ENVIRONMENTAL EDUCATION BASED INDIGENOUS KNOWLEDGE MANAGEMENT FOR COMMUNITY LEARNING

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Thesis

Entitled

ENVIRONMENTAL EDUCATION BASED INDIGENOUS KNOWLEDGE MANAGEMENT FOR COMMUNITY LEARNING

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ABSTRACT

This study was conducted to examine the indigenous knowledge base and indigenous knowledge management of communities. The studied area was at Amphoe Bang Len, Nakhon Pathom. The research model was mixed in methodology.

The results showed that there were 38 wisdom holders at Bang Len, which consisted of: 1) 10 wisdom holders in fields of handicraft and thai clothes (26.3%); 2) 10 wisdom holders in fields of art, culture and tradition (26.3%); 3) 8 wisdom holders in fields of food and nutrition (21.1%); 4) 6 wisdom holders in fields of agriculture, management and conservation of natural resources(15.8%) and 5) 4 wisdom holders in fields of thai traditional medicine and herbs(10.5%). The experiments in 3 community learning centers covering 105 persons in the sample group by using the t-test to compare the pre-test with post-test, it was discovered that learners in every center gained higher knowledge and attitude significantly at a statistic test level of 0.05 whereas the communities have been strongly involved in the indigenous knowledge management.

According to the indigenous knowledge management of Amphoe Bang Len, Nakhon Pathom, its knowledge cycle is comprised of 4 steps: 1) knowledge creation and community knowledge acquisition; 2) knowledge storing in form of indigenous knowledge database; 3) knowledge distribution by arranging environmental education based indigenous knowledge sharing activities among community people through community learning. and 4) knowledge application by applying the knowledge base deriving from knowledge sharing to each area condition until it became the new knowledge base of that community. The supporting factors were internal factors, e.g. community organization structure, network, learning organization and community resources; and external factor, e.g. involvements of persons outside the community, supports from external organizations and supports from external scholars.

KEY WORDS: INDIGENOUS KNOWLEDGE/ KNOWLEDGE MANAGEMENT/ ENVIRONMENTAL EDUCATION

136 pp.

การจัดการภูมิปัญญาท้องถิ่นผ่านกระบวนการสิ่งแวดล้อมศึกษาเพื่อการเรียนรู้ในชุมชน
(ENVIRONMENTAL EDUCATION BASED INDIGENOUS KNOWLEDGE MANAGEMENT FOR COMMUNITY LEARNING)

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บทคัดย่อ

การศึกษาครั้งนี้เป็นการวิจัยเพื่อศึกษา องค์ความรู้ภูมิปัญญาท้องถิ่น และรูปแบบการจัดการความรู้ภูมิปัญญาท้องถิ่นของชุมชน โดยทำการศึกษาในพื้นที่ อำเภอบางเลน จังหวัดนครปฐม รูปแบบการวิจัยเป็นแบบผสานวิธี

ผลการวิจัยพบว่า มีผู้ทรงภูมิปัญญาท้องถิ่นของอำเภอบางเลน จำนวน 38 คน คือ 1. ด้านหัตถกรรมและผ้าไทย จำนวน 10 คน (26.3%) 2. ด้านศิลปะ วัฒนธรรม ประเพณี จำนวน 10 คน (26.3%) 3. ด้านอาหาร และโภชนาการ จำนวน 8 คน(21.1%) 4. สาขาการเกษตร การจัดการอนุรักษ์ทรัพยากรธรรมชาติ จำนวน 6 คน (15.8%) และ 5. สาขาแพทย์แผนไทยและสมุนไพร จำนวน 4 คน (10.5%) จากการทดลองในศูนย์การเรียนรู้ชุมชน จำนวน 3 ศูนย์ จากกลุ่มตัวอย่าง จำนวน 105 คน โดยทำการเปรียบเทียบผลการเรียนรู้ก่อนและหลังเรียน ด้วยการทดสอบค่าที (t-test) พบว่า ผู้เรียนทุกศูนย์ฯ มีความรู้ และเจตคติ เพิ่มขึ้น อย่างมีนัยสำคัญ ที่ระดับ 0.05 และพบว่า ชุมชนมีส่วนร่วมในการจัดการภูมิปัญญาท้องถิ่น ในระดับมาก

รูปแบบกระบวนการจัดการความรู้ภูมิปัญญาท้องถิ่น อำเภอบางเลน จังหวัดนครปฐม พบว่า เป็นวงจรความรู้ (Knowledge Cycle) มี 4 ขั้นตอน คือ 1. การสร้างความรู้ (Knowledge Creation) และสืบค้นความรู้ของชุมชน 2. การจัดเก็บความรู้ (Knowledge Storing) โดยจัดเก็บในรูปแบบของ ฐานข้อมูลภูมิปัญญาท้องถิ่น 3. การกระจายความรู้ (Knowledge Distribution) โดยคนในชุมชนได้มีการจัดกิจกรรมแลกเปลี่ยนเรียนรู้ภูมิปัญญาท้องถิ่นด้วยกระบวนการสิ่งแวดล้อมศึกษา ผ่านการเรียนรู้ในศูนย์การเรียนรู้ชุมชน และ 4. การประยุกต์ใช้ความรู้ (Knowledge Application) มีการการนำองค์ความรู้ที่เกิดจาการแลกเปลี่ยนเรียนรู้มาประยุกต์ใช้กับสภาพของพื้นที่จนเกิดเป็นองค์ความรู้ใหม่ของชุมชนโดยมีปัจจัยสนับสนุน คือ ปัจจัยภายใน ได้แก่ โครงสร้างองค์กรชุมชน เครือข่าย องค์กรแห่งการเรียนรู้ และทรัพยากรชุมชน ปัจจัยภายนอก ได้แก่ การมีส่วนร่วมของบุคคลภายนอกชุมชน การสนับสนุนจากองค์กรภายนอกและการสนับสนุนจากนักวิชาการภายนอก

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CHAPTER I
INTRODUCTION

Rationale and Justification

Indigenous knowledge involves the management of relationship between human and human, human and natural environment and human and supernatural events based on all procedure of custom, tradition, ways of life, earning for living and rites in order to balance that relation (Samart Chansoon, 1991: 48). Indigenous knowledge, therefore, is the origin of knowledge base derived from the experience accumulated by the learning process and long transfer, which is used to solve problems and develop humans' lifestyle so that they are balanced to the surroundings and suitable for each era (Rung Khaewdaeng, 2002: 8). Indigenous knowledge is an integrated matter containing the cultural value rising in the lifestyle. So, knowledge may come from the experience in a particular area, from outside areas and from new creation or reproduction to solve problems or adjust to changes of relationship between local communities and diversity of resources in term of utilization, development and conservation reflecting the community culture developed by the adjustment to the context of local environment. The community knowledge reflects the perspective or thinking system in managing relationship between human and human, human and nature, and human and supernatural events so that it corresponds to the living (Ekavit Na Thalang, 1997: 11-12; Ekavit Na Thalang et al., 2003: 6-8).

According to the study of Waraporn Luangmanee (2002: 1-2), some indigenous knowledge may be extinct or has not been utilized to solve problems in the daily life due to:

1. No systematic records, no written transfer or no systematic management for knowledge information system – This is consistent to Suchada Chakpisut et al. (2005: 100) that, among the knowledge system of Thai society, 20% out of them has been

officially managed while 80% has not yet been managed officially. This knowledge may be divided into 2 parts: natural knowledge management system and knowledge about problem solutions.

2. Feeling reluctant to offer knowledge – This is consistent to Sutthiwong Pongphaiboon (1995: 3-4) that the loss of indigenous knowledge resulted from feeling reluctant to offer knowledge; so much indigenous knowledge is stored by individuals. The knowledge transfer has been done by telling and is limited at children or beloved students of those knowledge individuals only. That knowledge has not been recorded in writing with a fear that it will be distributed to other persons. Sometimes, some partial knowledge is transferred in form of puzzle; as a result, such transferred knowledge is incomplete.

3. No continuous transfer because of the acceptance of other knowledge, records in many forms and practice.

4. Development with no respect to knowledge - When external knowledge is accepted but it cannot be linked to the context of Thai society and communities.

Moreover, the government development has dominated the thinking process and culture by using the educational system under the curriculum set up by the central entity. This central education system replaced the community people's traditional learning obtained from monks, native doctors or community experts. The central educational system causes the cultural bias, encourages community people to leave their communities until those communities become weak. When community people slip out of their resource base whereas indigenous knowledge is not accepted; many knowledge bases get lose. Since the international knowledge has dictated the philosophy of national development for a long time, almost Thai indigenous knowledge has lost from the Thai society, which is replaced by the international knowledge that is not suitable for the Thai society (National Education Commission, 1998: f).

To solve the aforesaid problems, it is essential to combine indigenous knowledge with the educational system (Ekavit Na Thalang et al., 2003: 6-8) to be the lifelong education; its content and learning process must be developed continuously and integrated to every educational level.

Educational model must come from the combination among the formal education, non-formal education and informal education (Office of the National Education Commission, 1999: 6). The educational model should focus on knowledge, morality, learning process and integration of indigenous knowledge as it deems appropriate for each educational level (Section 23 of The National Education Act, B.E. 2542). Vicha Suangsawaeng (2000: 118-121) conducted a study that, in arranging the indigenous knowledge teaching and learning, there had to be surveys and selection of information, content and integration by combining the indigenous knowledge to every step of teaching and learning. The education derived from this process would be the acquisition of knowledge (body of knowledge) that might not be an instant knowledge but it originated from actual problems or problem base. This knowledge was different from the content base. The indigenous knowledge is like the public asset, which cannot be separated from the social relationship or reaction process of local people. This is the same process to "*local knowledge management*" to ensure that the indigenous knowledge acts as the base and key driving force for the development of human, economics, politics, sociology, culture and environment.

According to the study on "*Development Project for Involvement of Students, Schools and Communities Based Environmental Education Process*" conducted by the Department of Education, Faculty of Social Science and Humanities, Mahidol University, Amphoe Bang Len, Nakhon Pathom had 24 indigenous knowledge learning sources to arrange the teaching and learning of environmental education; they comprised of the sources of natural learning, sources of agriculture, sources of herbs, sources of indigenous knowledge, sources of community experts and sources of community occupations (Manee Chaiteeranuwatsiri, 2005: 2-23,2008:8-14). This was consistent to a study of The Thailand Research Found (TRF) on "*Potential and Status of Thai Indigenous Knowledge for Strong and Sustainable Communities*" (Songjit Poonlarp, 2001: 98) that Amphoe Bang Len was outstanding in part of indigenous knowledge potential and status, especially indigenous knowledge associated with handicraft (clothes, silk and basketwork). It was obvious that several Tambons have valued the development of basketry skills; for example, basketwork made from water hyacinth from Tambon Sai-ngarm, Tambon Bang Sai Pa, Water Hyacinth Group at Baan Nin Petch, Tambon Nin Petch, Cloth Weaving Group, Tang-Mo pattern woven

cloth, Mud Mi silk cloth of Tambon Phai Hoo Chang, which were extra income in the communities where local people could have self-reliance.

The indigenous knowledge in part of agriculture, nutrition and reformed food was high as well. The outstanding products developed from their indigenous knowledge included sugarcoated sliced banana and red unpolished rice from Tambon Bang Pla, Tambon Lam Phya, and Thai sweets made by the group of farmers housewives at Bung Lad Sawai. These areas realized that the nutrition was an essential part of living.

The indigenous knowledge in part of community management and community welfare was quite high. These organizations have focused on the promotion of the quality of life, economics, sociology, environment and women career development.

The indigenous knowledge that was quite outstanding included the knowledge about art and culture, tradition, literature. The lifestyle, tradition and culture looked outstanding due to the diversity of races such as Lao Song or Thai Song Dam, Mon, Chinese-Thai. There were also the indigenous knowledge regarding the conservation of natural resources and environment such as conservation of Nakhon Chaisi River, conservation of plant genes, management of local tourist locations, e.g. Lam Phya River Market and birds to be natural tourist locations.

However, it was discovered that such indigenous knowledge has not been gathered and developed systematically. There was no explicit management until the identity of indigenous knowledge could not be shown out so that it was recognized by others. For example, tacit knowledge could not be transferred to be the explicit knowledge to be conveniently accessed to by everyone. This meant that there should be the knowledge management in communities by processing data, information, thought, actions as well as experience of individuals to form knowledge or innovation, which would be further stored in form of accessible information sources. This knowledge could be applied, shared and transferred, and, eventually, the existing knowledge would be spreading all over the community equitably (Vijarn Panich, 2002: 41).

Indigenous knowledge management needs the educational model integrated to be consistent to the lifestyle and condition, and indigenous knowledge of each community. This concept is relevant to the environmental education process, which

consisted of 3 education arrangement patters: education about environment, education in environment, and education for environment by using the involvement process to transfer, share and learn with each other in each local community where knowledge base and community demand are connected together. This process also encourages each local community to recognize the significance of knowledge transfer and sharing process in combination of indigenous knowledge in order to form the learning community. This event helps develop and promote the community's potential in learning to enhance knowledge and good attitude towards the environment, to love and feel reluctant to the homeland, and to continue ancestors' knowledge and wisdom. Learning from doing can lead to skills and occupations (Office of the National Education Commission, n.d.: 2).

Indigenous knowledge management aims at strengthening communities. It consists of the ability of economic self-reliance, ability of self-solution, community identity and sustainability. Therefore, it could be said that the goals of community education management are:

1. To transfer knowledge, skills and wisdom for occupations and living based on resources and environment of a particular community.

2. To transfer belief and community value until they become the identity of that community, and its unique identity is succeeded further.

3. To be a learning and experience sharing among community members so that they can utilize such wisdom to solve their own problems and the community's problems.

This study aimed at local community organizations, houses, temples, schools and community members could be involved in the study by brainstorming, sharing opinions and searching for the direction and pattern of indigenous knowledge management in communities by using the environmental education process, proposing the development guideline of creating indigenous knowledge for solving and improving communities, coordinating to enhance the knowledge base sharing in local areas, and building up the cooperation network for local-based research.

The results of this study would be a partial mission of human development and indigenous knowledge base development to be consistent to existing problems, facts

and problem solutions so that it could develop communities and act as a mechanism leading to the sustainable development of communities.

Research Objectives

The objectives of this study were to build up the environmental education based indigenous knowledge management process for community learning.

Scope of the Research

1. Scope of area - The studied area was at Amphoe Bang Len, Nakhon Pathom Province, comprising 588,836 sq. km. Amphoe Bang Len consists of 15 Tambons: 4 Municipal Tambons, 15 Sub-district Administrative Organizations (SAO), 47 schools and 13 temples.

2. Scope of content- This study was based on the operation research methodology with emphasis on indigenous knowledge management, e.g. agriculture, food and nutrition, handicraft, home industry and Thai clothes, Thai traditional medicine and herbs, community economics, community fund, community organization and community welfare, art, culture, tradition, management and conservation of natural resources, which were based on environmental education for community learning.

Operational Definition of Terms

Community means all communities in Amphoe Bang Len, Nakhon Pathom Province.

Knowledge management means the management of indigenous knowledge starting from primary surveys of indigenous knowledge (knowledge defining), indigenous knowledge creation, knowledge capture by using the Knowledge Base System (KBS), knowledge sharing by sharing, disseminating, transferring and implementing such indigenous knowledge (knowledge utilization).

Indigenous knowledge means knowledge, ability, belief and behavior based on process of custom, lifestyle, earning for living and rites in a community that have been accumulated, transferred and learnt for a long time until they become the community identity. The indigenous knowledge comprises the knowledge in 6 fields:

1. Field of food and nutrition
2. Field of handicraft, home industry and Thai clothes,
3. Field of Thai traditional medicine and herbs
4. Field of community economics, community fund, community organization and welfare
5. Field of art, culture, tradition
6. Field of agriculture, management and conservation of natural resources.

Local expert means an individual who succeeds in his/her occupation, now they are accepted as the resources of indigenous knowledge, these local experts have been openly transferred their knowledge to others.

Community learning means learning activities based on the lifestyle in a community. The learning comes from various experience and environment already existing in that community or provided by external persons or organizations so that people there have more potential in term of knowledge, value, attitude and actions. The community learning aims at the community strength.

Conceptual Framework

The conceptual framework of this study was based on the indigenous knowledge management formed by Bodin Vijarn (2004: 45-46), including:

1. Knowledge defining
2. Indigenous knowledge creation
3. Knowledge capture by Knowledge Base System (KBS)
4. Environmental education based knowledge sharing through the community learning center
5. Knowledge utilization by evaluating the involvement in the community knowledge management, proficiency of knowledge and attitude towards indigenous

knowledge base of activity participants to share knowledge with each other through the community learning center.

The indigenous knowledge management on the concept of The Thailand Research Fund (TRF) consists of the following 6 fields:

1. Food and nutrition
2. Handicraft, home industry and Thai clothes
3. Thai traditional medicine and herbs
4. Community economics, community fund, community organization and welfare
5. Art, culture and tradition
6. Agriculture, management and conservation of natural resources

To carry on activities for indigenous knowledge management, it is essential to integrate concepts about environmental education process in the researches in order to reach the goal of environmental education, and community learning, including:

1. Transfer of knowledge, skills, wisdom of earning for living and living based on community resources and environment.
2. Transfer of community belief and value until the identity of that community is formed and continued in the long run.
3. Learning and sharing experience of community members in order to solve personal problems and community problems by utilizing the indigenous knowledge.

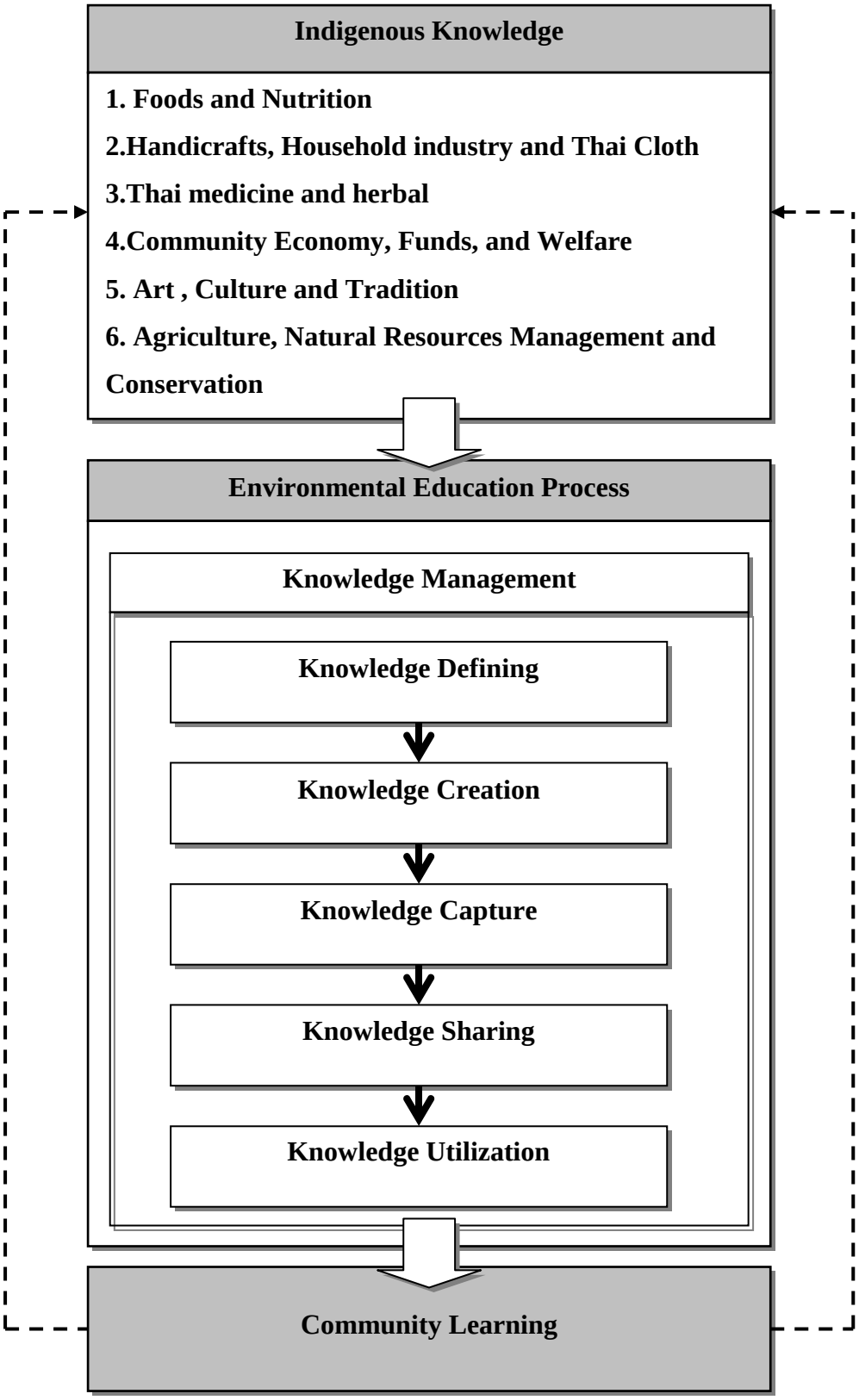

Figure 1: Conceptual framework

Expected Results

1. Indigenous knowledge management pattern obtained from this study could be implemented to develop the indigenous knowledge management system.

2. Indigenous knowledge base of various communities in Amphoe Bang Len, Nakhon Pathom Province could be learnt, which would lead to planning for the development of indigenous knowledge learning in communities of Amphoe Bang Len, Nakhon Pathom.

3. Joint learning process would occur, and the involvement process between schools, communities and related persons would be built up.

4. This would be a starting point making various communities value the process of transferring and learning technologies/ indigenous knowledge, which are important for developing the community potential in a long run.

5. This would be a research guideline to be implemented in other areas.

CHAPTER II
LITERATURE REVIEW

For the study on "Environmental Education Based Indigenous Knowledge Management for Community Learning", all literature and documents relating to this study, including research papers, books, textbooks and other lectures containing 5 the concepts is

1. Indigenous Knowledge
2. Knowledge Management
3. Environmental Education
4. Community Learning
5. Related Researches

Indigenous Knowledge

1. Definitions of indigenous knowledge

Samart Chansoon (1991: 48) defined the wisdom as what has been accumulated since the past used to manage the relationship between human and human, human and natural environment, human and supernatural things through the process of all customs, ways of life, earning for living and rites in order to balance such relationship.

Seree Pongpis (1991: 33) defined the wisdom as the knowledge base in various aspects of living derived from direct and indirect accumulation of experience. It also included ideas and analysis in solving problems until they became unique problem solutions that could be further implemented suitably in each period to solve living problems.

Chalardchai Ramitanon (1994: 2) mentioned the indigenous knowledge as a cultural heritage succeeded for a long period until it became a lifestyle of an

individual and community. The indigenous knowledge was the social heritage gained by learning through the refinement process until it turned to be an important root of life and society and living base.

The National Institute on Thai Wisdom and Education (1997: 3-4) defined wisdom as the use of wisdom to try what was right and wrong, which was further used to solve living problems in each period.

Ekavit Na Thalang (1997: 11-12) defined wisdom as the base of knowledge, abilities and skills resulted from the accumulated experience through the process of learning, selecting, improving, developing and transferring in order to solve problems and develop the lifestyle to be balanced with the environment and be suitable for each period. Wisdom might be derived from the experience in that area, wisdom from other areas and wisdom newly created or reproduced to solve problems or adjust to the necessity and changes incurred from the relationship pattern between local communities and diversity of resources in term of utilization, development, conservation of local resource diversity.

Rung Khaewdaeng (2002: 8) defined wisdom as an integrated base containing some cultural value and occurring in the daily life. The indigenous knowledge that might originate a new knowledge base would help in learning, solving, managing and adjusting in Thai people's living.

The above definitions could be concluded that the indigenous knowledge meant knowledge, abilities, belief and behavior based on the process of custom, lifestyle, earning for living and rites that have been accumulated and learnt for a long time until they became the community identity. The indigenous knowledge resulted from the process of succeeding the existing knowledge base in local communities as well as religious, cultural and belief base, which were developed, selected and improved until such knowledge base turned to be skills and expertise in solving problems and developing people's life suitably in each period. Finally, such knowledge became a new suitable knowledge base to be developed and succeeded infinitely.

2. Scope of Knowledge

Seree Pongpitch (1986: 145) divided knowledge into 2 types:

Abstract knowledge – it dealt with world perspective, life perspective, living philosophy, matters relating to birth, age, illness and death, value and meaning of every thing in the daily life.

Concrete knowledge – it dealt with particular matters, e.g. earning for living, agriculture, handicraft, art and music, etc.

Ratana Buason (1992: 19) classified knowledge into 3 types:

1) Knowledge about managing the relationship between human and environment.

2) Knowledge about social system or managing the relationship between human and human.

3) Knowledge about production system or earning for living that focuses on the production system for self-reliance.

Chalardchai Ramitanon (1994: 2) divided the indigenous knowledge into 2 levels:

1) Indigenous knowledge at the level of "common sense" that was the "culture" such as knowledge about production, planting techniques (rice farming, crops farming, dam system), animal hunting, food searching, etc.

2) Indigenous knowledge at the level of belief such as folklore, legend, proverbs, epigram, music, singing, art, rites.

The Office of National Education Commission set up 5 sub-groups of knowledge in order to select and honor persons creating outstanding cultural performance (Nantasarn Sisalub et al., 1998: 23):

1) Indigenous knowledge in part of agriculture, e.g. mixed agriculture, production problem solving, remedies of diseases and insects, utilization of technology.

2) Indigenous knowledge in part of environment, e.g. conservation of forest and headwaters, transfer of traditional knowledge for conservation.

3) Indigenous knowledge in part of management, welfare and community business; namely,

3.1 Community funds, e.g. cooperative, shops, Satja Ormsap Group.

3.2 The group of housewives, the group of youth.

4) Indigenous knowledge in part of disease remedy and prevention such as native doctors and herb experts

5) Indigenous knowledge in part of production and consumption, e.g. transformation of agricultural products to be consumed directly such as use of manual grain milling machine and mortar, applying new technologies to transform products in order to reduce imported goods.

The Office of National Education Commission (1998: 47-54) set up Thai indigenous knowledge in 10 groups as listed below:

1) Agriculture meant the ability in combining the agricultural knowledge base, skills and techniques with technologies to enhance the development on the basis of original value such as mixed agriculture, use of technologies suitable to agriculture, etc.

2) Industry and handicraft (production and consumption) meant the implementation of modern technologies to transform products, solve consumption problems safely, economically and fairly so that local communities could have self-reliance on economics, handicraft production and distribution.

3) Thai traditional medicine meant the ability in preventing and curing health of community members so that they could have self-reliance on health and sanitation.

4) Management of natural resources and environment meant the ability in managing, conserving, developing and utilizing natural resources and environment under the principle of balance and sustainability.

5) Community fund and business meant the ability in managing the collection, fund administration and businesses in the community.

6) Welfare meant the ability in managing the welfare to secure the quality of life of people so that they had some economic, social and cultural security.

7) Artwork meant the ability in producing artistic work in various fields, e.g. painting, sculpture, literature, visual art and musical art, etc.

8) Management meant the ability in managing and operating various matters, e.g. organization management of the housewife group, seniority system in the community, administration of religious places, and management of education including teaching and learning, etc.

9) Language and literature meant the ability in producing the work in relation to language, dialect, ancient language, Thai language and usage of language as well as all types of literature.

10) Religion and tradition meant the ability in applying and adjusting the principles of Dhamma, religious teaching, belief and valuable tradition in order to have good behavior and give good outcome to people and environment such as transfer of religious principles, forest ordination, etc.

Samart Chansoon (2000: 88-94) concluded that knowledge was the basis of local people's living. The knowledge characteristics could be reflected in 3 connected relationships:

1) Relationship between human and the world, environment, animals, plants and nature.

2) Relationship with other people staying in the society or community.

3) Relationship with holy, supernatural, invisible and untouchable things.

The Thailand Research Fund (TRF.) in "*Potential and Status of Thai Wisdom for the Promotion and Support of Strength and Sustainable Community Development"* (Songjit Poonlarb, 2004: 98) set up Thai indigenous knowledge in 6 groups as listed below:

1) Foods and nutrition

2) Handicrafts, Household industry and Thai Cloth

3) Thai medicine and herbal

4) Community Economy, Funds, and Welfare

5) Art, Culture and Tradition

6) Agriculture, Natural Resources Management and Conservation

According to document searching, scholars and entities classified the indigenous knowledge into several aspects. The Candidate, so, concluded the

indigenous knowledge for this study on the concept of The Thailand Research Fund (TRF.) in 6 group as follows:

1. Food and nutrition
2. Handicraft, home industry and Thai clothes
3. Thai traditional medicine and herbs
4. Community economics, community fund, community organization and welfare
5. Art, culture and tradition
6. Agriculture, management and conservation of natural resources

Knowledge Management

1. Definition of Knowledge

Knowledge was defined as follows:

Knowledge was the most valuable information; it was a combination of information from contents, value, experience and criteria (Pearlson, 2001: 190).

Knowledge consisted of data or information organized and processed for further understanding, experience, accumulated learning and expertise, which could be implemented to solve current problems or operations (Turban et al., 2001: 17,452).

From the relationship between data, information and knowledge, it indicated that knowledge was the information derived from experience, discretion, thought, value and intelligence of humans. Knowledge was utilized to support working or solve problems.

2. Types of Knowledge

Vijarn Panich (2004: 2-3) divided knowledge into 2 types: tacit knowledge and explicit knowledge.

1. Tacit Knowledge

This was the knowledge that could not be explained in words. It was derived from actions and experience in the manner of belief, skills. This knowledge was subjective and needed some practice for further expertise. This knowledge was the personal matter with content specific. It was difficult to make this knowledge

official and to communicate about it; for example, discretion, organizational culture, skills and expertise in various matters, organization learning, etc. The tactic knowledge took much time and high cost in transferring.

2. Explicit Knowledge

This was the knowledge easily gathered, organized and transferred. It was objective, theoretical and could be decoded in transferring by using official methods. It needed not any reaction with others to transfer this knowledge. This kind of knowledge included the organization policy, working process, software, document, strategy, objective and organization key ability.

The more tacit the knowledge was, the more difficult it was transferred. Sometimes, the tacit knowledge was called the sticky knowledge or embedded knowledge. The explicit knowledge could be transferred and shared easily; so it was called the leaky knowledge. Both kinds of knowledge could not be separated but mutually constituted since the tacit knowledge was the component of entire knowledge and it could be transformed to be the explicit knowledge by oral communications.

3. Level of Knowledge

Vijarn Panich (2004: 4) classified the knowledge into 4 levels:

1. Know-What – It was the theoretical knowledge only. When applying it, it might be successful or unsuccessful.

2. Know-How – It was the theoretical and context knowledge. This was like the knowledge of a person with working experience for a while such as 2-3 years who knew how to adjust himself to the environment or context.

3. Know-Why – This was the knowledge that could be explained why it was successful in an extent but it became unsuccessful in another extent.

4. Care-Why – This was the knowledge in the level of value and belief, which was driven by mind when confronting a situation.

4. Definitions of Knowledge Management

Knowledge Management (KM) was defined by many authors. For example, Vijarn Panich (2004: 4) defined it as the process mutually carried on by

workers in an organization to create and use knowledge in their working for better effectiveness.

The Office of the Public Sector Development Commission (2004: 19) defined the knowledge management as the process mutually done by workers in an organization or a working unit of that organization to create and utilize such working knowledge for more effectiveness. Knowledge management as defined above, so, was the meaning of activities done by workers not scholars or theorists. But, scholars or theorists might be useful as resource persons or facilitators of providing knowledge. Knowledge management was a connected process leading to the regular and continuous working development under the objectives of work development and human development while knowledge was an instrument and knowledge management was an instrument.

This could be concluded that knowledge management was a systematic process relating to the processing of data, information, thought, actions as well as personal experience in creating knowledge or innovations, which are stored as information resources to be accessed into by any persons through channels provided by the organization so that such knowledge could be implemented in working, shared and transferred. Finally, that existing knowledge would be disseminated and flowed all over there, which helped boost the ability in developing products and organization.

5. Knowledge Management Process

Knowledge management scholars divided knowledge management process differently. For example:

Turban et al. (2004: 12-24) divided the knowledge management process into 6 steps: create, capture, refine, store, manage and disseminate. However, there were 3 main steps to be frequently mentioned:

1. Knowledge creation or knowledge generation or knowledge acquisition

This was the organization's activity with an aim at acquiring or creating new knowledge. Knowledge would occur when workers in the group had strong relationship based on cooperation and inter-personal reaction.

2. Knowledge capture – The objective of knowledge capture was to organize knowledge in any form to be accessed into and applied conveniently. Some

scholars called this step as codification because knowledge was stored and utilized later. There were 3 main principles of knowledge capture as listed below:

1.) Setting up the scope and content of knowledge to be codified.

2.) Setting up the sources of knowledge by indicating the mechanism and media for knowledge compilation, time and frequency of capture, and regularly modernizing such knowledge.

3.) Indicating methods and instruments to access into and take out such captured knowledge.

Tacit knowledge was usually captured and stored in individuals' memory whereas explicit knowledge was stored in form of documents or files. Knowledge management of most organizations usually relied on the application of information technology to gather, store and capture the organization's explicit knowledge.

3. Knowledge utilization – Supporting and increasing knowledge utilization were important for an organization in managing, implementing and transferring such knowledge from knowledge sources to spots demanding it.

Takeuchi & Nonaka (2004: 61-62) proposed the "SECI" cycle that was acceptable by various organizations and experts. "SECI" explained the knowledge conversion between tacit knowledge and explicit knowledge until new knowledge was built up. This cycle would be rotating endlessly because learning occurred at all time. Knowledge creation could be derived from 4 ways:

1. Socialization – Creating tacit knowledge to be the tacit knowledge by way of experience sharing, training and advice.

2. Externalization – Telling or narrating tacit knowledge to be the tacit knowledge by way of metaphor, comparison and using models such as telling the experience from observing other agencies' working.

3. Combination – Creating explicit knowledge to be the explicit knowledge by compiling or integrating the knowledge base, or synthesizing the existing knowledge to form a new knowledge base.

4. Internalization - Creating explicit knowledge to be the tacit knowledge by learning from real practice, studying from knowledge recorded in manuals or documents in order to increase skills.

When knowledge was shared, it led to the socialization process, which was the conversion of our tacit knowledge to be other persons' tacit knowledge. This cycle would be rotating endlessly (Boondee Boonyakit et al., 2005: 16-18).

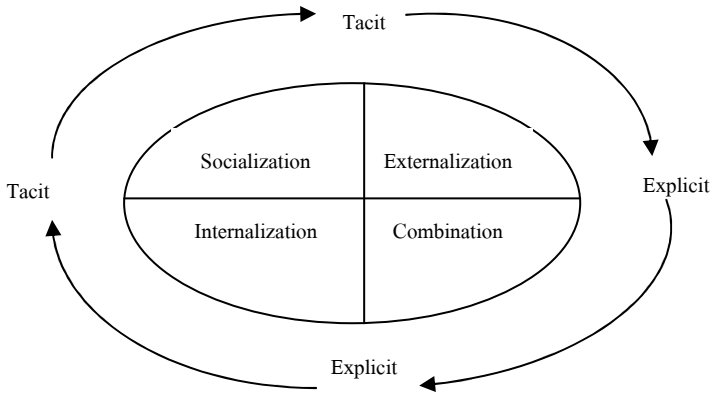

Figure 2: Knowledge Spiral (SECI) Model

Meyer and Zack (Meyer and Zack, 1996: 43-59) analyzed important stages of knowledge management cycle and development of knowledge sources as listed below:

1. Knowledge acquisition
2. Knowledge screening
3. Knowledge storage/withdrawal
4. Knowledge dissemination
5. Knowledge presentation

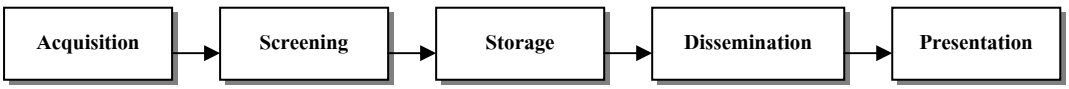

Figure 3: Cycle of Knowledge Management proposed by Meyer and Zack

Bodin Vijarn (2004: 45-46) stated that the knowledge management process was:

1. Knowledge Defining by conducting primary surveys of knowledge and setting up main types of knowledge to be demanded by an organization.

2. Knowledge Creation – This was to create the wisdom base or acquire or utilize what existed in an organization, coaching in the organization, and search for knowledge from external sources or learn from other persons.

3. Knowledge Capture – This was to acquire and store the knowledge base by using Knowledge Base System (KBS).

4. Knowledge Sharing – This was to share, disseminate and transfer knowledge in various forms and channels.

5. Knowledge Utilization – This was to utilize and implement knowledge to enhance the proficiency and practice wisdom by evaluating the involvement in knowledge management.

K. Wiig (cited in Boondee Boonyakit et al., 2005: 31-32) classified knowledge management components into 3 groups, which was called the Pillar of Knowledge Management. Each pillar contained activities to complete the knowledge cycle, comprising creation, manifestation, use and transfer of knowledge.

6. Benefits of Knowledge Management

There were at least 4 advantages of knowledge management: the work proficiency was better and work innovations might be created; employees enhanced their work development, learning, self-confidence until a community among co-workers occurred and those employees became knowledgeable persons while knowledge of individuals and organization was upgraded; knowledge has been accumulated and properly organized for further implementation; and the organization became a learning-base organization that was strong and able to compete with other organizations. The potential benefits from knowledge management were as follows:

1. Increasing the organization’s effectiveness

2. Preventing the knowledge loss

3. Increasing the competition potential and survival

4. Human capital building by developing the ability in sharing knowledge obtained with others in the same organization and applying such knowledge to responsible tasks for more effectiveness. This was to develop humans and organization.

5. Increasing the ability in making decisions and work planning quicker and better because the workers had the information or specific knowledge sources containing reliable principles and reasons supporting those decisions.

6. Supervisors could work with their subordinates closer; this helped increase the harmony in that working unit.

7 When a working error occurred, it could be solved promptly.

8. Knowledge could be transformed to be the capital that challenged the organization to produce products and services from its existing knowledge in order to increase more value and revenues for that organization.

9. Creating and attaining the goal of great imagination.

10. Changing the culture from the vertical authority culture to the horizontal knowledge culture where everyone had the equal right of learning.

In conclusion, in managing indigenous knowledge to enhance the highest effectiveness, it demanded good cooperation from every community member. In addition, knowledge should be transferred to everyone in the organization. All members should have the same understanding about knowledge management in the organization because good cooperation of all departments could make knowledge management in the organization smooth and efficient, and gain the outcome as expected. The important issue was the “knowledge sharing” among community members. In this study, the following concepts about knowledge management were utilized as the conceptual framework of indigenous knowledge management:

1. Knowledge defining
2. Indigenous knowledge creation and knowledge base selection
3. Knowledge capture by using Knowledge Base System (KBS)
4. Knowledge sharing
5. Knowledge utilization

Environmental Education

1. Definitions of Environmental Education

Environmental education was the concept of the International Union for Conservation of Nature (IUCN) stated in Belgrade Charter in 1975. It was defined as "*process to recognize value, encourage awareness and understand the shared living of natural environment, economics, sociology and politics by giving everyone opportunities of improving knowledge, attitude, skills and making-decisions in order to change attitude and behavior so that the environment is protected and healed. This process also creates a new form of living for the environment, including in the individual, group and social levels*" (The Department of Environmental Quality Promotion, 2001).

Kasem Chankaew (1993: 71) defined the environmental education as a process of educating under good system and pattern, especially the use of educational technologies to convey environmental knowledge to individuals at all levels in order to sustain the good quality of environment.

Stapp and Cox (1981: 7) defined the environmental education as a process with an aim at allowing world populations to understand the environment and problems occurred. It was also the process of providing, to individuals or the whole community, knowledge, attitude, practice and working skills to prevent and remedy environmental problems arising out.

Luckx et al. (1982: 7-18) explained that the environmental education was a process of developing populations' knowledge about livings and physical environment, awareness of problems to find out solutions, and motivation for behavior towards the environmental responsibility in order to have the quality life.

Palmer and Neal (1994: 12) defined the environmental education as a process of arousing the awareness of value and receiving clear concepts in order to develop skills and attitude necessary to have understanding, appreciation and decisions by concerning humans and environment, either cultural aspect or biological aspect, for good quality of environment.

In conclusion, the environmental education meant the educational process to disseminate the environmental knowledge systematically to make all people have

good knowledge and understanding so that they would have awareness, conscious mind and social value, and involvement in solving environmental problems, which led to the cooperation in promoting and developing the environmental quality for their own quality of life and the quality of life of general people.

2. Principles of Environmental Education

Environmental education is the process to develop intelligent human beings, principles of environmental education involved with building internal knowledge, then display as external knowledge, words from mouth from one person to another and so on to create environmental education. (Department of Environmental Quality Promotion, 2001: 6)

The Conference on Environment and Development held at Rio de Janeiro in 1992 established that the environmental education concept should be the mutual agreement to conform to Agenda 21 (Ministry of Foreign Affairs et al., 1994: 73) in order to cure environmental problems in the long run. The important guidelines of this Agenda 21 were:

1. Learning about the Environment – Allowing learners to have god knowledge and understanding about the working system of nature and environment, and impact from local, national and international environmental activities.

2. Learning in the Environment – Allowing learners to have experience from real practice so that they could develop skills on making decisions to solve problems.

3. Learning for the Environment – Implementing what learners learnt to the real practice to generate good results to the environment (The Department of Environmental Quality Promotion, 2003: 103).

The concept on environmental education, hence, dealt with using the environmental education as a mechanism of human development by forming thought under discretion, that is, humans should have understanding, revise their own behavior and change their living behavior in order to achieve the sustainable environmental development (The Office of Environment Policy and Plan, 2005: 271).

The principles of environmental education were as the same ones established in the Belgrade Charter as a result of the Conference on Environmental Education held at Belgrade in 1975.

The Belgrade Conference deemed the first environmental education conference of the world, which was the model to be adjusted by other countries including Thailand (UNESCO, 1976 cited in Winai Weerawatananon and Banchuen Sipanphong, 2006: 27-29). There were 8 principles of environmental education as listed below:

1. Environmental education should study the whole environment, either natural or human-made environment, as well as ecology, politics, economics, technology, sociology, law, culture and arts appreciation.

2. Environmental education should be the continuous life-long process arranged for both formal and informal educational systems.

3. Environmental education should be the inter-disciplinary approach.

4. Environmental education should focus on the participation in preventing and solving environmental problems.

5. Environmental education should regard global issues while differences in each region should be concerned as well.

6. Environmental education should focus on present and future environment situations.

7. Environmental education should consider the development and the growth of such development by regarding the impact to the environment.

8. Environmental education should promote the value and necessity of jointly preventing and solving environmental problems in local, national and global levels.

The above contents could lead to a conclusion that the principles of environmental education included the provision of education by integrating main contents of various sciences based on the holistic approach with a focus on past and present environment situations occurred in local, national, regional and global levels. The environmental education was the lifelong education by which the learners gained learning experience from the real practice, were able to develop skills of finding out causes and impact resulted by environmental problems, were able to have planning,

had problem-solution skills and were given opportunities for decision-making under a variety of learning environment (The Department of Environment Quality Promotion, 2001: 5-7).

3. Objectives of Environmental Education

The Belgrade Charter established the objectives of environmental education (UNESCO, 1976 cited in Winai Weerawatananon and Banchuen Sipanphong, 2006: 27-28) so that individuals and societies attained the following matters:

1. Awareness – To achieve awareness of and enthusiasm for the overall environment and related problems.

2. Knowledge – To achieve basic understanding about the overall environment and problems relating to humans' roles and responsibility for those problems.

3. Attitude – To have the social value with fondness to environment, and motivation to be involved in the environmental prevention and improvement.

4. Skills – To have skills in solving environmental problems.

5. Evaluation ability – To know how to evaluate environmental measures, study environmental projects in connection with ecological, political, economical, social, ethical and educational factors.

6. Participation – To develop the sense of responsibility so that general people had a concern that environmental problems were the urgent agenda and always adhered to the appropriate practice to solve those problems.

The above contents led to a conclusion that the environmental education aimed at 3A (The Department of Environment Quality Promotion, 1998: 6-7):

1. Awareness and knowledge about association between economics, sociology, administration and ecological systems in urban areas and rural areas.

2. Attitude and personal life decision by allowing everyone to have knowledge, value, attitude, fondness and skills in preventing and developing the environmental quality.

3. Action for better environment in order to create the behavior of individuals, groups of persons and the whole society that was appropriate for the environment.

4. Education for Sustainable Development (ESD)

The World Commission on Environment and Development (WCED, 1987) defined the sustainable development in its report entitled, "Our Common Future" that: "*Sustainable development is development that met the needs of the present without compromising the ability of future generations to meet their own needs.*"

In June 1992, the United Nation Conference on Environment and Development (UNCED) or it was called the Earth Summit was held at Rio de Janeiro, Brazil. In this event, 5 main documents were ratified:

1) The Rio Declaration on Environment and Development

2) Agenda 21

3) Statement of Principles on Forest

4) UN Framework Convention on Climate Change

5) Convention on Biological Diversity

In 2002, 10 years after the Earth Summit held at Rio de Janeiro, the United Nations arranged the World Summit on Sustainable Development (WSSD' 2002) at Johannesburg, South Africa to revise and consider the implementation progress pursuant to Agenda 21. This summit also set up Millennium Development Goals to be attained by country members with emphasis on human capacity building, which covered the educational development, provision of health services and forming of awareness, in order to encourage people around the world to recognize the sustainable development.

The World Summit on Sustainable Development was the starting point of "*UN Decade for Education for Sustainable Development (2005-2014).*

Education for Sustainable Development (ESD) dealt with the skill development, understanding and motivation of general people, which led to changes of economic and social status and sustainable environment.

The educational vision for sustainable development meant that everyone was given opportunities to receive the quality education and to learn value, way of practice and living guideline necessary for sustainable future and good social changes.

The objectives of UN Decade for Education for Sustainable Development were:

1. To provide up-to-date information to entities mainly in charge of education and learning in the manner that supported the sustainable development.

2. To facilitate and provide the information network to form relationship and share information between related persons in the education for sustainable development.

3. To provide some periods and opportunities of developing and promoting visions, and supporting the sustainable development by creating the awareness and learning for the public.

4. To support the development of teaching and learning quality for sustainable development.

5. To develop the strategy at all levels in order to strengthen the educational potential for sustainable development.

UN Decade of Education for Sustainable Development (2005-2014) stated that key issues regarding education for sustainable development in Asia-Pacific should be as follows (table 1):

Table 1: Key issues about education for sustainable development in the Asia-Pacific Region

Core ESD issues in Asia-Pacific

Issues	Examples
Information and Awareness	Eco-media, media literacy, ICT
Knowledge systems	Learning for local and indigenous knowledge, integrating traditional and modern technologies
Environmental Protection and Management	Biodiversity, climate change, natural resources, conservation
Peace and Equity	Conflict resolution, peace, equity, appropriate development, democracy
Local Context	Community development, empowerment
Transformation	Rural transformation, urbanization, sustainable habitat, water, sanitation, public infrastructure
Culture	Diversity and intercultural/ interfaith understanding
Cross-cutting Issues and Themes	Human rights, citizenship, gender equality, sustainable futures, holistic approaches, innovation partnerships, sustainable production and consumption, governance
Health	HIV/ AIDS, malaria
Environmental Education	Integrated pest management, environmental awareness, community recycling programs
Engagement of Leaders	Professional training courses, executive education, partnerships, networking

Sources: UN Decade of Education for Sustainable Development (2005 – 2014). (2005). **Working Paper: Asia-Pacific Region Strategy for Education for Sustainable Development**. Rev. ed. Bangkok, UNESCO Bangkok. pp.4.

Abe. Osamu and Bishnu B. Bhandari. (2004: 15) stated that the concept of environmental education was a process with holistic dimension; so it was developed to be the educational process for sustainable development. This was to change the concept of environmental education, which led to changes of behavior, awareness, knowledge, understanding and skills of persons at the individual level up to changes of socio-economic-political structures, lifestyle, equality and justice in the society through the diversity of political, ecological, ethical and dynamic dimensions for education for sustainable development (ESD) in order to form a new living model for environment in the global community.

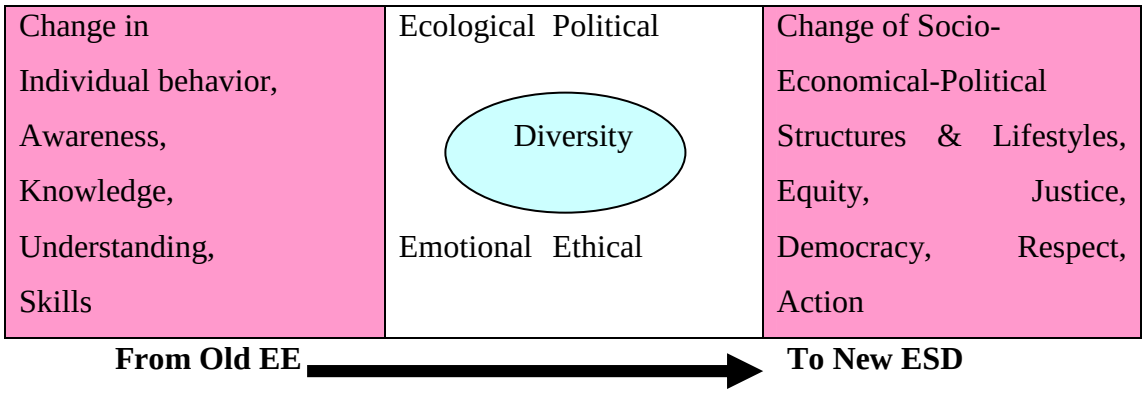

Figure 4: Education for Sustainable Development (ESD)

Sources: Abe. Osamu and Bishnu B. Bhandari. (2004). **Globalism and Education for Sustainable Development: Some Viewpoint**. Japan: Institute for Global Environmental Strategies (IGES)/Rikkyo University. pp15.

It could be concluded that the key issue of education for sustainable development was the education to develop better quality of life for everyone. This meant the development under balance of all related aspects, e.g. economics, sociology and environment for a good living of general people. Economics for development balance meant the economics growing on the stable base, competitiveness and self-reliance; meanwhile, general people develop their social lifestyles without destroying the environment.

Community Learning

1. Definitions of Community Learning

Kasem Wattanachai (2002: 12) had a conclusion that the learning process was derived from being transferred for knowledge, understanding, belief, faith, attitude, value, skills, work, life skills and self-holding in order to make changes of emotions, thought and behavior established in the learning objectives.

Krisada Boonchai et al. (1995: 4) defined the community learning process as succeeding and transferring knowledge with each other through various channels by mean of rites, traditions, value and individuals.

Community learning held a single objective, that is, to build up mentally and physically perfect humans who could live in the society happily (Wuttichai Moonsilp, 1982: 404). Therefore, community learning was the learning for life and lifelong learning. Every human had to stay in the lifelong learning condition. The concept of education for life seemed to be an important key opening to the learning-based society, and it was the important principle of all educational systems (UNESCO, 1992: 181 and Atchara Bhodiyanon, 1996: 5).

Bruner (Jerome Bruner as cited in Kanya Suwansaeng, 1989: 39) stated that the learning process was the combination of 3 processes that might occur simultaneously or process by process:

1. Acquisition – The process of gathering new knowledge to replace old one or arranging the knowledge outline to be more systematic.

2. Transformation – The process of transforming received knowledge to benefit the experience or new situations or new ideas to arrange the existing knowledge outline to relate or connect with new situations or new knowledge.

3. Evaluation – The process linked to Process 2 when a learner had to evaluate if such transformation was good or bad or if it could advance the learning and in what extent.

The above statements could lead to a conclusion that community learning process might be in different forms. It might be the learning by coincidence, learning by oneself or learning by group (Somkid Issarawatana, 1992: 89-90). The learning process might take place inside or outside a family and community. The learning

process helped the family or community rely on itself and it served the demand for sustainable development. The learning process consisted of the thinking process, information capture, analysis, inquiries and searching for answers about problems, causes and problem solutions. The learning process covered the analysis of problems and causes, problem diagnosis, analysis of alternatives and decisions on selecting alternatives for the community (Pravej Vasi, 1992). The community learning process aimed at the community strength, which consisted of ability of economic self-reliance, ability of solving community problems, community identity and community sustainability. It might be said that the goals of community learning process were:

1. To transfer knowledge, skills and wisdom in earning for living and living based on existing resources and environment of that community.

2. To transfer community belief and value until they became the community unique identity, and such unique attributes were succeeded endlessly.

3. To have learning and experience sharing among community members regarding using the indigenous knowledge to solve problems of individuals or those of community

2. Components of Community Learning

The Office of National Education Commission (2006: 28) stated that the community learning process should consist of the following components:

1. People, e.g. knowledgeable persons, local experts, community leaders, organization leaders, persons with specific knowledge, local people who modeled the living.

2. Knowledge, e.g. knowledge as existing indigenous knowledge of local people, series of knowledge or experience of community or organization that were not objects such as knowledge base, ideas, morality, ethics, rite, custom and tradition.

3. Resources, e.g. object resources such as capital, land, forest, water source, plant, animal and community products.

Silaporn Nakorntab (2006: 225) explained the components of learning process as follows:

1. Learning base meant learning source, learning provider, as well as learning network, local organization, community learning institute and other resources in the community.

2. Content/Knowledge base – Knowledge content for community learning came from the demand and necessity of that community. The content seemed practical rather than theoretical because it was expected for utilization in real situations.

3. Learning activities were various, including teaching, observing, reading, listening, questioning, trying, imitating, considering, sharing, etc. These activities were flexible depending on different contents and unequal skills of learners and teachers.

According to the study of Silaporn Nakorntub (1995: 38-48), the difference between community learning system and formal learning system was analyzed as shown below (table 2).

Table 2: Comparison of education between official system and community-learning system

	Formal System	**Community Learning System**
Organization	- School	- Community organization
Targeted Group	- Student	- Community members, either children or adults
Instructor	- Teacher	- Local expert, philosopher, local people
Teaching and learning methods	- Classroom	- No classroom
Teaching	- Based on contents	- Based on problems occurred in the community
Evaluation	- Test	- No test, but having self-assessment whether the problems were solved successfully or not.
Period	- Exact period as set in the curriculum	- Inexact period, endless learning

Source: Silaporn Nakorntub "Community Learning System for Sustainable Development: Case Study of South Isarn Communities" **Sukhothai Thammathiraj Bulletin**. 8 (1995), pp 38-48.

The above statements led to a conclusion that the community learning consisted of people, knowledge and community resources, which also determined community learning model, process, content and activities to be consistent to the lifestyle. The community learning was the transfer of knowledge and experience based on community culture under the simple and natural learning form. This learning was direct, rapid and lifelong or holistic approach.

3. Methods and Techniques for Promotion of Community Learning

Techniques, methods and process for promotion of community learning were essential since they led to the learning development of individuals, community network and learning process in other aspects. Techniques and methods were like instruments promoting understanding with each other. Developing some knowledge and techniques could form the harmony and exact knowledge to be the appropriate actions. Therefore, simple techniques and methods developed to be the process demanding the harmony and participation of many parties, those techniques and methods would be able to promote learning that was suitable for rising situations.

Thanongsak Khumkhainam (1991: 14-16) proposed two learning management methods in the manner of providing education to the community for development:

1. Direct education provided in form of telling or explaining to learners directly.

2. Indirect education provided by giving information, news, and encouraging learners or trainees to learn by considering, analyzing and summarizing such information by themselves.

Parichart Valaisathien et al. (2000: 10-11) mentioned about methods and techniques for promotion of community learning as follows:

1. Participative learning in practicing in real situations – Learning by doing deemed learning that could form actual knowledge. This learning could not be separated from living of community members. This learning could emerge while being involved in doing community activities in various steps; for example, community studies and analysis, problem framing, seeking for alternatives, planning, practice, controlling, monitoring and evaluation. In addition, learning might come

from demonstration and experiment. The demonstration and experiment pattern should be arranged under the same conditions actually confronted by community members so that they could be implemented in real situations.

2. Learning by experience – Apart from learning by oneself-experience, learning could be done by others' experience by observing operating activities that were not tourism or normal visits but such observation aimed at knowledge analysis and sharing, and summary of lesson learnt. There were also some preparations in part of observers and persons permitting such operating observation.

3. Learning from indigenous knowledge – This was to learn from local experts or community institutes. After that, such indigenous knowledge was combined with modern knowledge base to ensure that it was suitable for local status and condition.

4. Learning from simulations or examples, e.g. case study, role play, drama playing, game, activity.

5. Learning by transfer – This was to learn from the direct transfer of content and knowledge such as giving information, telling, narration, discussion, exhibition and media.

However, good techniques for promotion of learning process should be mixed techniques and cared for an important principle, that is, it should be learning associated with living while learners have been involved in learning with each other. Moreover, learning process was the natural or lifestyle learning process that was hidden in daily activities and rites.

This could be concluded that community learning was the educational activity emphasizing on learning from natural lifestyle, experience and circumstances in the society. Those learning activities could be grouped as follows:

1. Learning from community learning networks – Community learning networks included the community learning center, Tambon health station, Tambon Agricultural Office, as well as community knowledge sources existing in nature or local lifestyle such as herbal garden, etc.

2. Learning from new technologies such as Internet Tambon service system, establishing community radio broadcasting station, community radio, electronic library and website development, community information, remote

education through satellite, remote conference through computer network, local information, etc.

3. Learning from indigenous knowledge – This consisted of wisdom of knowledgeable persons, culture and community knowledge base that have been accumulated and succeeded.

4. Learning from native media – Native media took an important role in transferring knowledge, moral principles, moral value and morality via performance of actors such as Li Ge, Mor Lam, Ta Lung, Manorah, Lam Tud, local folk song, etc.

Related Researches

In examining related issues for indigenous knowledge management, it was found that:

Indigenous knowledge and community resource management – According to the study of Chayuti Polchuanpanyo (2000: 42-78) on Community Culture and Natural Resource Management. The results showed that factors influencing the management of natural resources and environment and changes in the communities were: 1) the State's actions, 2) activities of private development organizations, and 3) environmental networking groups. It was also found that the communities had culture and belief based on the relationship system in the family, relative and community lifestyle. All 3 belief systems had to be connected together before the management of natural resources and environment pursuant to the community culture could be built up. This result was consistent to Prasert Trakarnsuppakorn (1997: 53-94) that the development process of private development organizations could strengthen a community to attack with external culture, recover its own culture appropriately and create new generations to be dual-cultural people. Chookiet Lisuwan (1992: 58-64) conducted a study on Learning Systems in Northern Region. The result showed that the learning systems in Northern rural areas were phenomena derived from community structures, resources, conditions and situations in each era. Changes of learning systems at each period depended on changing factors, situations and conditions in those local areas, and learning systems from outside.

Community knowledge base management – According to the studies conducted by Vorapot Poomtrakul (1998: 88-99), Rachapol Punpiboon (1995: 46-74), Chayuti Polchuanpunyo (2000: 42-78), Suthalee Nomoon (2001: 51-88), Kamonporn Songmee (2000: 57 – 101), Songkhun Chantajorn (2001: 67-93) and Orathai Jitthaisong (2001: 54-113), community knowledge base process in the natural resource management was done through 2 informal organization levels:

1) Community-level organization management in form of relative or community member – The transfer came from living through real practice in the family.

2) Knowledge could be transferred through community networking organizations, natural leaders and religious leaders, value, belief, prohibition, custom, criteria prescribed by the community and principles enforced in the community for the management of natural resources in the community.

In addition, from the study of Orathai Jitthaisong (2001: 54-113)and Songsiri saprasert(1999:54-60), the knowledge transfer between communities were based on training, operating observations inside and outside the community, product selling by utilizing personal media in discussions. Also, from the research of Chookiet Lisuwan (1992: 58-64) and Kanya Chomsilp (1995:59-95), the knowledge transfer by families, temples, schools and learning centers in the community came from existing learning process and external sources.

Storing of indigenous knowledge base – According to the study of Suthalee Nomoon (2001: 51-88)and Kanchana Keitmaneratana (2003 :62-83), knowledge was stored and transferred through rites, tradition and custom. In the open society, knowledge has been always transferred, either directly or indirectly. According to the study of Prasert Trakarnsuppakorn (1997: 53-94), education should be the open stage for the reaction of various cultures. Moreover, from studies of Gboyega (Gboyega, 1997: 228-231), Monroe (Monroe, 1980: 16) and The World Bank (The World Bank, 2001), cultural wisdom was essential and it should be promoted and disseminated. In the management of cultural heritage, the library took roles in promoting and disseminating the cultural heritage.

Therefore, from reviews of literature and related research, it was obvious that indigenous knowledge was essential for promoting, developing and supplementing the

knowledge base between local knowledge and international knowledge, which would lead to stand as the unique-identity community and learning-based community. The studies and researches regarding the systematic management of indigenous knowledge by using the knowledge management process was so essential for developing and succeeding the indigenous knowledge base.

CHAPTER III
METHODOLOGY

The study on "Environmental Education Based Indigenous Knowledge Management for Community Learning" was conducted in accordance with the mixed methodology, comprising instruments and methodology in form of qualitative research and quantitative research. The studied area was at Amphoe Bang Len, Nakhon Pathom Province. The study was conducted as follows.

Population and Samples

The population and the samples of this study were key informants regarding indigenous knowledge base of communities and indigenous knowledge users in communities as per the following details:

1. Local experts at Amphoe Bang Len, Nakhon Pathom – Every sample group came from the list of local experts indicated in the following sources:

1.1 Database on indigenous knowledge teachers listed by the Office of the Basic Education Commission, Nakhon Pathom Office, Zone 2.

1.2 Database on local experts listed by the Office of Non-Formal Education Amphoe Bang Len.

1.3 Database on culture experts listed by the Office of Nakhon pathom's Cultural.

1.4 Database on local experts listed by Banglen's Cultural Council.

1.5 Database on local experts listed by Sub-district administrative organizations(SAO) Amphoe Bang Len, Nakhon Pathom.

1.6 Database on indigenous knowledge teachers from 47 schools at Amphoe Bang Len.

2. Representatives of teachers from 47 schools at Amphoe Bang Len under the supervision of the Office of the Basic Education Commission, Nakhon Pathom Office, Zone 2; one representative per school.

3. Representatives of communities, representatives of Amphoe Bang Len Cultural Council Commission, 15 local administrative organizations at Amphoe Bang Len, Nakhon Pathom. These representatives were selected by sampling; one representative per entity.

4. People in communities, e.g. people and student in areas of 3 learning centers who were involved in indigenous knowledge learning activities of those communities. Those centers consisted of 1 community learning center in type of school, 1 community learning center in type of temple, and 1 community learning center in type of Sub-district Administrative Organization (SAO). Finally, there were 33 persons from Wat Phai Hoo Chang Community Learning Center, 42 persons from Wat Sookwatanaram School Community Learning Center, and 30 persons from Bang Pasi SAO. Community Learning Center or this group covered 105 persons.

Research Instruments

The instruments of this study consisted of:

1. Semi-structured interview form by using “Question framework” or “question form” prepared in advance, e.g. storage of knowledge base, process, method, transfer and dissemination of indigenous knowledge, problems and hindrance of indigenous knowledge learning.

2. Indigenous Knowledge Achievement Test – This was the test with two alternative answers; 1 score for the correct answer and 0 score for the wrong answer.

3. Indigenous Knowledge Attitude Test – This was the rating scale test based on Likert’s scale.

4. Test for participation in indigenous knowledge learning activities – This was the rating scale test based on Likert’s scale. The test consisted of following matters:

1) Project or activity initiation

2) Planning relating to indigenous knowledge management

3) Practice or implementation of indigenous knowledge management

4) Utilization of indigenous knowledge management

5) Care for indigenous knowledge

6) Evaluation and follow-up indigenous knowledge management.

Methodology

For the study on "Environmental Education Based Indigenous Knowledge Management for Community Learning", the qualitative research was conducted as per the following steps:

1. Primary information survey

The primary survey was conducted to find out the status of knowledge base and indigenous knowledge of communities at Amphoe Bang Len, Nakhon Pathom. This was the indigenous knowledge defining to learn the actual context of those communities, problems, facts associated with the life base, cultural base and resource base of those communities (Thamrong Buasri, 1999: 156-157, Thanomwan Prasertcharoensook, 2000: 22-27). The contents in the primary survey included the community background and profile, physical condition, social structure, tradition and culture, indigenous knowledge and innovations and problem solutions.

The survey steps were as follows:

1) Documentary Searching – This was to get information about indigenous knowledge from documents that were the secondary source. Those documents included technical documents, research papers, articles, journals, related dissertations and information sources in the Internet.

2) Research Area Surveying – This was to get information from the primary source by interviewing local experts, observing studied areas, process, relationship, lifestyle or local people's behavior before recording such observed matters systematically.

The sample group covered 38 local experts living in Amphoe Bang Len, Nakhon Pathom Province.

The instrument in this part was the semi-structured interview form by using “question framework” or “question form” prepared in advance, e.g. village background, occupations, economic system, society, culture and tradition, indigenous knowledge and knowledge dissemination, etc.

3) Data analysis and processing – The indigenous knowledge obtained from documentary searching, research area surveying from observation, interview and evaluation of participation by the sample group was explained by way of descriptive analysis and content analysis.

2. Indigenous knowledge creation

1) Group discussion – Focus group discussion (FGD) was used to process the knowledge base, set up types of indigenous knowledge creation, and select explicit indigenous knowledge and tacit indigenous knowledge that were important for disseminating knowledge to communities.

The sample group of this study included the participants in group discussions; namely, local experts, representatives of teachers from schools located at Amphoe Bang Len, and 23 representatives from each community and local administrative organization carrying out the management of community learning center.

The instrument in this part included the mind map, social and community resource map.

2) Data analysis after action review for the knowledge base obtained from group discussions, and evaluation on the sample group’s participation were done by way of descriptive analysis and content analysis.

3. Indigenous knowledge capture

This was to arrange the indigenous knowledge in each community to be conveniently accessed and implemented by users. The indigenous knowledge capture process was done as follows:

Setting up the scope and content of indigenous knowledge base.

Group discussions were held subject to the focus group discussion techniques in order to set up the scope and content of indigenous knowledge base, and to find out instruments and storage materials appropriate for each community.

The sample group in the part included local experts, representatives of schools, temples and Sub-district Administrative Organizations that have carried out or coordinated, jointly with the candidate, for the management of community learning centers in the total of 32 persons.

Data analysis after action review for the knowledge base obtained from group discussions, and evaluation on the sample group's participation were done by way of descriptive analysis and content analysis.

4. Arrangements of indigenous knowledge learning activities

1) The data obtained by the candidate from documentary searching, interviews of local experts at Amphoe Bang Len, Nakhon Pathom whose indigenous knowledge was outstanding in those communities, as well as data obtained from group discussions were analyzed to build up the indigenous knowledge learning pattern, and to arrange indigenous knowledge learning activities for each community.

2) Indigenous knowledge learning pattern was improved by presenting this idea based on public participation by mean of focus group discussions in order to share opinions between the candidate, community representatives and local experts, and to consider the appropriateness and preciseness such as the appropriateness of presentation form, information accuracy, etc. After that, the proposed information was further improved.

3) Learning activities were held at 3 community learning centers: Wat Phai Hoo Chang Community Learning Center, Wat Sookwatanaram School Community Learning Center, and Bang Pasi SAO Community Learning Center.

The candidate did the content analysis for the data obtained from the documentary searching, interviews of local experts and field surveys. Key issues subject to the framework of knowledge management were summarized and utilized to build up the indigenous knowledge management model.

4) Effectiveness evaluation of environmental education based indigenous knowledge of communities at Amphoe Bang Len, Nakhon Pathom.

The environmental education model based indigenous knowledge of communities as revised by the thesis advisors of this study, experts and local experts was disseminated to be the indigenous knowledge of communities or it might be called the knowledge sharing under the studying steps listed below:

4.1 Selection of community learning centers

The community learning centers located at Amphoe Bang Len, Nakhon Pathom with potential and preparedness of knowledge sharing activities were selected to be the learning model centers in charge of indigenous knowledge transfer. These centers were selected by the purposive sampling and 3 out of them were selected: 33 persons from Wat Phai Hoo Chang Community Learning Center, 42 persons from Watsookwatanaram School Community Learning Center, and 30 persons from Bang Pasi SAO. Community Learning Center or this group covered 105 persons.

4.2 Indigenous knowledge learning activities

Knowledge sharing activities for indigenous knowledge base were arranged for community members through community learning centers via various media and learning-based activities.

The research design was the experimental research design and one group pretest-posttest design.

Learning activities for indigenous knowledge base were arranged via the media and activities as listed below:

1. Learning from media and general publicized documents such as book, board, database document entitled "*Indigenous Knowledge of Amphoe Bang Len*".

2. Observations at indigenous knowledge sources and learning from experience of local experts.

Instruments of the study

1. Achievement Test; and

2. Attitude Test

The evaluation was based on the knowledge achievement and attitude towards the indigenous knowledge base and community learning center.

The evaluation was under the attitude evaluation criteria, which divided the attitude into 5 levels pursuant to Best's concept (Best,1981: 34-36) as listed below:

1.00 – 1.80 meant weakest attitude

1.81 – 2.60 meant weak attitude

2.61 – 3.40 meant medium attitude

3.41 – 4.20 meant strong attitude

4.21 – 5.00 meant strongest attitude

The data of activity participants in knowledge sharing activities through community learning centers was analyzed by the descriptive statistics, content analysis and inferential statistics in order to compare the achievement results as described bellows:

1. Descriptive Statistics for general data analysis – They included frequency, percentage, mean and standard deviation.

2. Inferential Statistics for comparison of mean – They included T-test and ANOVA.

5) Evaluation for participation in indigenous knowledge learning activities

The participation in indigenous knowledge learning activities was assessed from 32 representatives of schools, Sub-district Administrative Organizations and temples in the arrangements of indigenous knowledge learning activities at community learning centers, who have been involved in this study.

The instrument constructed to assess the participation in indigenous knowledge learning activities was the 5-scale evaluation form based on Likert's scale.

The data of activity participants in knowledge sharing activities through community learning centers was analyzed by the descriptive statistics, which included frequency, percentage, mean and standard deviation.

The participation evaluation was under the participation evaluation criteria, which divided the participation into 5 levels pursuant to Best's concept (Best,1981: 34-36) as listed below:

1.00 – 1.80 meant weakest participation

1.81 – 2.60 meant weak participation

2.61 – 3.40 meant medium participation

3.41 – 4.20 meant strong participation

4.21 – 5.00 meant strongest participation

CHAPTER IV
RESULTS

The study on "Environmental Education Based Indigenous Knowledge Management for Community Learning" was conducted at Amphoe Bang Len, Nakhon Pathom based on the knowledge management process. The results could be presented in 4 parts:

1. Indigenous Knowledge Base
2. Storing Indigenous Knowledge Base
3. Results of Indigenous Knowledge Learning
4. Indigenous Knowledge Management Model

The results in detail were as follows:

Indigenous Knowledge Base

This study covered the indigenous knowledge management process of Amphoe Bang Len, Nakhon Pathom. Knowledge defining and knowledge creation were done by the following steps. The research results were also presented below.

1. Primary Data Surveys – Knowledge defining was conducted in order to learn the status of knowledge base and indigenous knowledge of communities at Amphoe Bang Len, Nakhon Pathom. All related documents and indigenous knowledge information from various entities; namely, Nakhon Pathom Educational Office 2, The Office of Basic Education Commission, Office of Non-Formal Education of Amphoe Bang Len, Bang Len Cultural Council and Nakhon Pathom Cultural Council. After that, the field surveys for primary information were also conducted at 15 Sub-district Administrative Organizations from 3 September – 30 November 2006.

2. Setting up Types of Indigenous Knowledge Base – The group discussion was held under the focus group discussion technique (FGD.) on 12 January 2007 at the Audio-Visual Meeting Room, Bang Len Wittaya School, Amphoe Bang Len, Nakhon Pathom.

The participants in the focus group discussion consisted of local experts, representatives of teachers from schools located at Amphoe Bang Len, representatives of communities and local administrative organizations that arranged the community learning centers in the total of 23 persons. The results obtained from the aforesaid knowledge defining were presented to participants in this focus group discussion in order to learn the status of knowledge base and indigenous knowledge base of communities at Amphoe Bang Len, Nakhon Pathom.

3. Indigenous Knowledge of Amphoe Bang Len – The survey results were as follows:

3.1 General Information about Indigenous Knowledge

The results showed that there were 38 indigenous knowledge experts at Amphoe Bang Len, Nakhon Pathom. The general information about those indigenous knowledge experts in term of gender, age, level of education, status and occupation was shown below (table 3).

1) Gender – Most of indigenous knowledge experts or 22 out of them were women or at 39.2%. Most indigenous knowledge female experts had expertise in food such as sweets making, food transformation; and handicraft such as woven products made from water hyacinth and native cloth weaving.

There were 16 indigenous knowledge male experts or at 60.8%. Most of them or 60.8% were experts in art; culture and tradition such as tradition and culture of Thai Song Dam, Northeastern mouth organ playing, etc.; agriculture; conservation of natural resources such as non-toxic agriculture, organic agriculture, orchid planting, etc.

2) Age – Most indigenous knowledge experts or 14 out of them (36.8%) were in the range of 50-59 years old; 13 experts were at ages over 60 (34.2%); 9 experts were at ages between 40-49 (23.7%); and 2 experts were at ages between 30-39 (5.3%). The oldest indigenous knowledge expert was 78 years old

while the youngest indigenous knowledge expert was 34 years old. The average age of indigenous knowledge experts was 54.8 years old.

3) Family status – Most indigenous knowledge experts were married: 32 were married persons (84.2%) while 4 out of them were single (10.5%) and 32 out of them were widows/divorced (5.3%).

4) Level of education – Most indigenous knowledge experts or 24 experts completed the primary educational level (63.2%); 5 experts completed the junior secondary level (13.2%); 4 experts completed the senior secondary level (10.5%); 3 experts completed the bachelor degree (7.9%); 1 expert completed the diploma (high-level diploma) (4.4%); and 1 expert completed the master degree (4.4%).

5) Occupation – Most indigenous knowledge experts or 15 out of them were farmers (65.2%); 4 experts did commerce or had personal business (17.4%); 3 experts were government officials (13.0%) and one expert was the labor (4.4%).

6) Indigenous Knowledge Areas – From the primary survey of indigenous knowledge data as classified by area, Sub-district where held the highest number of experts or 8 experts was Sub-district Bang Pla (21.1%) while there were 6 experts in Sub-district Bang Luang (15.8%), and 1 expert in Sub-district Khlong Nok Kra Tung (2.6%) (Table 4).

Table 3: General Information about Indigenous Knowledge

		Number (person)	Percentage (%)
Gender	Men	16	42.1
	Women	22	57.9
Age	30-39	2	5.3
	40-49	9	23.7
	50-59	14	36.8
	Over 60	13	34.2
Status	Married	32	84.2
	Single	4	10.5
	Widow/divorced	2	5.3
Education	Primary	24	63.2
	Junior Secondary	5	13.2
	Senior Secondary	4	10.5
	Diploma/High Diploma	1	2.6
	Bachelor Degree	3	7.9
	Master Degree	1	2.6
Occupation	Farmer	28	73.7
	Government Officer/ Pension Government Officer	4	10.5
	Commerce/ Personal Business	5	13.1
	Labor	1	2.6

Table 4: Indigenous knowledge at Amphoe Bang Len

Sub-district	Number (person)	Percentage (%)
Khlong Nok Kra Tung	1	2.6
Sai Ngarm	3	7.9
Narapirom	3	7.9
Nilpetch	1	2.6
Bua Pak Ta	2	5.3
Bua Pak Ta	2	5.3
Bang Pla	8	21.1
Bang Pasi	2	5.3
Bang La Gum	2	5.3
Bang Len	1	2.6
Bang Luang	6	15.8
Phai Hoo Chang	3	7.9
Lam Phya	3	7.9
Hin Moon	3	7.9
Total	**38**	**100.0**

7) Indigenous Knowledge Fields - From the primary survey of indigenous knowledge data as classified by indigenous knowledge management in 6 areas (Table 5), it was found that there were 10 experts in each of following areas: areas of handicraft, home industry and Thai clothes, and the area of art, culture, tradition (26.3%). It was found that most indigenous knowledge experts had expertise in water hyacinth weaving. Regarding local art and culture, the outstanding culture of Amphoe Bang Len was the culture of Thai Song Dam at Baan Koh Raed of Sub-district Bang Pla, Baan Phai Hoo Chang of Sub-district Phai Hoo Chang where there were successors of art, culture and tradition of Northeastern mouth organ playing, Northeastern mouth organ dance, weaving of Tang-Mo pattern clothes, sewing the front pillow case, etc.

There were other 8 indigenous knowledge experts in area of food and nutrition (21.1%). They had expertise in food making such as Chinese cake. The product made by Mrs. Siriwan Mingprasert was also awarded as the 5-star OTOP product. There was also the indigenous knowledge regarding food transformation such as dried salted fish. Amphoe Bang Len was also the largest freshwater fish market in Thailand.

There were 6 indigenous knowledge experts in the areas of agriculture, management and conservation of natural resources or at 15.8%. To elaborate, they were local experts in agricultural activities such as non-toxic agriculture, organic agriculture, e.g. Organic Agriculture School of LT. Ton Pankho at Sub-district Phai Hoo Chang, bio fertilizer of Mr. Pim Khumtonwong at Sub-district Narapirom, orchid growing, feeding and reproduction, e.g. Mr. Sawong Khumvichien who was the owner of Air Orchid Farm and Lab that was famous as the biggest orchid supermarket in Thailand.

There were 4 experts in Thai traditional medicine and herbs or at 10.5%. They had expertise in massaging, pulling muscles, joints and bones, holy water doctor and use of herbs for medical treatment.

For the area of community economics, community fund, community organization and community welfare, no data was found.

Table 5: Fields of Indigenous Knowledge

Fields	Number (person)	Percentage (%)
1. Food and nutrition	8	21.1
2. Handicraft, home industry and Thai clothes	10	26.3
3. Thai traditional medicine and herbs	4	10.5
4. Community economics, community fund, community organization and community welfare	-	-
5. Art, culture and tradition	10	26.3
6. Agriculture, management, conservation of natural resources and environment	6	15.8
Total	38	100.0

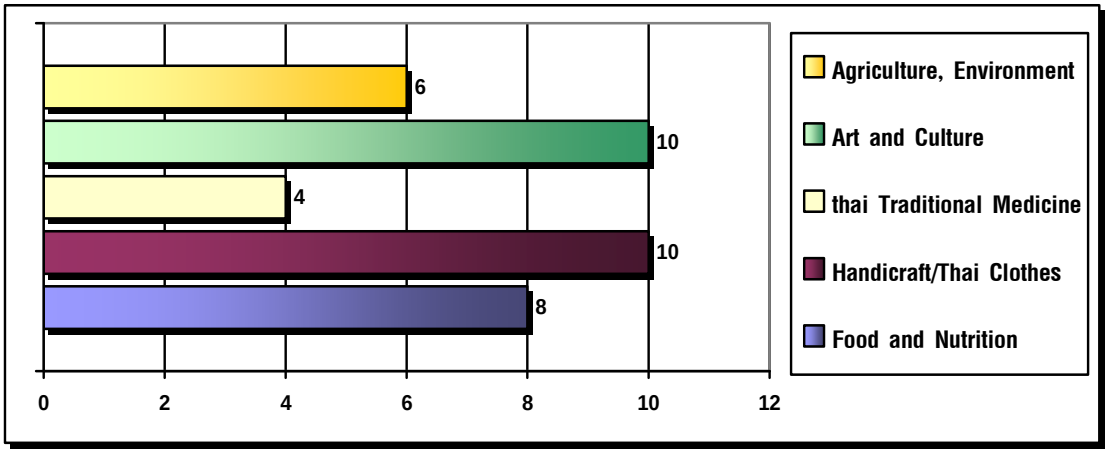

Chart 1: Areas of indigenous knowledge

Indigenous Knowledge Base Storing

The Candidate surveyed the indigenous knowledge information from related entities at Amphoe Bang Len in order to know the status of indigenous knowledge base storing so that it could be accessed and implemented conveniently by users. The surveys discovered that:

1. Status of Indigenous Knowledge Base Storing

1.1 Storing indigenous knowledge base of communities

According to the survey of information about indigenous knowledge base of communities, almost all entities in Amphoe Bang Len have stored the information about indigenous knowledge. In part of schools, the details of indigenous knowledge information were stored clearer than other entities. However, such indigenous knowledge stored by schools could be integrated to local school curricula only. In part of Sub-district Administrative Organization (SAO.), most of them have stored the information about indigenous knowledge of communities in form of the list of indigenous knowledge experts and expertise held by each expert only, and such information was requested from other entities. SAO.s have not systematically stored such obtained information in the database or have never had explicit undertaking about it.

1.2 Indigenous knowledge learning activities

The indigenous knowledge learning activities arranged by various agencies at Amphoe Bang Len were in the following forms:

1. Arranging occupation training activities for any interested groups that were supported by external agencies/organizations such as Bank for Agriculture and Agricultural Cooperatives, Community Development, Provincial Industry, Non-formal Education, etc. The learning activities were as follows:

Safe agriculture, non-toxic agriculture, organic agriculture in "*Organic Agricultural School*" of Lt. Ton Pankoh who was the indigenous knowledge expert in area of agriculture at Sub-district Phai Hoo Chang.

Training on making the fermented bio-extracts, organic agriculture and reduction of chemicals in farming at Sub-district Bang Pasi by Mr. Somkiat

Soonthorn-umpai who was the indigenous knowledge expert in area of agriculture at Sub-district Bang Rakhum.

Occupation training after floods such as basketry by Mr. Somwang Daengsin who was the indigenous knowledge expert in area of handicraft at Sub-district Bang Rakhum, which was arranged for the group of farmers of Sub-district Bang Pasi.

Occupation training on sweets making by Mrs. Siriwan Mingprasert who was the indigenous knowledge expert in area of food and nutrition at Sub-district Bang Pasi arranged for the group of housewives of Bung Lad Sawai.

2. Arranging occupation training activities for any interested groups who were in the communities that recognized and valued the indigenous knowledge that could be utilized for earning for living. The learning activities were as follows:

Training on basketry made from water hyacinth by Mrs. La-orrat Srithiamthong who was the indigenous knowledge expert in area of handicraft at Sub-district Khlong Nok Kra Tung for groups of housewives at many Sub-districts. This training was later expanded to be the water hyacinth weaving group of Amphoe Bang Len.

Training on cloth weaving of Thai Song Dam, e.g. Tang-Mo pattern, Mud-Mi pattern of Miss Ma Rodcharoenpan who was the indigenous knowledge expert in area of woven clothes at Sub-district Phai Hoo Chang. The training has been arranged for general interested people.

3. Arranging learning activities through local curriculums by schools – The schools implemented the indigenous knowledge base to be the school formal curriculum as integrated to various learning contents; for example:

Arranging learning activities concerning folk songs, Pleng Lae, Pleng Plob Gai by Mr. Vilai Kaewpara who was the indigenous knowledge expert in area of art & culture at Sub-district Bang Rakhum as arranged for students of Thai Rat Vittaya 4 School.

Arranging learning activities concerning orchid reproduction by Mr. Sukho Petchkasem who was the indigenous knowledge expert in area of agriculture at Sub-district Bang Rakhum as arranged for students of Wat Sookwatanaram School, and orchid reproduction, cloning, orchid tissue culture by Mr. Sawong Khoomvichien

who was the indigenous knowledge expert in area of agriculture at Sub-district Narapirom as arranged for students of Wat Narapirom School.

Arranging learning activities concerning Thai Song Dam art and culture by Teacher Piyawan Sookkasem who was the indigenous knowledge expert in area of art and culture at Sub-district Phai Hoo Chang as arranged for students of Wat Phai Hoo Chang School, and management of Thai Song Dam culture learning of Thai Song Dam Cultural Learning Center at Baan Koh Raed, Sub-district Bang Pla of Bang Len Vittaya School, Baan Talad Koh Read School and Wat Koh Raed School.

2. Indigenous knowledge learning pattern at Amphoe Bang Len

Regarding indigenous knowledge learning of Amphoe Bang Len, it was discovered that it consisted of both theoretical and practical learning, which might be divided as follows:

1) Self-learning in various learning sources such as library and information center where the work performed by related agencies and information of other related communities have been stored for general people.

2) Learning by practice – For this king of learning, the indigenous knowledge experts would have demonstrations and let learners follow them. Most learning activities were arranged for the occupation practice; so learning had to have some practice with those local experts such as water hyacinth weaving, bamboo strip weaving, making Kha Nom Pia (Chinese cake), Tang-Mo pattern weaving, making fish demonstrative pond, demonstration of plant reproduction, etc. The period of knowledge transfer by each indigenous knowledge expert was different depending on the difficulty and details of each activity. The demonstrations were usually done in the village to allow villagers to see and understand the details closely. Those demonstrations were usually activities jointly done in the village so that villagers could have the real practice and would be able to so those works in the future.

3) Learning by lecturing and telling – For this kind of learning, the indigenous knowledge experts would have lectures and let the learners ask questions. Most learning was the learning activity arrangements in schools such as inviting the local experts to demonstrate the singing of folk songs, Pleng Puang Malai, etc.

4) Training – Most trainings were to provide specific knowledge by inviting any local expert or specific expert to give knowledge in the village or assigning village representatives or interested persons to be trained in other projects outside the area.

5) Operating observations and visual education – This was to study the best practice of each community or observe the best practice of other communities to enhance learning, and to promote shared learning. The knowledge might be learnt from persons who used to do or were doing that particular activity in order to see the actual sample. This led to knowledge sharing in the individual and group levels, and to inspire and make learners understand that matter. Generally, it was found that local experts have studied knowledge from other learning sources before revising it for their personal working.

Results of Indigenous Knowledge Learning

The information obtained by the candidate from documentary searching, interviews of local experts at Amphoe Bang Len, Nakhon Pathom as well as information from focus group discussions was utilized to form the environmental education based indigenous knowledge learning model for communities at Amphoe Bang Len, Nakhon Pathom.

The outstanding indigenous knowledge in those communities was analyzed by the candidate in order to arrange indigenous knowledge learning activities for the communities. After that, such ideas were presented under the participation process by arranging a focus group discussion to share opinions between the candidate, representatives of communities, Sub-district Administrative Organizations, schools and local experts as held on 22 November 2007 at Audio-Visual Meeting Room, Bang Len Wittaya School, Amphoe Bang Len, Nakhon Pathom.

Three community learning centers at Amphoe Bang Len, Nakhon Pathom, is

1.) Wat Phai Hoo Chang Community Learning Center

2.)Wat Sookwatanaram School Community Learning Center, and

3.) Bang Pasi SOA Community Learning Center,

which had learning preparedness and potential and local experts agreed to give cooperation in arranging knowledge sharing activities.

The participants in indigenous knowledge learning activities of communities from 3 community learning centers included 33 participants from Wat Phai Hoo Chang Community Learning Center, 42 participants from Wat Sookwatanaram School Community Learning Center, and 30 participants from Baan Bang Pasi Community Learning Center or the total of 105 participants.

1. General Information about Participants

The results showed that there were 105 participants at Amphoe Bang Len, Nakhon Pathom. The participants in indigenous knowledge learning activities of communities from 3 community learning centers included 33 participants from Wat Phai Hoo Chang Community Learning Center, 42 participants from Wat Sookwatanaram School Community Learning Center, and 30 participants from SOA. Bang Pasi Community Learning Center or the total of 105 participants.

The general information about participants in term of gender and age was shown below.

1.1 Gender – Most of participants or 67 out of them were female or at 63.8%. There were 38 male participants or at 36.2%.

SOA. Bang Pasi Community Learning Center. There were totally 30 persons ,there were female 20 persons (66.7%) ,male 10 persons (33.3%)

Wat Sookwatanaram School Community Learning Center. There were totally 42 persons ,there were female 27 persons (64.3%) ,male 15 persons (35.7%)

Wat Phai Hoo Chang Community Learning Center. There were totally 33 persons ,there were female 20 persons (60.6%) ,male 13 persons (39.4%)

Table 6 : Gender about participants

Community Learning Center	Gender					
	male		female		total	
	N	%	N	%	N	%
Bang Pasi SAO	10	33.3	20	66.7	30	100.0
Wat Sookwatanaram School	15	35.7	27	64.3	42	100.0
Wat Phai Hoo Chang	13	39.4	20	60.6	33	100.0
Total	38	36.2	67	63.8	105	100.0

1.2 Age – Most participants or 98 out of them (36.8%) were in the below of 20 years old; 4 persons were at ages between 20-29 (3.8%); and 3 persons were at ages between 30-39 (2.9%).

The oldest participants was 36 years old while the youngest participants was 13 years old. The average age of participants was 15 years old.

Bang Pasi SOA.Community Learning Center. There were totally 30 persons , there were in the below of 20 years old 23 persons (76.7%) , 4 persons were at ages between 20-29 (13.3%); and 3 persons were at ages between 30-39 (10.0%).

Wat Sookwatanaram School Community Learning Center. There were totally 42 persons , there were in the below of 20 years old 42 persons (100.0%)

Wat Phai Hoo Chang Community Learning Center. There were totally 33 persons , there were in the below of 20 years old 33 persons (100.0%)

Table 7 : Age about participants

Community Learning Center	Age							
	below 20		20 – 29 year		30 – 39 year		total	
	N	%	N	%	N	%	N	%
Bang Pasi SAO.	23	76.7	4	13.3	3	10.0	30	100.0
Wat Sookwatanaram School	42	100.0	-	-	-	-	-	-
Wat Phai Hoo Chang	33	100.0	-	-	-	-	-	-
total	98	93.3	4	3.8	3	2.9		100.0

2. Knowledge of Indigenous Knowledge

For the results of arranging indigenous knowledge learning activities, the learning evaluation of environmental education based indigenous knowledge was done by the pre-test and post-test with details below.

2.1 Comparison of Indigenous Knowledge Before (Pre-test) and After (Post-test) of Learning Activity Participation

According to the comparison of mean of indigenous knowledge by analysis of t-test from pre-test scores and post-test scores for the participation of the sample group in learning activities in each of three learning centers, the results were as follows:

1) Bang Pasi SAO. Community Learning Center

The results showed that the pre-test scores equaled to 15.0 and post-test scores equaled to 17.70 with S.D. at 3.778 and 2.231. When using t-test to compare the difference between pre-test scores and post-test scores, t value equaled to 3.370 at a significance of 0.001.

The above results led to a conclusion that the indigenous knowledge of the sample group after arranging learning activities at Bang Pasi SAO. Community Learning Center increased significantly at a statistic test level of 0.05.

2) Wat Sookwatanaram School Community Learning Center

The results showed that the pre-test scores equaled to 15.90 and post-test scores equaled to 17.95. Standard Deviation value (S.D.) was 3.655 and 2.083. When using T-test to compare the difference between pre-test scores and post-test scores, t value equaled to 3.155 at a significance of 0.001.

The above results led to a conclusion that the indigenous knowledge of the sample group after arranging learning activities at Wat Sookwatanaram School Community Learning Center increased significantly at a statistic test level of 0.05.

3) Wat Phai Hoo Chang Community Learning Center

The results showed that the pre-test scores equaled to 15.55 and post-test scores equaled to 17.82. Standard Deviation value (S.D.) was 3.954 and 2.157. When using T-test to compare the difference between pre-test scores and post-test scores, t value equaled to 2.899 at a significance of 0.003.

The above results led to a conclusion that the indigenous knowledge of the sample group after arranging learning activities at Wat Phai Hoo Chang Community Learning Center increased significantly at a statistic test level of 0.05.

4) Overview of all Community Learning Centers

When comparing the overall indigenous knowledge learning achievement of the sample group, the results showed that the pre-test mean equaled to 15.53 and post-test mean equaled to 17.84. Standard Deviation value (S.D.) was 3.767 and 2.131. When using T-test to compare the difference between pre-test scores and post-test scores, t value equaled to 5.932 at a significance of 0.00.

The above results led to a conclusion that the indigenous knowledge of the sample group after arranging learning activities increased significantly at a statistic test level of 0.05 (Table 8).

Table 8: Comparison of mean of indigenous knowledge before and after arrangements of learning activities of community-learning centers

Test	N	$\bar{x}$	SD.	t	Sig.
Bang Pasi SAO					
Pre-test	30	15.00	3.778	3.370	0.001
Post-test	30	17.70	2.231		
Wat Sookwatanaram School					
Pre-test	42	15.90	3.655	3.155	0.001
Post-test	42	17.95	2.083		
Wat Phai Hoo Chang					
Pre-test	33	15.55	3.954	2.889	0.003
Post-test	33	17.82	2.157		
Total					
Pre-test	105	15.53	3.767	5.932	0.000
Post-test	105	17.84	2.131		

2.2 Comparison of indigenous knowledge after participation in learning activities between community learning centers

From the comparison of mean of indigenous knowledge after arranging learning activities of the sample group of this study in 3 centers by mean of ANOVA Analysis, it was found that F value equaled to 0.123 at the significance at 0.885.

This could be concluded that no significant difference was found in the indigenous knowledge after arranging learning activities among community learning centers at a statistic significance of 0.05.

Table 9: Comparison of indigenous knowledge after arrangements of learning activities between community-learning centers

	Sum of Squares	df	Square	F	Sig.
Between groups	1.134	2	.567	.123	.885
In the group	471.114	102	4.619		
Total	472.248	104			

3. Attitude towards Indigenous Knowledge

The evaluation was based on the achievement of attitude towards indigenous knowledge of learning activity participants of the sample group in community learning centers. The results were shown below.

3.1 Attitude towards Indigenous Knowledge before Participation in Learning Activities

For attitude of the sample group participating in indigenous knowledge sharing and learning activities, the results showed that the mean of attitude towards the indigenous knowledge before learning (pre-test) equaled to 3.76 or the evaluation result was at the strong level.

When considering sub-issues, it was found that the attitude in almost issues was at the strong level, except indigenous knowledge issue that “Important culture and traditions succeeded by ancestors are useful and worthwhile for community living” to which the attitude was at the medium level.

Table 10: Level of Attitude towards Indigenous Knowledge before Arrangements of Learning Activities of Community-Learning Centers

Statements	Level of Attitude						
	5	**4**	**3**	**2**	**1**	$\bar{x}$	**Results**
1. We are able to apply knowledge obtained from indigenous knowledge learning to the daily life.	7 (6.7)	63 (60.0)	35 (33.3)	-	-	3.73	Strong
2. Important culture and traditions succeeded by ancestors are useful and worthwhile for community living	1 (1.0)	2 (1.9)	41 (39.0)	61 (58.1)	-	2.46	Medium
3. Indigenous knowledge learning forms the guideline of occupation setting and income.	7 (6.7)	63 (60.0)	35 (33.3)	-	-	3.73	Strong
4. Indigenous knowledge helps you understand the principles of living and self-reliance so you can live happily.	7 (6.7)	52 (49.5)	39 (37.1)	6 (5.7)	-	3.55	Strong
5. Learning of art, culture and indigenous knowledge was out-of-date education.	8 (7.6)	65 (61.9)	28 (26.7)	3 (2.9)	1 (1.0)	3.72	Strong
6. Local art and culture reflect our ancestors' wisdom and they are useful for studying of art and culture.	25 (23.8)	60 (57.1)	16 (15.2)	3 (2.9)	1 (1.0)	4.00	Strong
7. Indigenous knowledge learning makes you realize the value and significance of indigenous knowledge more.	31 (29.5)	60 (57.1)	11 (10.5)	3 (2.9)		4.13	Strong
8. Sustaining indigenous knowledge is the duty of every community member.	22 (21.0)	66 (62.9)	17 (16.2)	-	-	4.05	Strong

Table 10: Level of Attitude towards Indigenous Knowledge before Arrangements of Learning Activities of Community-Learning Centers (Continued)

Statements	Level of Attitude						
	5	4	3	2	1	$\bar{x}$	Results
9. Providing knowledge and valuing occupations, lifestyle and community culture are the ways of forming attitude and awareness of conserving the indigenous knowledge.	23 (21.9)	55 (52.4)	27 (25.7)	-	-	3.96	Strong
10. Art, culture and indigenous knowledge hinder the economic and social growth of the country.	-	3 (2.9)	29 (27.6)	55 (52.4)	18 (17.7)	3.84*	weak
11. Art, culture and indigenous knowledge are matters of old generations; they are not suitable for the present social situation.	-	3 (2.9)	39 (37.1)	53 (50.5)	10 (9.5)	3.67*	weak
12. Conserving and succeeding the indigenous knowledge should be the last mission to be done because it is not an important matter of the society.	-	6 (5.7)	25 (23.8)	55 (52.4)	19 (18.1)	3.83*	weak
13. The community should set up the community learning center as a place of storing the indigenous knowledge in order to benefit the education of general people.	23 (21.9)	58 (55.2)	21 (20.0)	3 (2.9)	-	3.96	Strong

Table 10: Level of Attitude towards Indigenous Knowledge before Arrangements of Learning Activities of Community-Learning Centers (Continued)

Statements	Level of Attitude						
	5	4	3	2	1	$\bar{x}$	Results
14. Current education should take emphasis on science, technology and economics rather than indigenous knowledge since indigenous knowledge is not suitable for the present society.	-	15 (14.3)	37 (35.2)	39 (37.1)	14 (13.3)	3.50*	weak
15. Conservation of art and culture unnecessarily wastes the budget.	-	12 (11.4)	31 (29.5)	51 (38.6)	11 (10.5)	3.58*	weak
16. General people need not to conserve the indigenous knowledge since some government bodies are responsible for this matter directly.	-	6 (5.7)	23 (21.9)	54 (51.4)	22 (21.0)	3.88*	weak
17. You are able to implement abilities and skills obtained from arrangements of indigenous knowledge learning.	16 (15.2)	67 (63.8)	13 (12.4)	9 (8.6)	-	3.86	Strong
18. You are able to apply the indigenous knowledge to modern knowledge.	24 (22.9)	62 (59.0)	16 (15.2)	3 (2.9)	-	4.02	Strong
19. You prefer acquiring new indigenous knowledge in various local areas.	22 (21.0)	54 (51.4)	29 (27.6)	-	-	3.93	Strong

Table 10: Level of Attitude towards Indigenous Knowledge before Arrangements of Learning Activities of Community-Learning Centers (Continued)

Statements	Level of Attitude						
	5	**4**	**3**	**2**	**1**	$\bar{x}$	**Results**
20. You are able to take knowledge obtained from indigenous knowledge learning to solve problems, have self-adjustment and self-development in your life.	18 (17.1)	61 (58.1)	62 (24.8)	-	-	3.92	Strong
Total	**328**	**1,095**	**574**	**136**	**3**	**3.76**	**Strong**

When considering the mean of attitude towards indigenous knowledge at each learning center, the mean ($\bar{x}$) of Wat Phai Hoo Chang Learning Center equaled to 3.785, and the means of Wat Sookwatanaram School Learning Center and Bang Pasi SAO. Learning Center equaled to 3.775 and 3.733 respectively with Standard Deviation (S.D.) at 0.407, 0.380 and 0.438 respectively.

When considering the overall attitude, the mean of attitude before indigenous knowledge learning at those community learning centers equaled to 3.766 with S.D. at 0.403.

Table 11 : Mean of Attitude before Arrangements of Learning Activities of Community-Learning Centers

Learning Center	N	Pre-test	
		Mean	S.D.
Bang Pasi SAO	30	3.733	0.407
Wat Sookwatanaram School	42	3.775	0.380
Wat Phai Hoo Chang	33	3.785	0.438
Total	105	3.766	0.403

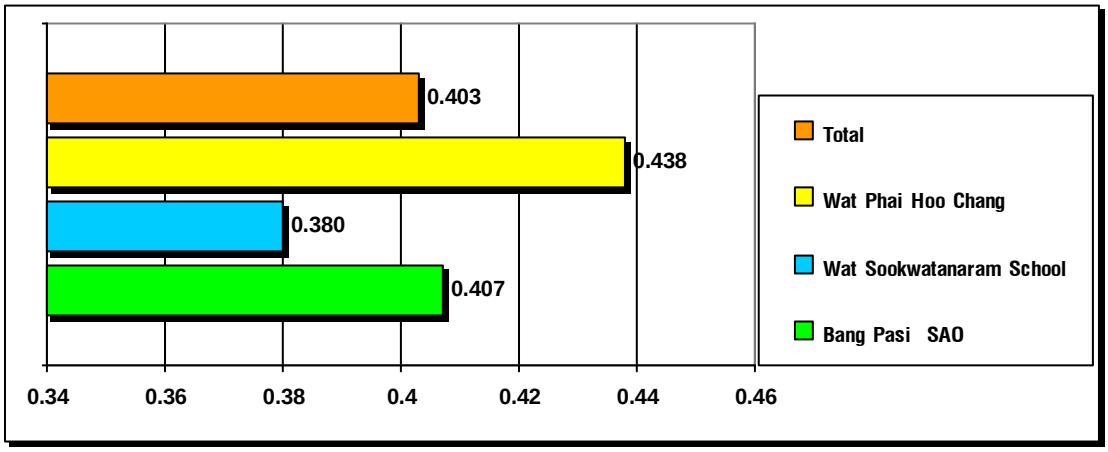

Chart 2: Mean of Attitude before Arrangements of Learning Activities of Community-Learning Centers

2.2 Comparison of attitude between community-learning centers towards indigenous knowledge before participation in learning activities

When comparing the mean of attitude of the sample group between community-learning centers towards indigenous knowledge before arrangements of learning activities in those 3 centers by way of Variance Analysis (ANOVA), F value equaled to 0.142 and the statistic significance was at 0.867.

This could be concluded that no significant difference was found in the attitude towards indigenous knowledge before arrangements of learning activities in each learning center at the statistic level of 0.05.

Table 12: Comparison of Attitude between Community-Learning Centers towards Indigenous Knowledge before Arrangements of Learning Activities

	Sum of Squares	df	Square	F	Sig.
Between groups	0.047	2	0.024	.142	.867
In the group	16.880	102	0.165		
Total	16.927	104			

2.3 Attitude towards Indigenous Knowledge Participation in Learning Activities of Community-Learning Centers

For attitude of the sample group participating in indigenous knowledge sharing and learning activities, the results showed that the mean of attitude towards the indigenous knowledge before learning (pre-test) equaled to 4.24 or the evaluation result was at the strongest level.

When considering sub-issues, it was found that the attitude in almost issues was at the strongest level, except the following issues, “Local art and culture reflect our ancestors’ wisdom and they are useful for studying of art and culture” with mean at 4.06; “Art, culture and indigenous knowledge hinder the economic and social growth of the country” with mean at 3.91; and “Conserving and succeeding the indigenous knowledge should be the last mission to be done because it is not an important matter of the society” with mean at 4.19 because the attitude towards these three issues were at the strong level. For the issue, “Learning of art, culture and indigenous knowledge was out-of-date education” with mean at 2.95, the attitude towards it was at the medium level.

Table 13: Level of Attitude towards Indigenous Knowledge after Arrangements of Learning Activities of Community-Learning Centers

Statements	Level of Attitude						
	5	**4**	**3**	**2**	**1**	$\bar{x}$	**Results**
1. We are able to apply knowledge obtained from indigenous knowledge learning to the daily life.	70 (66.7)	34 (32.4)	-	-	1 (1.0)	4.64	Strongest
2. Important culture and traditions succeeded by ancestors are useful and worthwhile for community living	64 (61.0)	25 (23.8)	12 (11.4)	4 (3.8)	-	4.42	Strongest
3. Indigenous knowledge learning forms the guideline of occupation setting and income.	64 (61.0)	20 (19.0)	17 (16.2)	1 (1.0)	3 (2.9)	4.34	Strongest
4. Indigenous knowledge helps you understand the principles of living and self-reliance so you can live happily.	13 (12.4)	10 (9.5)	30 (28.6)	12 (11.4)	-	2.47	Strongest
5. Learning of art, culture and indigenous knowledge was out-of-date education.	14 (13.3)	26 (24.8)	29 (27.6)	13 (12.4)	23 (21.9)	2.95	Medium
6. Local art and culture reflect our ancestors' wisdom and they are useful for studying of art and culture.	53 (50.5)	26 (24.8)	14 (13.3)	3 (2.9)	9 (8.6)	4.06	Strong
7. Indigenous knowledge learning makes you realize the value and significance of indigenous knowledge more.	68 (64.8)	33 (31.4)	-	-	4 (3.8)	4.53	Strongest
8. Sustaining indigenous knowledge is the duty of every community member.	65 (61.9)	21 (20)	15 (14.3)	4 (3.8)	-	4.40	Strongest

Table 13: Level of Attitude towards Indigenous Knowledge after Arrangements of Learning Activities of Community-Learning Centers (Continued)

Statements	Level of Attitude						
	5	4	3	2	1	$\bar{x}$	Results
9. Providing knowledge and valuing occupations, lifestyle and community culture are the ways of forming attitude and awareness of conserving the indigenous knowledge.	71 (67.6)	19 (18.1)	11 (105)	4 (3.8)	-	4.50	Strongest
10. Art, culture and indigenous knowledge hinder the economic and social growth of the country.	3 (2.9)	1 (1.0)	36 (34.3)	27 (25.7)	38 (36.2)	3.91 *	Weak
11. Art, culture and indigenous knowledge are matters of old generations; they are not suitable for the present social situation.	-	1 (1.0)	16 (15.2)	39 (37.1)	49 (46.7)	4.30 *	Weakest
12. Conserving and succeeding the indigenous knowledge should be the last mission to be done because it is not an important matter of the society.	-	-	30 (28.6)	25 (23.8)	50 (18.1)	4.19 *	Weak
13. The community should set up the community learning center as a place of storing the indigenous knowledge in order to benefit the education of general people.	68 (64.8)	24 (22.9)	9 (8.6)	3 (2.9)	1 (1.0)	4.48	Strongest
14. Current education should take emphasis on science, technology and economics rather than indigenous knowledge since indigenous knowledge is not suitable for the present society.	6 (14.3)	1 (1.0)	18 (17.1)	18 (17.1)	62 (59.0)	4.23 *	Weakest

Table 13: Level of Attitude towards Indigenous Knowledge after Arrangements of Learning Activities of Community-Learning Centers (Continued)

Statements	Level of Attitude						
	5	**4**	**3**	**2**	**1**	$\bar{x}$	**Results**
15. Conservation of art and culture unnecessarily wastes the budget.	-	6 (5.7)	23 (21.9)	15 (14.3)	61 (58.1)	4.25*	Weakest
16. General people need not to conserve the indigenous knowledge since some government bodies are responsible for this matter directly.	-	3 (2.9)	13 (12.4)	6 (5.7)	83 (79.0)	4.58*	Weakest
17. You are able to implement abilities and skills obtained from arrangements of indigenous knowledge learning.	83 (79.0)	18 (17.1)	1 (1.0)	3 (2.9)	-	4.72	Strongest
18. You are able to apply the indigenous knowledge to modern knowledge.	86 (81.9)	19 (18.1)	-	-	-	4.64	Strongest
19. You prefer acquiring new indigenous knowledge in various local areas.	83 (79.0)	6 (5.7)	13 (12.4)	3 (2.9)	-	4.58	Strongest
20. You are able to take knowledge obtained from indigenous knowledge learning to solve problems, have self-adjustment and self-development in your life.	83 (79.0)	18 (17.1)	1 (1.0)	3 (2.9)	-	4.72	Strongest
Total	**1228**	**429**	**288**	**65**	**50**	**4.245**	**Strongest**

When considering the mean of attitude towards indigenous knowledge after learning (post-test) at each learning center, the mean ($\bar{x}$) of Wat Sookwatanaram School Learning Center equaled to 4.289, and the means of Wat Phai Hoo Chang Learning Center and SAO. Bang Pasi Learning Center equaled to 4.245 and 4.190 respectively with Standard Deviation (S.D.) at 0.515, 0.536 and 0.660 respectively.

When considering the overall attitude, the mean of attitude before indigenous knowledge learning at those community learning centers equaled to 4.242 with S.D. at 0.562.

Table 14: Mean of attitude towards indigenous knowledge after arrangements of learning activities of community-learning centers

Learning Center	N	Post-test	
		Mean	S.D.
Bang Pasi SAO.	30	4.190	0.660
Wat Sookwatanaram School	42	4.285	0.515
Wat Phai Hoo Chang	33	4.245	0.536
Total	105	4.245	0.562

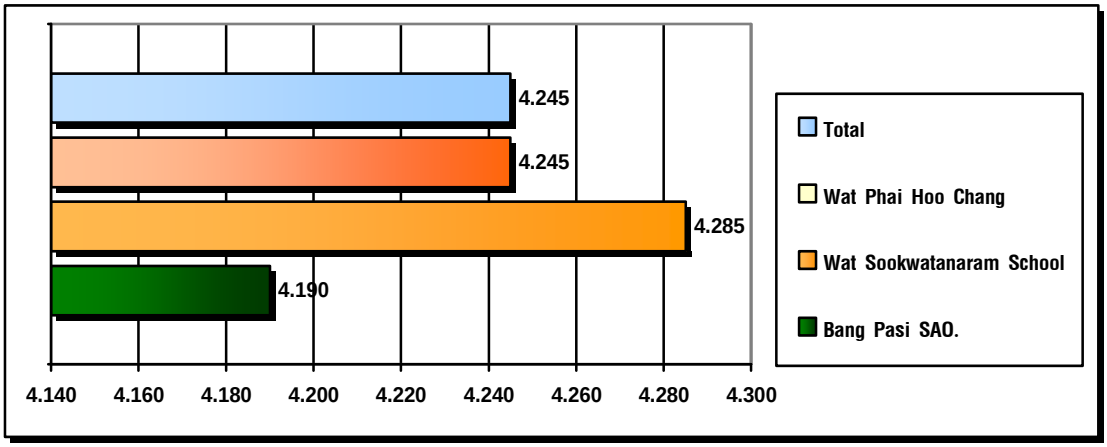

Chart 3: Mean Of Attitude towards Indigenous Knowledge after Arrangements of Learning Activities of Community-Learning Centers

2.4 Comparison of Attitude towards Indigenous Knowledge before and After Participation in Learning Activities

The attitude towards indigenous knowledge before and after participation in learning activities of each learning center was as follows: means of Wat Phai Hoo Chang Learning Center before and after participation in learning activities equaled to 3.785 and 4.245; means of Wat Sookwatararom School equaled to 3.775 and 4.285; and means of Bang Pasi SAO. equaled to 3.733 and 4.190. When considering the overall attitude of the sample group in all 3 learning centers, the means of attitude before and after participation in learning activities equaled to 3.766 and 4.245 respectively.

Table 15: Mean of Attitude towards Indigenous Knowledge Before and After Arrangements of Learning Activities of Community-Learning Centers

Learning Center	N	Pre-test		Post-test	
		Mean	S.D.	Mean	S.D.
Bang Pasi SAO.	30	3.733	0.407	4.190	0.660
Wat Sookwatanaram School	42	3.775	0.380	4.285	0.515
Wat Phai Hoo Chang	33	3.785	0.438	4.245	0.536
Total	105	3.766	0.403	4.245	0.562

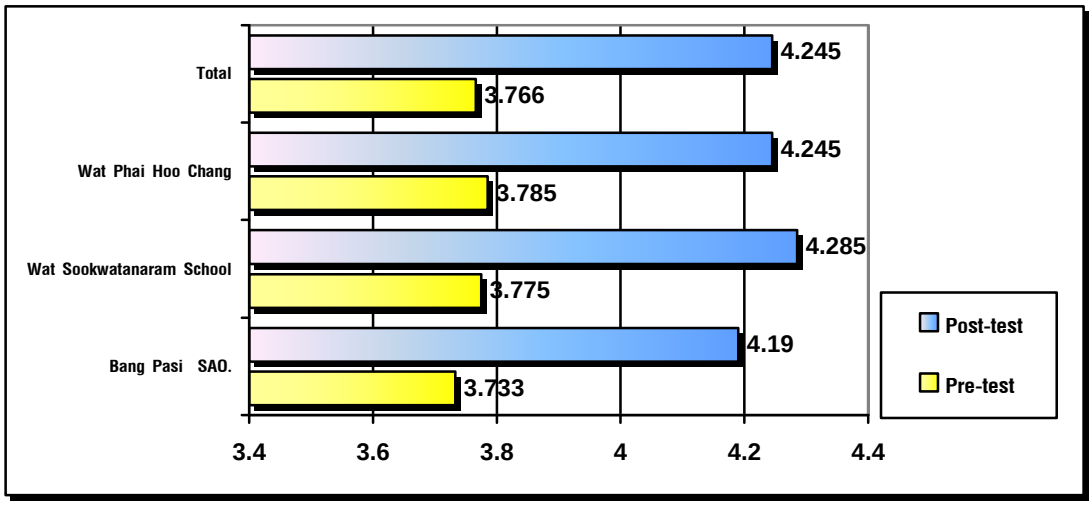

Chart 4: Mean of Attitude towards Indigenous Knowledge Before and After Arrangements of Learning Activities of Community-Learning Centers

When comparing the overall achievement of the attitude towards indigenous knowledge received by the sample group, the means of pre-test and post-test equaled to 3.766 and 4.245 respectively with S.D. at 0.403 and 0.562. When comparing the difference of pre-test scores and post-test scores by t-test, t value equaled to 7.644 and the statistic significance was at 0.00.

This could be concluded that the scores of attitude towards indigenous knowledge of the sample group after arrangements of learning activities increased significantly at the statistic level of 0.05.

Table 16: Comparison of Mean of Indigenous Knowledge before and after Arrangements of Learning Activities of Community-Learning Centers

Test	N	$\bar{x}$	S.D.	t	Sig.
Pre-test	105	3.766	.403	7.644	0.00
Post-test	105	4.245	.562		

df= 104

When comparing the means of attitude towards indigenous knowledge by analyzing t value (t-test) of pre-test scores and post-test scores for the participation of the sample group in learning activities in each of 3 learning centers, the results were as follows:

1) Bang Pasi SAO. Community Learning Center

The results showed that the pre-test scores equaled to 3.773 and post-test scores equaled to 4.190 with S.D. at 0.407 and 0.660. When using t-test to compare the difference between pre-test scores and post-test scores, t value equaled to 3.226 at a significance of 0.001.

The above results led to a conclusion that the attitude of the sample group towards indigenous knowledge after arranging learning activities at SAO. Bang Pasi Community Learning Center increased significantly at a statistic test level of 0.05.

Table 17: Comparison of mean of attitude towards indigenous knowledge before and after arrangements of learning activities of Bang Pasi SAO. Community Learning Center

Test	N	$\bar{x}$	S.D.	t	Sig.
Pre-test	30	3.733	0.407	3.226	.001
Post-test	30	4.190	0.660		

df = 58

2) Wat Sookwatanaram School Community Learning Center

The results showed that the pre-test scores equaled to 3.775 and post-test scores equaled to 4.285 with S.D. at 0.380 and 0.515. When using t-test to compare the difference between pre-test scores and post-test scores, t value equaled to 2.899 at a significance of 0.000.

The above results led to a conclusion that the attitude of the sample group towards indigenous knowledge after arranging learning activities at Wat Sookwatanaram Community Learning Center increased significantly at a statistic test level of 0.05.

Table 18: Comparison of Mean of Attitude towards Indigenous Knowledge before and after Arrangements of Learning Activities of Wat Sookwatanaram School Community Learning Center

Test	N	$\bar{x}$	S.D.	t	Sig.
Pre-test	42	3.775	0.308	5.156	0.000
Post-test	42	4.285	0.515		

df = 82

3) Wat Phai Hoo Chang Community Learning Center

The results showed that the pre-test scores equaled to 3.785 and post-test scores equaled to 4.245 with S.D. at 0.483 and 0.536. When using t-test to compare the difference between pre-test scores and post-test scores, t value equaled to 3.823 at a significance of 0.000.

The above results led to a conclusion that the attitude of the sample group towards indigenous knowledge after arranging learning activities at Wat Phai Hoo Chang Community Learning Center increased significantly at a statistic test level of 0.05.

Table 19: Comparison of Mean of Attitude towards Indigenous Knowledge Before and After Arrangements of Learning Activities of Wat Phai Hoo Chang Community Learning Center

Test	N	$\bar{x}$	S.D.	t	Sig.
Pre-test	33	3.785	0.438	3.823	0.000
Post-test	33	4.245	0.536		

df = 64

2.5 Comparison of attitude between community learning centers towards indigenous knowledge after participation in learning activities

When comparing the mean of attitude of the sample group between community-learning centers towards indigenous knowledge after arrangements of learning activities in those 3 centers by way of Variance Analysis (ANOVA), F value equaled to 0.244 and the statistic significance was at 0.783.

This could be concluded that no significant difference was found in the attitude towards indigenous knowledge after arrangements of learning activities in each learning center at the statistic level of 0.05.

Table 20: Comparison of Attitude towards Indigenous Knowledge after Arrangements of Learning Activities of Community Learning Centers

	Sum of Squares	df	Square	F	Sig.
Between groups	0.156	2	0.078	0.244	0.784
In the group	32.691	102	0.321		
Total	32.848	104			

3. Participation in Indigenous Knowledge Management

The participation in indigenous knowledge management of Amphoe Bang Len was surveyed by distributing the questionnaires to be filled out by 32 representatives of schools, temples and Sub-district Administrative Organizations that have jointly operated or coordinated with the Candidate for the management of community learning centers of Amphoe Bang Len. The results of this part were shown below.

3.1 Participation in project or activity initiation

For the overall participation in project or activity initiation dealing with indigenous knowledge management, it was found that the participation was strong ($\bar{x}$ = 3.73). When considering in each aspect, the participations in finding out causes or solutions of indigenous knowledge problems, creating and proposing ways of indigenous knowledge promotions, and attending meetings and discussions with related agencies were at the strongest level ($\bar{x}$ = 4.38, 4.22 and 4.38) while the participations in examining problems about indigenous knowledge, and acting as operating committees or advisors on activities of promoting, learning and conserving indigenous knowledge were at the strong level ($\bar{x}$ = 4.03 and 3.78).

Table 21: Level of participation in project or activity initiation

Issues	Level of Participation						
	5	**4**	**3**	**2**	**1**	$\bar{x}$	**Results**
Project or activity initiation							
1. Examining problems about indigenous knowledge.	16 (18.8)	5 (40.6)	9 (28.1)	-	2 (6.3)	4.03	Strong
2. Finding out causes or solutions of indigenous knowledge problems.	18 (56.3)	12 (37.5)	-	-	2 (6.3)	4.38	Strongest
3. Creating and proposing ways of indigenous knowledge promotions.	15 (46.9)	11 (34.3)	4 (12.5)	2 (6.3)	-	4.22	Strongest
4. Attending meetings and discussions with related agencies	20 (62.5)	6 (18.8)	4 (12.5)	2 (6.3)	-	4.38	Strongest
5. Acting as operating committees or advisors on activities of promoting, learning and conserving indigenous knowledge	11 (34.4)	6 (18.8)	13 (40.6)	1 (3.1)	1 (3.1)	3.78	Strong
Total	**64**	**38**	**27**	**14**	**16**	**3.73**	**Strong**

3.2 Participation in planning

For the overall participation in planning about indigenous knowledge management, it was at the strong level ($\bar{x}$ = 3.74). When considering in each aspect, the participations in planning for indigenous knowledge executions, planning for problem solutions and planning for action plans of indigenous knowledge promotion were at the strongest level ($\bar{x}$ = 4.47, 4.31 and 4.22) while the participation in planning for the follow-up and evaluation of indigenous knowledge executions was at

the strong level ($\bar{x}$ = 3.31), but the participation in planning for compilation of information, documents and textbooks regarding indigenous knowledge was at the weak level ($\bar{x}$ = 2.56).

Table 22: Level of participation in planning

Issues	Level of Participation						
	5	**4**	**3**	**2**	**1**	$\bar{x}$	**Results**
Planning							
1. Planning for indigenous knowledge executions.	18 (56.3)	13 (40.6)	-	-	1 (3.1)	4.47	Strongest
2. Planning for problem solutions caused by indigenous knowledge promotions.	18 (56.3)	8 (25.0)	4 (12.5)	2 (6.3)	-	4.31	Strongest
3. Planning for action plans of indigenous knowledge promotion.	18 (56.3)	6 (18.8)	6 (18.8)	1 (3.1)	1 (3.1)	4.22	Strong
4. Planning for compilation of information, documents and textbooks regarding indigenous knowledge.	5 (15.6)	3 (9.4)	8 (25.0)	5 (15.6)	11 (34.3)	2.56	Weak
5. Planning for the follow-up and evaluation of indigenous knowledge executions.	5 (15.6)	8 (25.0)	9 (28.1)	6 (18.8)	4 (12.5)	3.13	Strong
Total	**69**	**42**	**27**	**14**	**16**	**3.74**	**Strong**

3.3 Participation in practice

Regarding the overall participation in practice or execution of indigenous knowledge management, it was found that it was at the strong level ($\bar{x}$ = 4.10). When considering in each aspect, the participations in each issue were at the strong level ($\bar{x}$ = 4.09, 4.09, 4.22 and 4.00).

Table 23: Level of participation in practice

Issues	Level of Participation						
	5	**4**	**3**	**2**	**1**	$\bar{x}$	**Results**
Practice							
1. Participation in activities relating to indigenous knowledge promotions.	13 (40.6)	10 (31.3)	8 (25.0)	1 (3.1)	-	4.09	Strong
2. Coordination with officers relating to carrying out indigenous knowledge promotion projects or activities.	14 (56.3)	7 (21.9)	11 (34.4)	-	-	4.09	Strong
3. Dissemination of knowledge and information about indigenous knowledge promotions.	17 (53.1)	8 (25.0)	5 (15.6)	1 (3.1)	1 (3.1)	4.22	Strong
4. Participation in activities for indigenous knowledge promotions.	15 (46.9)	7 (21.9)	7 (21.9)	1 (3.1)	2 (6.3)	4.00	Strong
Total	**59**	**32**	**31**	**2**	**3**	**4.10**	**Strong**

3.4 Participation in indigenous knowledge utilization

Regarding the overall participation in utilizing the execution of indigenous knowledge management, it was at the strongest level ($\bar{x}$ = 4.36). When considering in each aspect, the participation in utilizing, learning and conserving indigenous knowledge as the lifestyle learning source was at the strongest level ($\bar{x}$ = 4.56) while the participation in allocating benefits derived from indigenous knowledge promotions to community members was at the strong level ($\bar{x}$ = 4.16).

Table 24: Level of participation in indigenous knowledge utilization

Issues	Level of Participation						
	5	**4**	**3**	**2**	**1**	$\bar{x}$	**Results**
Utilization							
1. Allocating benefits derived from indigenous knowledge promotions to community members.	16 (50.0)	7 (21.9)	7 (21.9)	2 (6.3)	-	4.16	Strong
2. Utilizing, learning and conserving indigenous knowledge as the lifestyle learning source.	24 (75.0)	5 (12.5)	11 (34.4)	1 (3.1)	-	4.56	Strongest
Total	**40**	**11**	**18**	**3**	**0**	**4.36**	**Strongest**

3.5 Participation in maintenance

Regarding the overall participation in indigenous knowledge maintenance, it was at the strong level ($\bar{x}$ = 4.09). When considering in each aspect, the participations in maintaining products from indigenous knowledge promotion projects or activities and in jointly solving problems derived from indigenous knowledge promotion projects or activities was at the strong level ($\bar{x}$ = 4.09 and 4.09).

Table 25: Level of participation in maintenance

Issues	Level of Participation						
	5	**4**	**3**	**2**	**1**	$\bar{x}$	**Results**
Maintenance							
1. Maintaining products from indigenous knowledge promotion projects or activities.	13 (40.6)	10 (31.3)	8 (25.0)	1 (3.1)	-	4.09	Strong
2. Jointly solving problems derived from indigenous knowledge promotion projects or activities.	14 (43.8)	7 (21.9)	11 (34.3)	-	-	4.09	Strong
Total	**27**	**17**	**19**	**1**	**0**	**4.09**	**Strong**

3.6 Participation in evaluation and follow-up

For the overall participation in the follow-up and evaluation of indigenous knowledge management, it was at the strongest level ($\bar{x}$ = 4.58). When considering in each aspect, the participations in controlling and supervising indigenous knowledge promotions and in following up and evaluating the indigenous knowledge promotion projects or activities were at the strongest level ($\bar{x}$ = 4.66 and 4.50).

Table 26: Level of participation in evaluation and follow-up

Issues	Level of Participation						
	5	**4**	**3**	**2**	**1**	$\bar{x}$	**Results**
Follow-up and Evaluation							
1. Controlling and supervising indigenous knowledge promotions.	24 (75.0)	6 (18.8)	1 (3.1)	1 (3.1)	-	4.66	Strongest
2. Following up and evaluating the indigenous knowledge promotion projects or activities.	24 (75.0)	8 (25.0)	-	-	-	4.50	Strongest
Total	**48**	**12**	**1**	**1**	**0**	**4.58**	**Strongest**

Indigenous Knowledge Management Model

From studying the indigenous knowledge management forms of Amphoe Bang Len, Nakhon Pathom, the indigenous knowledge management process could be divided into 4 steps: knowledge creation, knowledge storing, knowledge distribution and knowledge application. These 4 steps went on continuously as the knowledge cycle. The details of each step were as follow:

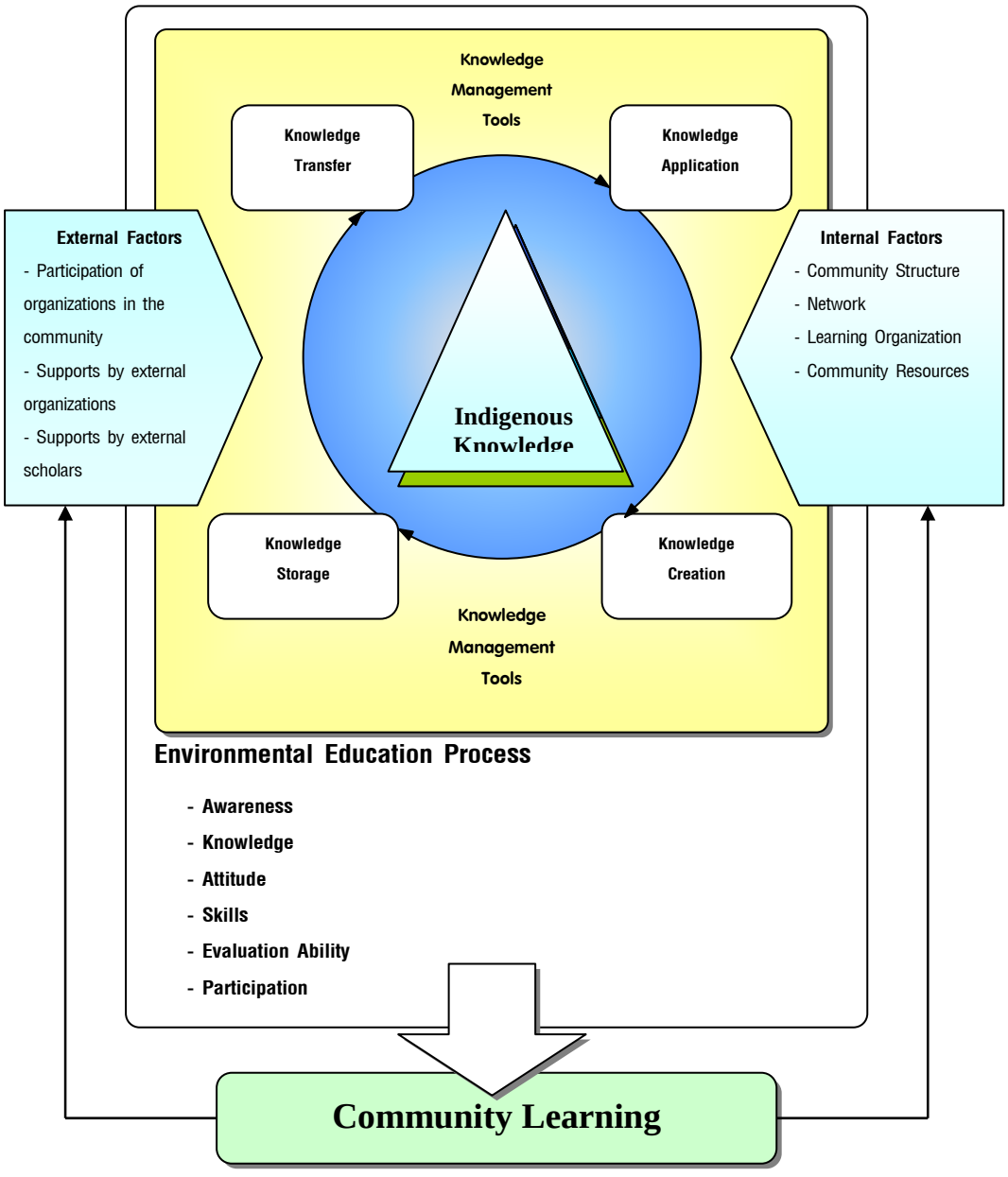

Figure 5: Indigenous knowledge management model

1. Knowledge Creation

Regarding the indigenous knowledge management of Amphoe Bang Len, knowledge creation was the first step of indigenous knowledge management. Knowledge creation meant forming new knowledge or taking external knowledge to the community. The existing knowledge was in 2 forms: explicit knowledge and tacit knowledge.

Knowledge creation must have one important sub-element, that is, knowledge defining by indicating which indigenous knowledge the community held, which knowledge the community still lacked or desired, where and with whom that indigenous knowledge source stayed. This knowledge defining was done through the group process of that community. Knowledge creation also needed knowledge management tools to seek and search for knowledge. The knowledge creation might emerge through knowledge transfer as well.

2. Knowledge Storing

Knowledge storing might emerge at every step of indigenous knowledge management process. Knowledge storing would follow the knowledge creation step. Knowledge storing started from knowledge capture of knowledge transferor (local expert), knowledge organizing to simplify the knowledge management, access and reuse. Knowledge storing was in various forms, but important step was the knowledge codification. The indigenous knowledge would be classified into 2 types: explicit knowledge, which was kept in form of documents, and materials that could be searched, accessed and utilized; and tacit knowledge, which was kept in memories of workers or performers. Therefore, management and storing tools were important. The knowledge storing tools such as information technology tools, computer and knowledge database might be in form of knowledge mapping. For the indigenous knowledge management of Amphoe Bang Len, the knowledge storing process of school learning centers was done on the basic structure or explicit supporting system; meanwhile, learning centers like temple or SAO. were based on various management forms and management tools.

3. Knowledge Distribution

Knowledge distribution or knowledge transfer was to transfer knowledge from person to person by using some knowledge transfer tools such as training,

working observation, etc. In respect with knowledge distribution, knowledge consisted of 2 parts: explicit knowledge and tacit knowledge; so knowledge transfer methods and tools were different. The distribution or transfer of tacit knowledge certainly dealt with the organization culture that supported the knowledge sharing. In the step of knowledge distribution and dissemination, the important issue was the knowledge screening process, that is, the community had to answer the question, "which knowledge has not yet existed there or is desired there?" in order to trap such knowledge for the community. Some persons focused on the channels of knowledge distribution or dissemination and knowledge based system to support the community knowledge management.

The candidate proposed the indigenous knowledge learning process occurred in Amphoe Bang Len, Nakhon Pathom with regards to model, learning process, network and media and learning materials. The related information came from the synthesis of documents and interviews of local experts. The details of this part were as follows:

1.) Transferred contents – The contents transferred to community members or other interested persons involved knowledge and experience in each area of indigenous knowledge, which might be the specific knowledge; for example, in part of agriculture, e.g. knowledge and experience regarding mixed planting, making the organic fertilizer, planting non-toxic plants, drip irrigation system, soil caring method, fish feeding, product increasing techniques, etc.; in part of industry and handicraft, e.g. knowledge and experience about cloth weaving, making Thai musical instruments, basketry, etc.; in part of art, culture and tradition, e.g. singing, Mor Lum, plays, knowledge base about traditions, rites, dialects, folk songs, verses, tales and local background, etc.

Some of those contents dealt with occupations; so persons receiving such knowledge and experience could apply them for their occupations or improve existing ones or create new ones. For general knowledge, it might be applied to general living or to improve the quality of life. Therefore, knowledge from local wisdom involved both general knowledge and specific knowledge about occupations.

2.) Knowledge transfer process – Each indigenous knowledge, as surveyed and interviewed by the Candidate, has been transferred by various transfer

processes, e.g. lecture, demonstration, experiment, practice, exhibition, meeting and seminar, group discussion among local people, brainstorming, working observation, man-to-man practice, group practice, studying from the real sample, studying from documents, studying from videos and other media, teaching before going to have personal practice and returning to continue practicing with indigenous knowledge teaches, etc. The transfer process also depended on the type of knowledge to be transferred. However, the most favorite transfer method used by local experts was telling or explaining before allowing learners to have their own practice. Such telling or explanation by most local experts did not rely on any textbook since that knowledge base and experience stayed in those local experts. Such knowledge and experience were transferred from local experts' mind and memory by way of telling, allowing learners to follow them, and observing real samples or pieces of work before giving more advice until learners could do that work. After that, the local experts would ask the learners to help the work being performed by local experts. Knowledge transfer was to explain basic knowledge without any text, to allow learners to help doing some pieces of work and to give some advice simultaneously. The learners were also able to observe local experts' working from the real sample done in each step until that sample work was completed.

For other indigenous knowledge, the knowledge transfer process was similar, depending on the complexity of that indigenous knowledge. In some aspects, e.g. making herbal medicine, hot compress, balm, etc., the indigenous knowledge teachers let learners have real practice. The learners were assigned to help indigenous knowledge teachers at every step starting from digging out herbs, washing, cutting, grinding and other actions until the product came out. The learners had learning while helping the teachers until they were able to do that work by themselves. The learners might have the different learning objectives; some came to have observations whereas some desired to have intensive practice so that they could do those works as their occupations.

3.) Materials and instruments for knowledge transfer – Materials and instruments used for knowledge transfer depended on each type of knowledge. Most materials and instruments were used in the real working. In most practice steps, the materials were real; for example, basketry, organic fertilizer making, food cooking,

etc. In case of using real materials, some teachers might prepare them for learners but some teachers might ask learners to prepare materials.

Regarding working observations, in case of mass production, the learners might have observations at the production source or plants actually manufacturing those products so that all production steps were observed. The observations might be at other production sources to allow learners to have some experience from real production sources until they had good knowledge and understanding to be applied in earning for living.

4. Knowledge Application

Knowledge application was an important step. The indigenous knowledge application might come from existing knowledge base or searching for new knowledge, which turned back to the first step of knowledge management, that is, knowledge creation or knowledge re-searching. When the knowledge application and execution were finalized, new information and experience would occur; for example, application of indigenous knowledge base in part of agriculture to each area and it became a new knowledge base of that community. The external knowledge base has been applied to the local environment and culture until it became the community indigenous knowledge, e.g. water hyacinth weaving, making thai sweets, food transformation, farming, organic agriculture, non-toxic agriculture, orchid farming, etc.

5. Internal Factors and External Factors

Factors supporting knowledge management included internal factors and external factors; namely,

5.1 Internal factors, e.g. community structure, network, learning organization and community resources.

Community organization structure, for example, support by the old generation in the community by implanting in the young men and women the significance of inheriting the Thai Songdam culture so that it may not fade away from the community. The community may hold activities to maintain, develop and revive the local culture. From an interview, the researcher finds that internal factors conducive to the community's learning process come from the fact that the social

structure of that community is strong, family relations are good and the locals deeply love their homeland.

Network setting – According to this study, each indigenous knowledge teacher has tried to disseminate, succeed and enlarge that knowledge by forming the network and coordinating with various agencies, educational institutes and organizations earlier inviting him/her to disseminate such indigenous knowledge, or contacting any groups interested in that indigenous knowledge. The indigenous knowledge teacher might set the network with schools, colleges, universities, agencies arranging the non-formal education, indigenous knowledge learning centers in other areas, and groups or clubs such as Thai Traditional Medicine Association. These networks might have various joint activities, e.g. meeting, seminar, working observation, information distribution in many forms such as radio program, television program, knowledge lecture, shared learning forum and working observation for successful groups, etc. Those activities not only enlarged indigenous knowledge and experience, they could provide help and supports with each other so that the activities could be continued and developed.

Learning organization - Learning centers effectively facilitate transfer of knowledge to one another and they also learn from external sources. From a study, the researcher finds that community learning through the transfer of knowledge, i.e. offering information, training by public and private sectors, plays a key role in urging learning process in the community. For instance, training in the form of a demonstration: weaving, dessert making, cooking techniques by local instructors with intellectual property. In addition to the training, the learning process comes from idea exchange among community members and with other communities through experience sharing.

Community resources - Community resources, namely, the community learning resources such as learning centers, library, information centers, community learning center, which feature a collection of journals from various organizations and information from other communities. All of them are factors facilitating community learning.

5.2 External factors, e.g. participation of persons outside the community, supports by external organizations and supports by external scholars.

Supports from the public sector in terms of budget, public relations encourage learning process in the community. For example, the Thai Songdam Cultural Center, Ban Ko Raet has received budgetary supports from such public organizations as Mahidol University and the Community Development Office to make signboards, tags, folders, and public relations activities.

The organizations involving the indigenous knowledge base management affecting the knowledge base management and changes in the community included:

1) The State's execution, e.g. District Agriculture, Community Development, Non-formal Education, Mahidol University, Kasetsart University, etc.

2) Activities of private development organizations, e.g. Thai Song Dam Foundation of Thailand, Thai Dam Association of Thailand, and private organizations, etc.

3) Community network groups, e.g. Research Network in Bang Len Research Project, Rak Tha Chin Group, Housewife Group, Farmer Group, etc.

The knowledge cycle not only inherits intellectual properties to another generation but also encourage learning in the community and people in the community realize the significance of learning, understanding, attitude, skills, participation and capability of evaluating their own intellectual properties. Therefore, intellectual property management requires an integrated educational administration in line with the local lifestyle, conditions and intellectual properties.

Indigenous knowledge management needs the educational model integrated to be consistent to the lifestyle and condition, and indigenous knowledge of each community. This concept is relevant to the environmental education process, which consisted of 3 education arrangement patters: education about environment, education in environment, and education for environment by using the involvement process to transfer, share and learn with each other in each local community where knowledge base and community demand are connected together. This process also encourages each local community to recognize the significance of knowledge transfer and sharing process in combination of indigenous knowledge in order to form the learning community.

The community learning process aimed at the community strength, which consisted of ability of economic self-reliance, ability of solving community problems, community identity and community sustainability. Goals of community learning process were:

1. To transfer knowledge, skills and wisdom in earning for living and living based on existing resources and environment of that community.

2. To transfer community belief and value until they became the community unique identity, and such unique attributes were succeeded endlessly.

3. To have learning and experience sharing among community members regarding using the indigenous knowledge to solve problems of individuals or those of community.

To become a learning community will strengthen factors favorable to the learning process, for example, the social structure of the community, learning network, learning centers, community resources, participation of people outside the community, supports from other organizations and from academics outside.

Therefore, the overall indigenous knowledge management of Amphoe Bang Len, Nakhon Pathom, along with the environmental education process was the combination of process until a cycle occurred, that is, there were transfers between steps and the indigenous knowledge management system has been always improved and developed until the knowledge cycle occurred. This cycle would rotate continuously and endlessly.

CHAPTER V
DISCUSSION

The study on "Environmental Education Based Indigenous Knowledge Management for Community Learning" was conducted to learn the status of knowledge base, database of indigenous knowledge of communities at Amphoe Bang Len, Nakhon Pathom, indigenous knowledge base of communities at Amphoe Bang Len, Nakhon Pathom that came from the joint learning process and participation process between schools, communities and related personnel. The results from this study could be discussed in 3 main issues:

Indigenous Knowledge Base

Indigenous Knowledge Management Model

Environmental Education Process for Indigenous Knowledge Management

Indigenous Knowledge Base

For the indigenous knowledge base of Amphoe Bang Len in this study, after analyzing each area of indigenous knowledge, the results were as follows:

1. Area of food and nutrition

There were 8 local experts (21.1%) who had expertise in cooking, e.g. Kanom Pia (Chinese cake) at Amphoe Bang Len where several persons were widely recognized as experts in Chinese cake making. In addition, there were local experts in making Thai sweets such as sweet potato pudding, sweet jackfruit seeds, sweet egg yolk thread, etc. Moreover, there were local experts in food transformation such as dried and salted fish, making red curry, chili paste in oil bean, grilled fish chili paste, etc. The indigenous knowledge in area of food and nutrition of Amphoe Bang Len might come from the abundance of resources and raw materials for production, e.g.

hen's egg and duck's egg because there were plenty of poultry farms at Amphoe Bang Len. Moreover, regarding the transformation of aquatic animals, especially dried and salted fish, the women group of dried and salted Pla Nil was set up to produce the dried and salted fish since various areas in Amphoe Bang Len and surrounding areas have fed fresh water fish such as Pla Nil, Pla Raed. Amphoe Bang Len was recognized as the biggest fresh water fish in Thailand. When some fishes were bought by merchants from other provinces, remaining small-sized fishes could have more value when they were exposed to the sun to be the dried and salted Pla Nil (from 3-6 Baht per kilo to 70 Baht per kilo).

2. Area of handicraft, home industry and Thai clothes

At Amphoe Bang Len, there were 10 indigenous knowledge experts in the area of handicraft, home industry and Thai clothes (26.3%); most of them were experts in dried water hyacinth weaving. When considering the geographical factor, these local experts have lived in Sub-districts close to Tha Chin River where contained important resources to be further developed as occupations. The shared learning process of housewife networking groups in each Sub-district also encouraged the distribution of knowledge about dried water hyacinth weaving in many Sub-districts such as Sub-district Khlong Nok Kra Tung, Sub-district Silamoon, Sub-district Sai Ngarm, Sub-district Nilpetch, etc.

There was also other wisdom about basketwork such as weaving of Mackerel basket, weaving of aquatic-animal catching tools, weaving daily-life tools made by Thai Song Dam, e.g. "Ngob" (farmer's bamboo hat) to be protected from sunshine and rain while farming, "Ga Leab" carried over the shoulder by Thai Song Dam during their traveling.

Regarding the indigenous knowledge about cloth weaving at Amphoe Bang Len, it was found in 2 Sub-districts: Baan Phai Hoo Chang of Sub-district Phai Hoo Chang, and Baan Koh Raed of Sub-district Bang Pla. These areas have been settled by Thai Song Dam or they were known as "Lao Song". Lao Song people preferred wearing black clothes made from their weaving for personal uses. Most aged women owned looms or "Gi" in their houses. This indigenous knowledge, therefore, was the cloth weaving that succeeded the culture of native cloth or Tang-Mo pattern cloth of

Thai Song Dam, which was their unique culture. This cloth was woven in the black background that was inserted by light blue or white in the vertical way. Apart from woven clothes for traditional rites of Thai Song Dam, at present, their cloth pattern was applied to other cloth patterns such as Mud-Mi pattern in order to serve the market need. At present, most Thai Song Dam people with ability in cloth weaving were aged people and their children rarely succeeded or learnt this weaving method; so there were few persons weaving this cloth. Moreover, raw materials had to be bought at other distant places while the cotton was more expensive. Sometimes, if the quality of thread was bad, the cloth would be torn easily. Another obstacle of weaving was the belief of Thai Song Dam traditionally succeeded, that is, if any cremation occurred in the village, weaving had to be stopped up to the end of that cremation in order to pay tribute to such dead person. This, so, blocked the succession of community wisdom.

3. Area of Thai traditional medicine and herbs

There were 4 local experts in Thai traditional medicine and herbs (10.5%). They were experts in massaging, pulling muscles and joints. Most massage was to press body joints to let the blood flow smoothly, which helped cure many diseases. For the indigenous knowledge about bone treatment, the bone doctor cured the broken bone by way of oil massage, herbal medicine, holy water, etc.

4. Area of art, culture and tradition

There were 10 local experts in area of art, culture and tradition (26.3%). The outstanding culture of Amphoe Bang Len belonged to Thai Song Dam people at Baan Koh Raed of Sub-district Bang Pla, Baan Phai Hoo Chang of Sub-district Phai Hoo Chang. The culture and tradition regarding playing Northeastern mouth organ, sewing the front pillow case have been succeeded by establishing a learning center where related materials and information about such tradition and culture were compiled for any interested persons.

5. Area of agriculture, management and conservation of natural resources

There were 6 local experts in the area of agriculture, management and conservation of natural resources (15.8%) such as non-toxic agriculture, organic agriculture, grouping for farmers' learning in form of "*Organic Agricultural School*", bio-fertilizer, fermented bio-extract, and reduction of chemicals in farming.

Orchid farming, planting and reproduction that might be studied and observed by general people such as Air Orchid Farm and Lab that was the biggest orchid supermarket in Thailand.

The factors supporting the emerge of wisdom in the area of agriculture, management and conservation of natural resources – Since most areas of Amphoe Bang Len were plains where the Tha Chin River that was flowing from the North to the South divided this district (Amphoe) into 2 parts. There were several canals separating from the Tha Chin River that were water sources suitable for agriculture and planting. The main canals were Khlong Bang Len, Khlong Phra Pimon, Khlong Bang Luang, Khlong Bang Sai, Khlong Bang Pasi, Khlong Nok Kra Tung, Khlong Narapirom, etc. where it was so suitable for agricultural activities.

If analyzing the indigenous knowledge subject to the concept of Ekkavit Na Thalang (1997: 11-12) that the indigenous knowledge was the knowledge base, abilities and skills derived from the accumulated experience obtained from learning process that has been selected, improved, developed and succeeded to solve problems and develop the lifestyle to be balanced with the environment and era. This might be concluded that the indigenous knowledge of Amphoe Bang Len contained high potential. In particular, the indigenous knowledge in term of handicraft was more outstanding than other areas. It was obvious that several districts valued the development of weaving skills such as basketwork made from water hyacinth at Sub-district Khlong Nok Kra Tung, Sub-district Sai Ngarm, Sub-district Nilpetch and Sub-district Silamoon, or woven cloth groups making Tang-Mo pattern cloth weaving, Mud-Mi pattern cloth weaving at Sub-district Phai Hoo Chang. These handicrafts generated more income for these communities and allowed them to have self-reliance.

The outstanding indigenous knowledge in area of art, culture and tradition consisted of the wisdom in respect with art, culture, tradition, literature. They looked

outstanding due to the variety of races such as Thai Song or Thai Song Dam, Mon and Chinese-Thai.

Regarding indigenous knowledge in area of food and nutrition, the outstanding transformed products were the dried and salted fish of Sub-district Lum Phya, Thai sweets of the Housewife Farmers Group at Bung Lad Sawai, and making the Chinese cake. This showed that nutrition was an essential part of living. This was consistent with the study of the Thailand Research Found (TRF) on "*Potential and Status of Thai Indigenous Knowledge for the Community Strength and Sustainability*" (Songjit Poonlarp, 2001: 98).

According to the analysis of indigenous knowledge at Amphoe Bang Len, such indigenous knowledge could be divided into 2 parts:

1. Conventional indigenous knowledge derived from the experience in each area; namely, cloth weaving, basketwork, folk handicraft, art and culture of Thai Song Dam, Northeastern mouth organ dance, singing Pleng Kub, Pleng Lae, Pleng Plob Gai, oil doctor, herb, etc.

2. New indigenous knowledge to be combined with local indigenous knowledge. New indigenous knowledge came from the external indigenous knowledge or the knowledge newly created or reproduced to solve problems or adjust as per some necessities and changes of relationship pattern between local communities and resource diversity in term of utilization, development and conservation of resource diversity in those local areas. The external knowledge base has been applied to the local environment and culture until it became the community indigenous knowledge, e.g. water hyacinth weaving, making Thai sweets, food transformation, farming, organic agriculture, non-toxic agriculture, orchid farming, etc.

Indigenous Knowledge Management Model

Indigenous knowledge management of Amphoe Bang Len, Nakhon Pathom consisted of 4 main steps as the knowledge cycle: knowledge creation, knowledge storing, knowledge distribution, and knowledge application.

1. Knowledge Creation or Knowledge Generation or Knowledge Acquisition

This was the community activity aiming at acquiring or creating new knowledge. The knowledge would occur when the workers in that group had strong relationship by creating cooperation and interpersonal reaction.

For the indigenous knowledge of Amphoe Bang Len in this study, the knowledge creation was done through knowledge defining in order to learn the status of knowledge base and indigenous knowledge of Amphoe Bang Len, Nakhon Pathom. Such knowledge defining was not only done to acquire the indigenous knowledge, it also led to the interpersonal learning process between the Candidate, local researchers and local experts.

2. Knowledge Storing

From defining the indigenous knowledge of communities at Amphoe Bang Len, it was found that almost agencies in Amphoe Bang Len stored the indigenous knowledge in the Indigenous Knowledge Base System (KBS). For schools at Amphoe Bang Len, they stored the information and details of indigenous knowledge clearer than other agencies, but the indigenous knowledge stored by those schools could be integrated to those schools' local curriculum only. In part of Sub-district Administrative Organizations (SAO.), most of them stored the indigenous knowledge of each community by listing names of local experts and expertise of each expert only. The information that SAOs might ask from or survey from other agencies was not done in form of systematic database or done under the explicit working method. Most obtained information was in form of local indigenous knowledge only. It was obvious that knowledge management of most organizations focused on using the information technology to compile, store and extract the organizations' explicit knowledge. This was consistent to the concept of Alavi (2000: 15-28)that knowledge should be kept by allowing the users to access into and apply it conveniently so that users could have knowledge sharing and re-use that knowledge base. Regarding knowledge base storing, according to the study of Suthalee Nomoon (2001: 51-88), indigenous knowledge has been stored and transferred through rites and traditions. In the communities without concealment of knowledge, knowledge would be always

transferred both directly and indirectly. This was consistent to Gboyega (1997: 228-231), Monroe (1980: 16) and The World Bank (2001) that it was essential to promote and disseminate the indigenous knowledge and culture. For the management of cultural heritage, it was found that the library took part in promoting and disseminating the cultural heritage, and in being the center of promoting the cultural heritage.

3. Knowledge Distribution

The shared learning of indigenous knowledge base was a process of knowledge conversion between tacit knowledge and explicit knowledge. Tacit knowledge was usually processed and stored in individuals' memories while explicit knowledge was stored in documents or files. The learning activities arranged by many agencies at Amphoe Bang Len were done in various learning forms. The learning included both theoretical learning and practical learning, that is, self-learning, learning by practice, learning by telling, lecture, training, working observation and visual education. The learning patterns could be concluded as follows:

1) Arranging career training activities concerning many aspects of indigenous knowledge base such as practicing cloth weaving of Thai Song Dam, e.g. Tang-Mo pattern cloth, Mud-Mi pattern cloth, etc. These communities recognized and valued the indigenous knowledge that could be applied to earn for living.

2) Arranging schools' learning activities through local curriculum – The schools turned the indigenous knowledge base to be their educational curriculum that was integrated to learning contents such as activities of learning folk songs, Pleng Lae, Pleng Plob Gai or learning the art and culture of Thai Song Dam.

Moreover, the indigenous knowledge learning process of Amphoe Bang Len was the natural or lifestyle learning system inserted in the daily life and rites. This was the socialization (Vichai Tansiri, 1993: 60), e.g. Saen Ruan tradition, Northeastern mouth organ dance of Thai Song Dam, etc. Supatra Suparb (1994: 47-48) stated that the socialization was essential for humans since it was humans' lifelong process and it seemed the method of transferring the culture.

The result of this study showed that the indigenous knowledge transfer of Amphoe Bang Len could be divided into 3 levels: individual, community and inter-

community. This result was consistent to Ratchapol Punchapiboon (1995: 46-74), Suthalee Nomoon (2001: 51-88), Orathai Jitthaisong (2001: 51-113) and Ratana Tohsakul et al. (2005: 214-225).

1) Individual level – Persons in charge of knowledge transfer included the family, relative, aged people and local expert by way of practicing, teaching and advising by relying on the socialization. The materials used in knowledge transfer were real working tools or persons. The transferred contents involved traditions, culture and lifestyles; for example, culture of Thai Song Dam at Baan Koh Raed, Sub-district Bang Pla, Sub-district Phai Hoo Chang, or culture of Mon at Bung Lad Sawai, Sub-district Bang Pasi, etc.

2) Community level – Knowledge transfer relied on social groups such as group of friends, group of leaders, career group, etc. by way of training, meeting and local people's discussion forum. The material was based on persons. The knowledge contents were not exact, but this knowledge transfer usually aimed at income generation, careers and sharing of experience in the community, e.g. shared learning of housewife group, water hyacinth weaving training group, etc.

3) Inter-community level – Learning was based on training, working operation both inside and outside the community, as well as product distribution by assigning persons for meetings and talks. The objective was to tie relationships between communities. The learning contents included the production process, marketing and occupations learnt from other communities and to be applied to each particular community.

This could be concluded that the community learning process was to transfer knowledge and experience based on the cultural and social base of that community. Therefore, the learning pattern was simple, natural and relevant to the lifestyle of the community, which could be learnt directly, quickly and broadly. This knowledge was learnt from real practice and served the real demand of each community.

4. Knowledge Utilization

Supports and increases of knowledge utilization were important for each community in managing the knowledge, especially applying such knowledge base and transferring it from knowledge creation sources to any place desiring and using such

knowledge. The indigenous knowledge of Amphoe Bang Len had the learning process and knowledge transfer for the shared learning in the community so that such knowledge base could be utilized and developed such as learning of basketwork of the community at Sub-district Bang Ra Gum, learning of water hyacinth weaving of the women group at Baan Don Feb, Sub-district Nilpetch, etc. This was consistent to the concept of Suthiwong Pongphaiboon (1995: 25) that "…*Recovering local art and culture will be more efficient if local people also receive the economic benefits together*…"

5. Supporting Factors in Knowledge Management

1) Internal factors consisted of:

Structure of community organization: Factors supporting learning process were derived from being the community with stable social structure, which was consistent to the study by Prachasan Saenpakdi (2006: a) who found that successful community from the implementation of knowledge management process into community's problem-solving was the factor related to fundamental structure of the community. In addition, the study by Worapot Poomtrakul (1998: 88-99) indicated that knowledge management process of the community was organized through informal organizations in two levels, which were organization at the community level in the form of kinship, and transfer via community network organization. According to Prasert Trakarnsuppakorn (1997: 53-94), the education should allow various cultures to have reactions. The indigenous knowledge management process was done by informal organizations is organization management at the community level by relatives and community members. The knowledge transfer came from the daily living and real practice in the family.

Learning organization : John H. Falk (2000: 3-10) found that the social context, which consisted of culture and learning community, was the factors affecting to learning, which was consistent to learning of community studied by Davis Garvin (1993: 23) who pointed out that development of personnel within organization to acquire learning was behavioral adjustment of individuals that had an effect on new knowledge in which the application of knowledge management concept as the tool for behavioral adjustment of individuals was crucial to the creation of learning in

individuals as well as the knowledge application with an ability to transform people's knowledge into organizational knowledge or knowledge of community.

Network: The study by Namthip Wipawin (2004: 17-21) found that in order for the organization to succeed in knowledge management, it required group members to exchange learning in the form of network. Community network - Indigenous knowledge management was done through community leaders while value, belief, prohibition and custom of the community were managed through the community's regulation and the community's natural resource management was done under the enforcement inside the community. This was consistent to the study of Vorapoj Poomtrakul (1998: 88-99), Songkhun Chantajorn (2001: 67-93) and Orathai Jitthaisong (2001: 54-113).

Community resources: Kamoltip Kongprasertamorn (2005: 46-78) found that the community could synthesize knowledge of community to apply into management of community resources using wisdom, by transferring to the next generation in the community through the school system and connecting knowledge to external environment.

2) External factors consisted of :

Involvement of external parties, support from external organization and support from external scholars, which were consistent to the study by Chayuti Polchuanpanyo (2000: 42-78). Results showed that factors affecting to natural resource and environmental management that led to change within community were government administration, activities of NGOs and environmental network groups. Additionally, Orathai Jithaisong (2001: 54-113) studied factors related to local wisdom transfer consisted of support from public and private sector. Prasert Trakarnsuppakorn (1997: 53-94) also found that the development process of private development organizations helped strengthen the community to tackle with external culture and to recover its own culture appropriately and create new generations to be dual-culture people.

Indigenous Knowledge management resulted in knowledge cycle. In addition to maintenance and extension of local wisdom, it was also the creation of awareness concerning culture and local wisdom and awareness building toward the love and obsession of local wisdom, decision-making in problem solving, and

management of local wisdom that would encourage community to have positive attitude toward the environment as well as value and mutual responsibility in local wisdom. Ornsri Ngamvitthayapong (2006: 67) stated that people within the community must obtain and then transform knowledge that could be applied in every process, create understanding of people within the community to be aware of ability to preserve and disseminate local wisdom, have reception of external wisdom as well as have internal and external response in the form of knowledge chain in order to enable the community to change to learning organization.

Learning process of the community was important to community and social development as it was the process of learning as well as capacity development of individuals for their subsistence in the society in the age of information, which was highly crucial (Seree Pongpit et al., 1995: 23; Amornwit Nakornthap, 1998: 5). Community's learning process was a focal point of community development in which people have participation and roles in formulation of project planning and methods of operation, which supported group coalition based on nature and network creation as people's movement that was integrated in order to find alternatives and solutions in their local development (Seree Pongpit et al., 1995: 17).

Environmental Education Process for Indigenous Knowledge Management

According to the arrangements of indigenous knowledge learning activities at Amphoe Bang Len at 3 community learning centers, the results could be discussed as follows:

1. Knowledge

When comparing the overall achievement of indigenous knowledge learning in the sample group, the average scores of pre-test equaled to 15.53 and the average scores of post-test equaled to 17.84 with t value at 5.932. This could be concluded that the indigenous knowledge of the sample group after the arrangements

of learning activities significantly increased at a statistic test level of 0.05. When considering in each learning center, it was found that:

1) Bang Pasi SAO. Community Learning Center – The result showed that the pre-test scores equaled to 15.00 and the post-test scores equaled to 17.70 with t value at 3.370. This could be concluded that the indigenous knowledge of the sample group at TAO Bang Pasi Community Learning Center after the arrangements of learning activities significantly increased at a statistic test level of 0.05.

2) Wat Sookwatanaram Community Learning Center – The result showed that the pre-test scores equaled to 15.55 and the post-test scores equaled to 17.82 with t value at 2.899. This could be concluded that the indigenous knowledge of the sample group at Wat Sookwatanaram Community Learning Center after the arrangements of learning activities significantly increased at a statistic test level of 0.05.

3) Wat Phai Hoo Chang Community Learning Center – The result showed that the pre-test scores equaled to 15.55 and the post-test scores equaled to 17.82 with t value at 2.899. This could be concluded that the indigenous knowledge of the sample group at Wat Phai Hoo Chang Community Learning Center after the arrangements of learning activities significantly increased at a statistic test level of 0.05.

When comparing the average scores of indigenous knowledge of the sample group after the arrangements of learning activities between 3 learning centers by using ANOVA, it was found that F value equaled to 0.123. This led to a conclusion that the indigenous learning between learning centers after the arrangements of learning activities was not significantly different at a statistic test level of 0.05.

2. Attitude

When comparing the overall attitude towards indigenous knowledge learning before and after the indigenous knowledge learning, the average scores of attitude before and after such learning equaled to 3.766 and 4.245 respectively. When comparing the overall achievement of attitude of the sample group towards the indigenous knowledge, and comparing the difference of pre-test and post-test by t-test, it was found that t value equaled to 7.644. This could be concluded that the attitude towards indigenous knowledge of the sample group after the arrangements of

learning activities significantly increased at a statistic test level of 0.05. When considering in each learning center, it was found that:

1) Wat Phai Hoo Chang Community Learning Center – The result showed that the attitude towards indigenous knowledge before and after the participation in learning activities equaled to 3.785 and 4.245 with t value at 3.226. This could be concluded that attitude of the sample group towards the indigenous knowledge at Wat Phai Hoo Chang Community Learning Center after the arrangements of learning activities significantly increased at a statistic test level of 0.05.

2) Wat Sookwatanaram Community Learning Center – The result showed that the attitude towards indigenous knowledge before and after the participation in learning activities equaled to 3.775 and 4.285 with t value at 2.899. This could be concluded that attitude of the sample group towards the indigenous knowledge at Wat Sookwatanaram Community Learning Center after the arrangements of learning activities significantly increased at a statistic test level of 0.05.

3) Bang Pasi SAO. Community Learning Center – The result showed that the attitude towards indigenous knowledge before and after the participation in learning activities equaled to 3.733 and 4.190 with t value at 3.823. This could be concluded that attitude of the sample group towards the indigenous knowledge at Bang Pasi SAO. Community Learning Center after the arrangements of learning activities significantly increased at a statistic test level of 0.05.

When comparing the average attitude towards indigenous knowledge of the sample group after the arrangements of learning activities between 3 learning centers by using ANOVA, it was found that F value equaled to 0.244. This led to a conclusion that the attitude towards indigenous learning between learning centers after the arrangements of learning activities was not significantly different at a statistic test level of 0.05.

3. Participation

The participation in the indigenous knowledge management of Amphoe Bang Len was surveyed by using the questionnaire distributed to 32 representatives of

schools, temples and Sub-district Administrative Organizations that carried on or coordinate with the Candidate in the management of community learning centers for indigenous knowledge management of Amphoe Bang Len. The results were as follows:

1) Participation in project or activity initiation was strong ($\bar{x}$ = 3.73).

2) Participation in planning about indigenous knowledge management was strong ($\bar{x}$ = 3.74).

3) Participation in practice and execution of indigenous knowledge was strong ($\bar{x}$ = 4.10).

4) Participation in utilization of indigenous knowledge management was strongest ($\bar{x}$ = 4.36).

5) Participation in evaluation and follow-up of indigenous knowledge management was strongest ($\bar{x}$ = 4.58).

6) Participation in maintenance of indigenous knowledge was strong ($\bar{x}$ = 4.09).

From the above results, it was obvious that the indigenous knowledge required the educational management integrated to the lifestyle and community condition by using the participation process to transfer and learning of indigenous knowledge, which was connected to the knowledge base and community demands. The indigenous knowledge management also encouraged local communities to recognize the importance of knowledge and shared learning process, which was combined to the indigenous knowledge until it became the learning community. This concept was consistent to the environmental education process comprising 3 management forms (Fien, J. 1988: 4-15):

1) Education about Environment – It was the indigenous knowledge learning of Amphoe Bang Len, which was the wisdom combined between the cultural environment and natural environment until it became the community identity.

2) Education in Environment – This was the learning in the environment. In case of indigenous knowledge of Amphoe Bang Len, learners could

have learning in the community learning centers and in real locations of those local experts to allow learners to have direct learning experience.

3) Education for Environment – From indigenous knowledge management of Amphoe Bang Len, the results from learning focused on conserving, succeeding and developing the indigenous knowledge.

The environmental education process took emphasis that the learners should have knowledge, understanding, awareness, attitude and participatory action and decision-making skills. The impact to the environment might be reduced through the activity-based learning process. This was relevant to one objective of educational reform in connection with learning process reform, that is, the learning process should be set up to develop humans to reach their full potential. This was obvious that indigenous knowledge sharing activities resulted to rising knowledge and attitude. This was consistent to the study of Tharithwan Nontabhuda and Yaowanit Kittithornkul (2004: 77-78) that "…*A community may be strengthened by developing the learning process by way of workshop training, local people forum and working observation so that community members have new ideas and accumulate experience in the community management*". The participatory action research was an important part allowing the community to be involved in the indigenous knowledge management of Amphoe Bang Len. This was consistent to the study of Kanchana Kiatmaneerat (2003: 62-83) and Sayan Praicharnjit (2004: 46-53) that the process of combining social development methods such as community participation, role of the researcher as the facilitator in the participatory action research could enhance the feeling of participation and ownership in the community, and help local people develop their own knowledge base on managing and caring community resources.

In this study, the results showed that the indigenous knowledge management could lead the concept on environmental education process, which would further lead to the emergence of learning community. The indigenous knowledge management could help develop and promote the community potential to have knowledge and good attitude towards the environment, have affection and attachment to homeland, and be able to succeed ancestors' knowledge and wisdom. Learning by practice led to skills and occupations. In doing activities on knowledge management, it was necessary to integrate the concept of environmental education

process to the indigenous knowledge of community, which would finally lead to the environmental education goal and community learning (Pravej Vasi, 1992: 9), including:

1) Transfer of knowledge, skills and wisdom in occupations and living base on resources and environment of a particular community.

2) Transfer of community belief and value until they were the identities of that community, and continuous and sustainable succession of such identities.

3) Learning and sharing of experience between community members in solving problems of individuals and community by using their own indigenous knowledge.

Learning Community - The indigenous knowledge management in this study was, so, important to create the learning process of the community, which was the first step to be a strong community. Seelaporn Nakornthup (1995: 40, 1996 : 66) proposed that learning process of the community was a factor strengthening that community. It was like the process of learning the way of life, which community members formed the group to analyze problems, causes and alternative solutions, solve problems and conclude lessons that helped upgrade the community's ability of problem solving.

Therefore, community learning was the learning for life and lifetime learning. All humans must live in the condition of learning throughout their lives. The concept of the study for life acted as the important key of learning society and was the crucial principle of the study in all forms and all systems (UNESCO, 1992:181; Atchara Potiyanont, 1996: 5). The current environmental education aimed at allowing learners to have knowledge, understanding and ability in creating good living while recognizing the wise and worthwhile utilization of natural resources. This education also focused on creating the environmental ethics, holding right social value about environmental treating, and developing decision-making skills in environmental treating under the right and appropriate economic and political ways or it was the Education for Sustainable Development (ESD) (Abe. Osamu and Bishnu B. Bhandari, 2004: 15).

Indigenous knowledge management of Amphoe Bang Len involved the shared learning; so it promoted the learning process of indigenous knowledge by arranging learning activities in the community learning center by searching, extracting knowledge/ wisdom in individuals' memories to be the knowledge to be learnt by others, compiling the indigenous knowledge as the information source in the community and utilizing it for community development, and supporting new generations to share the indigenous knowledge by having the real practice with wisdom holders, knowledgeable persons and experienced aged people through community learning centers. The indigenous knowledge might be developed to be subjects taught and learnt in the educational institutes. The new technologies might be used to develop the indigenous knowledge for daily activities. The natural resources and environment in each area should be developed systematically and used to produce products and services to generate some revenues for the community. These actions should be done along with conducting local researches in which community researchers joined hands with educational institutes and the government sector. In addition, the research system should be arranged to form the in-depth knowledge base.

CHAPTER VI
CONCLUSION AND RECOMMENDATIONS

The study on "Environmental Education Based Indigenous Knowledge Management for Community Learning" aimed at creating the indigenous knowledge management process in 6 indigenous knowledge areas: 1) food and nutrition, 2) handicraft, home industry and Thai clothes, 3) Thai traditional medicine and herbs, 4) community economics, community fund, community organization and community welfare, 5) art, culture and tradition, and 6) agriculture, management and conservation of natural resources. The knowledge management process used in this study consisted of knowledge defining, indigenous knowledge creation, knowledge capture under Knowledge Base System (KBS), knowledge sharing and knowledge utilization.

Conclusion

The results of this study could be summarized as follows:

1. Indigenous knowledge base – It was found that the indigenous knowledge of Amphoe Bang Len was various; it could be divided into the following areas:

1.1 Food and nutrition - There were 8 local experts (21.1%) who had expertise in cooking, e.g. Kanom Pia (Chinese cake), Thai sweets and food transformation, e.g. dried and salted fish, making red curry, chili paste in oil bean, grilled fish chili paste, etc.

1.2 Handicraft, home industry and Thai clothes - There were 10 indigenous knowledge experts (26.3%); most of them were experts in dried water hyacinth weaving. There was also other wisdom about basketwork such as weaving of Mackerel basket, weaving of aquatic-animal catching tools, weaving daily-life tools made by Thai Song Dam, e.g. "Ngob", "Aeb-Khao", "Ho" and "Ga Leab" and other

indigenous knowledge about cloth weaving such as Tang-Mo pattern cloth made by Thai Song Dam.

1.3 Thai traditional medicine and herbs - There were 4 local experts in Thai traditional medicine and herbs (10.5%). They were experts in massaging, pulling muscles and joints. Most massage was to press body joints to let the blood flow smoothly, which helped cure many diseases. For the indigenous knowledge about bone treatment, the bone doctor cured the broken bone by way of oil massage, herbal medicine, holy water, etc.

1.4 Art, culture and tradition – There were 10 local experts in area of art, culture and tradition (26.3%). The outstanding culture of Amphoe Bang Len belonged to Thai Song Dam people at Baan Koh Raed of Tambon Bang Pla, Baan Phai Hoo Chang of Tambon Phai Hoo Chang. The culture and tradition regarding playing Northeastern mouth organ, sewing the front pillow case have been succeeded by establishing a learning center where related materials and information about such tradition and culture were compiled for any interested persons.

1.5 Agriculture, management and conservation of natural resources – There were 6 local experts in the area of agriculture, management and conservation of natural resources (15.8%) such as non-toxic agriculture, organic agriculture, grouping for farmers' learning in form of "*Organic Agricultural School*", bio-fertilizer, fermented bio-extract, and reduction of chemicals in farming, orchid farming, and orchid planting and reproduction.

According to the analysis of indigenous knowledge at Amphoe Bang Len, such indigenous knowledge could be divided into 2 parts:

1. Conventional indigenous knowledge derived from the experience in each area; namely, cloth weaving, basketwork, folk handicraft, art and culture of Thai Song Dam, Northeastern mouth organ dance, singing Pleng Kub, Pleng Lae, Pleng Plob Gai, oil doctor, herb, etc.

2. New indigenous knowledge to be combined with local indigenous knowledge. New indigenous knowledge came from the external indigenous knowledge or the knowledge newly created or reproduced to solve problems or adjust as per some necessities and changes of relationship pattern between local communities and resource diversity in term of utilization, development and

conservation of resource diversity in those local areas. The external knowledge base has been applied to the local environment and culture until it became the community indigenous knowledge, e.g. water hyacinth weaving, making Thai sweets, food transformation, farming, organic agriculture, non-toxic agriculture, orchid farming, etc.

2. Indigenous knowledge management

2.1 Knowledge creation or knowledge generation or knowledge acquisition - This was to acquire knowledge by knowledge defining in order to learn the status of knowledge base and indigenous knowledge of Amphoe Bang Len, Nakhon Pathom. Such knowledge defining was not only done to acquire the indigenous knowledge, it also led to the interpersonal learning process between the Candidate, local researchers and local experts.

2.2 Knowledge storing - From defining the indigenous knowledge of communities, the indigenous knowledge was stored in the Indigenous Knowledge Base System (KBS), but most indigenous knowledge was kept in the form of names of local experts and expertise of each expert only. Such indigenous knowledge was not stored in form of systematic database. For schools at Amphoe Bang Len, they stored the information and details of indigenous knowledge clearer than other agencies

Therefore, the Candidate prepared the materials to store the indigenous knowledge of those communities, including:

1) General documents and knowledge boards from which the community members could learn at such community learning centers.

2) documents under the name of "*Indigenous Knowledge of Amphoe Bang Len*" where the indigenous knowledge details were classified by area and it also contained the information concerning indigenous knowledge experts such as name, address, operating steps or working method of the particular indigenous knowledge so that general interested people could come to study and understand each area of indigenous knowledge.

2.3 Knowledge distribution - The shared learning of indigenous knowledge base was a process of knowledge conversion between tacit knowledge and explicit knowledge. Tacit knowledge was usually processed and stored in individuals'

memories while explicit knowledge was stored in documents or files. The learning activities arranged by many agencies at Amphoe Bang Len were done in various learning forms. The learning included both theoretical learning and practical learning, that is, self-learning, learning by practice, learning by telling, lecture, training, working observation and visual education. The learning patterns could be concluded as follows:

1) Arranging career training activities concerning many aspects of indigenous knowledge base such as practicing cloth weaving of Thai Song Dam, e.g. Tang-Mo pattern cloth, Mud-Mi pattern cloth, etc. These communities recognized and valued the indigenous knowledge that could be applied to earn for living.

2) Arranging schools' learning activities through local curriculum – The schools turned the indigenous knowledge base to be their educational curriculum that was integrated to learning contents such as activities of learning folk songs, Pleng Lae, Pleng Plob Gai or learning the art and culture of Thai Song Dam.

The result of this study showed that the indigenous knowledge transfer of Amphoe Bang Len could be divided into 3 levels: individual, community and inter-community.

2.4 Knowledge utilization -Supports and increases of knowledge utilization were important for each community in managing the knowledge, especially applying such knowledge base and transferring it from knowledge creation sources to any place desiring and using such knowledge.

The indigenous knowledge of Amphoe Bang Len had the learning process and knowledge transfer for the shared learning in the community so that such knowledge base could be utilized and developed.

The organizations involving the indigenous knowledge base management affecting the knowledge base management and changes in the community included:

1) The State's execution, e.g. District Agriculture, Community Development, Non-formal Education, Mahidol University, Kasetsart University, etc.

2) Activities of private development organizations, e.g. Thai Song Dam Foundation of Thailand, Thai Dam Association of Thailand, and private organizations, etc.

3) Community network groups, e.g. Research Network in Bang Len Research Project, Rak Tha Chin Group, Housewife Group, Farmer Group, etc.

3. Results of indigenous knowledge learning

3.1 Knowledge – According to the achievement test for indigenous knowledge learning, the average scores of the sample group after the arrangements of learning activities significantly increased at a statistic test level of 0.05. When considering in each learning center, every center had higher indigenous knowledge after the arrangements of learning activities significantly at the statistic test level of 0.05.

When comparing the average scores of indigenous knowledge of the sample group after the arrangements of learning activities between 3 learning centers by using ANOVA, it was found that the indigenous learning between learning centers after the arrangements of learning activities was not significantly different at a statistic test level of 0.05.

3.2 Attitude – The average scores of attitude after the arrangements of learning activities significantly increased at a statistic test level of 0.05. When considering in each learning center, every center had higher attitude towards indigenous knowledge after the arrangements of learning activities significantly at the statistic test level of 0.05.

When comparing the average attitude towards indigenous knowledge of the sample group after the arrangements of learning activities between 3 learning centers by using ANOVA, the attitude towards indigenous learning between learning centers after the arrangements of learning activities was not significantly different at a statistic test level of 0.05. According to the overall evaluation of average attitude towards indigenous knowledge after learning (Pre-test), the evaluation result was at the strongest level.

3.3 Participation in indigenous knowledge management.

The participation in utilization of indigenous knowledge management ($\bar{x}$ = 4.36) and in evaluation and follow-up of indigenous knowledge management ($\bar{x}$ = 4.58) was at the strongest level. Meanwhile, the participation in project or activity initiation ($\bar{x}$ = 3.73), in planning about indigenous knowledge management

($\bar{x}$ = 3.74), in practice and execution of indigenous knowledge ($\bar{x}$ = 4.10) and in maintenance of indigenous knowledge was strong ($\bar{x}$ = 4.09) was at the strong level.

From studying the indigenous knowledge management forms of Amphoe Bang Len, Nakhon Pathom, the indigenous knowledge management process could be divided into 4 steps: knowledge creation, knowledge storing, knowledge distribution and knowledge application. These 4 steps went on continuously as the knowledge cycle. The supporting factors were the internal factor, e.g. community organization structure, network, learning organization and community resources; and external factor, e.g. involvements of persons outside the community, supports from external organizations and supports from external scholars. Indigenous knowledge management needs the educational model integrated to be consistent to the lifestyle and condition, and indigenous knowledge of each community. This concept is relevant to the environmental education process, which consisted of 3 education arrangement patters: education about environment, education in environment, and education for environment by using the involvement process to transfer, share and learn with each other in each local community where knowledge base and community demand are connected together. This process also encourages each local community to recognize the significance of knowledge transfer and sharing process in combination of indigenous knowledge in order to form the learning community.

Therefore, the overall indigenous knowledge management of Amphoe Bang Len, Nakhon Pathom, along with the environmental education process was the combination of process until a cycle occurred, that is, there were transfers between steps and the indigenous knowledge management system has been always improved and developed until the knowledge cycle occurred. This cycle would rotate continuously and endlessly.

Research Findings

1. Indigenous knowledge base at Amphoe Bang Len, Nakorn pathom province, that was the most distinctive was handicraft, household industry, Thai fabric, arts, culture and tradition, which consisted of both conventional indigenous

knowledge and new indigenous knowledge obtained from the outside and applied into local environment and culture, which later became indigenous knowledge.

2. Knowledge management of indigenous knowledge through environmental education process of Banglen district, Nakornpathom province, had the forms of knowledge management consisting of 4 processes: knowledge creation, knowledge storing, knowledge distribution and knowledge application, which created new knowledge that was the indigenous knowledge, leading to a new process of knowledge creation and circulated as a continuous knowledge cycle.

3. Factors related to knowledge management of indigenous knowledge consisted of internal and external factors as follows.

3.1 Internal factors were community structure, network, learning organization and community resources.

3.2 External factors were participation of persons outside the community, supports by external organizations and supports by external scholars.

4. Knowledge management of indigenous knowledge based on 4 processes of knowledge management enabled people within the community to have learning of indigenous knowledge, positive attitude toward indigenous knowledge, and participation in conservation and inheritance of indigenous knowledge, which was consistent to the goals of environmental education: awareness, knowledge, attitude, skill, evaluation ability and participation. Outcome of knowledge management of indigenous knowledge enabled the community in Banglen district, Nakorn pathom province to become a learning community.

Recommendations

1) Policy recommendations

1.1 The strategy on indigenous knowledge base development should be set up to cover all important issues: 1) development of indigenous knowledge base, 2) development of materials and tools for indigenous knowledge storing indigenous data and information all community, and 3) development of indigenous knowledge learning system.

1.2 Related entities should take roles in managing indigenous knowledge and supporting the process-based working since the previous working of various agencies focused on the output only, but, in fact, the indigenous knowledge management should rely on the process for the shared learning, which needs great time and budget.

1.3 Indigenous knowledge management process of each community should be studied to learn its management form, method, results, gap of knowledge base, factors influencing success or failure, etc. to be the basis of managing the indigenous knowledge base.

1.4 The results of this study may be implemented to organize the indigenous knowledge system and learning process in other learning centers, including formal learning, non-formal learning and nature-based learning in order to conserve and succeed the indigenous knowledge, and to promote occupations for community members.

2. Recommendations for further research

2.1 There should be a comparative study between indigenous knowledge management and research areas under “Project on Participatory Development for Students, Schools and Communities based on Environmental Education Process” (Bang Len Research Project) of the Department of Education, Faculty of Social Science and Humanities, Mahidol University and other areas not involved in the project.

2.2 There should be a comparison by utilizing many knowledge management forms for the indigenous knowledge management in order to receive the appropriate guideline in each area.

2.3 Indigenous knowledge transfer should be studied by comparing several cases and locations so that it can be applied to each situation more appropriately.

2.4 The development of information system for indigenous knowledge should be studied to find out the information system that is appropriate for users’ demand, can be managed by each community and can be utilized efficiently.

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APPENDIX

APPENDIX A
QUESTIONNAIRE
ON
ENVIRONMENT EDUCATION BASED INDIGENOUS KNOWLEDGE MANAGEMENT FOR COMMUNITY LEARNING

Questionnaire No. …….

……..

Instruction

This questionnaire is prepared as a tool of data collection for the study on "Environmental Education Based Indigenous Knowledge Management for Community Learning". It consists of 4 main parts:

Part 1: Personal Information
Part 2: Indigenous Knowledge
Part 3: Attitude towards Indigenous Knowledge
Part 4: General Suggestions

The collected data will be analyzed for the completeness of research conducted as the partial fulfillment of the requirements for the doctorate degree in the area of Environmental Education, the Department of Education, Faculty of Social Science and Humanities.

I highly appreciate your cooperation.

(Mr. Ekachai Phmduang)
Researcher
Mobile: 086-9005208

Part 1: Personal Information

1. First name …….. Last name ……..

2. Gender

☐ Male ☐ Female

3. Age ……. years (in case of more than 6 months, it must be counted as 1 year)

4. Level of Education

☐ Primary ☐ Junior secondary

☐ Senior secondary/High vocational school ☐ Diploma

☐ Graduate ☐ Higher than graduate

☐ Others (please specify) ……

5. Religion

☐ Buddhist ☐ Christ

☐ Islam ☐ Others (please specify) ……

6. Family Status

☐ Single ☐ Married ☐ Widow/Divorced

7. Occupation

☐ Merchant/ Personal business ☐ General employee

☐ Farmer ☐ Government officer/ State enterprise officer

☐ Private Company's employee ☐ Others (please specify) ……

8. Did you study/ attend any training/ observe any working about indigenous knowledge?

☐ Yes ☐ No

Part 2: Knowledge about Indigenous Knowledge

Instruction: Please mark ✓ in front of any statements you think they are correct and mark × in front of any statements you think they are wrong.

…… 1. Indigenous knowledge means the local people's knowledge succeeded by generations.

…… 2. Thai art, culture and tradition are not the indigenous knowledge.

…… 3. The indigenous knowledge stays in each local area and it helps develop that area.

4. Water hyacinth weaving is the handicraft, which is the indigenous knowledge of Amphoe Bang Len.

…… 5. Thai Song Dam culture is the original indigenous knowledge of Amphoe Bang Len.

…… 6. Agriculture, livestock, conservation of natural resources and handicraft in the local area are not the indigenous knowledge.

…… 7. Environmental factors take effect o the creation of indigenous knowledge.

…… 8. Loss of indigenous knowledge is mainly derived from no succession and continuous learning.

…… 9. Indigenous knowledge could be transferred and learnt both in the formal and non-formal educational systems.

…… 10. Indigenous knowledge helps create occupations for local people.

…… 11. Community development absolutely contrasts with indigenous knowledge conservation.

…… 12. Migration of community members for working in city areas does not take effect to the succession of indigenous knowledge.

…… 13. Without the indigenous knowledge conservation, such indigenous knowledge in each local area will lost.

…… 14. Organic agriculture is old-fashioned and it cannot generate revenues for the community.

…… 15. Refinement and attractiveness of woven clothes are local identities for a long time, but the cloth patterns and weaving methods should be changed or this cloth weaving should be replaced by machine.

…… 16. Visiting local art and culture is a method of conserving and disseminating the indigenous knowledge.

…… 17. Only children can learn the original indigenous knowledge transferred by their ancestors.

…… 18. Changes of material shape and production methods to be suitable for the production and marketing of water hyacinth basketwork are not the conservation of indigenous knowledge.

…… 19. Dressing of Thai Song Dam in their rites is one way of succeeding the indigenous knowledge of Amphoe Bang Len.

…… 20. Indigenous knowledge conservation should be the duty of government bodies only; general people should not be involved in it.

Part 3: Attitude towards Indigenous Knowledge

Instruction: For each of statements below, please mark ✓in the space provided on the right that is most relevant to your opinions.

5 means the level of attitude most strongly agree
4 means the level of attitude strongly agree
3 means the level of attitude agree
2 means the level of attitude weakly agree
1 means the level of attitude most weakly agree

Statement	Level of Opinion				
	5	**4**	**3**	**2**	**1**
1. We can apply the indigenous knowledge learning to our daily life.					
2. Indigenous knowledge, culture and important traditions succeeded by our ancestors are useful and valuable to the community living.					
3. Indigenous knowledge learning can be the guideline of occupations and income.					
4. Indigenous knowledge helps you understand the principle of living and self-reliance; so you can live happily.					
5. Learning of art, culture and indigenous knowledge is the out-of-date education.					
6. Local art and culture reflect our ancestors' wisdom and they are useful for studying art and culture.					
7. Indigenous knowledge learning makes you more recognize the value and importance of indigenous knowledge.					

Statement	Level of Opinion				
	5	4	3	2	1
8. Sustaining the indigenous knowledge is the duty of every community member.					
9. Providing knowledge and emphasizing the importance of occupations, lifestyle and community culture are to form the mutual attitude and awareness of indigenous knowledge conservation.					
10. Art, culture and indigenous knowledge hinder the economic and social progress of the country.					
11. Art, culture and indigenous knowledge are matters of old generations; so they are inappropriate to be utilized in the present society.					
12. Conservation and succession of indigenous knowledge should be the last mission to be performed since they are not important for the society.					
13. A community should set up its community learning center to be a source of compiling the indigenous knowledge, which benefits the education of general people.					
14. The present education should focus on science, technology and economics rather than indigenous knowledge since the latter is not suitable for the present society.					
15. Conservation of art and culture wastes the budget.					
16. General people need not to conserve the indigenous knowledge since certain government bodies are directly in charge of it.					

Statement	Level of Opinion				
	5	4	3	2	1
17. You can utilize knowledge, ability and skills received from learning the indigenous knowledge in real situations.					
18. You can apply the indigenous knowledge to any modern knowledge.					
19. You always like seeking for new indigenous knowledge.					
20. You are able to apply knowledge received from indigenous knowledge learning to solve problems, adjust and develop yourself in your daily life.					

Part 4: Suggestions about indigenous knowledge learning management

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- Thank you for your cooperation –

APPENDIX B

QUESTIONNAIRE

ON

PARTICIPATION IN INDIGENOUS KNOWLEDGE MANAGEMENT OF AMPHOE BANG LEN

Questionnaire No.

❑❑❑❑

Part 1: Personal information about questionnaire respondents

First name …… Last name …….

Address …… Moo …… Tambon …… Ampohe Bang Len, Nakhon Pathom

Postcode …… Telephone No. ……..

Under School/SAO./Temple ……..

Part 2: Participation in the indigenous knowledge management

Instruction: For each of statements below, please mark ✓in the space provided on the right that is most relevant to your participation in the indigenous knowledge management.

5 means the level of participation	most strongly
4 means the level of participation	strongly
3 means the level of participation	moderately
2 means the level of participation	weakly
1 means the level of participation	most weakly

Statement	Level of Participation				
	5	4	3	2	1
Project or activity initiation					
1. Studying problems about indigenous knowledge.					
2. Finding out causes and problem solutions about indigenous knowledge.					
3. Creating and proposing the guideline of promoting indigenous knowledge.					
4. Attending meetings and discussions with related agencies					
5. Acting as operating committees or advisors on activities of promoting, learning and conserving indigenous knowledge					
Planning					
1. Planning for indigenous knowledge executions.					
2. Planning for problem solutions caused by indigenous knowledge promotions.					
3. Planning for action plans of indigenous knowledge promotion.					
4. Planning for compilation of information, documents and textbooks regarding indigenous knowledge.					
5. Planning for the follow-up and evaluation of indigenous knowledge executions.					
Practice					
1. Participation in activities relating to indigenous knowledge promotions.					
2. Coordination with officers relating to carrying out indigenous knowledge promotion projects or activities.					
3. Dissemination of knowledge and information about indigenous knowledge promotions.					
4. Participation in activities for indigenous knowledge promotions.					

Utilization					
1. Allocating benefits derived from indigenous knowledge promotions to community members.					
2. Utilizing, learning and conserving indigenous knowledge as the lifestyle learning source.					
Maintenance					
1. Maintaining products from indigenous knowledge promotion projects or activities.					
2. Jointly solving problems derived from indigenous knowledge promotion projects or activities.					
Evaluation and follow-up					
1. Controlling and supervising indigenous knowledge promotions.					
2. Following up and evaluating the indigenous knowledge promotion projects or activities.					

Part 3: Suggestions about participation indigenous knowledge learning management

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……
……
……
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……

- Thank you for your cooperation –

BIOGRAPHY

NAME	Mr. Ekachai Phumduang
DATE OF BIRTH	28 November 1972
PLACE OF BIRTH	Nakhon Si Thammarat, Thailand
INSTITUTION ADTENDED	Ramkhamhaeng University,:1996 Bachelor of Economics (Public Economy) Mahidol University,:2000 Master of Education (Environmental Education) Mahidol University,:2008 Doctor of Education (Environmental Education)
POSITION& OFFICE	Department of Geography Faculty of Humanities and Social Science Suan Dusit Rajabhat University 295 Rachasima Road, Dusit, Bangkok 10300 Position : Lecturer
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THESIS SCHOLARSHIP	- Royal Scholarship from Karu Patham Foundation under the royal patronage of His Royal Highness Crown Prince Maha Vajiralongkorn - Thesis support scholarship from the research project for the participatory development of students, schools and communities based on environmental education (Bang Len Research Project) Phase 2.