an another significant factor that affected to environmental conservation behavior with prediction power of 0.331, therefore, it indicated that LCA knowledge would an essential issue that should be introduced to undergraduate students to make them understand how to choose to buy a friendly environmental product that will decrease the energy consumption during the production

process and minimize the waste after use product and perform better behavior for conserving the environment. This also pertinent to the studies of Donkonchum, et al, 2012a and Maporn, et al., 2015.

Reaching the highest benefit for the educational institute like as Rajabhat Mahasarakham University to maintain good environmental quality inside the university and surrounding community, the administrative committee should encourage all faculties to set the subject of environmental education and environmental management based on LCA knowledge to awake the undergraduate students to really gain knowledge and understanding to their participation and responsibility to take care environment because they are important change agents as academic leaders of community and society. Furthermore, these new generations are our future hope of national and international level.

Suggestions

Currently, LCA knowledge and environmental education principle are widely recognized as environmental technology and environmental process for measuring and monitoring the environmental quality in both industrial and agricultural activities to alleviate global warming phenomenon. Particularly, environmental education principle includes the environmental awareness, attitude, participation and responsibility is an essentially successful variable to support and promote them to aware and realize to alter their daily live activities to achieve better environmental quality for better health and quality of life. Environmental education can be conducted through different channels of education either formal, informal, non-formal or lifelong learning. Thus the educational institutes in all levels should intensively introduce the concept of LCA and environmental education in diverse curriculums including holding the projects and activities for their students to make active participation. This would increase an opportunity to reach sustainable development.

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