



**A PROPOSED MODEL OF PROVINCIAL
ENVIRONMENTAL EDUCATION CENTERS**

RAWEEWON SANANWORAKIAT

อุภินันท์นากการ

จาก

บัณฑิตวิทยาลัย มหาวิทยาลัยมหิดล

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**Thesis
Entitled**

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ENVIRONMENTAL EDUCATION CENTERS**



.....

Mrs. Raweewon Sananworakiat
Candidate



.....

Lect. Pattaraboon Pitchayapaiboon, Ed.D.
Major-Advisor



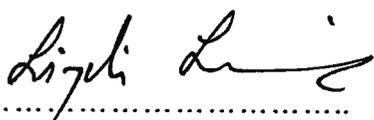
.....

Assoc. Prof. Vinai Veeravatnanond, Ph.D.
Co-advisor



.....

Assoc. Prof. Boonyuen Jirapong, Ph.D.
Co-advisor



.....

Prof. Liangchai Limlomwongse Ph.D.
Dean
Faculty of Graduate Studies



.....

Assoc. Prof. Rachanont Supapongpichate
Ph.D.
Chairman
Doctor of Education Programme
in Environmental Education
Faculty of Social Sciences and Humanities

**Thesis
entitled**

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ENVIRONMENTAL EDUCATION CENTERS**

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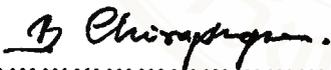
August 10, 2000



.....
Mrs. Raweewon Sananworakiat
Candidate



.....
Lect. Pattaraboon Pitchayapaiboon, Ph.D.
Chairman



.....
Assoc.Prof. Boonyuen Jirapong, Ph.D.
Member



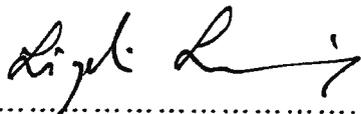
.....
Assoc.Prof. Vinai Veeravatnanond, Ph.D.
Member



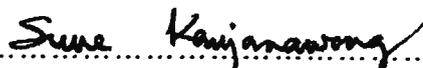
.....
Asst.Prof. Aurapin Eamsiri, Ph.D.
Member



.....
Lect. Kowit Krachang, D.Tech.Sc.
Member



.....
Prof.Liangchai Limlomwongse, Ph.D.
Dean
Faculty of Graduate Studies
Mahidol University



.....
Assoc.Prof.Suree Kanjanawong,
Ph.D.
Dean
Faculty of Social Sciences and Humanities
Mahidol University

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The purposes of this study were : 1) to find out and to analyze the model of the existing Environmental Education Center (EEC) that has been operated under different government agencies in Thailand in order to know the status and factors that effect the EEC operation and conduction by SWOT analytical technique, and 2) to then synthesize those known factors to form a suitable practical model for Provincial Environmental Education Center (PEEC). The EEC at Chulalongkorn University, the Rajabhat Phranakhon Institute, and other 17 PEEC's in secondary schools were concerned in the study. Documentary study, direct observation and interview with questionnaire were employed. There were 17 responsible personnel of PEEC, 240 PEEC personnel, and 752 PEEC service users involved. Percentage, mean, standard deviation, and stepwise multiple regression analysis were used to analyze the collected data.

Analysis of collected data reveal that the existing EEC have no practicable model for implementation. From the knowledge and experiences of this study, the researcher recommends strategies and tactics for sustainable EEC in the province as follows : 1) establish a cooperative network, 2) improve and adjust administrative structure, 3) improve and develop PEEC spaces for service, 4) improve the method of personnel development, and 5) improve and manage co-ordination and establish systematic public communication. The researcher also proposes a model of PEEC for provincial implementation with stress on joint participation of all citizens in community and in the nation. The PEEC model consists of 5 parts : The first is the introduction ; the second is the objectives of PEEC ; the third is the roles of PEEC ; the fourth is the composite factors of PEEC ; and the last is the method of conduction and operation.

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การวิจัยครั้งนี้ มีวัตถุประสงค์เพื่อวิเคราะห์รูปแบบของศูนย์สิ่งแวดล้อมศึกษาที่ดำเนินงานโดยหน่วยงานต่างๆจากการศึกษาด้านเอกสารของศูนย์ และวิเคราะห์รูปแบบของศูนย์สิ่งแวดล้อมศึกษาระดับจังหวัด จากการศึกษาสภาพการดำเนินงานและปัจจัยที่มีผลต่อการดำเนินงานของศูนย์ เพื่อนำมาศึกษาเปรียบเทียบ สังเคราะห์และเสนอรูปแบบศูนย์สิ่งแวดล้อมศึกษาระดับจังหวัด โดยศูนย์สิ่งแวดล้อมศึกษาที่ใช้เป็นกลุ่มตัวอย่างในการวิจัยครั้งนี้ คือ ศูนย์สิ่งแวดล้อมศึกษาแห่งสถาบันราชภัฏพระนคร ศูนย์สิ่งแวดล้อมศึกษาและโลกศึกษา จุฬาลงกรณ์มหาวิทยาลัย และศูนย์สิ่งแวดล้อมศึกษาระดับจังหวัดที่ตั้งอยู่ในโรงเรียนระดับมัธยมศึกษา สังกัดกรมสามัญศึกษาทั่วประเทศ จำนวน 17 ศูนย์ วิธีการวิจัยใช้การศึกษาเอกสาร การสังเกต การสัมภาษณ์ และการใช้แบบสอบถามความคิดเห็นจากผู้รับผิดชอบศูนย์ บุคลากรด้านสิ่งแวดล้อมศึกษาของศูนย์ และผู้ใช้บริการของศูนย์ การวิเคราะห์รูปแบบของศูนย์ใช้วิธีวิเคราะห์ SWOT สถิติที่ใช้ในการวิเคราะห์ข้อมูล คือ ค่าร้อยละ ค่าเฉลี่ย ส่วนเบี่ยงเบนมาตรฐาน และการวิเคราะห์ถดถอยพหุคูณแบบขั้นตอน

ผลจากการศึกษาและวิเคราะห์ข้อมูล สรุปได้ว่า การดำเนินงานของศูนย์สิ่งแวดล้อมศึกษายังไม่มีรูปแบบที่สามารถใช้เป็นแนวทางดำเนินงานได้อย่างชัดเจน และผลการวิจัยทำให้ได้ข้อเสนอแนะที่ใช้เป็นกลยุทธ์ในการพัฒนาศูนย์ 5 ประการ คือ 1) การสร้างเครือข่ายเพื่อการมีส่วนร่วม 2) การปรับโครงสร้างการบริหาร 3) การพัฒนาห้องศูนย์เพื่อการบริหาร 4) การพัฒนามูลนิธิสิ่งแวดล้อมศึกษา 5) การจัดกลไกการประสานงานและการประชาสัมพันธ์อย่างเป็นระบบ และผู้วิจัยได้เสนอรูปแบบศูนย์สิ่งแวดล้อมศึกษาระดับจังหวัด ที่เน้นการมีส่วนร่วมของหลายฝ่าย โดยมีรายละเอียดของรูปแบบประกอบด้วย บทนำ วัตถุประสงค์ บทบาทหน้าที่ของศูนย์ ปัจจัย/องค์ประกอบของศูนย์ และแนวทางการดำเนินงาน

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CHAPTER I

INTRODUCTION

1.1 Background of Study

Environmental crisis is now global problems, and increasingly hazardous to human life and health. Lacey (1990, quoted in John Fien, n.d. : 1.10) stated that :

1) The Amazon rainforest which took 60 million years to evolve could all be gone within our lifetime.

2) Increases in carbon dioxide and other “greenhouse gases” and the destruction of the ozone layer are causing climatic changes on a global scale.

3) Leakage of PCBs from industrial waste could cause the extinction of marine mammals inside 40 years.

4) Acid rain is destroying forests, lakes and major historic landmarks in Europe and North America.

5) The devastating economies of many countries are causing intense pressure on natural ecosystems as resources of soil and forests are exploited in order to provide daily necessities as well as export income to pay off foreign debt.

Under continue population explosion, natural resources had been non-carefully planned, managed, and extravagant consumed unwisely that caused the depletion of natural resources and destroyed ecological system all over the world.

(Ministry of Science Technology and Environment, 1999 : 6)

In Thailand, the people became to know about the environmental problems in 1967 when the Maenglong River polluted with waste chemical products effluence from battery factories that damage all fishes and aquatic animals ; another great event occurred when wild life animals in Naresuan National Park were hunted by helicopter followed by great forest degradation through out the country. Ministry of Science Technology and Environment concluded the environment situation in 1999 that : (Ibid, 1999 : 6-9)

1. The demand of natural resources are rapidly increased mean while ineffective management are hold ; depletion of natural resources are resulted that limited the economic development.
2. Population increased and economic development bring about the expansion of agriculture, industries, transportation, tourism, trade and services. All of these, in turn, leading to the depletion of natural resources and increasing pollutants back into environment; especially carbon monoxide add up in the air where there are heavy traffic jams.
3. Natural beauties, craftsman, and national heritages are destroyed and depletion by appetite human. Economic development did not realize the conservation of natual environment and resources.
4. Community problems in the city, urban, rural, and in remote areas are due to the inappropriate and unbalance between human demand and the environmental potentiality.

5. Environment issue has been interporate into school curricula both formal and informal education but still not enough to encourage awareness, build up co-ordinate skill for students to protect and prevent the environmental problems..

6. Development and implementation of environmental technologies to protect and to conserve the natural resources are in premature stage.

There were various global issues to be tackled. Environmentalists in Europe and North America felt strongly the need with the issues since 1960. The UN Conference on the Human Environment was held at Stockholm in 1972. At the conference, major concerns regarding the deterioration of the environment was discussed ; issues on environmental education came up. UNESCO and UNEP held a conference in Belgrade in 1975 and declared "Belgrade Charter". In a conference held in Greece in 1977 (The Inter-government Conference on Environmental Education) environmental education was explained as an education for sustainability. At this point the international community recognized the relationship of sustainable development and environmental education. (IGES, 1999 ; Nat Tuntawiroon and Poonsup Samutsakorn, 1985 : 182 ; Vinai Veeravatnanond and Banchaun Seepunpong, 1996 : 16) Environmental education can take a variety of forms and such diversity school be respected and should link up together with that background. The Agenda 21 Chapter on Education, Public Awareness and Training identified training as an important program area. In it, governments committed themselves to update or prepare strategies aimed at integrating environment and

development as a cross-cutting issue into education at all levels within the next 3 years. (UNESCO –UNEP, 1992 : 3) “ Environmental education is a process aimed at raising the level of knowledge, understanding and awareness of students towards the environment which would lead their adapting the values and attitudes towards it and equipping themselves with the skills that would enable them to access the quality of the environment and act to better it.” (IGES, 1999 : 48)

Environmental Education in Thailand had been originated by Faculty of Environment and resources, Mahidol University in 1973 ; at the time to initiate the program the faculty was not yet set up, it was in the form of research project of the graduate studies. Until 1978 the environment research project has been changed to Faculty of Environment and Resources. (Mahidol University, 1998 : 21) Few years followed, Kasetsart University, Chiangmai University, Thammasart University, Khonkean University and Kerk University offered some courses concerning environment such as ecology, environmental science, forestry etc. but not in the form of interdisciplinary as Mahidol University did. Ministry of Education had integrated knowledge of environment to secondary and primary education curricula since 1978 in the form of interdisciplinary. After curricula improvement in 1990 more content and activities of environment have strong emphasized at all level ever before. NGOs also participated in environmental education of the students such as Electricity Authority, and other non-profit organizations. (Montip Sriratana T., 1997 : 49 ; Vinai Veeravatnanond and others, 1997 : 65)

In recent years, Environmental Education (EE) is integrated into school curricula both formal and informal education at all level to the issue of quality of life and health to promote the awareness and the co-ordinate skill in order to protect and conserve natural environment, but that goal is yet attained due to the lack of linkage of content and appropriate extra curriculum activities of each level, lack of co-ordination effort between government department and private sectors with government department, lack of sufficient information network of up-to-date, topical local materials, and the consciousness in value and important of environment of the people are little. To rectify these failures, Ministry of science technology and environment declared the “National Policy and Long Plan (1997-2016) to promote and conserve the environment” aimed at :

1. To speed up the development and actual management of environmental education. To establish the information network centers for environmental education. To promote the exchangeable knowledge, understanding and experience continually among groups of people.
2. To improve educational curricula and organize appropriate extra curricula activities according to the needs of local communities. To provide sufficient learning materials for EE to that educational institutes.
3. To promote the co-ordination of EE development among nations and among the countries in region. To promote the participation in EE among government departments, private sectors, and the people.
4. To develop knowledge, understanding, skills, experiences and technologies for EE teachers.

Meanwhile some higher education institutes started EE program as pilot project to emphasis on cultivation of knowledge, understanding, responsibilities and intend to participate in EE program this leading to build up the awareness and consciousness of conservation of natural environment. Two institutes, for example, Rajabhat Phranakhon Institute and Chulalongkorn University have established the Environmental Education Centers (EEC) in 1988 and 1992 respectively. Their objective were :

1. To study and develop EE program
2. To act as the centers for EE training and promotion
3. To be the centers for services and distribution of EE knowledge and technologies to public schools and the people.

Since then, there were numbers of schools applied to participate and training in the services ; and there are other institute consider to follow their steps. (Rajabhat Phranakhon Institute, 1992 : 3 ; Chulalongkorn University, 1995 : 52) Department of Promotion Environmental Quality, Ministry of Science Technology and Environment, is responsible for distribution and communication all information and technologies concerning environment to public, and to co-ordinate the environment promotion between the government department and private sectors. To handle this task, The department started without planning to support fund to some secondary schools to set up the EEC in school as a representative of each province in 1995 and 1996 (See Table 1) aimed at :

1. To develop EE personnel in both formal and informal school.
2. To promote and develop EE materials, handbooks, teaching aids according to local needs.
3. To promote the co-ordination and participation of the people in community towards EE program
4. To be the center for EE services to public and community.

Table 1 Funding support given to schools in 1995 and 1996

Year Region	1995		1996	
	Schools	Province	Schools	Province
Northern	1. Maehorphra Wittayakom	Chiangmai	5. Chalermkwan	Phitsanuloke
Southern	2. Vichianmatu	Trung	6. Muengsurathanee	Surathanee
N.Eastern	3. Kulayanawat	Khonkean	7. Narasikalai	Narathivat
Central	4. Kokgateamwittayalai	Lopburi	8. Ban nongkam	Rajaburi
Eastern			9. Ban kongmongta	Kanjanaburi
			10. Romkloawwattana-nakorn	Srakeaw

In 1997 funding has been little changed by the department worked co-ordinately with Supervision units of each province instead of funding directly to schools. There were more nine school added up to join the project mostly secondary schools in the northern region school in Table 2.

Table 2 Schools that added up in 1997

Region	Schools	Province
Northern	1. Hoaphra	Chiangmai
	2. Chomthong	Chiangmai
	3. Banhongratanawittaya	Lumpoon
	4. Konyuamwittaya	Maehongsorn
	5. Satreesrinan	Nan
	6. Maesrauywittayakom	Chiengrai
	7. Sadej wanachayunggulwittaya	Lumpang
	8. Payaowpittaya	Payaow
	9. Nareerat	Prea

Funding without planning, modeling and obligation, the department let each candidate schools running the EE program on there own to set up the Provincial Environmental Education Center (PEEC). In-fact, there had been long lacked of qualified teachers in knowledge, understanding, skills and experiences of environment at the beginning ; therefore, the output did not deserve the investment. Environmental problems still exist and increasingly harmful to human life and health. It is the researcher's intention to propose the practicable model for EE program center in Thailand, but before doing it is necessary to investigate the existing information, conduction and management of each candidate schools to

what it had been done during those years by applying the SWOT analytical technique developed by Bryson (1988).

The research questions are :

1. What is the modeling structure of each PEEC ?
2. What are the conduction and management of each center ?
3. How are the conduction and management of each center differed ?
4. What should the model of PEEC be?

1.2 Objectives

General objective

To propose a practicable model of PEEC.

Specific objectives

1. To analyze the existing EEC modeling of each government departments.
2. To analyze the existing PEEC modeling on the conduction and the management.
3. To compare the existing PEEC model and EEC model.
4. To propose practicable model of PEEC application.

1.3 Scope of study

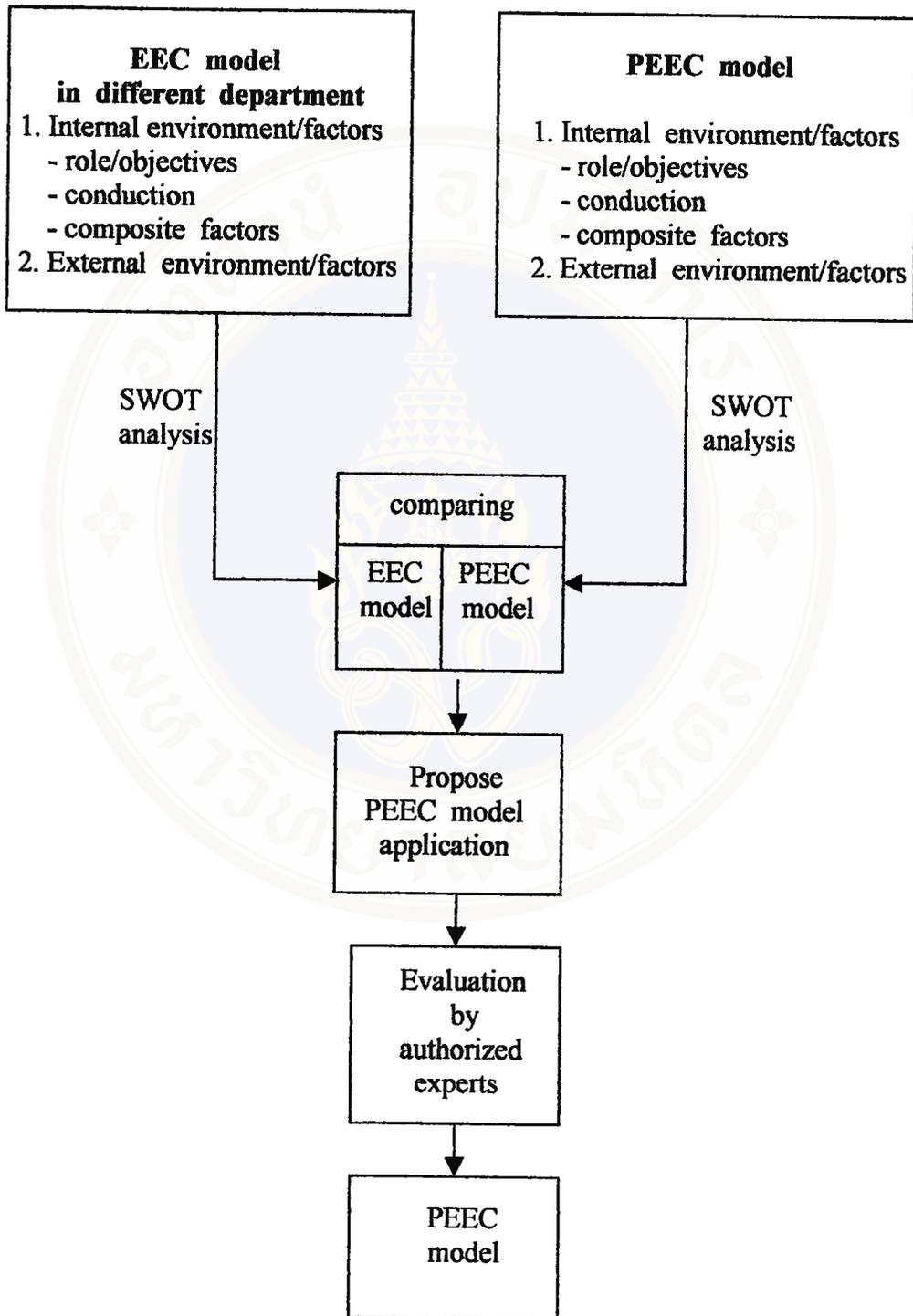
1. The research article on EEC modeling in Thailand is yet documented. The documentary study should seek from government departments that has dealt with environmental issues, namely :

- 1) EEC of Rajabhat phranakhon Institute
- 2) EEC of Chulalongkorn University.
- 3) PEEC available from Department of Promotion Environmental Quality.
- 4) EEC under Department of Secondary Education.

The SWOT technique to analyze the conduction and management would be applied to EEC of Rajabhat phranakhon Institute and Chulalongkorn University

2. The information collection and the analysis of conduction and management of PEEC would be done to those candidate schools listed in Table 1 and Table 2 that have been funded from Department of Promotion Environmental Quality. Direct observation and interview along with check lists questionnaire will be applied to these school.

1.4 Conceptual Framework



1.5 Definitions of terms

To give terms definition in various kinds of research is considered important as it is essential to make the same concept between the researcher and the readers. Terms that should be defined are as follows :

Environmental Education (EE) : a process aimed at raising level of knowledge, understanding and awareness of students towards the environment which would lead their adapting the values and attitudes towards it and equipping themselves with skill that would enable them to access the quality of the environment and act to better it.

Environmental Education Center (EEC) : The center for the promotion of EE conduction and management towards its goals.

Provincial Environmental Education Center (PEEC) : The EEC in the province to operate and conduct the EE program among schools, public and people in the community to act together to better the environment.

Environmental Education Center Model (EEC Model) : The pattern of EEC to be conducted as the center to serve public and people in the community.

Provincial Environmental Education Center Model (PEEC Model) : The pattern , the plan of operation and conduction the EE program of each province and to serve as to the center for services to all.

Internal environment/factors : The inside climate that effects the conduction and the operation of the center including 1) the role/objectives 2) conduction 3) composite factors.

External environment/factors : The situation or climate or pressure from outside that effect the operation and conduction of the center including 1) economic system 2) political policies 3) socio-economic system 4) technologies 5) the needs and expectation 6) educational system

SWOT analysis : The analysis of situation both inside and outside of the center concerning strength (S), weakness (W), opportunity (O) and threats (T) as barriers or successive factors.

Conduction of EEC operation : The process of conducting the EEC that involves : 1) Development of EE personnel 2) Development of materials, activities 3) The services given 4) Community co-ordination.

Composite factors : The surrounding situation, resources and process in conducting and operation the EEC. These composite factors are that :

- site and location or environment of EEC.
- availability of resources namely qualified personnel, budget, materials, building and facilities, funding support.
- Planning and strategies of conduction and operation such as administrative procedures, co-ordination, evaluation and public communication.

1.6 Significance of the Study

Academic advantage

If the proposed PEEC model could work out properly, each province, then can apply on their own to response the needs of its local community.

Policy advantage

1. Upper administrators and decision makers have sufficient information on EEC organization and management on hand. Therefore, it will be easy for them to funding and supporting other province appropriately.

2. Administrators and experienced personnel of the EEC would be a valuable resource persons to support development of other EEC thereafter.

Practical advantage

1. Government sectors and private sectors could adapt the model to implement in other organization.

2. It is in the hope that the quality of environment could be better, human life and health also be better.

CHAPTER II

LITERATURE REVIEW

Documentary studies have been made following orders :

2.1 Environmental Education (EE)

2.1.1 EE in Thailand

2.1.2 Background of EE

2.1.3 EE in Asia Pacific region

2.1.4 Aims, objectives and principles of EE

2.1.5 EE activities in Thailand education reform

2.2 Environmental Education Center (EEC)

2.2.1 Establish of EEC

2.2.2 Model of EEC

1) EEC at College and University

- EEC at Rajabhat Phranakhon Institute

- EEC at Chulalongkorn University

2) EEC at Secondary Education

- EEC of Secondary Schools

- EEC of Department of Environmental Quality Promotion

2.3 Research Theories

2.3.1 SWOT analytical technique

2.3.2 Participation Theory

2.3.3 Personnel development and EE teachers' competency

2.4 Review Study

2.1 Environmental Education

2.1.1 Man and environment and EE in Thailand

In general most of people think about every things surrounded them either living things or non-livings another words physical environment including man-made environment and biological environment. Economic and social system, politic, culture, tradition, religion, belief are also environment of man. (Nat Tuntawiroon and Poonsup Samutsakorn, 1985 : 1)

Man borne on earth, their lives tighten with earth (soil), water, air, sun (light and heat source) and all living things relied on these elements of nature and environment and its mechanisms. Thousands of years men and women increasingly until after World War II, science and technology development, population explosion, industrial reform, economic growth but in turn natural resources and elements of nature become deteriorated ;balancing of nature has been destroyed by human activities. Pollution emerged as the results of industrial development and economic growth.

In Thailand, 1975, the first time that water in Mae Glong River, 150 km long, become polluted with waste effluence from 18 sugar plants, during summer water level decrease till self purifier of the water could not hold ; anaerobic bacteria bloomed up changed the waste effluence to toxic hydrogen sulfide and

methane. All fishes and aquatic animals were dead and it lasted for 4-5 years. The people become to know the dangerous of pollution and environmental deterioration ; in the mean times, shift cultivation and forests have been heavy cut down in the north, big dams construction, over sea companies withdrawn natural resources from Thailand, consumers faced with borax and artificial colors in foods. All of these problems reinforced the emergence of National Environmental Protection and Quality Promotion Act in 1975 (Nat Tuntawiroon and Poonsup Samutsakorn, 1985 : 14) and the National Committee of Environment had been established ever since.

Professional process of resolution originated at Mahidol University and the graduate school jointed the environmental program to establish environmental study and research project in 1973 in the form of interdisciplinary approach at graduate level which was the first program in the nation, then, in 1978, the Faculty of Environmental Sciences had been settled down at Salaya. (Mahidol University, 1998 : 21)

Few years later, college and university both government and private added up the environmental issues into their curricula at undergraduate level, but not in interdisciplinary form ; it still in science course. (Montip Siriratana Tabucanon, 1997 : 50) Ministry of Education also integrated environmental issues in elementary and secondary curricula since 1978 in the hope that the students would appreciate the value of natural environment, awareness, and join to better it. (Vinai Veeravatnanond, 1996 : 22)

2.1.2 Background of EE

The Declaration of the United Nations Conference on Human Environment organized in Stockholm in 1972 proclaimed: "to defend and improve the environment for present and future generations has become an imperative goal for mankind." This undertaking urgently calls for new strategies, incorporated into development, with particularly in the developing countries is a prerequisite for any such improvement. Solidarity and equity in the relations between nations should constitute the basis of a new international order, and bring together as soon as possible, all available resources. Education utilizing the findings of science and technology should play a leading role in creating an awareness and a better understanding of environmental problems. It must foster positive patterns of conduct towards the environment and the nations use of their resources.

Under recommendation 96, UNESCO and United Nations Environmental Program (UNEP) had been established International Environmental Education Program in 1975 and planning International workshop on Environmental Education at Belgrade, Ugoslavia during 13-22 October, 1975 by invited environmental education experts from all over the globe. As the results of this meeting came out the declaration of "Belgrade Charter." (UNESCO, 1996 ; Nat Tuntawiroon and Poonsup Samutsakorn, 1985 : 178) They agreed to organize Region Meeting in 5 countries, namely Africa, Arab, Asia, Europe and North America and Latin America under Belgrade Charter.

In 1977, The region meeting first held in Brazzaville, Congo, then at Kuwait, Bogota Columbia, Helsingki Finland, Bangkok Thailand at Mahidol University. All recommendations were gathered and report submitted to top meeting on EE at Tbilisi Soviet Union during 14-26 October 1977 : “The Intergovernmental Conference on Environmental Education” which has been used as the master plan of EE for every country :

- 1) Create theory and principle by applying EE as a core subject and knowledge for all.
- 2) Integrate from root based of environment to program system and other subjects for teaching-learning in the city and rural.
- 3) Develop and reinforce consciousness in environment, advise decision-making in every unit to develop every programs
- 4) Aids the government to build educational system including environmental issues as national policy
- 5) Support and promote EE training at all level
- 6) Provide facilities and encourage materials and resources development to be used in EE
- 7) Support and promote research, experiment, and method of EE evaluation
- 8) Build up the information exchange system articles and printed matters for appropriate sectors

(UNESCO-EP International Environmental Education Program, 1977 : 24)

In Thailand, Faculty of Environment and resources studies (former a research project in environment since 1973) Mahidol University first in the nation offered the graduate program in environment and resources in the form of interdisciplinary approach entitled "Master of Science in Technology and environment administration" in 1974 (Mahidol University, 1998 : 21) After that there have been many curricula offered from undergraduate through doctorate degree. Chulalongkorn University, Songklanakarin University, Silpakorn University Thamasat University, Chiangmai University, Kerg University, and Khonkhan University followed to offer environmental courses in their curricula but not in interdisciplinary approach. Ministry of Education also add up environmental issue in their Rajabhat Institutes curricula at undergraduate and master degrees level. (Montip Siriratana Tabucanon, 1977 : 49 ; Vinai Veeravatnanond and others, 1997 : 66)

Ministry of Education announced National Education curricula in 1978 both elementary and secondary education, environment and resources issues have been integrated into five groups of subject : skills (mathematics and language) life and experiences, work-oriented experiences, character development, and special experiences. At the secondary school level, environmental issues have been integrated into social study and science ; and also offered elective course in environmental education. (Vinai Veeravatnanond, 1996 : 17) In 1988 Rajabhat Phranakhon Institute established EEC in Bangkok ; and in 1992 Chulalongkorn University established EE and world studies center by the same token. (Rajabhat Phranakhon Institute, 1988 : 1 ; Chulalongkorn University, 1995 : 52) And in 1996

Mahidol University offered EE at doctorate degree in its curriculum which is the first in the nation.

Department of Environmental Quality Promotion, Department of Pollution Control, Office of Environmental Planning Policy, Ministry of Sciences Technology and Environment are all in charge with environmental problems and issues, especially, Department of Environmental Quality Promotion is the center of data base for government sectors and private sectors, also center for training, seminar, and public communication to cultivate the sense of awareness and consciousness on environment. In 1995 the department originated funding support to some schools to establish Provincial Environmental Education Center (PEEC) to serve EE policy. (Department of Environmental Quality Promotion, 1997 : 44-47)

2.1.3 EE in Asia Pacific region

The Tbilisi Conference in 1972 stressed on education where the people come together and co-operative works feasible to solve the environmental problems by applying education as a tool practicable. Tbilisi Declaration stated that “Environmental Education is not merely added up environmental issues into any subject in curricula, but it means to integrate environmental issues into all dimension of the curricula as well as teaching and learning processes. Environmental education is the results of interdisciplinary system of educational experiences, natural sciences, social sciences, cultural and ethics integrated into environmental perception. (Fien J, Heek D, and Ferreira, Jo-an, 1982 : 2.1)

The Asia Pacific region consists of Australia, China, India, Indonesia, Japan, Malaysia, New Zealand, Philippines, Korea, Singapore, Ceylon, Thailand and Vietnam implementing the Tbilisi Declaration 1977 in educational system of their countries leading by Griffith University, Australia in Asia Pacific Program of Educational Innovation for Development funding support from ACEID and UNESCO to organize training seminars for in-service teachers in EE entitled "Learning for a Sustainable Environment." (Fien, J and Tilbury, D, 1996 : 26-32)

During February 27-28, 1999 there have a workshop seminar of Asia Pacific countries in Yokohama, Japan, to reports the results of EE practices of each country which can be concluded that some countries have put environmental education as co-ordinate program both primary and secondary education, some countries supported and developed training program in EE for in-service teachers. But the majority of operation lacked of co-ordination and organizing national framework for EE program, These due to :

- Inflexibility of curricula and method of teaching
- Inflexibility of time schedule that stress on disciplinary orientation at secondary education level
- Lack of up-to-date topics and teaching aids
- Lack of co-ordination between government and private sections especially NGO
- Little co-operative task between schools and communities
- Lack of training EE competency of in-service teachers and pre-service teachers (IGES, 1999 : 103)

2.1.4 Aims, objectives and principles of EE

Many educators defined EE in different ways, Vinai Veeravatnanond and others (1997) defined that “EE stressed on knowledge of physical environment and social environment to cultivate attitude, behaviors and values in conserve or quality development of environment. Fien stated that “EE is an interdisciplinary learning which help individual or groups of people understand environment the main purpose is attitude towards conserve and close relation with environment and with responsibility to it. EE not only encourage in knowledge but also sense of belonging attitude, skills and social in actual practices.” Kasem Chunkao and Prapun Koysomboon (1982) described EE as a process of giving systematic knowledge and develop skills, attitude, and experiences in thinking, doing and be able to solve problems among people, culture, and environment to sustain and to better it. Lucko, Disinger and Roth (1982) stated that “ EE is a process to cultivate people to become 1) knowledgeable in environment biological and cultural terms 2) awareness of environmental problems and see its option to solve the problems 3) reinforce responsibility actions for the best of environmental development.

All of these definitions concentrate into the same sense of knowledge understanding, awareness to conserve the natural environment for all and for ever.

Objectives of EE

In “Belgrade Charter” stated that “To develop quality of life of the people in awareness, close relation with environment and problems concerned, encourage knowledge, attitude, reinforcement and co-operative work together either

individual or in group to solve the social problems on environment and prevent not let new problem occurs again.” (UNESCO, 1980 quoted in Vinai Veeravatnanond, 1976 : 27) Tbilisi Conference in 1977 stated objectives of EE as : (UNESCO, 1980 : 26)

- 1) To promote global population to aware of condition and relation among economic, social, politic, city and rural ecology.
- 2) To encourage global population to know, value, attitude and have skill in protect, prevent, and improve environment.
- 3) To build behavioral pattern to environment either individual or social group properly.

In brief, the EE objectives are :

- 1) Development of environmental knowledge, understanding, attitude, skill and responsibilities ; to know how to analyze the problems relate to environment.
- 2) Develop and increase awareness of the people towards environment and be able to co-ordinate and participate in social problems effectively present and future.

Belgrade aims of EE

- 1) Awareness - To encourage awareness of individual and social to sensitive to environmental problems
- 2) Knowledge - To encourage knowledge and experience of the people towards environment
- 3) Attitudes - To encourage positive attitude of individual and social towards environment to co-operative protect, improve, and to better it

4) **Skills** - To encourage skill of individual and social to analyze and solve environmental problems

5) **Participation** - To encourage the people to participate in and co-operative work or join community activities

(UNESCO, 1978 : 20-27)

Principles of EE

According to Belgrade Charter, principle of EE are :

1) EE must deals with all environmental concerned natural environment or man-made environment, ecology, politic, economic, technology, social, law and registration, culture, and ethics.

2) EE is life long education

3) EE should be interdisciplinary

4) EE should emphasis on co-operative and participate in protect and solve environmental problems

5) EE should consider global problems at the same time not over look local and region problems

6) EE should stress present as well as future situation

7) EE should consider total progress and development that proportional effects to environment

8) EE should encourage the people appreciate the value and the necessity to co-operative and participate in protect and solve the environmental problems either at local, national or global levels. (UNESCO, 1976 : 2)

Tbilisi Conference confirmed the main principles of EE as :

1) Declare co-operative in environmental problems solving and improve new method of implementation by applying information, knowledge and science technologies to build up awareness and understanding towards environment and carefully use the resources.

2) EE should encourage men and women of all educational level either formal or informal system including all mass media come together to share responsibilities in environmental problems ; EE personnel policy and decision-makers should be experienced and skillful in environment.

3) EE should be life long education and progress as rapid changing world.

4) EE should stress on community to build up co-operative process and responsibilities towards environmental protection and conservation. (UNESCO, 1978 a : 27)

From these documentary studied, the author conclude that EE should be based on :

- 1) All environmental elements
- 2) Life long or sustainable education
- 3) Interdisciplinary approach
- 4) Integrate into all dimension of subjects
- 5) Open up the participation in developing and decision making among the learners
- 6) Learning to live together among men

7) Stress on EE learning network

2.1.5 EE activities in Thailand education reform

The government declared Educational Reform Act in 1999 to reform administration, Curricula, teaching-learning process, and teachers and personnel professional qualification.

Teaching-learning process is the heart of educational reform that swift to students as the center of teaching and learning process. Open up the opportunity of public and community to participate in curriculum and method of teaching planning and development. One of the Department of Secondary Education policy stated that “ The teaching-learning process must stress on students center, actual practices, participation, group process, self learning climate, diversity of technologies, materials and media savely.” Another policy stated that “ Learning network : promote schools co-ordination support each other either government or private sectors in providing learning experiences and quality of learning.” (Department of Secondary Education, 1997)

In practicing, according to Educational Reform Act the teaching-learning process should stress on participation in learning activities by students, learning by doing by themselves and work together co-operatively. EE is part of their learning and experiencing directly to environment and EE activities should lead them develop knowledge, understanding, attitudes, and skills that they can apply to their daily lives at home or in community as responsible citizen. These are some EE activities :

- 1) Field trip, field practices or out door activities
- 2) Role playing and games
- 3) Joint activities with community
- 4) Environmental projects
- 5) EE practical lessons
- 6) EE camping
- 7) Field survey and information collection
- 8) Organize landscape in school or in community

Another important of EE activity is the joint and participation between schools and community, and between community and government sectors as well as private sectors to bring in their thought and co-ordination to solve social and local environmental problems. Exhibition , campaigning posters, cleaning and clearing public places on national day, organize natural center or environmental learning center, planting forest trees etc. These are some feasible joint activities could be held. In practicable terms, The author suggest that goals, objectives and principles of EE must be hold and follow through and the EE development and practices must keep in line of Educational Reform Act.

2.2 Environmental Education Center (EEC)

2.2.1 Establishment of EE

Australia EE in Australia had been established at Griffith University as Innovation in Environment Education and Center for Environmental Education in Technology University, Sidney New South Wales.

New Zealand EE in New Zealand had been established in rural schools all over the country by incorporated of teachers, parents, local community and a Center of Environmental studies in university.

Malaysia There are many pattern of EE programs in Malaysia :

- Natural Education Center by incorporated with Wild Life Department, National Parks and Ministry of Education, which organize activity programs for students both formal and informal education.

- Negara Educational Center – to develop National Animal Zoo and Aquarium offers educational advises and visiting services, besides that also responsible for :

1) Provide library, teaching – learning aids and materials concerning animal zoo and education.

2) Organize lecture to zoo personnel, teachers and public

3) Co-ordinate with educational institutes and public communication.

4) Joint and co-operative with EE organization of other countries.

- Field educational center received funding support from Nuffield, England in order to :

1) Support ecological research, biology, and wild life

2) Support ecological techniques to university

3) Support ecological teachers and field practices, also support curriculum development and personnel training seminars

4) Promote interest in natural environment and resources

Indonesia Environmental Study Center has been established to :

- 1) Research and study on environment
- 2) Training and seminars
- 3) Services

Thailand The centers for environmental study have been established in different name with different sectors such as :

- Center for teaching – learning EE in secondary schools, Department of Secondary Education
- Center for training and environmental research Department of Environmental Quality Promotion
- Center for energy training and research, Naresuan University
- Provincial Environmental Education Center in primary and secondary schools, Ministry of Education
- Environmental Education and World Study Center, Chulalongkorn University
- Environmental Education Center, Rajabhat Phranakhon Institute

etc.

2.2.2 Model of EEC

The existing method of conduction and operation EE in our nation are yet perform a specific model, mostly institutions and schools run the EE program on their own thought at two levels :

1) EEC at College and University

- EEC at Rajabhat Phranakhon Institute

Rajabhat Phranakhon Institute established EEC in 1988 under the goals and objectives :

1. Resources center for research and study in the method of teaching environmental issues for primary and secondary students to cultivate the awareness and value of environment.
2. To be the center for training and seminars in method of teaching environment of primary and secondary school teachers.
3. To be the center for services, attitudes, practical activities, and field practices.
4. To be the center for environmental information distribution and environmental value to students and public.

Process and method of conduction

1. At primary level, let students learn direct experiences and touching, and gradually build up awareness and conscious in environment ; at secondary level, introduce background and knowledge of ecology.
2. Direct observation and survey practices in the field to collect information, hypothesis formation, and information interpretation.
3. Students learn and practice along the EEC practical lessons.
4. The designed activities are interdisciplinary approach with science, mathematics, social, Thai language, music, and arts.

5. Try to identify environmental problems and understand its effects, and decision making practices.

- EEC at Chulalongkorn University

It has been established in 1992 to :

1. To be the center for research in environment and world study ;
2. To be the center to support environmental teaching and world study ;
3. To be the resources services for teachers, educators and academic professional and training, seminars, and research ;
4. To be the resources of co-operation at national and international level for environment and world study.

Process and method of conduction

1. Organize workshop, seminars for primary and secondary school teachers.
2. Collect information, documents, articles, and research article on environment for public study.

In 1995 EEC at Chulalongkorn University organized a workshop seminar entitled “Innovation in Environmental Education” which linked to PEEC as well.

The perception of EEC establishment and operation are the development of awareness, consciousness of the people and students to appreciate



the value of natural environment and resources, and to build up the co-operative effort to conserve protect and to better it for ever.

2) EEC at Secondary Education

- EEC of Secondary Schools

Department of Secondary Education announced the EEC for opinion collection, technical needs, construct and produce teaching-learning materials, information collection, the needs of local community is the most concerned. The objectives of EEC are :

1. To develop activities and teaching-learning process to the best effective means by stress on students participation and actual practices ;
2. To add up knowledge, skills, attitude towards environment by implementing up-to-date technologies, materials, and practices ;
3. To develop knowledge and understanding ecological issues in schools group system ;
4. Support and promote students' opportunity to direct experiencing towards environment equity and similarity
5. Reinforce and support extra-curricula activities, students' participation which leading to development quality of life.

Role and functions of EEC which Department of Secondary Education assigned :

1. To be center for academic promotion, organize meetings or seminars to develop teaching and learning
2. Advice, guiding teaching-learning process

3. Organizing seminars, workshops, and field studies

4. Give services to schools in the province

5. Promote academic quality such as competition, exhibition, and contest

6. Co-operative in educational research to develop curriculum and method of teaching

7. Provide local directory, patterned teachers, excellent teachers and experts

8. Select and promote output products of excellent teachers

- EEC of Department of Environment Quality Promotion

In order to develop awareness, attitudes, and to be concerned with environment of the young generation, the Department of Environment Quality Promotion donate to funding schools in the rural provinces to set up EE in their schools in the hope that :

1. To encourage the teachers who actually practices with environment in both system ;

2. To encourage and support technical technique in organizing EE, curriculum, teaching materials according to the local needs ;

3. To encourage and support in EE conduction with co-operative effort of community and other sectors ;

4. To be the center for training, seminars, and produce teaching materials at provincial level.

These are under some conditions that :

1. The Department will allow to organize workshop and seminars among local administrators of the center and network to build up understanding role and duties of PEEC.

2. The PEEC must co-ordinate with schools network to prepare project proposal for funding support from the Department by PEEC committee approval.

3. The Department will funding support for three consecutive years after that each PEEC must running the EE program on their own.

4. The Department maintain to support in academic advises, materials, and follow-up

5. The Department will joint and co-ordinate with the supervision unit of each province.

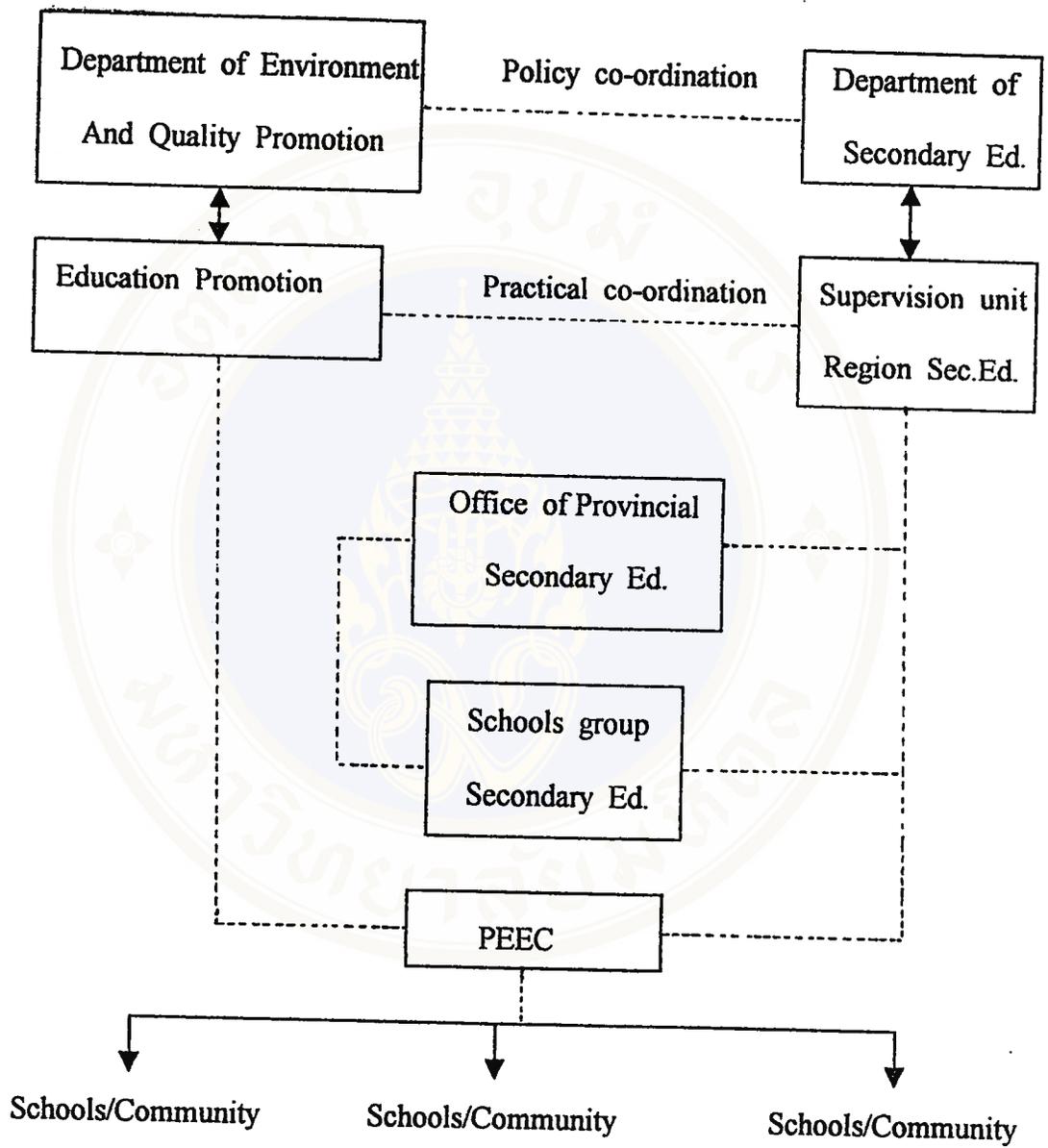


Figure 1 Schematic operation of PEEC

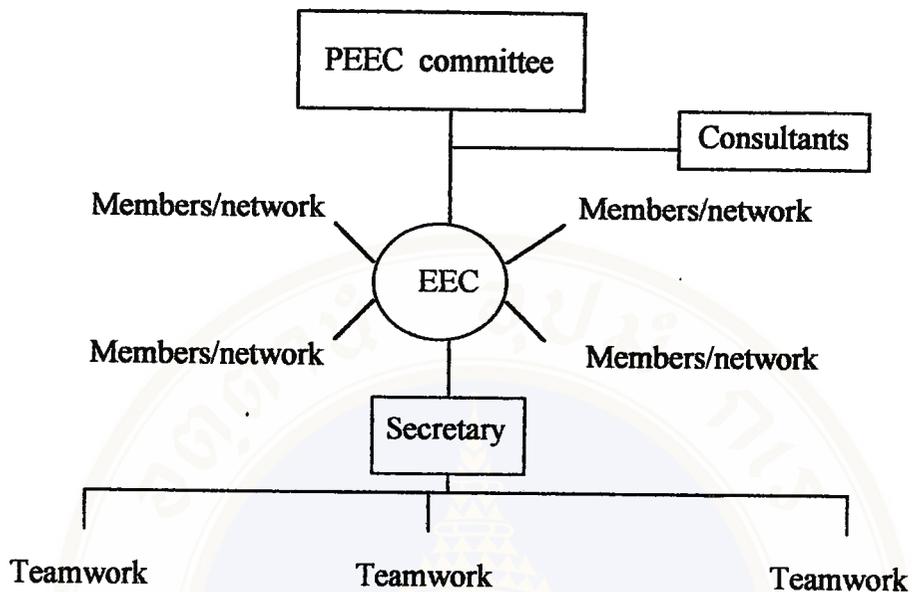


Figure 2 PEEC administrative structure

2.3 Research Theories

2.3.1 SWOT analytical technique

Strategic Planning

Langly (1998 : 40) stated that strategic planning is a useful tool in planning, it leading to systematic operation, rational and more options. The steps in strategic planning are as follows :

- 1) determine organizational purpose and management philosophy,
- 2) identify internal strengths and weakness,
- 3) monitor changes in the external environment,
- 4) forecast future conditions and establish planning premisses,
- 5) determine threats and opportunities,
- 6) formulate specific goals,
- 7) identify and evaluate alternative policies and strategies,

- 8) select the best strategic plan,
- 9) prepare functional action plans,
- 10) prepare action plans.

Bryson (1988 : 73-77) confirmed the necessity of strategic planning either government sectors or private sectors, the success of the organization would not possible without strategic planning. He carefully designed strategic planning to assist the non-profit sharing organization to implement effectively with new situation. It is an endeavor to build up funding resource to innovate pattern and direction of organization conduction in the framework of laws and registration concerning services, cost, monetary, or determination of organization model. (See Figure 3)

Practical steps are as follows :

- 1) Develop the fundamental agreement of strategic planning concerning goals and objectives, steps and process, duration, role and duties of planning committee.
- 2) Clear determination and identify the operation or administration in order to identify and clarify the outside pressures either formal or informal.
- 3) Develop and clarify the value of organization teamwork.
- 4) Assess the external environment to find out the problems that organization facing, and influenced groups towards the organization.

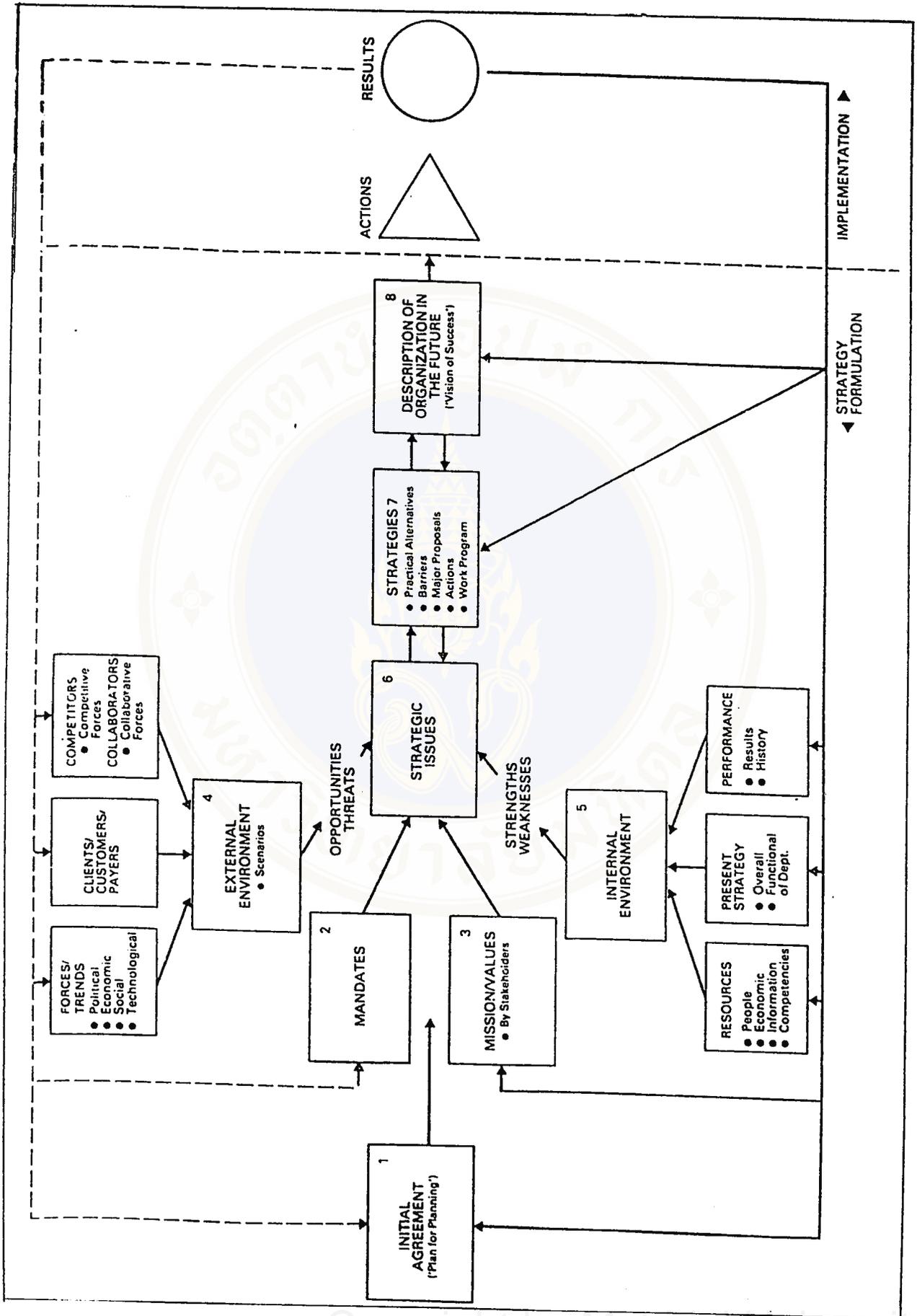


Figure 3 Strategic planning Process

5) Assess the internal environment to identify the strengths and weakness of organization by examine the input, process, and output.

4) and 5) are the SWOT analytical technique that analysis of strength (S) weakness (W) opportunity (O) and threat (T)

6) Clear definde the context of operation that is total or overhead costs, and some existing conflicts.

7) The effective of strategic planning relies on the effects and results of implementation that relate to public opinions, the intention to participate in and to join with the organization.

8) Future expectation is the inspiration and vision of success of administrative committee and management.

Bryson concluded that government and non-profit organizations in United States gain advantage from strategic planning such as :

- open the thought of strategies
- know the direction of future operation
- feasible to link the decision making in the future
- see the way of decision making in the future
- select the method of action that can be controlled
- improve for betterment
- can take action properly with quick change of situation
- be able to build coordinators and experts

Therefore, strategic planning is the thought and process of organization operation, but it is not end by itself ; it is a tool of success organization . (Barry, 1993 : 18)

SWOT analysis is the heart of strategic planning since it identify what are the strengths and weaknesses of the internal and external factors, also identify the opportunities and threats that effect the operation of the organization. If all of those factors are known, it is not too hard to plan the job and makes strategy workable successfully.

An example of SWOT analysis of an organization as shown in Figure 4

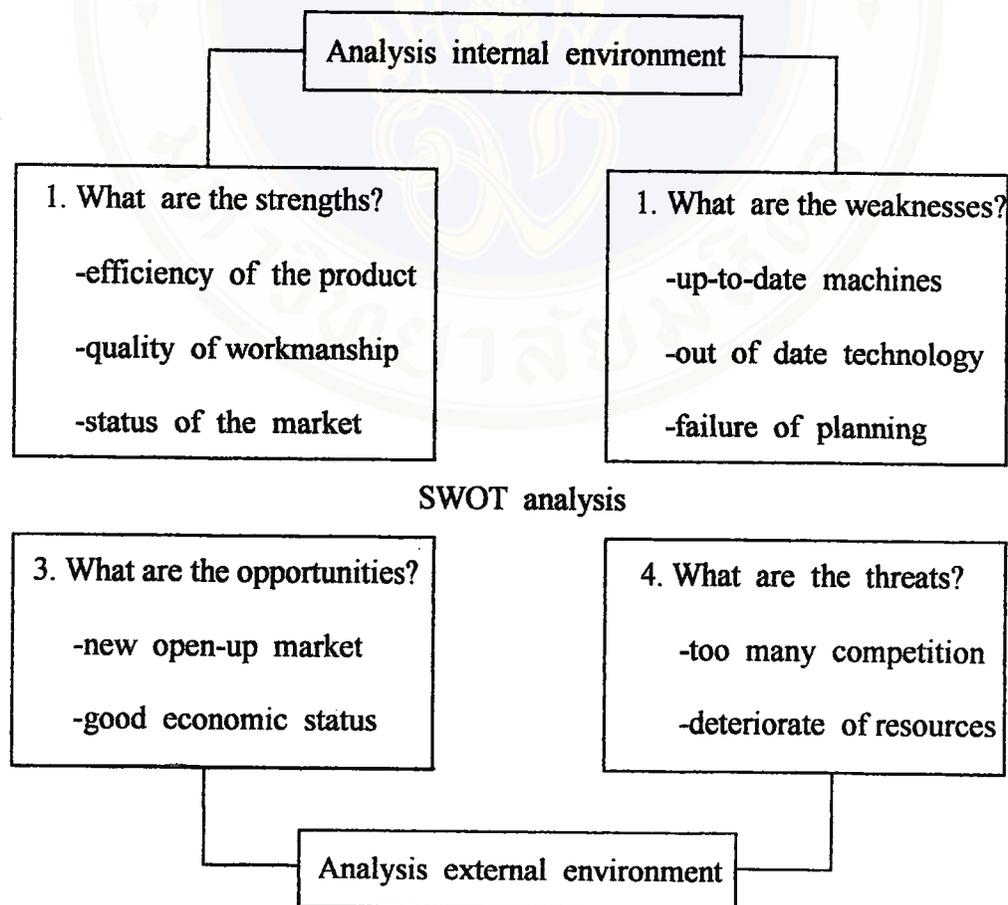


Figure 4 An example of SWOT analysis

SWOT analysis is also the heart of this study. The researcher seeks to know clearly the internal and external factors that effected existing EEC conduction and operation before be able to plan and design the PEEC model. The followings are the internal and external factors have been analyzed by SWOT.

Internal factors	External factors
1. Role/Objectives	1. Economic system
2. Surrounding situation	- foreign aids
3. Resources	- economic regression
- personnel	- economic and social policy
- budget	2. Politic system
- materials	- global and nation environmental condition
- building and spaces	- shifting government policy
- funding support	- decentralize authorities
4. Process	- government status
- planning	3. Social system
- administrative structure	- community strength
- co-ordination	4. Technology
- evaluation and follow-up	- innovation of technology
- public communication	5. Needs/expectation of service users
5. Conduction and management	- use of services
- personnel development	- information needs
- materials development and activities	

Internal factors

- services given
- co-ordination

External factors

- satisfaction of service users
- 6. Education system
- educational reform

2.3.2 Participation Theory

An association of two or more people to carry on a joint business or share of thinking, join in decision making, work together and share profit proportionly (Pearse and Stiefel, 1979 : 4-8) Nirun Jongwutiwate (1984 : 183) stated the factors that bring the people come to join and do things together due to :

1. faith and thrust to something or on the same holly ground ;
2. to respect or to be considerate of another's feeling and join to do some thing as requested ;
3. to be afraid of power and authority, have to do it not thrustful.

Under these condition the way the people come together is not long stable, participation or co-operative task will not success. The people must be free to do and to think on their own mind in doing something in public. They must be the advantage of thinking together, doing together, co-ordinate with hand-in-hand, and there a good relationship ; respect and thrust each other. Uphoff N. (1981 : 10-21) suggested four types of co-operative and participation :

1. co-operative in thinking and decision making in doing some things ;
2. co-operative in activities by equity participation ;
3. co-operative in profit sharing in business or any social activity ;

4. co-operative in evaluation, assessment, to control and keep things under orders.

Co-operative effort of public people in solving environmental problems is very urgent important because of deterioration of resources, forest degradation, severe weathering climate and variation hazardous to human life. Co-operative effort of public and all citizen are in great demand. PEEC operation will not be attained if the people in the province and in community do not give their hands and put hand-in-hand to solve the environmental problems.

2.3.3 Personnel development and EE teachers' competency

Personnel development

Any systematic means that change human behavior and actual practices to build up knowledge attitudes, skills and implementation to the better result is the definition of "personnel development" (Megginson, 1969 : 307 ; Silkula, 1976 : 85)

Tobin and others (1979 : 137-147) suggested the personnel tactics as follow :

- 1) lecture - transfer of knowledge, skills, experiences through the audiences by experts' speech ;
- 2) demonstration - the method or process of presenting facts, the procedure of doing something in the present of others either as a means of showing them how to do it themselves or in order to illustrate a principle ;

- 3) self-study - the act of inciting and effecting growth and development of oneself through one's own motivation. A person choose himself the stimuli to which he will attend ; he determines within himself ;
- 4) conference – a meeting of a group of individual to consider a particular subject ;
- 5) case-study - analysis of the origin of the individual's problems and of the methods used in counseling ;
- 6) simulation – to give a false indication or appearance, pretend to have the external characteristics to look or act like ;
- 7) role playing – the assuming, either in imagination or overtly, of the part of function of another or others, the concept of role-playing now has important theoretical and practical application in group dynamics and education ;
- 8) brainstorming – a tactic to stimulate one individual expresses his own idea and thinking towards to topic given without fear and oppost from anyone, no criticize will allow to do so during brainstorming process ;
- 9) seminar – a form of group or class organization in higer education in which a group of advanced students engaged in research or advanced study meets under the general direction of one or more staff members for discussion of problems of mutual interest.

Besides these techniques in PEEC method of personnel development the direct practical and experiences in the field and in the surrounding natural environment, field survey, and camping will create and stimulate vision and

inspiration of the participation. Each individual will gain insight and convinced to appreciate the value of natural environment.

EE teachers' competency

Research conferences and Summit Meeting indicated that competent and qualified teachers are the key role of EE development. Therefore, UNESCO-ACEID (1993) determined Competency Framework for EE Teacher Education such that :

- 1) knowledge and understanding environmental issues and its problems ;
- 2) be able to think, analysis, criticize and decision making appropriately- critical thinking abilities ;
- 3) attitudes and environmental values ;
- 4) experiencing in actual practices with environment – environmental action skills.

These four sets of characteristics are outlined below as a range of competencies from which objectives and content for teacher education programs can be developed.

Knowledge and understanding of environmental issues and problems

1. Knowledge and understanding of a variety of environment and development issues and problems at the local, regional, national, international and global level.
2. Knowledge and understanding of environmental concepts which underlie environmental issues and problems.

3. Knowledge and understanding of the conceptual links between local, regional, national, international and global environmental issues and problems.
4. Knowledge and understanding of the interconnections between social, political, economic and environmental system, as relevant to the study of environmental issues and problems.
5. Knowledge of a variety of environmental dimensions (e.g. social, economic, political, historical, cultural, aesthetic, physical and biological) and an appreciation of their important in understanding environmental issues and problems.
6. Knowledge and understanding about the chemical, physical, biological, social and aesthetic changes to the environment caused by human activities (such as farming, mining, industrialization, urbanization and tourism) and the environmental issues with surround such activities.
7. Knowledge about how different beliefs and values (1) determine the relationships that people have with their environment, and (2) those which underlie environmental issues and problems.
8. Knowledge and understanding of how different culture, and their subgroups perceive the environment and respond to its problems.
9. Knowledge and understanding of gender and indigenous peoples' perspectives on environmental issues and problems.
10. An understanding of global citizenship and its relevance to environmental issues and problems.

11. Knowledge about the different world religions and their environmental philosophies and perspectives on environmental issues.

12. Knowledge about how music has depicted the environmental relationships and concerns of different cultures including those of indigenous people.

13. Understanding of the importance of sound as a medium for developing and expressing personal feelings about the environment and its problems.

14. Knowledge and understanding of how music can raise environmental awareness and stimulate environmental participation or action.

15. Knowledge and understanding about the environmental and social appropriateness of technological developments.

16. Knowledge and understanding about (1) environmentally-sustaining, (2) environmental-damaging, and (3) alternative forms of technology.

17. Knowledge and understanding about the importance of environmental aesthetics in design technology.

18. Knowledge and understanding about how environmental problems influence (1) physical and mental health and (2) the quality of life.

19. Knowledge about the environment through first-hand experience and outdoor activities in a variety of settings.

20. Knowledge and understanding of (1) what it means to be a consumer (2) how consumer decisions are made and (3) the environmental issues surrounding these decisions.

21. Knowledge and understanding about the nature of co-operation and competition between community groups with regards to the environment.
22. Knowledge and understanding about how communities reconcile the conflicting demands and needs of the individuals with regards to the environment.
23. Knowledge about the local, national, regional and international controls and agreements on the protection and improvement of the environment.
24. Knowledge and understanding of how perceptions of nature through history have shaped the environment and environmental concerns.
25. Knowledge and understanding of the historical origins of current environmental concerns.
26. Knowledge about the environmental issues arising from war and conflict.
27. Knowledge about how individual values and beliefs concerning environmental issues change over time and are influenced by personal experience.
28. Knowledge and understanding of some of the solutions for remedying environmental issues and the values perspectives associated with these.

Critical thinking abilities

29. The ability to successfully identify and investigate environmental issues.
30. The ability to critically examine information and data presented by the media and environmental interest groups on environmental issues.

31. The ability to critically interpret data concerning environmental problems and issues from a computer database.
32. The ability to join in the environmental debate.
33. The ability to express critical views about the environment and its related problems through different media.
34. The ability to critically examine the political systems of power and decision-making which influence environmental issues.
35. The ability to critically examine different forms of social organization and their relevance to environmental issues.
36. The ability to critically examine the main political disputes over environmental issues and the differing value positions which underlie these disputes.
37. The ability to become involved in the political process with the goal of addressing environmental issues.
38. The ability to critically examine how the media portrays and transmits images and beliefs about environmental issues.
39. The ability to discuss and consider solutions to personal dilemmas about environmental issues.
40. A critical awareness of how everyday processes and events have consequences for environmental issues and problems.
41. The ability to critically examine their own lifestyles and identify practical ways in which they can contribute towards more sustainable relationships with the environment.

42. A critical awareness of other people's environmental needs/rights.
 43. The ability to critically examine the future consequences of present actions.
 44. The ability to distinguish between statements of facts and values, in relation to environmental issues.
 45. An awareness of the existence of different value perspectives within environmental issues.
 46. Respect for different ways of life and environmental beliefs and values concerning environmental issues.
 47. The ability to identify, clarify and justify their own value positions regarding environmental issues.
 48. A personal environmental ethic, based on a sensitivity to and willingness to care for the natural and social environment.
 49. A sense of responsibility for the consequences of their own choices and actions on the environment.
- Environmental action skills**
50. An awareness of how individual, community, corporate and government actions (or non-actions) can have an impact on the environment.
 51. The ability and commitment to participate in environmental decision-making.
 52. The ability to work individually as well as co-operatively in the resolution of environmental problem.

53. The ability to collect, classify and present environmental data to support environmental action or non-action.

54. The ability to participate and initiate a range of environmental actions (including-negotiation, persuasion, consumerism, political action, legal action, ecomanagement) to improve local and global environments.

55. An attitude to be predisposed to solving environmental issues in a way which is respectful of freedom of choice and is tolerant and fair.

56. The ability to develop, implement and assess action plans and strategies.

57. The ability to predict the future consequences of present actions.

2.4 Review Study

Robert E. Roth (1970) ERIC center of Ohio State University, center for science, mathematics, and environmental education analysis atated that EE is a process to develop people for :

- 1) knowledgeable to relation among physical biology social, culture and human as part of environment ;
- 2) awareness in environmental problems and seeking the ways to solve it ;
- 3) every one intent to maintain environment and develop the diversity of environment for better living of mankind.

Prio 1970 in the United State the term "Environmental Education" had not found in primary and secondary schools, but the learning programs were "Outdoor Education", "Conservation Education" or "School Camping", in junior and senior high school level. One fourth of schools system operated all year round ;

the programs emphasis on science applied science, conservation, ecology, biology, insect study, geology, botany, general science, climate and weathering. Most of schools used their schools area as the study places or field practices. Some schools, if not so far from national park, often used the park when received funding support. In 1970 the government announced "The Environmental Quality Act" to protect the degradation of environment, water, soil, air pollution from industrial manufacturers. Especially influence from the book of Rachel Carson (1962) entitled "Silent Spring" the best sale book that convinced the congress to pass the Environmental Quality Act to funding support environmental education in all level from primary education through the university. After that research article on EE appeared to the public eyes. (AIBS, 1970 : 4 ; SMEAC, 1972 : 17)

Research on Environmental Education Programs

Rhead (1967) surveyed fifty university in United States to find out how many institution offered outdoor education for teacher. He found that there were only 18 universities did in term of interdisciplinary approach.

Mouser (1969) studied the training program of the teacher to be the leader to teach outdoor education, he found that to be the leader of the community the teachers must be capable in diversified experiences, competent in integration of learning programs. Workshop and camping were the better way of training about six weeks period, field practice in ecology seemed to be better.

Macmillan (1969) surveyed the directors and advisors of school camps to see what responsibilities should perform for the success of the task. He concluded that the directors or advisors must be special trained in science, leadership, and

camping process ; besides that knowledgeable in arts, craft or hand craft, music, and administration are necessary. He/She must interested in students and gained thrust and respected from students. He/She must experienced in basic science, conservation, and appreciated in value of nature and ecology.

Simpson (1988) stated that the teachers who just known information about environment could not teach EE. He/She must learned and earned deep, wide, experiences in science and ecology and interdisciplinary form, be able to integrate into related discipline. The competent and qualified EE teachers would be able to lead students and public to know, understand, and be able to apply to their daily life. (UNESCO, 1976 : 37)

Bing HAO (1999) expressed in Yokohama Conference on 27-28 February, 1999 that lack of qualified and competent EE teachers are the barrier of EE in every country in Asia-Pacific. Lack of model and program to train teachers, to determine curricula ; lack of teaching materials are also factors. More importance are lack of awareness and funding support from institution. He concluded that training EE teachers should be the starting point for EE and formal education. (IGES, 1999 : 74)

Research on Environmental Education Center

Wilson and Martin (1991) of Western Kentucky University presented a model of collaborative effort that establishes a network of 15 university-based and 2 non-university based centers for EE in the Tennessee River watershed region. The model begins by establishing definitions for a center for EE and a network system. Next, the history of this Tennessee Valley Authority-sponsored network is

provided. Follow by seven guidelines for new EEC development or evaluation of established center program : 1) the host institution for the center must include service as an integral part of its philosophy ; 2) the center should have a strong base of support ; 3) the center staff should include director who has the authority to develop the center, as well as a full-time assistant director who is responsible for managing the program ; 4) a strong network of communication must be established and maintained ; 5) specific attainable goals for the center should be established ; 6) functions of the center should be identified and worked according to degree of emphasis given to each ; and 7) an advisory committee should be formed to help guide the center's development.

Gramann and Andereck (1990) Department Recreation/Park/Tourism Science Texas A&M University research on the response of EEC, nature center, zoos and museum, to recent changes in public education policy in Texas, which had the potential to reduce public school field trips to such off-campus educational facilities. Five hypothesis are derived from human ecological theory that focus on organizational function, hierarchical integration, resource competition and organizational capacity as determinants of response to policy changes. A profit analysis of data obtained via telephone interview from 293 facilities indicates that off-campus EEC were more likely to adapt to the changes if their key function was education, they had a pattern of relatively extensive interaction with other local units, and they were characterized by higher levels of excess capacity.

Chavez (1995) Texas A&M University investigated fifth grade teachers in public schools located in Education Service Center, Region X. Response rate was 38% (316 of 836 potential respondents). Teachers were grouped into two classes based on whether they considered themselves to be environmental educators including : training, personal actions, attitudes, knowledge, process, classroom activities, facilities, materials, and school-based support. General Linear Model tests showed that environmental educators distinguished themselves from others on all variables except attitudes. Standardized betas from a regression model isolated the characteristics of fifth grade teachers that most effectively bring EE into their classroom. These included personal actions, understanding of the process of EE, classroom activities, and materials. Group status accounted for 30% of the variance in independent variables.

Ginger Keho (1999) Office of Environmental Education, Environmental Protection Agency, U.S.A. concluded in part about EE in Asia-Pacific Region in Yokohama Conference that potential barriers for the successful development and implementation of EE programs in this region could include :

- not knowing who the potential “player” are in each country or region ; those individuals who can make things happen in the government or in the EE field ;
- lack of human and financial resources ;
- lack of a high-level “champions” for EE ;
- regular turn over of government jobs in some countries ;

- lack of infrastructure in both the U.S. and most Asia-Pacific countries to support the development and implementation of sustainable EE programs ;
- emphasis on legislation, regulation and enforcement as the only successful tools for environmental protection ;
- division of responsibilities between environment and education agencies and little/no co-ordination of activities or programs ;
- economic growth vs. environmental protection arguments/ issues.

(IGES, 1999 : 103)

From documentary studied reveals that the environmental studies and environmental education originated in Europe and the U.S. more than a half century after the great industrial revolution in 18th century. Number of factory and industrial manufacturers had been established and built up that caused the deterioration of natural resources, at the same time chemical and waste products have been increasing and flowing back to environment building up pollution in rivers, soil, air and space in industrial countries. After World War II, colonialism have shifted to export of pollution to developing countries or the third world in Asia-Pacific by foreign investment policy ; the developed countries shifting industrial plants and factories to settle in the developing countries, they take back all advantages and benefit but left back the pollution in the third world countries. For economic growth and the national development of the developing countries, deterioration of resources increased, pollution and environmental dangerous also double increased to harmful to human life and health. The people in the developing countries in Asia-Pacific become to know and realize the coming

hazardous ; they begin to educate their people to know, understand, and protect their natural environment with affiliate of UNESCO to enforce the third world countries under Tbilisi Declaration 1977 EE in Asia-Pacific started in 1988 (UNESCO-UNEP, 1988 : 12) but still not progress because the lack of qualified and competent in EE in almost institution. For the development of EE programs college and university experts in the field must be the starting point and should be the main principal to organize training and seminar programs for in-service and pre-service EE teachers in primary and secondary schools the same as Griffith University the pioneer of EE training programs in Asia-Pacific region.

Research Framework

The study has been integrated related theories and research on EE in foreign countries along with her own thoughts welding together to create framework for EE programs and EEC in the provinces of Thailand in the hope that sustainable EE programs and EEC could be implemented and the UNESCO-UNEP goals could be attainable. The followings are variables and indicators of the study.

Variables	Indicators
<p>Independent variables</p> <p>1. Existing EEC model</p>	<p>1) Information on role/objectives</p> <p>2) Composite factors</p> <p style="padding-left: 20px;">2.1 Surrounding situation</p> <p style="padding-left: 20px;">2.2 Resources : personnel, budget, materials, building, funding support</p>

Variables

Indicators

2.3 Process : planning, administrative structure, co-operation, evaluation and follow-up, public communication

3) Conduction and management

- personnel development
- materials development and activities
- services given
- co-ordination

2. Existing PEEC model

2.1 Conduction and management

- | | |
|----------------------------------------|------------------------------------------------------------------|
| - personnel development | 1) method and process 2) content |
| - materials development and activities | 1) method and process
2) type of activities and communication |
| - services given | 1) readiness 2) method and process |
| - co-ordination | 1) method and process
2) characteristics of co-ordination |

2.2 Factors effects the PEEC

- 1) readiness in surrounding situation
- 2) readiness in resources : personnel, budget, materials, building, funding support
- 3) propriety of process :
 - planning, administrative structure,

Variables	Indicators
	co-operation, evaluation and follow-up, Public communication
3. Existing model of PEEC and EEC	1) role/objectives 2) composite factors 3) conduction and management
Dependent variable Model of PEEC	1) role/objectives 2) composite factors 3) conduction and management 4) elements of PEEC model <ol style="list-style-type: none">1. introduction2. objectives of PEEC3. role and duty4. composite factors5. method of conduction

CHAPTER III

MATERIALS AND METHODS

3.1 Method of Study

In order to answer the proposed question : 1) What is the modeling structure of each EEC ? 2) What are the conduction and management of each center ? 3) How are the conduction and management of each center differed ? and 4) What should the model of PEEC be?

It is necessary to investigate in the form of quantitative and qualitative styles of EEC to what it had been done during those year (1995 – 1997). The method to gather the enquired information would be documentary study from government department, existing centers and direct observation and interview the responsible personnel of each center. Three procedures will be applied :

1. Collect and analyze enquired information from government departments, EEC of Rajabhat Phranakhon Institute, and EEC of Chulalongkorn University. The SWOT analytical technique will be applied to Rajabhat Phranakhon Institute and Chulalongkorn University, because they are rather complete systematic conduction and operation.

2. Collect and analyze enquired information from candidate schools that had been funded to set up PEEC. Direct observation and interview along with check-list questionnaire and then the SWOT analytical will be applied.

3. Propose the PEEC model application from recommendations by compare data in 1, 2 .

3.2 Sampling Method

The subject to be involved in this study at provincial level will be purposive sampling from the teachers who responsible for EE program one from each center ; 10 – 19 teachers who assigned to co-ordinate the program of each center ; and the people who used the services. This sample shows in Table 3.

Table 3 Sample drawn from each PEEC

PEEC	Responsible Personnel	Co-ordinate Personnel	services users
Surathanee	1	15	45
Trung	1	10	75
Narathivat	1	17	50
Srakeaw	1	13	40
Phitsanulok	1	10	50
Lopburi	1	18	45
Khonkean	1	10	40
Chiangmai (Hopra)	1	13	45
Chiangmai (Maehopra)	1	15	40
Chiangmai (Jomthong)	1	10	30
Lumpung	1	14	50
Lumpoon	1	16	52
Payaow	1	17	45
Prea	1	16	30
Nan	1	19	35
Chiengrai	1	17	40
Meahongsorn	1	10	40
Total	17	240	752

3.3 The Research Instruments

To assess the processes of conduction and the elements that effected the operation and management of the EEC, The researcher applied three instruments :

1. Direct observation form.
2. Structured Interview check-list form
3. Questionnaire

The enquired information seeking are :

1. General status of the responses
2. General information of the EEC.
3. The processes of conduction and management the PEEC concerning :
 - 3.1 The conduction and management towards the given tasks
 - The development of qualified personnel both formal and informal system.
 - The development of communication materials based on local appropriation
 - The services given to public, school, and community
 - The co-ordination among departments, public, and community towards the EE program.
 - 3.2 The conduction and management barriers.
 - 3.3 The expectation of EE program to support the curricula.

The Five point Likert's rating scale were applied to all assessment in this study. (Likert, 1961)

There are five ranges in the rating scale :

Mark range	Meaning
5	highest
4	high
3	moderate
2	low
1	lowest

The researcher analyzed the data to find arithmetic means and interpreted the meaning according to the following criteria

Means	Meaning
4.50 – 5.00	highest
3.50 – 4.49	high
2.50 – 3.49	moderate
1.50 – 2.49	low
1.00 – 1.49	lowest

3.4 Construction of Research Instrument

1. Collect enquired information from departments that dealing with environmental issues in the form of document study as data base.
2. Construct the observation procedure, structured interview, and questionnaire for the research committee approval.
3. Corrected the instrument according to the committee approval.

4. Tested the final instruments before administer with 20 personnel in the four region centers for reliability, discrimination power determination by applying Cronbach's Coefficient Alpha. (Cronbach, 1951 : quoted in Boontham Kitpreedaborisuit, 1994 : 130-131, 253-259) Reliability of the questionnaire was at 0.98 and of the services users was at 0.96

3.5 Data collection

1. Received the document on the role/objectives, conduction and composite factors of Rajabhat Phranakhon Institute and Chulalongkorn University EEC.

2. Sample Subjects of 17 PEEC in Table 3 were directly asked to response the questionnaire and the check-list interview ; that is 17 responsible personnel, 240 co-ordinators, and 752 service users according to their roles and participation. These 17 PEEC locate in four regions of the country as shows in the map. (Figure 1)

3.6 Data Analysis

1. Qualitative data concerning physical feature and situation of each from observation and directed interview were classified and collected by mean of percentage and arithmetic mean.

2. Quantitative data from questionnaires were analyzed by computer SPSS/PC+ program (Statistical Package for the Social Science/ Personal Computer Plus)
 - 2.1 Analysis of factors involved based on percentage, mean and standard deviation (S.D.)
 - 2.2 Analysis of conduction, management and the service users' satisfaction were based on mean and S.D.
 - 2.3 Analysis of linear relationship between dependent and independent variables, Pearson's simple correlation was applied.
 - 2.4 Stepwise Multiple Regression Analysis was applied to analyzed the conduction and management of PEEC.
3. Compare the analysis data between PEEC and EEC of Rajabhat Phranakhon Institute and Chulalongkorn University to sketch out the recommendation.

3.7 Evaluating PEEC model

1. Ask the thesis committee for suggestions and recommendation to modify and improve the PEEC model.
2. Bring the PEEC model to 20 authorized experts for evaluation, then modify and improve PEEC model.

CHAPTER IV

RESULTS

Analysis of enquired information are presented in three parts :

Part 1

Analysis of Rajabhat Phranakhon Institute and Chulalongkorn University EEC model.

Part 2

Analysis of PEEC model on the conduction and management.

Part 3

Comparative Environmental Education Center models between Rajabhat Phranakorn Institute, Chulalongkorn University EEC and PEEC.

4.1 Analysis of Rajabhat Phranakorn Institute and Chulalongkorn University EEC model.

4.1.1 General features

Rajabhat Phranakorn Institute

- Role/Objectives

- 1) The center for research and study on environmental teaching and learning for elementary and secondary schools to build up the attitude, concious, awareness and responsibility towards environment value.
- 2) The center for training elementary and secondary school teachers towards EE.

3) The center for documentary and information services and field activities.

4) The center for EE distribution and services to public.

- **Conduction and management**

1) Training teachers, personnel and students within and outside the center.

2) Develop teaching materials and activities to integrate EE program, curricula and camping.

3) Advising and guiding to provide EE activities, experienced personnel to reserve the requests.

4) To co-ordinate with government departments.

- **Composite factors**

1) The Institute has specific building equipped with necessary facilities and technology devices available to groups of uses, has a big co-ordinate staff of 15-20 science and agriculture instructors to handle the tasks and requests.

2) The Institute support and funding the center budget continually.

3) The center has specific plans and tasks to operate and conduct under the advisory committee.

Chulalongkorn University

- **Role/Objectives**

1) The center for research and environmental development.

2) The center to promote EE program.

3) The center to services public, teachers, students and educators ; also serve as information center and training.

4) The center to promote co-ordination inland and international information exchange.

- Conduction and management

1) Conducts and manages workshops for elementary and secondary school teachers, translate and prepare EE modules for teachers.

2) Prepare and provide EE activities and materials such as handbooks, video tape etc.

3) Provision of experienced personnel to serve public and requests.

4) Co-ordinates with government departments.

- Composite factors

1) The center located in limited space of the Faculty of Education equipped with small number of facilities and information technology devices ; The co-ordinators (20-25) are the instructors from elementary and secondary education.

2) The center revenue comes from faculty budget and sometimes from non-profit organizations.

3) The center conducts and operates the tasks under advisory committee and specific plan and strategies.

4.1.2 Analysis of internal and external environment/factors by SWOT

Analysis of the internal environment/ factors in terms of strength (S) and weakness (W) of Rajabhat Phranakorn Institute and Chulalongkorn University is presented in Table 4

Table 4 Analysis of internal environment/ factors in terms of S and W

Internal factors	EEC	
	Rajabhat Inst.	Ckula. Univ.
1. Role/Objectives	S	S
2. Conduction and management		
2.1 personnel development		
- training personnel	S	S
2.2 materials development	S	S
2.3 services given		
- services information	W	W
- services materials	W	W
- expertise services	S	S
2.4 co-ordination		
- co-ordinate between departments	S	S
- co-ordinate with community	W	W
3. Composite factors		
3.1 surrounding situation	W	W
3.2 resources		
- personnel	S	S
- budget	S	S
- materials	S	S
- building	S	W
- funding support	S	S
3.3 Process		
- planning	S	S
- administrative structure	W	W
- co-ordination	W	W
- evaluation and follow-up	W	W
- public communication	W	W

Analysis of the external environmental/ factors in term of opportunity (O) and threat (T) of Rajabhat Phranakhon Institute and Chulalongkorn University is presented in Table 5

Table 5 Analysis of external environmental/factors in term of O and T

External factors	EEC	
	Rajabhat Inst.	Chula. Univ.
1. Economic system		
- Funding and support from foreign country, UNESCO, WWF, IGES.	O	O
- Social and economic policy human resource development, environmental important, public co-ordination.	O	O
- Economic regression inflation, down value of baht currency, budget cut down.	T	T
2. Political system		
- Environmental situation in the country link with global environmental problems, the new constitution encourage the people to response and co-ordinate to better et.	O	O
- Decentralize of authorities the 1992 environmental act open up to the local authorities	O	O
- Government security frequently change of the government all policies change.	T	T
3. Social system		
- community strength and accountability should support to solve the environmental problems.	O	O
4. Technology		
- development and investment of information technologies open up globalization	O	O
5. Needs and expectation of the services users		
- seeking for information on environmental issue is increasing		
- services users' satisfaction is increased due to lack of information center	O	O

External factors	EEC	
	Rajabhat Inst.	Chula. Univ.
<p>6. Educational system - educational reform emphasis on personnel development and improvement of teaching-learning process to stress on co-ordinate and participation of the students and child-center</p>	O	O

The conclusion of the SWOT analytical technique of the Rajabhat Phranakorn Institute and Chulalongkorn University EEC model as a whole and recommendation as shown in Table 6.

Table 6 Conclusion of SWOT analysis of Rajabhat Institute and Chulalongkorn University EEC model

<p>Internal factors</p> <p>External factors</p>	<p>Strength (S)</p> <ol style="list-style-type: none"> 1. Role/Objectives 2. Expertise and personnel 3. Sufficient budget 4. Readiness of materials 5. Funding support 6. Planning and strategies 7. Training personnel 8. Development materials 	<p>Weakness (W)</p> <ol style="list-style-type: none"> 1. Facilities and readiness 2. Co-ordination 3. Evaluation and follow-up 4. Administrative structure 5. Public communication 6. Services 7. Community co-ordination
<p>Opportunity (O)</p> <ol style="list-style-type: none"> 1. Foreign supports and funding 2. Social and economic policies 3. Surrounding situations 4. Community strength 5. New and advanced technologies 6. Needs and expectation of users 7. Educational reform 	<p>Strategies (SO)</p> <p>Application and implementation of opportunity to conduct and management of personnel development towards its goals and objectives (S1-S8 and O1-O7)</p>	<p>Strategies (WO)</p> <p>Correct and improve indicated weakness and increasing public communication and co-ordination.</p>
<p>Threat (T)</p> <ol style="list-style-type: none"> 1. Economic regression 2. Government security 	<p>Strategies (ST)</p> <p>Implementation of all strength and decreases budget as possible.</p>	<p>Strategies (WT)</p> <p>Role and objectives may have to cut down as Necessary.</p>

4.2 Analysis of PEEC model on the conduction and management.

4.2.1 General features of the PEEC.

The 17 PEEC located in secondary schools of each province ; 41.18 % are large school size, enrollment more than 2,000 students ; 58.82 % are in medium schools, enrollment less than 2,000 students ; the teachers in these school range from 28 – 230 teachers. About 47.06 % of these schools provided spaces for materials storage and handling, services, reading corner, small group meeting and equipped with necessary information technology devices. Surrounding area mostly organized landscape closely to natural environment as possible as available spaces. Some schools organized medicinal plants garden and recreation area for students.

Each center has one responsible for running the EE program, 10 – 19 coordinators mostly interested teachers, the average services users are student (93%). These 17 PEEC have been supported by funding from Department of Promotion Environmental Quality during 1995 – 1997 (see Table 2). Only one center has been continually supported to 2000 (Maehopra Wittayakom School, Cheingmai), some other schools have been cut down funding support. It has to be running the program on their own sake, used the school budget instead. Since there has been no direction or modeling guideline to run the program from the Department, each school has to run on their own thought. Therefore, there would be no modeling or pattern to run the EE program since the beginning in 1995. Until 1998 the Department has shifted the method of funding through the Supervision unit of each province and suggested to run the EE program under the advisory committee came from different educational departments in the province.

4.2.2 Role/ Objectives

The principle role of PEEC are :

- 1) Training the EE teachers in both educational system.
- 2) To promote and develop technology and organize the EE program and activities, curricula, handbooks and materials in accordance with the local needs.
- 3) To promote and develop the co-ordination with government departments and community in terms of network.
- 4) Center for services, information, training, educational materials to public and other schools.

4.2.3 Conduction and management

Analysis of conduction and management of PEEC concerning with

- 1) Personnel development
- 2) Materials development and activities
- 3) Services given
- 4) Co-ordination

1) Personnel development

Analysis of conduction with training and personnel development on method of conduction as a whole as shown in Table 7

Table 7 Analysis of conduction dealing with personnel development of PEEC.

Method of conducting	Number	Percentage
1. Training EE teachers of the center and network.	12	70.59
2. Seminar and conferences.	10	58.82
3. Field practices and education trips.	4	23.53
4. Small group meeting.	5	29.41
5. Expertise lecturing.	4	23.53
6. Community information distribution.	3	17.65
7. Informal dialogue.	2	11.76

The training of EE teachers emphasis on contents as shown in Table 8

Table 8 Percentage of emphasis training content for EE teachers

Content	Number	Percentage
1. Knowledge and understanding the environment	17	100.00
2. Environmental attitude	2	11.76
3. Environmental skills	10	58.82
4. Environmental processes	10	58.82

2) Materials development and activities

Analysis of materials development and activities found that most frequently activities are seminars and conferences and camping ; The materials development presents in Table 9

Table 9 EE materials that have been developed

Type of materials	Number	Percentage
1. Teaching documentary and papers	1	5.88
2. Video tape	1	5.88
3. Natural study handbooks	2	11.76
4. Integrated learning plans	3	17.65
5. Reinforced experienced	3	17.65
6. Learning package	1	5.88
7. Practical article	5	29.41

3) Services given

Analysis of facilities, readiness and services of PEEC found that each center is not ready to services to public and community due to limiting of space, information technology devices and materials, as shown in Table 10

Table 10 Services that given to schools and public

Service types	Number	Percentage
1. Services system		
- information files	3	17.65
- loan record	5	29.41
- permanent personnel	2	11.76
2. Types of service materials		
- articles, textbooks	8	47.06
- charts, posters	8	47.06
- projectors	2	11.76
- videotape	8	47.06

4) Co-ordination

There are little co-ordination with public and community. Method of co-ordination actually send the students out to meet with the people and to join or help community handle some problems as shown in Table 11.

Table 11 Method of co-ordination with public and community

Activities	Number	Percentage
1. To join with community activities	14	82.35
2. People join the EEC for some activities	6	35.29
3. EEC join with community and departments activities	3	17.65

4.2.4 Composite factors

Analysis factors that effect the PEEC operation

1) Surrounding situation

The situation outside and inside the Centers presents in Table 12.

Table 12 Opinion of the response personnel towards factors

Surrounding situation	Percentage of level					Mean	S.D.
	5	4	3	2	1		
1. Surrounding situation outside and inside the center are satisfy to promote learning, conciousness to every concerned men and women.	10.4	42.9	40.4	5.4	0.8	3.56	0.78
2. The centers are convenient in communication	38.3	35.4	20.0	4.6	1.7	4.04	0.95
3. The centers location and environment are favor for waste management	8.8	41.7	41.3	7.5	0.8	3.22	0.74
4. Environment situation in the provinces have been watched protected to better it	4.2	28.3	53.8	13.3	0.4	3.22	0.74
5. Community environment are in favor for conduction the EE program, good soil, air and water	5.8	38.3	48.3	9.6	0.0	3.40	0.74

Total Mean = 3.54 S.D. = 0.58
Surrounding situation are in high level

(Code meaning 5 = highest 4 = high 3 = moderate 2 = low 1 = lowest)

2) Personnel

Analysis of the personnel in the EE program show their readiness and are in favor to join the program as shown in Table 13.

Table 13 Intention and qualification of PEEC personnel.

Intention and qualification	Percentage of level					Mean	S.D.
	5	4	3	2	1		
1. PEEC personnel have been trained in environment	12.5	42.1	36.3	7.5	1.7	3.56	0.86
2. Number of personnel in each center	13.8	25.0	36.7	20.8	3.8	3.24	1.05
3. EE personnel experienced in handle the task	8.3	32.9	44.2	13.8	0.8	3.34	0.84
4. EE personnel have been train from the Department or involved institutes	10.0	32.5	42.1	12.9	2.5	3.34	0.91
5. EE personnel intend to do their tasks towards EE program	23.8	42.1	26.7	7.5	0.0	3.82	0.88

Total Mean = 3.46 S.D. = 0.70

Personnel intention and qualification are in moderate level

3) Budget

Analysis of budget and funding support to conduct and management the EE program of 17 centers as shown in Table 14.

Table 14 Budget management and funding supports

Contents	Percentage of level					Mean	S.D.
	5	4	3	2	1		
1. The expense budget to provide materials of the center	6.3	32.1	45.8	13.8	2.1	3.26	0.85
2. The expense budget to promote network	3.3	27.1	50.0	16.3	3.3	3.10	0.83
3. The expense budget to provide activities	7.1	29.6	48.8	11.3	3.3	3.25	0.87
4. The sufficient budget planned is returned properly	7.1	30.8	46.3	13.3	2.5	3.26	0.87
5. The convenience to withdraw the budget is acceptable	7.1	29.6	47.5	12.9	2.9	3.25	0.87

Total Mean = 3.23 S.D. = 0.75

Budget are in moderate level

4) Materials

Analysis of materials of each center provided and available for services as shown in Table 15

Table 15 The provision and available materials for services

Materials	Percentage of level					Mean	S.D.
	5	4	3	2	1		
1. Centers provide article, handbook, textbook in environment issue	11.7	26.7	45.4	13.3	2.9	3.30	0.94
2. Charts, posters on environment have been provided	6.7	25.0	47.5	18.3	2.5	3.15	0.88
3. TV, videotape, slide projectors, overhead projectors are available	5.0	21.7	38.8	23.8	10.8	2.86	1.03
4. Teaching aids and materials are in good cared and ready to use	4.6	27.9	44.2	18.8	4.6	3.09	0.91
5. Sufficient supply of materials to serve the users	3.8	24.6	41.3	23.8	6.7	2.95	0.94

Total Mean = 3.07 S.D. = 0.76

Materials and supplied are in moderate level

5) Building and facilities

Analysis of spaces and facilities of the PEEC reveals that each center has provided space for center conduction and operation but not special building for their own as shown in Table 16

Table 16 Spaces and facilities for PEEC

Spaces and facilities	Percentage of level					Mean	S.D.
	5	4	3	2	1		
1. The centers have specific spaces to run, storage, exhibit or meeting	7.5	25.8	36.3	21.7	8.8	3.01	1.06
2. Articles materials and devises are kept in order	4.6	27.9	45.4	17.1	5.0	3.10	0.90
3. Spaces and climate in the centers have been provided to promote and encourage learning	8.8	25.4	49.2	15.8	0.8	3.25	0.85
4. Centers location are convenient to visit and use services	12.9	28.3	40.8	13.3	4.6	3.31	1.01
5. Centers have provided sufficient spaces for meeting and informal dialogue among member and users	11.7	31.3	39.2	14.6	3.3	3.33	0.97

Total Mean = 3.20 S.D. = 0.82

Spaces and facilities are in moderate level

6) Funding support

Analysis of supporting from government departments and private sectors as shown in Table 17

Table 17 Supporting departments and private sectors

Supporting agents	Percentage of level					Mean	S.D.
	5	4	3	2	1		
1. Immediate superior support	30.8	32.9	26.7	8.8	0.8	3.84	0.98
2. Supports from local departments, forestry, health, agriculture	15.4	34.6	34.6	14.6	0.8	3.49	0.95
3. Private section, NGO	8.8	28.3	34.6	21.7	6.7	3.10	1.05
4. Public and community, expertise	9.2	27.5	46.7	13.8	2.9	3.26	0.91
5. Schools and institutes join and co-ordination	10.4	31.8	41.3	14.2	2.9	3.32	0.94

Total Mean = 3.40 S.D. = 0.77

The supports to PEEC are in moderate level

7) Planning and strategies

Analysis of planning and strategies to conduct, manage and operation of the PEEC as shown in Table 18.

Table 18 Planning and strategies of the PEEC

Planning and strategies	Percentage of level					Mean	S.D.
	5	4	3	2	1		
1. Strategies are carefully planned	22.5	36.7	33.3	6.7	0.8	3.73	0.91
2. Running the center according to the plan	21.3	39.6	31.3	6.7	1.3	3.72	0.91
3. Annual agenda has been set	17.1	40.4	30.0	10.8	1.7	3.60	0.94
4. Consecutive planning and strategies are provided	17.1	40.0	30.4	11.3	1.3	3.60	0.94
5. Communication and co-ordination among advisory committee policy are well practiced	21.3	32.1	33.8	11.3	1.7	3.60	0.99

Total Mean = 3.65 S.D. = 0.85

Planning and strategies are in high level

8) Administrative structure

Analysis of administrative structure of The 17 PEEC as shown in

Table 19

Table 19 Administrative structure of The PEEC

Administrative structure	Percentage of level					Mean	S.D.
	5	4	3	2	1		
1. The PEEC operated under the administrative committee	25.0	34.2	32.1	7.5	1.3	3.74	0.95
2. Team work and co-ordination have been established	25.4	34.2	32.9	6.7	0.8	3.76	0.93
3. Administrative committee composed of center representative, school network, institute, departments and private sectors on environment	22.9	32.1	35.0	7.9	2.1	3.65	0.98
4. Appropriate administrative committee numbers	20.0	30.0	33.8	12.1	4.2	3.49	1.07
5. The center responsible is the secretary of the committee and of the center	32.9	31.7	21.7	12.1	1.7	3.82	1.07

Total Mean = 3.69 S.D. = 0.88

The administrative structure and management are in high level

9) Co-ordination

Analysis of the co-ordination of the PEEC as shown in Table 20

Table 20 Co-ordination of the personnel in the PEEC

Co-ordination	Percentage of level					Mean	S.D.
	5	4	3	2	1		
1. Co-ordinate system are well organized and operated	14.2	33.8	34.6	15.8	1.7	3.42	0.97
2. Co-ordinate with schools network and PEEC meeting are held	19.2	32.9	32.5	13.8	1.7	3.54	1.00
3. Co-ordinate with other departments concerning environmental issue in order to be materials and funding supported	11.7	32.5	36.3	19.2	0.4	3.35	0.93
4. Co-ordinate with public and community to bring them in activities participation	10.0	34.6	35.8	17.5	2.1	3.32	0.94
5. Administrative committee and team work frequently meet to learn the process of the task	14.2	33.8	36.3	13.8	2.1	3.44	0.96

Total Mean = 3.42 S.D. = 0.85

Co-ordination among the centers are in moderate level

10) Evaluation and follow-up

Analysis of evaluation and follow-up the conduction management and operation of the PEEC as shown in Table 21.

Table 21 Evaluation and follow-up of PEEC

Evaluation and follow-up	Percentage of level					Mean	S.D.
	5	4	3	2	1		
1. Evaluation and follow-up have been continually administered	15.4	37.1	32.9	13.3	1.3	3.52	0.95
2. Funding supports have evaluation and follow-up the centers operation annually	16.7	40.8	29.6	11.7	1.3	3.60	0.94
3. The center responsible has continually follow-up the schools network conduction	13.8	35.0	38.3	11.7	1.3	3.48	0.91
4. Annual report has been made to present to the funding supports	19.6	36.7	30.4	12.5	0.8	3.61	0.96
5. Follow-up has been made every time of co-activities with community	15.0	31.7	39.2	11.7	2.5	3.45	0.96

Total Mean = 3.53 S.D. = 0.84

The evaluation and follow-up of the centers are in moderate level

11) Public communication

Analysis of public communication as shown in Table 22

Table 22 The public communication of the PEEC

Public communication	Percentage of level					Mean	S.D.
	5	4	3	2	1		
1. PEEC asked the province public communication to distribute the PEEC's news in the air	14.6	23.3	37.9	21.7	2.5	3.25	1.03
2. Posters, leaflets, folded leaflets are used to distribute information	12.1	22.5	39.6	22.9	2.9	3.17	1.01
3. Public communication through community activities continually	8.3	25.8	40.4	22.5	2.9	3.14	0.95
4. Policy, objectives, conductive structure of the EE program have been posted to all	10.4	30.8	37.9	18.3	2.5	3.28	0.96
5. Environmental protection and conservation of natural environment have been campaigned	12.9	32.9	38.3	14.6	1.3	3.41	0.93

Total Mean = 3.25 S.D. = 0.85

Public communication are in moderate level

4.2.5 Output of conduction and management

To conclude the output of conduction and management of all 17 PEEC concerning with 1) personnel development 2) materials development 3) services given to public and community 4) co-ordination and participation presents in Table 23

Table 23 Output of conduction and management of PEEC

The tasks	Mean	S.D.	degree level of agreement
1) Personnel development			
1. Training teachers in the center and in network schools concerning knowledge, understanding and environmental context	3.35	0.96	moderate
2. Training teachers in the centers and in network schools concerning the process of EE program	3.32	0.89	moderate
3. Training teachers in the centers and in network schools concerning steps and strategies of EE program	3.26	0.90	moderate
4. Invitation local officials and community leader to participate in environmental training activities	3.08	0.96	moderate
5. Environmental seminar among teachers in formal and informal school systems	3.19	0.97	moderate
Total	3.19	0.86	moderate
2) Materials development			
1. PEEC teachers and personnel co-operative construct materials and teaching aids according to local environment	3.20	0.99	moderate
2. PEEC teachers and personnel co-operative to public activities handbooks according to local environment	3.15	1.03	moderate

The tasks	Mean	S.D.	degree level of agreement
3. PEEC teachers and personnel organized the workshops and curriculum development according to local environment	3.20	0.99	moderate
4. PEEC promote teachers and personnel in school network construct materials continually	3.27	0.92	moderate
5. PEEC organized training and seminar on materials and curriculum development according to local environment	3.13	0.97	moderate
Total	3.19	0.86	moderate
3) Services given to public and community			
1. Filing the resources people in environment for local reference and government departments	3.01	0.91	moderate
2. Set up the rules for articles, materials and EE devices to users and loan	3.06	0.97	moderate
3. Organized and set up systematic of article, materials and all devices	3.04	0.98	moderate
4. Provision of materials, article and information technology devices for services	3.11	0.96	moderate
5. Provision of spaces and climate to promote learning, meeting and sharing ideas and experience among members and users	3.24	0.84	moderate
Total	3.09	0.84	moderate
4) Co-ordination			
1. Co-ordinate with other departments such as Health and Sanitation, Forestry and Agriculture etc.	3.27	1.01	moderate
2. Organize co-activities that public and community be able to participate	3.21	1.01	moderate
3. Invites local officials and experts to lecture on environmental management	3.26	0.98	moderate
4. The center receive funding support party from local private section	3.11	0.96	moderate
5. Administrative committee of the center composes of representative from departments and community	3.24	0.92	moderate
Total	3.09	0.84	moderate



Mean = 3.15 S.D. = 0.73

It can conclude that the output as the whole are in moderate level.

Users' satisfaction

Analysis of users' satisfaction presents in Table 24

Table 24 Level of users' satisfaction of the center services

Satisfaction	Mean	S.D	degree level of agreement
1. Personnel development	3.59	0.73	high
2. Materials development	3.50	0.93	high
3. Services given	3.49	0.92	moderate
4. Co-ordination	3.50	0.83	high

Mean = 3.52 S.D. = 0.76

Users' satisfaction is in high level

Relationship between factors and output of PEEC conduction

In order to know which factors effect the output of conduction of PEEC, the Stepwise Multiple Regression Analysis is employed with 11 independent variables as these :

Independent variables	Code	Scale
1. Surrounding situation	ENVI	interval
2. Personnel	PERS	interval
3. Budget	BUGE	interval
4. Materials	MATE	interval
5. Building	BUIL	interval
6. Funding support	SUPP	interval
7. Planning	PLAN	interval
8. Administrative structure	ORGA	interval
9. Co-ordination	COOR	interval
10. Evaluation and Follow-up	FOLLO	interval
11. Public communication	PUBL	interval

Statistical symbols :

Mean	=	average
S.D.	=	standard deviation
R	=	multiple regression coefficient
R ²	=	predict coefficient
B	=	regression coefficient
Beta	=	standard regression value
SE.B.	=	standard deviation of regression coefficient
SEE	=	standard deviation of predict
F	=	test of group different variable
T	=	test of different between groups
r	=	correlation coefficient

To test the linear relationship between dependent and independent variable, simple correlation is applied. The 11 variables correlated significantly with dependent variable positively at .01. See details in Table 25 and Table 26

Table 25 Mean and Standard Deviation of variables

Variables	Mean	S.D.
1. Surrounding situation	3.54	0.58
2. Personnel	3.46	0.70
3. Budget	3.20	0.75
4. Materials	3.07	0.76
5. Building	3.20	0.82
6. Funding support	3.40	0.77
7. Planning	3.65	0.85
8. Administrative structure	3.69	0.88
9. Co-ordination	3.42	0.85
10. Evaluation and follow-up	3.53	0.84
11. Public communication	3.25	0.85

Table 26 Correlation Coefficient between variable

ตัวแปร	ENVI	PERS	BUDG	MATE	BUIL	SUPP	PLAN	ORGA	COOR	FOLLO	PUBL
ACHIE	.4644**	.5691**	.5279**	.6328**	.6059**	.5911**	.6559**	.6096**	.7550**	.7175**	.7591**
ENVI		.4915**	.4101**	.4258**	.5214**	.5436**	.4811**	.4718**	.4797**	.4422**	.4061**
PERS			.5109**	.5621**	.5397**	.5730**	.5836**	.5373**	.5928**	.5864**	.5367**
BUDG				.5735**	.4552**	.5053**	.5515**	.5198**	.5918**	.5826**	.4948**
MATE					.5494**	.4795**	.5523**	.5691**	.6540**	.6360**	.6457**
BUIL						.7275**	.6232**	.5941**	.6603**	.5494**	.5396**
SUPP							.6542**	.6269**	.6298**	.5667**	.5333**
PLAN								.7651**	.7522**	.7935**	.7067**
ORGA									.7662**	.7816**	.6674**
COOR										.8169**	.7800**
FOLLO											.7974**

* P < 0.05 ** P < 0.01

4.2.6 Analysis of Relationship between factor and output of PEEC conduction

There are four out of 11 factors effect output of conduction of PEEC namely, materials, building, public communication and co-ordination as shown in Table 27

Table 27 Stepwise Multiple Regression Analysis of output of PEEC conduction.

Variables	B	SE.B	Beta	t	Sig.t
1. Public communication (PUBL)	0.3307	0.0541	0.3831	6.112	.000**
2. Co-ordination (COOR)	0.2395	0.0592	0.2786	4.047	.001**
3. Building (BUIL)	0.1325	0.0457	0.1482	2.898	.004**
4. Materials (MATE)	0.1165	0.0506	0.1217	2.300	.022*

N = 240 SEE = 0.4281

R = 0.8173 F = 118.265

R² = 0.6681 Sig.t = .000

* P < 0.05 ** P < 0.01

4.2.7 Analysis of internal and external environment/ factors of PEEC by SWOT

Analysis of internal environment/ factors in terms of Strength (S) and Weakness (W) of PEEC as shown in Table 28

Table 28 Strength (S) and Weakness (W) of PEEC

Internal factors	Analysis
1. Role/ Objectives	-To training and develop EE personnel. To promote and develop materials, and activities according to local environment. To promote and and develop co-ordination school networks. To be center for services of EE program. (S)
2. Conduction	
2.1 Personnel development	-Send principle personnel to train once a year. Some PEEC organized seminar, small group meeting, and given lecture knowledge of environment but not yet covers the UNESCO-ACEID purposes. (W)
2.2 Materials development	-Workshops have been held to produce materials activities, camping, handbooks in small scale not yet appropriates to local environment. (W)
2.3 Services given	-Spaces and facilities are not sufficient for public services and loans. (W)
2.4 Co-ordination	-Co-ordination have been practices only among schools networks. (W)
3. Composite factors	
3.1 Surrounding situation	-Since all PEEC locate in secondary schools of each province, the land scape and sanitation in schools are well organized ; some school keep the surrounding area of building as closed to natural environment. (S)
3.2 Resources	
- personnel	-Average 10-19 personnel at each PEEC. EE personnel are not yet qualified. (W)
- budget	-Insufficient budget to support schools networks activities. (W)

Internal factors	Analysis
- materials	-Insufficient materials of each PEEC therefore services and loans to public or schools networks are impossible to handle. (W)
- building	-47.06% of PEEC have specific spaces for EE program. (W)
- funding support	-PEEC are funding by Department of Promotion Environmental Quality only. (W)
3.3 Process	
- planning	-Planning and project have been drawn yearly for funding support. (S)
- administrative structure	-Each PEEC has advisory committee but the total responsibilities are in secretary's hand. (W)
- co-ordination	-Co-ordination among PEEC schools networks is in small scale. (W)
- evaluation and follow-up	-Little practice has been done on follow-up. (W)
- public communication	-Little practice has been taken on public communication of each PEEC. (W)

Analysis of external environment/ factors in terms of the opportunity (O) and threat (T) of PEEC presents in Table 29

Table 29 Opportunity (O) and Threat (T) of PEEC

External factors	Analysis
1. Economic system	
- Foreign aids	O
- National social and economic policy	O
- Economic regression	T
2. Political system	
- National condition of environment/ global	O
- Decentralize of government	O
- Government status.	T
3. Social system	
- Community strength.	O
4. Technology	
- New discovery of technology	O
5. Needs and expectation of the services users	
- Use of services.	O
- Information needs.	O
- Users' satisfaction.	O
6. Educational system	
- Educational reform.	O

4.3 Comparative models between Rajabhat Phranakhon Institute, Chulalongkorn University EEC and PEEC.

Analysis of strength (S) and weakness (W) of the internal factors and opportunity (O), threat (T) of the external factors of PEEC and Rajabhat Phranakhon Institute, Chulalongkorn University EEC in comparative forms are presented in Table 30 and Table 31.

Table 30 Comparative strength (S) and weakness (W) of internal factors between PEEC and Rajabhat Phanakhon Institute, Chulalongkorn University EEC.

Internal factors	EEC		
	Rajabhat Inst	Ckula. Univ.	PEEC
1. Role/Objectives	S	S	S
2. Conduction and management			
2.1 personnel development			
- training personnel	S	S	W
2.2 materials development	S	S	W
2.3 services given	W	W	W
2.4 co-ordination with community	W	W	W
3. Composite factors			
3.1 surrounding situation	W	W	S
3.2 resources			
- personnel	S	S	W
- budget	S	S	W
- materials	S	S	W
- building	S	W	W
- funding support	S	S	W
4.3 Process			
- planning	S	S	S
- administrative structure	W	W	W
- co-ordination	W	W	W
- evaluation and follow-up	W	W	W
- public communication	W	W	W

Table 31 Comparative opportunity (O) and threat (T) of external factors between PEEC and Rajabhat Phranakhon Institute, Chulalongkorn University EEC.

External factors	EEC		
	Rajabhat Inst.	Chula.Univ.	PEEC
1. Economic system			
- Foreign aids	O	O	O
- National social and economic policy	O	O	O
- Economic regression	T	T	T
2. Political system			
- National condition of environment/global	O	O	O
- Decentralize of government	O	O	O
- Government status.	T	T	T
3. Social system			
- Community strength.	O	O	O
4. Technology			
- New discovery of technology	O	O	O
5. Needs/expectation of the services users			
- Use of services.			
- Information needs.	O	O	O
- Users' satisfaction.	O	O	O
6. Educational system			
- Educational reform.	O	O	O

Analysis from Table 31 indicates that mostly external factors support the opportunity to EE program not only in Bangkok but also every part of the country, the two EE program barriers are economic regression and the government status. It seems to be true in any activity.

CHAPTER V

DISCUSSION

5.1 Discussion

The main purpose of this research is to propose the PEEC model but it has to be based on existing EE program in the country, therefore, it has to be 1) studied and analyzed the EEC model at Rajabhat Phranakhon Institute and Chulalongkorn University ; 2) analyzed the PEEC model in each province ; 3) compared the PEEC model and EEC model at Rajabhat Phranakhon Institute, Chulalongkorn University ; then comes to the PEEC model by the researcher.

To discuss the results of the studies ; there are three major issues :

5.1.1 Analysis of EE model at Rajabhat Phranakhon Institute and Chulalongkorn University.

5.1.2 Analysis of PEEC model with conduction and factors effected the centers operation.

5.1.3 Compare the PEEC model and EEC model at Rajabhat Phranakorn Institute, Chulalongkorn University.

5.1.1 Analysis of EE model at Rajabhat Phranakhon Institute and Chulalongkorn University.

By applying SWOT analytical technique, the results could be concluded in the following fashion :

1. Results of internal environment/ factors analysis in terms of strength (S) and weakness (W) dealing with :

1.1 Role/ objectives

1.2 Conduction and management

1.3 Composite factors of EEC

Its outputs are :

1.1 Role/ objectives (S)

Both EEC are similar in role/ objectives as the centers for study, information services, training, and support the promotion of EE to public that agrees with the National Social and Economic 8th Plan (1997-2002) where human development is stressed along with environmental awareness. All these processes together would affiliate the goals of UNESCO-IGES EE programs. (Vinai Veeravatnanond and Banchuen Sripunpong, 1996)

1.2 Conduction and management (S)

- **Personnel development** Both EEC organized annual workshop and training programs to elementary and secondary schools teachers which emphasis on environmental knowledge, attitude awareness, skill and EE activities The Department of Promotion Environmental Quality continually support the transfer of new information and technologies to the trainers in order to better the sustainable environment.

- **Materials development and activities** Rajabhat Phranakhon Institute has constructed and developed numbers of materials for training and services in terms of article, videotape, activities and camping. While Chulalongkorn University produced handbooks for EE activities to introduce basic knowledge and problems

of environment such as forest, waste, soil, water in interdisciplinary forms and emphasis on practical activities and students' participation rather than learning from reading and memory. (Vinai Veeravatnanond and Banchuen Sripunpong, 1996 : 33 ; Surapol Sudara, 1993 ; Nataya Pataraseangchai, 1977 : 47-49) The two EEC also offered experts lectures as requested.

1.3 Composite factors of EEC (S)

Resources

- **Personnel** EEC at Rajabhat Phranakhon Institute and Chulalongkorn University have sufficient qualified personnel to train and gives services to public which is the means to promote human development. Especially, those who have to dealt with EE program, training and competency in environment are the central goals and heart of EE programs. (Ibid, 1996)

- **Budget** Both EEC have sufficient budget provided by the Institute and the faculty to support the programs annually, with well planning and budgeting organization the EEC can sustainable manage and operate the programs (Peerasak Buranasophon, 1997 : 290)

- **Materials** Both EEC have sufficient materials to serve the requested. Especially Rajabhat Phranakhon Institute provided articles, textbooks, photograph album, posters, projectors, TV, videotape, computers ready to serve the public.

- **Funding supports** EEC at Rajabhat Phranakhon Institute and Chulalongkorn University have been continually received supports from many sources, especially the Rajabhat Phranakhon Institute also received funding support

from Office of National Youth. (Thammaros Chotgulchorn and Jumrus Nongmark, 1993 : 388-389)

Process

- **Planning** Both EEC have a well planning and strategies continually, not only for funding support donation but also for organizing and operating the programs. There are however, some weakness should not look over such as :

1) Surrounding situation

Space are full of complicated buildings, little spaces are available for recreation and natured environment provision.

2) Resources

Both EEC have set up advisory committee but there have been no authorized section to responsible for the specific tasks. (Sarisa Trakulwong, 1997 : 19-20 ; Kookiat Saetung, 1995 : 126)

3) Process

- **Co-ordination** There have been little systematic co-ordination both inside and outside centers, mostly verbal communication are common either formal or informal issues. Sharing of ideas and experiences and closed communication helps to create critical thinking and find the better way to do the job successfully. (Punsak Sritape, 1995 quoted in Sarisa Trakulwong, 1997.)

- **Evaluation and follow-up** Another weakness is lack of evaluation and follow-up of both EEC. In fact, evaluation and follow-up are the fundamental task that any organization should not over look and neglect.

Improvement and development would not possible if lacked of evaluation of what had been done.

- **Public communication** There have been little emphasis on public communication of both centers. Therefor the jobs are known only within the networks circle. Good communication will bring in helps, supports, and participation. (Bernays, 1952 : 7)

4) Conduction and management

- **Services given** Services that EEC at Rajabhat Phranakhon Institute and Chulalongkorn University given are in the form of advises and experts lectures. Articles, printed information, and materials are not prepared and provided for distribution nor for loaning. (Aurathai Pleugwattananond, 1997 : 48-49)

- **Community co-ordination** Since the two centers are located in Bangkok, the center for all business of the country, the community seems to hard to reach or to bring them in to participate in the EEC program. Every body has to struggle for their existence. So it has to be worked so hard in order to get community co-ordination.

2. Results of external environment/ factors analysis in terms of opportunity (O) and threat (T)

External environment/ factors have been concerned were :

2.1 Economic system such as foreign aids, National Social and Economic Policy, and economic regression

2.2 Political system such as environmental condition, decentralize authorities, government status.

2.3 Social system – community strength

2.4 Technology changes and development

2.5 Needs/ users expectation

2.6 Educational reform

Analysis of these factors revealed that most of them are opportunity to support the EEC conduction and operation except economic regression and government status are the barriers to conduct the center.

Factors that are opportunity (O)

The author would briefly commend some external factors that open up the opportunity to support the conduction of EEC at Rajabhat Phranakhon Institute and Chulalongkorn University for consideration :

- foreign aids funding support from developed countries could a pear up the EE program of the developing countries such as Thailand to reach the UNESCO-UNEP goals to solve the environmental crisis and help the people to better it ;

- social and economic development policy 8 edition emphasis on human development and quality of life and health also stresses on quality of environment that make the EE program more convenience and easier to conduct than before ;

- environment crisis and decentralize authorities seems to encourage the people in community have a good will to participate in and give their hand to co-ordinate to solve the local environmental problems and to better it

- community strength, when the people in the community realize the hazardous come to their life and health due to the environmental crisis, they would agree to give their hands to solve the problem together along with the co-operative tasks from government, the solutions are at hand ; and that community strength built up the power to deal with EE programs ;
- change and development of technology would make the information distribution faster and wider to public and community ;
- education system, the educational reform stress on human development, every citizen could think, do, and implement their learning experiences for their daily living and could stand on their own legs ;
- needs/ users' expectation, when people become to know, understanding and realize the important and value of environment, teachers, students, community people would come to join and participate in EE program activities.

Factors that are threat (T)

As described earlier, two main external factors that are threat were economic depression and government status, unstable government status frequently change of the government the policy has been also changed accordingly. But the two EEC have not relied on these two factors, since they have annually budget support from the Institute and the Faculty to run on their projects and plans. However, it has effected on limiting of the extension of the EE programs.

5.1.2 Analysis of PEEC model with conduction and factors effected the centers operation

1. Conduction and management

1.1 Personnel development

To promote knowledge, understanding, attitude, skill, and experiences to the teachers and personnel who has been responsible for the PEEC, the Department of Promotion Environmental Quality have been organized training and seminar annually so that these principle key man can extend their skills and experiences to their coordinators in each center. Greenburg and Baron (1988 : 501-502) suggested an effective seminar that 1) find out the needs ; 2) define the objective ; 3) planning the seminar strategies ; 4) select appropriate resources and techniques ; 5) running the processes accordingly ; 6) assess and evaluate the seminar all through.

There are some opposed to seminar in terms of a complicate management, time waste, budget, and funding, not sufficient profit returned because most seminars relied on experts speeches and lecturers to transfer of knowledge and principle of environment. They are still lack of experiences, skills and field practices. Especially they are still not competent on environmental education so as to UNESCO-ACEID goals that EE teachers should 1) know and understand basic principle of environment 2) be able to think, decision making, analysis, criticize concerning environmental issues appropriately 3) values and attitude towards environment 4) sufficient experiences and skills towards environment. (UNESCO-ACEID, 1993)

1.2 Materials development and activities

Most PEEC constructed materials and teaching aids through workshop among schools networks ; camping and field practices were highlight extra curricula activities of every PEEC. Integration of EE to other subjects in terms of interdisciplinary approach has not been yet practiced in full scale.

1.3 Services given

Many PEEC could not give or extend services of materials and teaching aids to schools due to lack of budget to provide materials, limiting of spaces to store materials. Especially new information technology devices, such as projectors, videotape, computer etc., every center has in limit number not able to serve public or schools networks. Every PEEC has not specific technician to take care the materials and equipment or to serve the request. The co-ordinate teachers have to do this job. (Aurathai Pleugwattananond, 1987 : 160-164 ; Chaiyos Reaungsuwan, 1983 : 82 ; Vilas Poompimol, 1991 : 67)

1.4 Co-ordination

There are some PEEC emphasis community co-ordination frankly and sincerely due to they have been facing critical problems on environment, but many PEEC not yet reached the community co-ordination. The later group stressed on limited co-work with public outside schools and students, and that EE programs are known only in the circle of schools networks. The study revealed that co-ordination on EE programs with :

- 1) activities that existing in the community, the PEEC center get involed later ;

2) PEEC activities doing and community comes to join with ;

3) The joint activities between PEEC and community.

2. Factors that effected the centers operation

Factors to be concern are surrounding situation, personnel, budget, materials, building, funding support, planning, administrative structure, co-ordination, evaluation and follow-up, and public communication. Among these factors, there are four factors that effected the PEEC operation, namely, materials, building, co-ordination and public communication, significantly at .05 level.

2.1 Material

Every PEEC possessed insufficient materials and facilities even the use within center due to small number of budget and funding provided either from school or from the Department. In order to be able to serve public and school networks sufficient sums are desperately required especially to provide information technology devices such as TV, videotape, projectors, overhead projectors etc. The materials that the PEEC can serve are posters, charts, folded leaflet received from the Department.

2.2 Building

Most PEEC do not have specific building or spaces to store the materials on their own, no spaces for small group meeting, or organize EE corner for students reading nor study. Materials are scattered in the teachers' room where spaces are possible. This is the real weakness of PEEC. (Kookiat Saetung, 1995 : 44 ; Vilas Poompimol, 1991 : 75) and also the PEEC are not located in the center

of the town or closed to community where transportation and communication are inconvenient to reach.

2.3 Co-ordination

The conduction and management of the PEEC are not successful due to there very little co-ordination among government sectors and the center to the departments and the departments to public and community, very slow communication and transform of information caused the slow growing and progress of EE programs at provincial level. (Sarisa Trakulwong, 1997 : 23 ; Sanaou Ampai, 1995 : 199)

2.4 Public communication

There are little public communication applied and administered to every PEEC, information technology, progression and advancement of environment and EE programs are not flowed through and not reach the public and people in community that resulted to the low or little co-ordinate and participation of the people of each province. To promote the co-thinking, co-doing or practicing and co-responsibility among public and community will not reach or attainable if lack of public communication or neglect. (Chom Pumipark, 1993 : 2-4) There are many ways of public communication, for example posters, advertising, local radio, newspapers, line-voice, community tower broadcasting etc.

Therefore, for a successful of PEEC operation these four factors should be stressed as important factors as other factors equally. At the same time internal factors such as personnel, budget, funding support, administrative

structure, planning, evaluation and follow-up should continually improve and adapt appropriately as time goes by.

5.1.3 Comparative model of PEEC and EEC at Rajabhat Phranakhon Institute and Chulalongkorn University.

Comparative the analysis of conduction and management between PEEC and EEC in terms of strength (S) weakness (W) opportunity (O) and threat (T) to build up the strategies to strengthen up SO and WO for improvement of next PEEC operation. This presents in Table 32

Table 32 Recommendation for strengthen up the PEEC model

Factors	strengthen up S by O or strategy SO	Improvement W by O or strategy WO
1) Role/ Objectives	Every center objective agree with National Social and Economic Policy and EE, Then apply all O, foreign aids, community strength to build up SO for PEEC objectives : 1) To be center for personnel Development 2) To be center for Materials and curricula development 3) To be center for information and services given	

Factors	strengthen up S by O or strategy SO	Improvement W by O or strategy WO
<p>2) Conduction and management</p>	<p>4) To be center for activities 5) To be center for co-ordination of all Rajabhat Phranakhon Institute and Chulalongkorn University have S in personnel development, materials and activities development can apply outside factors to strengthen up two EEC more effectively</p>	<p>PEEC are W in conduction EEC at Rajabhat Institute and Chulalongkorn Univ. are W in services given and community co-ordination Improvement : 1) Devided and clearly defined the job and responsibilities that can measure its outcome 2) Set up networks to conduct EE programs with the center from all sectors 3) Apply the outside O to Adapt and adjust accordingly</p>
<p>3) Composite factors</p>	<p>PEEC are surrounded with natural environment it is wise</p>	<p>EEC at Rajabhat Inst. and Chulalongkorn Univ. have</p>

Factors	strengthen up S by O or strategy SO	Improvement W by O or strategy WO
3.1 resources	<p>enough to apply this O to strengthen the EE programs and seeks more funding support or foreign aids for PEEC success</p> <p>EEC at Rajabhat Inst. and Chulalongkorn Univ. are ready to serve with personnel, budget, materials, spaces, funding support.</p> <p>These opportunities (O) should be applied to strengthen up the EEC and extend services, provision of materials and activities for all.</p>	<p>limit spaces and environment</p> <p>Improvement :</p> <ol style="list-style-type: none"> 1) Find small space available to build up natural module 2) Build up natural climate within the center by potted plants and small locks <p>PEEC have weakness on limited qualified personnel budget, materials, building and facilities and funding</p> <p>Improvement :</p> <ol style="list-style-type: none"> 1) send teachers and personnel to re-training 2) Find supporting network from non-profit organization and foreign aids. 3) Prepare and provide sufficient materials and equipment to serve public

Factors	strengthen up S by O or strategy SO	Improvement W by O or strategy WO
3.2 Process	<p>Every PEEC should have specific plans and strategies and long plan to apply O along with national social and economic policy to reach EE programs in</p>	<p>community or school network</p> <p>4) Seeking for and providing sufficient spaces to serve public users.</p> <p>Most EEC weakness on processes and management, administrative structure, coordination, evaluation and follow-up.</p> <p>Improvement :</p> <p>1) Adjust the administrative structure, clearly devided and defined the job and responsibilities that should be composed personnel development, materials and curricula development section , services, co-ordination and public communication, activities section.</p>

Factors	strengthen up S by O or strategy SO	Improvement W by O or strategy WO
		2) Systematic management and co-ordination with schools network. 3) Increase evaluation and follow-up process frequently 4) Improve public communication to bring schools network to co-ordination and participation through mass media.

From these recommendations the researcher draws up five principles to operate PEEC model :

- 1) To set up co-ordination networks
- 2) To improve the administrative structure
- 3) To develop spaces and room center for services
- 4) To develop personnel competency in EE
- 5) To organize and co-ordinate systematic public communication

Factors	strengthen up S by O or strategy SO	Improvement W by O or strategy WO
		<p>2) Systematic management and co-ordination with schools network.</p> <p>3) Increase evaluation and follow-up process frequently</p> <p>4) Improve public communication to bring schools network to co-ordination and participation through mass media.</p>

From these recommendations the researcher draws up five principles to operate PEEC model :

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- 2) To improve the administrative structure
- 3) To develop spaces and room center for services
- 4) To develop personnel competency in EE
- 5) To organize and co-ordinate systematic public communication

5.2 Propose model of Provincial Environmental Education Centers

Knowledge and experiences from documentary study, closed observation and associated with EEC at Rajabhat Phranakhon Institute and Chulalongkorn University also 17 PEEC visiting, the researcher would propose the sustainable EEC model for provincial operation. It composes of:

1. Introduction
2. Objectives
3. Role of PEEC
4. Composite factors of PEEC
5. Method of conduction and management

Model of Provincial Environmental Education Centers (PEEC model)

1. Introduction

The valuable lesson that the Thai people learned in the past four decates of social and economic growth policy in order to develop the country and the better living of its people, but in turn the environmental deterioration, forest degradation, natural resources depletion, chemical and waste products increasingly flow back into environment ; pollution appears every where. Now the environmental problems become hazardous to human life and health. Today the environmental problems are the global problems that all men have to give their hands and faced together to find the effective solution and that the sustainable EE and sustainable development are emerged.

Sustainable development is a process of change in which the exploitation of resources, the direction of investment, the orientation of technological development, and institutional change are all in harmony to meet human need and aspirations. Sustainable EE is to promote awareness towards the environment and to generate social responsibilities in dealing with environmental issues at the grass-root level. The goal is to aid students to develop sensitivity for the environment, become knowledgeable and skill and dedicated to it. Sustainable EE can not be achieved by the effort of single man or single organization. All men in community, in the provinces, all involved government sectors and all organization, profit or non-profit, must deal with it as well as to collaborate and cooperate with one another. By positioning EE as education for sustainability, we must establish internal cooperative relation in the area of EE with 1) institutions at all level ; 2) government sectors ; 3) private sectors ; 4) business organization, and 5) people in community.

To establish PEEC as education for sustainability the researcher propose 5 methods to implement : 1) establish cooperative network ; 2) improve and adjust the administrative structure ; 3) improve and develop PEEC spaces for services ; 4) improve the method of personnel development ; 5) improve and manage co-ordinate and establish systematic public communication. The PEEC strategy that to propose the model is in Figure 6.

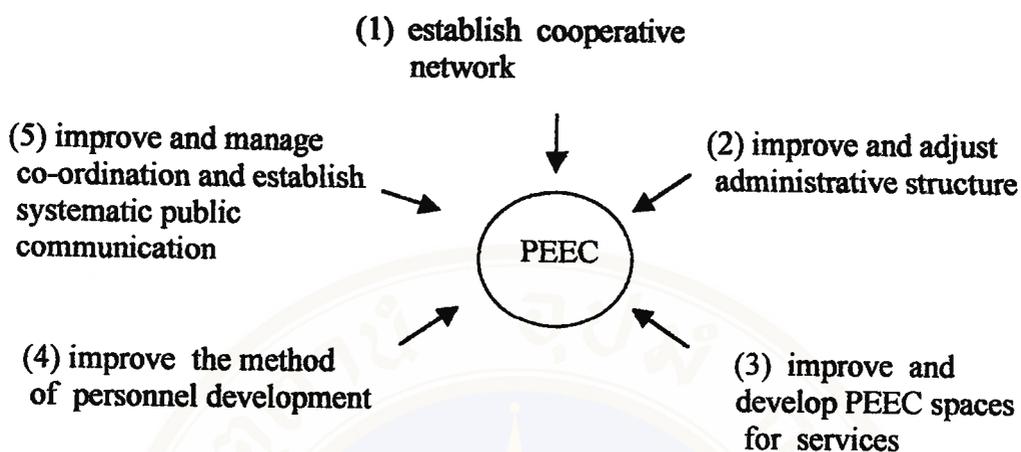


Figure 6 Strategy for establish PEEC model

2. Objectives

The objectives of PEEC are :

- 1) To be the center for EE personnel development both formal and informal system
- 2) To be the center for EE information services and EE activities and learning materials
- 3) To be the center for co-ordinate and public communication to collaborate in PEEC at all level
- 4) To support and promote EE materials, curricula, activities development according to the local demand
- 5) To be the center for EE activities based on cooperative, collaborative efforts and participation

3. Role of PEEC

Role and duty of PEEC are :

- 1) To promote the EE personnel development as the center for training, seminars, workshops, and field study.
- 2) To distribute EE information and materials services, be the center to produce and provide EE information materials in sufficient supplies.
- 3) To co-ordinate, collaborate PEEC programs and participation by public communication for all.
- 4) To collaborate and cooperative with local learning center for research and advanced studies.
- 5) To be the center for EE activities to bring in all participation.

4. Composite factors of PEEC

In-general, factors and composite of PEEC are :

- 1) Surrounding situation
- 2) Resources
 - Personnel
 - Budget
 - Materials
 - Building and spaces
 - Funding supports
- 3) Process
 - Planning

- Administrative structure
- Co-ordination
- Evaluation and follow-up
- Public communication

Strategy of establish PEEC model (from Figure 6)

1) Establish cooperative network

The collaboration of the people to do any successful job should be based on understanding, acceptance, and supportiveness. Internal cooperative and personnel relations are very important tactics ; make sure that they understand clearly the goals and objectives of what the PEEC are doing and for whom. When they are agree with or not oppost to that would come an acceptance and supportiveness follow. The cooperative task should come from 1) institutions at all levels 2) government sectors 3) private section 4) business organization and 5) community. Clearly and wisely with long vision to select the methods of approach properly with time, season, chance, climate, position and places. For example, campaigning, community meeting, personal relation, co-ordination and public communication.

2) Improve and adjust administrative structure

Administrative sections, responsibilities, and authorities should be clearly fixed and limited to necessity task. For example 1) Personnel development section 2) Coordinators and public communication 3) Services section 4) Activities section 5) Materials, curricula development section. This presents in Figure 7.

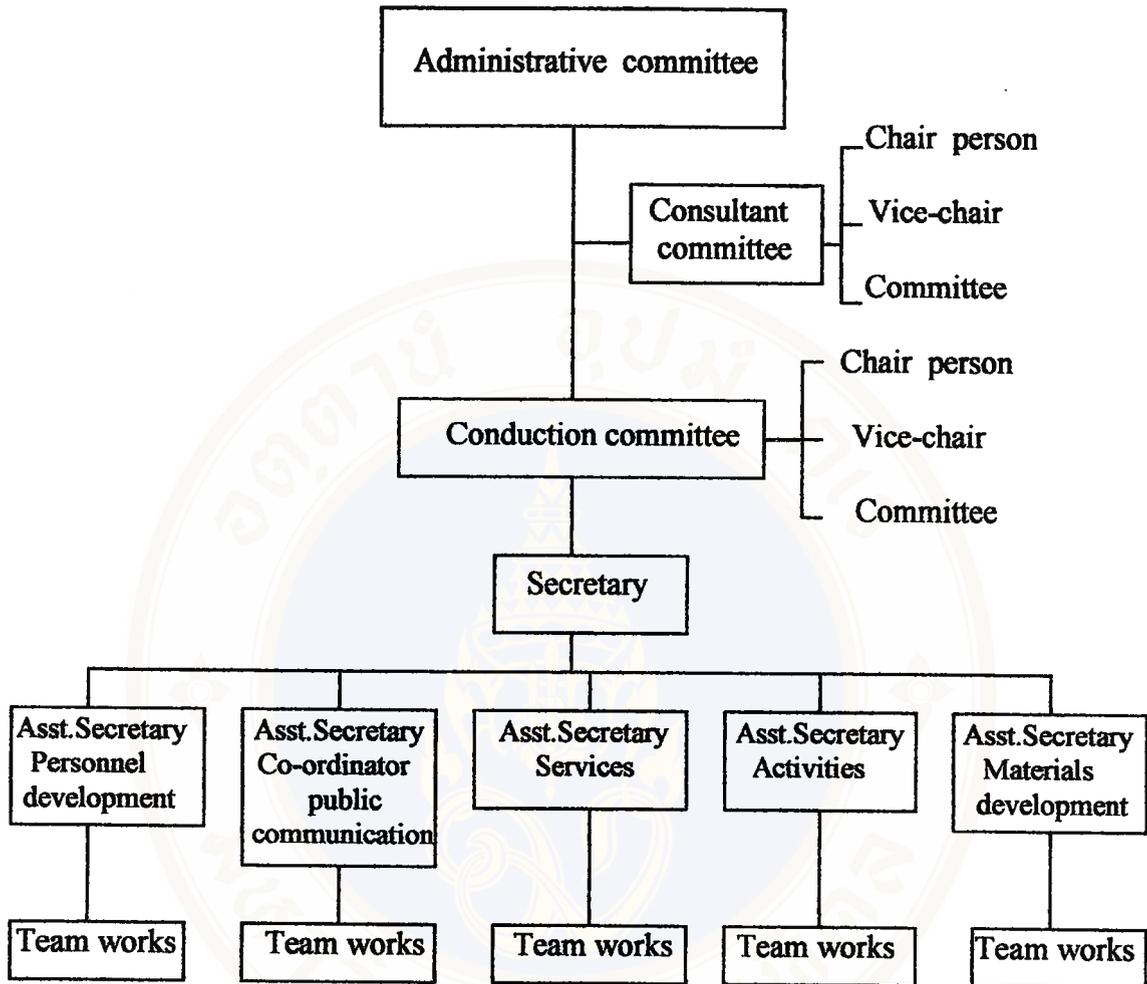


Figure 7 PEEC administrative structure

Committee Position	Assigned authorized persons
<p>Consultant committee</p> <ol style="list-style-type: none"> 1. Chair person 2. Vice-chair 3. Committee 	<ul style="list-style-type: none"> - Governor - Director of Provincial Secondary Ed. - Head of institution - Leader of government sector - Leader of private sector - Leader of business organization - Leader of committee network
<p>Conduction committee</p> <ol style="list-style-type: none"> 1. PEEC chair person 2. Vice-chair 3. Committee 4. Secretary 5. Asst. secretary 	<ul style="list-style-type: none"> - Director of EEC school - Head of network unit - Representative of EEC or network - Representative of EEC school - Representative of school or network

Duties and responsibilities

Administrative committee

1. Determination of PEEC policy
2. Determination of role and PEEC duties
3. Assignment of team works and responsibilities
4. Approve the proposed plans and projects

5. Continually support and promote PEEC conduction

Consultant committee

1. Advise and co-determination of PEEC policy and direction
2. Advise and co-approval plans and projects
3. Advise and co-determination role and PEEC duties
4. Academic advise as requested
5. Support the PEEC conduction

Conduction committee

PEEC Chair person

1. To supervise regulate, and responsible for PEEC
2. To support the PEEC operation so as to role and duties operation
3. To support personnel, building and spaces and others as needs
4. Continually assess the PEEC operation
5. Consider the results, assess and report the PEEC conduction to superior order

PEEC secretary

1. Responsible for all PEEC duties
2. Co-ordinate with all PEEC committees
3. Follow-up all job and duties of all sections
4. Co-ordinate with planning and every sections
5. Responsible for conduction assignments from chair person

Assistant secretary

1. Responsible for and supervise all assigned duties
2. Collaborate with all PEEC sections
3. Collaborate with network to propose plans and projects
4. Do all tasks and assigned duties
5. Do the jobs as assigned by PEEC secretary

3) Improve and develop PEEC spaces and services

To provide comfortable climate in the PEEC room and spaces to meet consumers' satisfaction the followings are required :

1. Select the appropriate room and location in the building at least its size should not less than 6.0 x 8.0 meters.

2. Design and divide the space into three section :

Section 1 : for cabinets, shelves or books rack for books, articles, and materials.

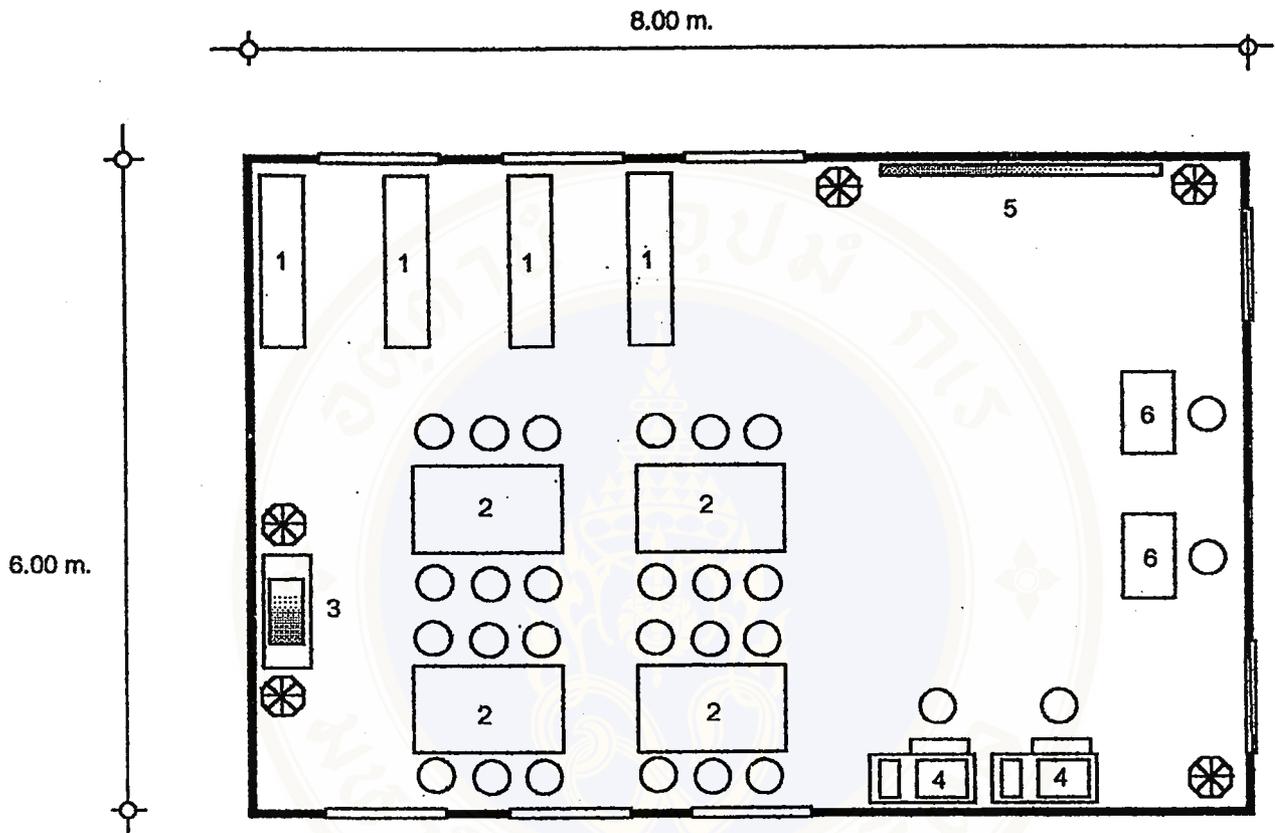
Section 2 : for tables, chairs of PEEC personnel.

Section 3 : for desks, chairs for small group meeting and services users.

3. Interior decoration with pot flowers and trees as natural environment also wall decorated with posters and EE information.

4. Prepare and provide sufficient learning materials and services such as articles, textbooks, environmental information, maps, posters, T.V, video tape, slide projector, transparencies, overhead projector, computer and CD about EE.

5. Set up exhibition corner and reading corner as possible.



1. cabinets, shelves or books rack for books, article, and materials
 2. desks, chairs for small group meeting and service users
 3. shelve for TV and video tape
 4. tables for computers
 5. exhibition corner
 6. tables and chairs of PEEC personnels
-  flowerpot

Figure 8 Example of PEEC room arrangement and design

4) Improve the method of personnel development

In-fact, lacks of qualified teachers and personnel is common in provincial institutions, especially in the field of EE very few center has the personnel knowledgeable of environment graduated from college or university. Some of them gain understanding and skills through short course training and seminar or workshop participation. Therefore, PEEC personnel are needed :

1. to gain new knowledge and technology in EE
2. to transfer method of teaching from teacher center to students-center
3. to establish internal relation and collaboration among people in community and PEEC personnel
4. to encourage EE teachers to follow UNESCO-UNEP framework
5. to add more qualified EE teachers in to the system

Method of improve personnel development planning :

1. plan training program, seminar, or workshops carefully including objectives, aim, target groups to participate in and collaborate to the integrated program by means of think together, do together with hand-in-hand relation ;
2. have a reasonable criteria to select the target groups to participate in the training program ;
3. principle lecture expert, grouping experts, and training framework should be constantly and clearly set up ;
4. training curriculum, schedule, method of training, activities, and time duration should be fixed ;

5. materials and devices should be harmony with training curriculum and activities ; assessment and evaluation should be made at the end of training.

5) Improve and manage co-ordinate and establish systematic public communication

Understanding, acceptance, supportiveness and collaboration are relied on good human relationship and well planned public communication. For a successful PEEC operation, well planned and systematic public communication should be stressed :

1. over all co-ordinate with administrative committee, PEEC conduction committee ;
2. co-ordinate between centers, institutions, government sectors, private sectors, business organization and network ;
3. co-ordinate between PEEC and superior orders and funding support agencies ;
4. continually communication with network and all funding support sectors ;
5. continually distribution of information to all for collaboration and participation.

Method of conduction :

1. network meeting and information distribution
2. campaigning to promote environmental health occasionally
3. information distribution through community broadcasting tower

4. information distribution through mass media, radio broadcasting, TV, and local newspaper

5. co-ordinate with PEEC committee represents network

Composite Factors of PEEC

1. Surrounding situation

Surrounding area and landscape in the school that the PEEC has been set up should be arranged and organized so as to close as natural environment ; it should be cleaned and well maintenance, a specific place for wastes has been provided. To keep school clean with good climate and comfortable place for students, three main procedures have to do continually : 1) within school survey, 2) improvement landscape design, 3) good maintenance

2. Resources

Factors	Source	Readiness
Personnel	1) Personnel of PEEC 2) Personnel from network, government and private sectors	Each center should has coordinators not less than 15 personnel to handle the task Qualification of PEEC personnel : 1) knowledgeable in EE and its philosophy

Factors	Source	Readiness
<p>Budget</p> <p>materials</p>	<p>1) annual budget from school</p> <p>2) funding support agents</p> <p>3) foreign aids and funding between governments</p> <p>4) donation from private sectors and non-profit organizations</p> <p>1) government sectors at PEEC</p> <p>2) private sectors</p> <p>3) donation</p> <p>4) PEEC budget</p>	<p>2) awareness and appreciate the value of environment, commitment to better it</p> <p>3) knowledgeable and understand EE techniques</p> <p>4) be able to transfer knowledge and skill to students</p> <p>5) high responsibility, endeavor and dedication</p> <p>6) good human relationship, cooperative mind</p> <p>sufficient fund to provide materials and information devices for services users</p> <p>1) printing materials, books, articles, research, posters folded leaflet</p> <p>2) electronic devices, TV, video tape, projectors</p> <p>3) computers, modules</p>

3. Process

Planning and strategies for

- personnel development
- co-ordinate and public communication
- services
- activities
- materials and curricula development

assessment, evaluation and follow-up

- pre-planning what to be measured and evaluated
- evaluation instrument
- objective of measurement and evaluation
- criteria to indicate successful or otherwise

5) Method of conduction and management

The PEEC operation presents in Table 33

Table 33 Method of PEEC conduction and management

Section/Role and duty	Method of conduction	criteria
1. EE personnel development section 1) Co-ordinate, planning, organize module	1. Determine necessity and needs -Team meeting for survey and planning	1. Interesting of the participation 2. EE personnel changing method of teaching to students center



Section/Role and duty	Method of conduction	criteria
<p>2) Co-ordinate with personnel development</p>	<p>-Survey qualification of personnel</p> <p>-Survey the needs of development</p> <p>2. Personnel development planning</p> <p>3. Activities and practices</p> <p>4. Evaluation</p>	<p>3. Changing in behavior of the personnel responsibilities, awareness in environment</p> <p>4. EE personnel use new technologies devices more in their teaching</p>
<p>2. Service section</p> <p>1) Improve and develop PEEC room</p> <p>2) Collect information and materials for services</p> <p>3) Set up system of services</p> <p>4) Co-ordinate and exchange information</p>	<p>1. Team meeting, survey and planning</p> <p>2. Survey problems and needs of services</p> <p>3. Planning the strategies and practice agenda .</p> <p>4. Take action and do the job</p> <p>5. Organize the service system all over</p> <p>6. Evaluation</p> <p>7. Conclusion and report</p>	<p>1. The numbers and frequency of the users</p> <p>2. The exchange of information among network</p> <p>3. The systematic of services for users convenience</p>
<p>3. Co-ordination and public communication section</p>	<p>1. Survey and collect all network</p> <p>2. Co-ordinate to organize network meeting for EE conduction</p>	<p>1. PEEC committee composes of five representatives network</p>

Section/Role and duty	Method of conduction	criteria
<p>1) Co-ordinate and collaborate among EE network and PEEC</p> <p>2) Distribution of information to bring in participation and supports</p>	<p>3. Campaign and distribute public communication to build up awareness to environmental deterioration and natural resources in the province</p> <p>4. Open and build up opportunity for five representative network to participate in learning and managing the natural resources with PEEC</p> <p>5. Organize EE activities that require cooperatives working together</p> <p>6. Co-ordinate to organize meeting, seminar or dialogue to sharing knowledge, skill, and experiences</p> <p>7. Do the job as planned</p> <p>8. Evaluation</p>	<p>2. Continually meeting and sharing knowledge, and thinking among network</p> <p>3. Continually co-ordinate and collaborate organize EE activities</p> <p>4. Participation and collaboration from all parts of PEEC personnel</p> <p>5. Public and all sections know the PEEC movement through mass media</p>
<p>4. Activity section</p> <p>1) Co-ordinate with planning section to</p>	<p>1. Team meeting to survey and planning</p>	<p>1. Continually running activities that all parts and sectors expressed their</p>

Section/Role and duty	Method of conduction	criteria
<p>Organize EE activities in cooperative manner</p> <p>2) Co-ordinate with conduction section to run EE activities</p>	<p>2. Survey and collect the needs for EE collaboration and participation</p> <p>3. Prepare planning and strategy for activities practice</p> <ul style="list-style-type: none"> - Stress on specific topic and issue - Stress on cooperative and participation - Open up all people could participate in activities - Students center to let them think and practice on their own <p>4. Do the job as planned</p> <p>5. Co-ordinate to develop</p> <ul style="list-style-type: none"> - Continuity co-activities <p>6. Evaluation and follow-up</p> <p>7. Conclusion and report</p>	<p>thinking</p> <p>2. PEEC activities could held network solve local problems</p> <p>3. PEEC network frequently join and participate in activities</p>

Section/Role and duty	Method of conduction	criteria
<p>5. Materials and curricula section</p> <p>1) Co-ordinate planning materials model products according to local needs and resources</p> <p>2) Promote and develop local learning resources</p> <p>3) Support and be the center for knowledge, understanding meetings concerning materials and curriculum development</p>	<p>1. Team meeting for survey and planning</p> <p>2. Survey and collect the needs to develop materials and curriculum</p> <p>3. Survey the learning resources available in government sectors and community</p> <p>4. Prepare plans, strategy agenda</p> <p>5. Do the job as planned</p> <p>6. Evaluation, conclusion and report</p>	<p>1. Planning for EE materials development according to local needs and resources</p> <p>2. Every network has learning resources</p> <p>3. Curricula, content and teaching based on interdisciplinary approach</p> <p>4. Continually co-thinking, co-doing to develop materials and curricula among network</p>

CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusion

Due to the PEEC do not have specific model to administer and operation, the existing PEEC in 20 provinces received funding support from Department of Environmental Quality Promotion without policy and pattern. Each center located in secondary schools of each province and running the program on their own. In order to organize the PEEC model effectively, the researcher seeks the factors and composite of the existing two EEC in Bangkok and seventeen PEEC in other provinces by SWOT analytical technique ; then propose the method of operation and PEEC model for provincial implementation.

This study is aimed to propose the model of Provincial Environmental Education Center. Various aspects to be considered are objectives/role, conduction and management and composite factors of PEEC. The method of research were 1) Documentary study from EEC at Rajabhat Phranakhon Institute, Chulalongkorn University, and government agents that involved the environment. Then analysis their objectives/role, composite factors, conduction and management by SWOT analytical technique to identify the strength, weakness, opportunity and threat. 2) Direct observation and interview 17 responsible personnel, 240 EE personnel and 752 service users of PEEC by applied structured observation format and

Questionnaires, then identify strength, weakness, opportunity and threat. 3) Compare the objectives/role, composite factors, conduction and management of all EEC to found out strategies for establish PEEC model.

The results of this study are :

1. The EEC at Rajabhat Phranakhon Institute and Chulalongkorn University have similar strength and weakness in objectives/role, composite factors of the centers, and methods of conduction and management. Improvement and adjust should be made on administrative structure, evaluation and follow-up, co-ordination, public communication, services, and community collaboration by applying the opportunity such as economic, political, social, technology, needs and expectation of the users and educational reform.

2. The PEEC conduction and management are : 1) Training, seminar, small group meeting, informal dialogue are common use in condition of personnel development. 2) EE practical direction, integrated lesson plans, reinforced experiences book, learning package and video tape have been developed under workshop and materials development plans. 3) Due to lack of spaces and room center to store and keep materials, therefore services could not given to users as needed. 4) Condition of community co-ordination, sending students out to join and collaborate with community to solve some environmental problems, or to invite people in community to join and participate in meeting and activities at the PEEC occasionally.

Results of composite factors that effect the PEEC operation found that there are four factors that effect the PEEC conduction significantly at 0.01 and 0.05 levels. They are materials, building and spaces, co-ordination, and public communication.

3. Result of comparative model of all EEC found that all EEC have similar weakness such as administrative structure, co-ordination, evaluation and follow-up, public communication, community co-operative effort. It is necessary to recommend the method of PEEC operation and conduction as follows : 1) Establish cooperative network 2) Improve and adjust administrative structure 3) Improve and develop PEEC spaces for services 4) Improve the method of personnel development 5) Improve and manage co-ordination, and establish systematic public communication.

4. Propose model of PEEC composes of 5 parts : 1) Introduction 2) Objectives of PEEC 3) Role and function 4) Composite factors of PEEC 5) Method of conduction and management.

6.2 Recommendations

6.2.1 Recommendations from the research

Most PEEC have problems on personnel, budget, materials, building and spaces, and funding support, it is necessary that :

1. Department of Environmental Quality Promotion should provide funding support continually and frequently evaluate and follow-up.

2. The PEEC should be carefully and reasonable selected to do the task as center of the province.

3. Local university and Rajabhat Institute should be the center and representative for EE for all.

4. Ministry of Education should support and promote elementary education, secondary education to join and participate in PEEC programs and closely evaluate and follow-up.

5. Government sectors that involved in EE should support research and development of PEEC.

6. UNESCO-UNEP should pay much more attention to support and reinforce the work of PEEC

The propose model of PEEC can be implemented in education at all level from elementary education through university depend on subjects and contents appropriate to the learners abilities and capacity, but it must think together, do together and strengthen cooperative efforts to reach its goals.

6.2.2 Recommendations for future research

1. Consider another variable such as characteristic of population, attitude, and economic status.
2. Competency of EE teachers is very interested in study
3. Compare the PEEC conduction and operation of four regions in Thailand.
4. The output of PEEC whether or not it deserve the investment.
5. Seeking for the network model for PEEC.
6. Should try on experimental research on PEEC.

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**Observation Form of Provincial Environmental Education Center
Conduction and Management**

School Province

Date

Observation Guidelines

1. Surrounding Situation

Observe the total conditions of places : buildings, classroom, flower plants,
big trees, ponds, learning resources, spaces for the center, etc.

.....
.....
.....

2. Conduction and Management of PEEC

2.1 PEEC personnel

2.2 Services given

2.3 EE Activities

2.4 Administrative Structure of PEEC

2.5 Networks

2.6 Others

Interview Structured Form
of PEEC Conduction and Management
 (for PEEC responsible)

School Province

Date

Part I : Correspondent' s general status

Part II : General situation of PEEC

Part III : Conduction and Management

Part I : Correspondent' s general status

1. Sex
2. Age
3. Education level
4. Position
5. Experiences in
 - 5.1 EE teaching
 - 5.2 EE training
 - 5.3 EE center

Part II : General situation of PEEC

1. Amount of EE personnel
2. Amount of school network
3. Amount of services users
4. Budgeting

5. Spaces of PEEC

6. Readiness of materials

Part III : Conduction and Management

1. Method of Conduction :

- personnel development

() training EE teachers of the center and network

() seminar and conferences

() field practices and education trips

() small group meeting

() community information distribution

() informal dialogue.

Content :

() knowledge and understanding the environment

() environmental attitude

() environmental skills

() environmental processes

- materials

() teaching documentary and papers

() video tape

() natural study handbooks

() integrated learning plans

() reinforced experienced

learning package

- services given

information files

loan record

permanent personnel

service materials :

articles, textbooks

charts, posters

projectors

videotape

- co-ordination

to join with community activities

people join the EEC for some activities

EEC join with community and departments activities

Questionnaire for Personnel of PEEC

Factors and Situation effect the Conduction and Management of PEEC

School Province

Position Date

Part I : Correspondent' s general status

Part II : Factors and situation effect the Conduction and Management

Part III : Output of Conduction and Management of PEEC

Part I : Correspondent' s general status

1. Sex male female

2. Age lower 30 years

30 – 40 years

41 – 50 years

upper 50 tears

3. Education level

Bachelor Degree

Master Degree

Other (please specify

4. Position

Lecturer Officer

Other (please specify

5. Subject that you are teaching

- Science Mathematics
 Social Other (please specify)

Part II : Factors and situation effect the Conduction and Management

Please mark / in the only one column.

1. Surrounding situation

Surrounding situation	Appropriate level				
	5	4	3	2	1
1. Surrounding situation outside and inside the center are satisfy to promote learning, consciousness to every concerned men and women.					
2. The centers are convenient in communication					
3. The centers location and environment are favor for waste management					
4. Environment situation in the provinces have been watched protected to better it					
5. Community environment are in favor for conduction the EE program, good soil, air and water					

2. Personnel

Intention and qualification	Appropriate level				
	5	4	3	2	1
1. PEEC personnel have been trained in environment 2. Number of personnel in each center 3. EE personnel experienced in handle the task 4. EE personnel have been train from the Department or involved institutes 5. EE personnel intend to do their tasks towards EE program					

3. Budget

Contents	Appropriate level				
	5	4	3	2	1
1. The expense budget to provide materials of the center					
2. The expense budget to promote network					
3. The expense budget to provide activities					
4. The sufficient budget planned is returned properly					
5. The convenience to withdraw the budget is acceptable					

4. Materials

Materials	Appropriate level				
	5	4	3	2	1
1. Centers provide article, handbook, textbook in environment issue 2. Charts, posters in environment have been provided 3. TV, videotape, slide projectors, overhead projectors are available 4. Teaching aids and materials are in good cared and ready to use 5. Sufficient supply of materials to serve the users					

5. Building and facilities

Spaces and facilities	Appropriate level				
	5	4	3	2	1
1. The centers have specific spaces to run, storage, exhibit or meeting 2. Articles materials and devises are kept in order 3. Spaces and climate in the centers have been provided to promote and encourage learning 4. Centers location are convenient to visit and use services 5. Centers have provided sufficient spaces for meeting and informal dialogue among member and users					

6. Funding support

Supporting agents	Appropriate level				
	5	4	3	2	1
1. Immediate superior support 2. Supports from local departments, forestry, health, agriculture 3. Private section, NGO 4. Public and community, expertise 5. Schools and institutes join and co-ordination					

7. Planning and strategies

Planning and strategies	Appropriate level				
	5	4	3	2	1
1. Strategies are carefully planned 2. Running the center according to the plan 3. Annual agenda has been set 4. Consecutive planning and strategies are provided 5. Communication and co-ordination among advisory committee policy are well practiced					

8. Administrative structure

Administrative structure	Appropriate level				
	5	4	3	2	1
<p>1. The PEEC operated under the administrative committee</p> <p>2. Team work and co-ordination have been established</p> <p>3. Administrative committee composed of center representative, school network, institute, departments and private sectors on environment</p> <p>4. Appropriate administrative committee numbers</p> <p>5. The center responsible is the secretary of the committee and of the center</p>					

9. Co-ordination

Co-ordination	Appropriate level				
	5	4	3	2	1
1. Co-ordinate system are well organized and operated 2. Co-ordinate with schools network and PEEC meeting are held 3. Co-ordinate with other departments concerning environmental issue in order to be materials and funding supported 4. Co-ordinate with public and community to bring them in activities participation 5. Administrative committee and team work frequently meet to learn the process of the task					

10. Evaluation and follow-up

Evaluation and follow-up	Appropriate level				
	5	4	3	2	1
1. Evaluation and follow-up have been continually administered 2. Funding supports have evaluation and follow-up the centers operation annually 3. The center responsible has continually follow-up the schools network conduction 4. Annual report has been made to present to the funding supports 5. Follow-up has been made every time of co-activities with community					

11. Public communication

Public communication	Appropriate level				
	5	4	3	2	1
<p>1. PEEC asked the province public communication to distribute the PEEC's news in the air</p> <p>2. Posters, leaflets, folded leaflets are used to distribute information</p> <p>3. Public communication through community activities continually</p> <p>4. Policy, objectives, conductive structure of the EE program have been posted to all</p> <p>5. Environmental protection and conservation of natural environment have been campaigned</p>					

Part III : Output of conduction and management of PEEC

The tasks	Performance level				
	5	4	3	2	1
<p>1) Personnel development</p> <p>1. Training teachers in the center and in network schools concerning knowledge, understanding and environmental context</p> <p>2. Training teachers in the centers and in network schools concerning the process of EE program</p> <p>3. Training teachers in the centers and in network schools concerning steps and strategies of EE program</p> <p>4. Invitation local officials and community leader to participate in environmental training activities</p> <p>5. Environmental seminar among teachers in formal and informal school systems</p>					
<p>2) Materials development</p> <p>1. PEEC teachers and personnel co-operative construct materials and teaching aids according to local environment</p> <p>2. PEEC teachers and personnel co-operative to public activities handbooks according to local environment</p>					

The tasks	Performance level				
	5	4	3	2	1
<p>3. PEEC teachers and personnel organized the workshops and curriculum development according to local environment</p> <p>4. PEEC promote teachers and personnel in school network construct materials continually</p> <p>5. PEEC organized training and seminar on materials and curriculum development according to local environment</p>					
<p>3) Services given to public and community</p> <p>1. Filing the resources people in environment for local reference and government departments</p> <p>2. Set up the rules for articles, materials and EE devices to users and loan</p> <p>3. Organized and set up systematic of article, materials and all devices</p> <p>4. Provision of materials, article and information technology devices for services</p> <p>5. Provision of spaces and climate to promote learning, meeting and sharing ideas and experience among members and users</p>					
<p>4) Co-ordination</p> <p>1. Co-ordinate with other departments such as Health and Sanitation, Forestry and Agriculture etc.</p> <p>2. Organize co-activities that public and community be able to participate</p> <p>3. Invites local officials and experts to lecture on environmental management</p> <p>4. The center receive funding support party from local private section</p> <p>5. Administrative committee of the center composes of representative from departments and community</p>					

Thank you

Questionnaire for Service Users

Satisfaction of PEEC Conduction and management

School/Office Province

Position Date

Part I : Correspondent's general status

Part II : Satisfaction of PEEC Conduction and Management

Part I : Correspondent's general status

1. Sex male female

2. Age lower 15 years

15 – 20 years

21 – 30 years

31 – 40 years

upper 40 years

3. Class level (for students)

1 – 3

4 - 6

other (please specify

4. Have you used for services of PEEC

Yes

No

Part II : Satisfaction of PEEC Conduction and Management

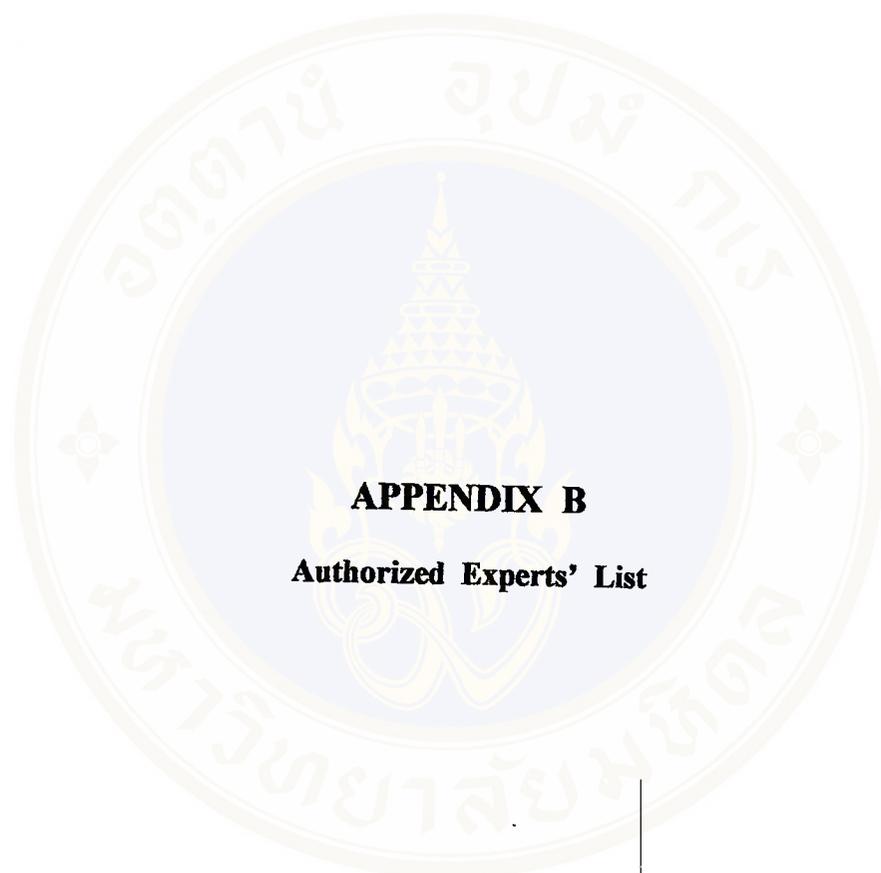
Please mark / in the only one column.

The tasks	Satisfactory level				
	5	4	3	2	1
<p>1) Personnel development</p> <p>1. Training teachers in the center and in network schools concerning knowledge, understanding and environmental context</p> <p>2. Training teachers in the centers and in network schools concerning the process of EE program</p> <p>3. Training teachers in the centers and in network schools concerning steps and strategies of EE program</p> <p>4. Invitation local officials and community leader to participate in environmental training activities</p> <p>5. Environmental seminar among teachers in formal and informal school systems</p>					
<p>2) Materials development</p> <p>1. PEEC teachers and personnel co-operative construct materials and teaching aids according to local environment</p> <p>2. PEEC teachers and personnel co-operative to public activities handbooks according to local environment</p>					

The tasks	Satisfactory level				
	5	4	3	2	1
<p>3. PEEC teachers and personnel organized the workshops and curriculum development according to local environment</p> <p>4. PEEC promote teachers and personnel in school network construct materials continually</p> <p>5. PEEC organized training and seminar on materials and curriculum development according to local environment</p>					
<p>3) Services given to public and community</p> <p>1. Filing the resources people in environment for local reference and government departments</p> <p>2. Set up the rules for articles, materials and EE devices to users and loan</p> <p>3. Organized and set up systematic of article, materials and all devices</p> <p>4. Provision of materials, article and information technology devices for services</p>					

The tasks	Satisfactory level				
	5	4	3	2	1
5. Provision of spaces and climate to promote learning, meeting and sharing ideas and experience among members and users					
4) Co-ordination 1. Co-ordinate with other departments such as Health and Sanitation, Forestry and Agriculture etc. 2. Organize co-activities that public and community be able to participate 3. Invites local officials and experts to lecture on environmental management 4. The center receive funding support party from local private section 5. Administrative committee of the center composes of representative from departments and community					

Thank you



APPENDIX B

Authorized Experts' List

Authorized Experts' List

1. Asst. Prof. Prapa Norapanlop Director of Rajabhat Phranakhon Institute
Environmental Education Center.
2. Asst. Prof. Walai Panich Director of Chulalongkorn University
Environmental Education and World Study
Center.
3. Lect. Malee Toskul Academic Supervisor 7, Elementary Education
Department.
4. Responsible Personnel of 17 Provincial Environmental Education Centers.

BIOGRAPHY

NAME Mrs. Raweewon Sananworakiat

DATE OF BIRTH 1 June 1953

PLACE OF BIRTH Sukhothai Thailand

INSTITUTIONS ATTENDED Srinakarinwirot University, 1973-1975 :
Bachelor of Education (Chemistry)
Naresuan University, 1991-1993
Master of Education (Science Education)
Mahidol University, 1996-2000
Doctor of Education (Environmental Education)

RESEARCH GRANT Research for Thesis Grant, Faculty of Graduate
Studies, Mahidol University.

POSITION & OFFICE 1988-Present, Udomdarunee School.
Sukhothai, Thailand.
Position : Lecturer

