MODEL OF KNOWLEDGE-BASED MANAGEMENT
ON MEDICINAL PLANT UTILIZATION FOR THE WESTERN
BIODIVERSITY CENTER, KANCHANABURI PROVINCE,
THAILAND

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THESIS SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR
THE DEGREE OF MASTER OF SCIENCE
(NATURAL RESOURCES MANAGEMENT)
FACULTY OF GRADUATE STUDIES
MAHIDOL UNIVERSITY
2008

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MODEL OF KNOWLEDGE-BASE MANAGEMENT ON MEDICINAL PLANT UTILIZATION FOR THE WESTERN BIODIVERSITY CENTER, KANCHANABURI PROVINCE, THAILAND

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ACKNOWLEDGEMENT

The success of this thesis can be attributed to the extensive support and assistance from my major advisor, Asst. Prof. Dr. Piyakarn Teartisup for her supervision throughout this thesis and providing suggestion for improvement and my co-advisor, Asst. Prof. Dr. Raywadee Roachankananan for her valuable and kindness guidance, and special thank to my director, Dr. Monthip Sriratana Tabucanon who sacrificed her time on my thesis defense examination and any guidance in this research. I am very grateful and would like to express my sincere gratitude and deep appreciate to all of them.

Next, special thank is given to my junior assistance, my best friend (P’Ann) and everyone for their assistance in data collection. And I would like to thank you to P’Tuk, P’Noom and N’Dao at the Division of Environmental Education, DEQP for their kindly support in my secondary data and others in the office are not mention here. In addition, I like to thank my classmate: Dipak, Loy, and Cathy who help each other for the good past activity and works.

Moreover, I am deeply thank to local resident of Phu Toei Forest Community who provide the great hospitality and all respondent who are willing to take part in the interview and give the important knowledge for my study. My special gratefulness contributes to Mr. Boonma, Mr. Somkiet, Mr. Cheing, Mr. Vikit, Mr. Viklom, Mr. Akarin, Mr. Pipat and other participants who are not mentions here for their kindness and warm welcome.

Importantly Finally, I would like to express special thank to my dearest father for financial support, and my dearest mother with entirely care and love, and my cute sisters who are very kindness support and cheer up to me. Finally, I am graduated in Master Degree this time particularly if without those special peoples and I would like to say thank you very much to all of them.

Bajaree Saguanwongse
ABSTRACT

The objectives of this research were 1) to study the values and utilization of medicinal plants in terms of the society and culture of Phu Toei Forest Community, 2) to identify the characteristics and type of a Knowledge Management model for medicinal plants utilization and 3) to design a suitable model of Knowledge-based management for medicinal plants utilization for Phu Toei Forest Community. The study used the Rapid Rural Appraisal (RRA) concept as a guideline for conducting interviews and focus group discussions. Stakeholder Analysis was used with Snowballing Technique to identify key informants. Appreciation-Influence-Control (AIC) was used to guide focus group discussion. Documentary analysis was also used. Then, data were analyzed and synthesized in order to set up a model of knowledge-based management for medicinal plant utilization.

Baan Phu Toei Community Forest, Ta-Sao subdistrict, Sai Yok district, Kanchanaburi province which is the location for the western center of biodiversity was selected as the study area. Fifteen key informants on medicinal plant utilization in the community were identified and they attended the AIC activity. The researcher used the SWOT Analysis to identify the results of discussion. It was found that the informants had a lot of local knowledge to medicinal plant utilization, such as species of plants, productive plant usage, time of collection, and location of sources. Even though the local wise people were few, they were knowledgeable and aware of utilization of medicinal plants. Also because these people had a low level of education, they were often illiterate, and they had little experience of knowledge-based management, transmitting their knowledge to new generation was difficult for them and only partially successful. Also the data had never been recorded and collected consistently. Therefore, the researcher designed a model of knowledge-based management for medicinal plant utilization in order to maintain and manage their local knowledge base before it disappears. It was found that the target groups were interested in the participatory process, especially leaders and traditional healers. They suggested improvements of their community and developed this model for the sustainable development.

KEY WORDS: LOCAL KNOWLEDGE BASE / KNOWLEDGE-BASED MANAGEMENT / MEDICINAL PLANT UTILIZATION / PHU TOEI FOREST COMMUNITY

146 pp.
รูปแบบการจัดการความรู้การใช้ประโยชน์พืชสมุนไพรในศูนย์ความหลากหลายทางชีวภาพตะวันตกแห่งประเทศไทย (MODEL OF KNOWLEDGE-BASED MANAGEMENT ON MEDICINAL PLANT UTILIZATION FOR THE WESTERN BIODIVERSITY CENTRE, THAILAND)

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บทคัดย่อ

การวิจัยในครั้งนี้มีวัตถุประสงค์ 1) เพื่อศึกษาคุณค่าและความตระหนักการใช้ประโยชน์พืชสมุนไพรในชุมชนพุเตย และ 2) เพื่อศึกษาชนิด รูปแบบ และลักษณะของการจัดการความรู้การใช้ประโยชน์พืชสมุนไพรของชุมชน 3) การเสนอแนะรูปแบบการจัดการความรู้การใช้ประโยชน์พืชสมุนไพรในป่าชุมชนพุเตย การศึกษานี้ใช้หลักการศึกษาแบบขุดหลุมแบบการศึกษารูปแบบเร็ว (Rapid Rural Appraisal/RRA) ซึ่งใช้การสัมภาษณ์ และประชุมกลุ่มย่อย และการวิเคราะห์ข้อมูลที่ได้จากเก็บ (Stakeholder Analysis) ซึ่งใช้ Snowball Technique เพื่อเสนอชื่อบุคคลที่มีส่วนเกี่ยวข้องในการใช้ประโยชน์พืชสมุนไพร รวมทั้งการวิเคราะห์สถานะบุคคล และใช้กระบวนการ Appreciation-Influence-Control (AIC) เพื่อให้ผู้มีส่วนได้ส่วนเสียประชุมระดมความคิดเห็นของผลการระดมความคิดเห็นและข้อมูลที่มีมาประมวลผล และนำไปสู่การเสนอแนะรูปแบบการจัดการองค์ความรู้การใช้ประโยชน์พืชสมุนไพรเพื่อชุมชน

พื้นที่ที่ปรากฏขึ้นที่พุเตย ตำบลบ้านพุเตย อ่างทอง จังหวัดกาญจนบุรี ได้รับตั้งต้นให้เป็นศูนย์ความหลากหลายทางชีวภาพตะวันตกเป็นพื้นที่ศึกษาในโครงการจังหวัดบ้านพุเตย แต่ผลการศึกษาพบว่า มีผู้มีส่วนได้ส่วนเสียในการใช้ประโยชน์พืชสมุนไพร จำนวน 15 คน เข้าร่วมในการระดมความคิดในกิจกรรมของ AIC และเก็บข้อมูลจากกลุ่มผู้มีส่วนได้ส่วนเสีย (S.W.O.T. Analysis) ซึ่งพบว่ากลุ่มเป้าหมายมีองค์ความรู้การใช้ประโยชน์พืชสมุนไพรสูง เนื่องจากมีผู้มีส่วนได้ส่วนเสียสูง การศึกษานี้พบว่า

1. ผู้มีส่วนได้ส่วนเสียจะมีองค์ความรู้พืชสมุนไพรสูงกว่าผู้ที่ไม่ใช้พืชสมุนไพร
2. ผู้มีส่วนได้ส่วนเสียจะมีองค์ความรู้พืชสมุนไพรสูงกว่าผู้ที่ไม่ใช้พืชสมุนไพร
3. ผู้มีส่วนได้ส่วนเสียจะมีองค์ความรู้พืชสมุนไพรสูงกว่าผู้ที่ไม่ใช้พืชสมุนไพร
4. ผู้มีส่วนได้ส่วนเสียจะมีองค์ความรู้พืชสมุนไพรสูงกว่าผู้ที่ไม่ใช้พืชสมุนไพร

ดังนั้นเพื่อรักษาองค์ความรู้เหล่านี้ให้สูญหายไป ผู้วิจัยจึงได้นำเสนอรูปแบบการจัดการความรู้การใช้ประโยชน์พืชสมุนไพรให้แก่ชุมชน และพบว่ากลุ่มผู้ที่มีการเข้าร่วมการให้ความสนใจที่สูง ซึ่งได้รับการเสนอแนะและปรับปรุงรูปแบบการดังกล่าวให้เหมาะสมกับสภาพชุมชนพุเตยเพื่อพัฒนาอย่างยั่งยืนต่อไป

146 หน้า
CONTENTS

ACKNOWLEDGEMENT iii
ABSTRACT iv
LIST OF TABLES x
LIST OF FIGURES xi
ABBREVIATION xiii

CHAPTERS

I. INTRODUCTION 1
1.1 Justification 1
1.2 Research Objectives 5
1.3 Conceptual Framework 5
1.4 Expected Results 6
1.5 Definition of Terms 6

II. LITERATURE REVIEW 8
2.1 Concept and Model of Knowledge Management 8
  2.1.1 Meaning of knowledge management 8
  2.1.2 Concept of knowledge management 9
  2.1.3 Types of knowledge management 10
  2.1.4 The important role of knowledge worker in KM model 11
  2.1.5 Model and process of KM 12
  2.1.6 Related research 23
2.2 Relevant Information about Biodiversity 25
  2.2.1 Definitions of biodiversity 25
  2.2.2 State and important of biodiversity 26
  2.2.3 Conservation of biodiversity directly concern on people’s participation 29
CONTENTS (CONT.)

2.2.4 Study area of the western biodiversity center in Thailand 33
2.2.5 Related research 35

2.3 Participatory Approach (PA) 37
2.3.1 Definition of participants 37
2.3.2 Definition and concept of participatory approach (PA) 37
2.3.3 Technique of participatory approach (PA) 39
2.3.4 Concept of Appreciation, Influence and Control (AIC) 44
2.3.5 Related research 50

III. METHODOLOGY 53
3.1 Scope of the Study 53
3.2 Research Design 53
3.3 Research Process 54
3.3.1 Step of study 56
3.4 Validity 61
3.5 Data Collection and Analysis 61

IV. RESULT AND DISCUSSION 63
4.1 The Result of Stakeholder Analysis related to Medicinal Plant Utilization 63
4.1.1 Identifying the number and right key informants related to medicinal plant utilization by snowball technique 63
4.1.2 Categorize of key informants 67
4.1.3 Prioritizing and relevant of key informants 69
4.2 Value and Benefit of Medicinal Plants 71
in Phu Toei Forest Community under AIC process (Result of A stage) 71
4.2.1 General Information of Phu Toei Forest Community 73
4.2.2 Background of medicinal plant utilization 75
in Phu Toei Forest Community in the past 30 years 75
## CONTENTS (CONT.)

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.2.3 The result of surveying and observing medicinal plant around the community</td>
<td>80</td>
</tr>
<tr>
<td>4.3 Medicinal Plant Utilization in Phu Toei Forest Community</td>
<td>82</td>
</tr>
<tr>
<td>under AIC process (Result of I stage)</td>
<td></td>
</tr>
<tr>
<td>4.3.1 The Result of local knowledge-based toward on types and quality of treatment of medicinal plants usage among key informants</td>
<td>84</td>
</tr>
<tr>
<td>4.3.2 Seasonal collection of productive medicinal plants in Phu Toei Forest Community</td>
<td>85</td>
</tr>
<tr>
<td>4.3.3 Transmitted the local knowledge-base toward on medicinal plants in Phu Toei Forest Community</td>
<td>87</td>
</tr>
<tr>
<td>4.4 Construct the model of Knowledge-Based Management on Medicinal Plant Utilization for Phu Toei Forest Community under AIC process (Result of C stage)</td>
<td>90</td>
</tr>
<tr>
<td>4.4.1 Construct and design the model of knowledge-based management for medicinal plant utilization (KBM-MPU)</td>
<td>90</td>
</tr>
<tr>
<td>4.4.2 Guiding the model of KBM-MPU in Phu Toei Forest Community</td>
<td>92</td>
</tr>
<tr>
<td>4.4.3 Finalize the model of knowledge-based management for medicinal plant utilization (KM-MPU)</td>
<td>97</td>
</tr>
<tr>
<td>4.5 Lesson Learn about Utilization of Medicinal Plants in PTFC under AIC process</td>
<td>100</td>
</tr>
<tr>
<td>4.5.1 Lack of knowledge linkage between wise people and new generation</td>
<td>100</td>
</tr>
<tr>
<td>4.5.2 Shifting the local knowledge-base up to the society</td>
<td>102</td>
</tr>
<tr>
<td>4.5.3 Building up the figure of transmitting knowledge</td>
<td>104</td>
</tr>
<tr>
<td>4.6 Evaluation of AIC Process</td>
<td>105</td>
</tr>
<tr>
<td>4.6.1 Observing behavior of the participants</td>
<td>105</td>
</tr>
<tr>
<td>4.6.2 Satisfaction and benefit from AIC process</td>
<td>106</td>
</tr>
</tbody>
</table>
## CONTENTS (CONT.)

<table>
<thead>
<tr>
<th>V. CONCLUSION AND RECOMMENDATION</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1 Summary of Major Finding</td>
<td>107</td>
</tr>
<tr>
<td>5.2 Limitation of Study</td>
<td>108</td>
</tr>
<tr>
<td>5.3 Recommendation for further Study</td>
<td>109</td>
</tr>
</tbody>
</table>

| BIBLIOGRAPHY                      | 110  |
| APPENDIX                          | 117  |
| BIOGRAPHY                         | 146  |
## LIST OF TABLES

<table>
<thead>
<tr>
<th>TABLE</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-1</td>
<td>Categorize of Key Informants (KIs)</td>
<td>68</td>
</tr>
<tr>
<td>4-2</td>
<td>Prioritizing of Key Stakeholders and the Reason of Choosing</td>
<td>70</td>
</tr>
<tr>
<td>4-3</td>
<td>Trend Diagramming about Background of medicinal plant utilization at Phu Toei Forest Community in 30 years ago</td>
<td>77</td>
</tr>
<tr>
<td>4-4</td>
<td>Analysis on utilization of medicinal plants in PTFC by using S.W.O.T Analysis</td>
<td>95</td>
</tr>
</tbody>
</table>
LIST OF FIGURES

FIGURE

1-1 Conceptual framework for Model of Knowledge Management on Medicinal Plant Utilization 5

2-1 General Model of Knowledge by Newman and Conrad 13
2-2 Model of Individualism Knowledge Management Window (IKMW) by Dr. Prapon Pasukyud 14
2-3 The SECI model by Nonaka and Takeuchi 16
2-4 The Knowledge Management Approach by Collision and Parcell 18
2-5 Model of Knowledge Management by Knowledge Management Institution 19

3-1 The stages of research process 55

4-1 Mind Map presenting the stakeholders identifying by Mr. Preecha Tippaboon 65
4-2 Mind Map presenting the stakeholders identifying by Mr. Pipat Keawjitkugtong 65
4-3 Mind Map presenting the stakeholders identifying by Mr. Somkiet Boonyaleka 65
4-4 Mind Map presenting the stakeholders identifying by Mr. Akarin Bunton and Mr. Pipat Shuchan 65
4-5 Mind Map presenting the stakeholders identifying by Mr. Boonma Pansang 66
4-6 Mind Map presenting the stakeholders identifying by Mr. Viklom Keawjitkugtong 66
4-7 Mind Map presenting the stakeholders identifying by Mr. Vikit Keawjitkugtong 66
4-8 Mind Map presenting the stakeholders identifying by Mr. Anukun Shuchan 66
## LIST OF FIGURES (CONTTS)

<table>
<thead>
<tr>
<th>FIGURE</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-9</td>
<td>73</td>
</tr>
<tr>
<td>4-10</td>
<td>78</td>
</tr>
<tr>
<td>4-11</td>
<td>86</td>
</tr>
<tr>
<td>4-12</td>
<td>87</td>
</tr>
<tr>
<td>4-13</td>
<td>99</td>
</tr>
</tbody>
</table>

- 4-9 Map of Phu Toei Forest Community area in Kanchanaburi province
- 4-10 Mapping of MP collection for natural trail in PTFC
- 4-11 Seasonal calendar of productive MP for PTFC
- 4-12 Venn Diagram- Key informants involved in transmitting local knowledge-base for medicinal plant utilization
- 4-13 Model of knowledge-based management for medicinal plant utilization for Phu Toei Forest Community
# ABBREVIATION

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIC</td>
<td>Appreciation-Influence-Control</td>
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<td>CBD</td>
<td>Convention on Biological Diversity</td>
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<td>CF</td>
<td>Community Forest</td>
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<tr>
<td>CI</td>
<td>Convention International</td>
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<td>DEQP</td>
<td>Department of Environmental Quality Promotion</td>
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<tr>
<td>KBM</td>
<td>Knowledge-Based Management</td>
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<tr>
<td>KKF</td>
<td>Khao Kwan Foundation</td>
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<td>KM</td>
<td>Knowledge Management</td>
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<tr>
<td>KBM-MPU</td>
<td>Knowledge-Based Management on Medicinal Plant Utilization</td>
</tr>
<tr>
<td>MONRE</td>
<td>Ministry of Natural Resources and Environment</td>
</tr>
<tr>
<td>MP</td>
<td>Medicinal Plants</td>
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<tr>
<td>MPU</td>
<td>Medicinal Plants Utilization</td>
</tr>
<tr>
<td>NESDP</td>
<td>National Economic and Social Development Plan</td>
</tr>
<tr>
<td>NR</td>
<td>Natural Resources</td>
</tr>
<tr>
<td>PAR</td>
<td>Participatory Action Research</td>
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<td>PRA</td>
<td>Participatory Rural Appraisal</td>
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<td>PTFC</td>
<td>Phu Toei Forest Community</td>
</tr>
<tr>
<td>RRA</td>
<td>Rapid Rural Appraisal</td>
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<td>SA</td>
<td>Stakeholder Analysis</td>
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<tr>
<td>TH</td>
<td>Traditional Healer</td>
</tr>
</tbody>
</table>
CHAPTER 1
INTRODUCTION

1.1 Justification

Presently, decreasing of biodiversity is a big important issue throughout the world and almost all countries have participated to solve this problem together. Unequally abundance of biological diversity in each region is one factor caused by increasing higher rate of degradation, especially in tropical region with highly natural resources (NR) more than the western region (cool climate). Moreover, it has been noticeable phenomena about the occurring of taking advantages by developed countries with their advance and high technology in science from those who have high biodiversity but low level in technological science. So in 1987, the World Union on Nature Conservation had initiated the development of the Convention on Biological Diversity, in order to reflect the need of measures to protect diversity of living organisms and ecosystems, and measures to control the utilization of biodiversity (CBD, 2007). Sometimes, the process of utilization of NR leads to loss of biodiversity that the human are able to take both benefit and destroy on biodiversity together, and the ecosystem has been changes, such as climate change occurring mentioned by Mr. Suratsawadee, a Former Permanent Secretary of Ministry of Natural Resource and Environment (Public Education and Extension Division, 2005a), referred to the advantage of the Biodiversity Convention is to reach the benefit utilization of economic of NR conservation but human are also able to destroy the biodiversity, such as completing on NR by using new technology. Taking advantages by cooperating in academy is the best way to seek good practices for the utilization of NR.

Tropical area is the richest area of biological diversity, it contains over 50% of the world’s species in just 7% of the world’s land (Oxford University, 2000), and Thailand has been recognized that has very high important of biodiversity cause of
location in the tropical zone. Comparing to temperate zone, there has fewer types of species and diversity, so people in the western area have a few months to produce and collect their foods, and also they need to compete with limited resources among themselves. The livelihoods of people between the western and eastern regions are different because of limited food sources. People in the eastern living with high biodiversity has simply life, no need to collect and compete for foods, but they will share and distribute their foods to each others, so their concept of natural resources are different from the people in the western or cool area (Public Education and Extension Division, 2005b).

Medicinal plants are the one of the biological diversity which has been shown a significant role for human living since in the past until now. In the primitive time Medicinal plant utilization used for the symbolic of the spiritual treatment but nowadays their role has been changed for the economical purpose, and increasing its important role in improvement of health care in both of developing and developed countries. In Thailand, the Ministry of Public Health aims to expand the primary health care program for better health of Thai people. Nowadays, the significant of medicinal plants is obviously seen by the increasing number of established research centers to analyze the active compound of plants in order to discovering new biologically active from natural materials (Pipitkul, 2001).

Over the past four decades, Thailand has followed the western ideology of development by using the National Economic and Social Development Plan (NESDP) to guide, as the national development direction (ONEP, 2005). Although the first three NESDP could boost the economic growth up to 7%, the exploitation of NR and pollution caused by economic and pollution growth led to environmental crisis. Mrs. Suwannaaut said that Thailand was the one of 25 countries facing of the biodiversity crisis, the area of Thailand has been small so concerning on conservative natural resources has been too less. However, the relationship of biodiversity should not consider only covering area but it should realize and overview the connection of its role with the whole ecosystem (Public Education and Extension Division, 2005a). As same as Prof. Saneay Jamarik, the president of the National Human Right
Commission of Thailand, mentioned about the fact of NR management by local people in Thailand in the past time that the locals had ever been clear cut the forest just only half of area, but remaining destroy of forest caused by the government developing policy to export of agricultural production, and at that moment the administrator of Thailand did not have any policy to implement the idea of knowledge utilization on NR management. The public participation concept came into the light of the 8th NESDP, with principle emphasized on people-centered development. The Participatory Approach came up with the new dimension as an important solution on conservative biodiversity (Public Education and Extension Division, 2005a). By all type of development including environmental management should strengthen people’s self-reliance capacity and solving their problem by Indigenous Knowledge. President Luiz Inacio Lula da Silva of Brazil said in the meeting of the COP 8 High-Level Ministerial Segment that education and awareness raising might play a key role for all major groups, particularly young people, to better understand the essential ecological services that biodiversity provided and the risks to human society that its loss had represented (CBD, 2007).

Therefore, the Department of Environmental Quality Promotion (DEQP) under Ministry of Natural Resources and Environment (MONRE) followed the concept of announcing the National Biodiversity Year with the aim to encourage the local knowledge and awareness on biodiversity conservation about developing the basic of self-reliance (Public Education and Extension Division, 2005b). DEQP set up four biodiversity centers in each part of Thailand in 2005, the over all aim is to build up learning process which emphasis on environment and community to make maximum uses of human resources in environmental education development. Environmental education needs people who have knowledge and understanding about environmental education techniques. It is necessary to have effective materials and it is important to establish networks for supporting the exchange of experiences between people and continually developing the skill of people who carry out environmental education. As well as, indigenous and local communities, and the knowledge they hold, are significant to the conservation and sustainable use of biodiversity. These cultural communities have in common is a long-term association with the lands and waters on
Environmental education is not only concerned with education issues but also involves building up feelings, attitudes, skills and community actions.

This research decided to choose the western biodiversity center of Thailand that is located at Phu Toei Forest Community (PTFC) in Kanchanaburi province as the research site since it consists of abundance of biodiversity with three different types of forests, and local people have high benefit from their biodiversity especially the medicinal plants. As the result of developing the environmental sustainability and reasoning of disappearing local knowledge-based, it needed to study and focus on NR utilization relating to the cultural communities because of one way of culture’s build up is transferred the local knowledge by ancestors through the new generation, so the process of Knowledge Management (KM) is the important starting point to protect and conserve the local knowledge before disappearing from this community. Thus, the research was interested in searching and motivating the community’s movement by using a tool of Participatory Approach to gain the local knowledge-base, KM assist the exchanging knowledge within the community and also to make the researcher learning together with them. It was assumed that if researcher provided technically more on KM, it would be responded back a lot of knowledge required. So this research was somehow a part of exchanging knowledge (or learning by doing) and the important point was to learn about their experiences, and to analyze how the community managed their KM. It was expected that this research should provide the useful method and process for the community forestry to manage their knowledge, and to provide the guideline on the model of knowledge-based management about the medicinal plant utilization for the western biodiversity center in Thailand.
1.2 Research Objectives

The objectives of this study were as follows:

1.2.1 to study the values and utilization of medicinal plants of Phu Toei Forest Community;
1.2.2 to identify the characteristic and type of knowledge model about medicinal plant utilization;
1.2.3 to design a suitable model of knowledge-based management on medicinal plant utilization for the western biodiversity center in Thailand.

1.3 Conceptual Framework

This research would apply the concept of Knowledge Management (KM) to identify and design the model in order to maintain the local knowledge-based on medicinal plants usage for PTFC. For the study, it was consisted of two main components: studying of the Biodiversity and the society in PTFC, the research needed to understand the utilization the medicinal plants by local people, to identify the structure of medicinal plants (MP): species, density, and frequency. The second component was about the forest community in the term of physical study and learning process on Medicinal plant utilization (MPU). Both of two components as mentioned then be integrated and analyzed with the KM concept to identify a model. Finally, the study ended up with analyse and synthesis on data collection by qualitative research in order to gain the model of knowledge-based management for medicinal plant utilization (KBM-MPU) that should be able to adapt and develop for the western biodiversity center.
1.4 Expected Results

Acquiring a model of KBM-MPU by local community’s practicing, the model should be applicable for the western biodiversity center in Thailand, in order to encourage the local community to protect and be awareness about their local knowledge-base regarding medicinal plant usage.

1.5 Definitions of Terms

Local knowledge-base is a kind of knowledge that local people have derived through experience and experimentation.
Traditional healer (TH) is the person who has traditional medicinal plants knowledge by practically experience or might be able to be transferred the knowledge from ancestors, and those people are accepted by the local community.

Indigenous knowledge is accumulated and passed through knowledge by antecedents and can be found only in the specific area, and these knowledge has differed according to its location causing by social, culture and tradition, and belief, etc.

Knowledge Management (KM) means a pattern of management on people’s knowledge in order to gather the local knowledge in order to manage and develop for their sustainable environmental conservation.

Medicinal plants (MP) defined to the natural plants and cultivated plants which can be used for medicine and to be ingredient in curing any disease by local expertise’s diagnosed.

Medicinal plant utilization (MPU) is a kind of local knowledge-based about species, method of usage, part of MP’s using, sources of collection, treatment, etc.

Forest Community is a group of people who live with forest area and these people are influenced on the forest, not only respond to sustain the environmental forest but also they can earn the benefit from those resources.

Biodiversity is the living organism which has many species and difficult to find in other places, and those are important and value to both people and environment.

Biodiversity Center is a place which locates in Phu Toei Forest Community that gathers the information about biological diversity of Phu Toei area as a model to utilize for studying of biodiversity belonging to the western part of Thailand.
CHAPTER II
LITERATURE REVIEW

This study was conducted based on concepts, theories, and various documents including related research works to be the fundamental knowledge and methodology of the research. The content of this part consisted of four parts, Knowledge Management (KM), Biological Diversity, Participatory Approach (PA), and relevant researches. The details were summarized as follows:

2.1 Concept and Model of Knowledge Management

2.1.1 Meaning of knowledge management

The definition of Knowledge Management (KM) were varied, many scholars explained the meaning of KM as the following:

Knowledge is created, shared, and distributed by a given set of explicit or implicit rules which are common to all members of the organization. This knowledge takes very different forms, not all of them amenable to computerized treatment, not all of them easily converted into data (Cortés et al., 1994).

Knowledge is experience, concepts, beliefs, or information that can be communicated and shared (Alee, 1997).

The knowledge is power that people had come from transmitting information to make its productive, not only making a secret (Drucker, n.d.).

KM is a discipline whose main goal is to develop methods and tools for detecting, leveraging, distributing and improving the knowledge assets of an organization. Its
background comprises several different sources as organizational theory, information systems, general management theory, knowledge representation, human and machine learning, sociology of work, etc (Nonaka, 1998).

KM is the explicit and systematic management of vital knowledge and its associated processes of creating, gathering, organizing, diffusion, use and exploitation. It requires turning personal knowledge into corporate knowledge than can be widely shared throughout an organization and appropriately applied (Skyrme, 1997).

KM is about managing the knowledge you have on paper (explicit experience) and the knowledge so intrinsic to your daily practice that you cannot quite articulate it (Tacit experience) (Rusanow, 2007).

From all above definitions, KM is emphasis on human know-how and how it brings information value to communicate and share for their group. Meanwhile utilizing individual expertise to get maximum return for every group or organization should be encouraged.

2.1.2 Concept of knowledge management

Knowledge and information are increasingly becoming key assets for organizations. Many people may be confused the different concept between knowledge and information. Therefore, three key terms to understand as the building blocks for KM is including data, information, and knowledge, as referred by Groff and Jones (2003) explaining that:

Data: the nature of data is raw and without context and can exist in any form, usable or not. For example, numbers in a spreadsheet are data. Information: data that has been given meaning. Spreadsheets are often used to create information form a set of data, such as sales over a period of time, increases or decreases in sale, competitor trends, and so on. For knowledge information; meant, knowledge combined with
understand enables action. For example, a manager analyzing a declining sales trend may take action to identify issues and carry out strategies to change the trend.

Think of the relationship of data, information, and knowledge as a hierarchy, data turned into information, which they provides knowledge on which decision are based. The key for organizations to harness the power of KM is to turn information into accessible and reusable knowledge. Knowledge is regarded as essential for successful action. This is not only the case for basic skills, such as reading and writing, but also for highly sophisticated professional performance, such as brain surgery. Knowledge is commonly seen as a necessary precondition for a person’s behavior. Consistent with this, most educational interventions rely on knowledge transfer.

For the concept of KM, Panich (2007a) explained that KM is a kind of tool using for work on four factors together; development of job, people, organization, and harmony among the group. Those factors are the heart of KM to motivate management of knowledge getting successful. If no action of doing, we do not know how work of KM is, for example, riding on bicycle, if we only listened only process of riding on bicycle without practicing and trying, we are not able to ride on bicycle certainly. And Pasukkud (2006) explained that KM needs to realize on the process of action, not only concern on the content but including a part of skill, practice, attitude and emotion. So KM is a process of learning by action. Therefore, the concept of KM can be explained as a tool use to manage individual knowledge through action.

### 2.1.3 Types of knowledge management

Many scholars; Sumner (1999), Groff and Jones (2003), Panich (2005b), and Nonaka (1998) have divided the type of Knowledge into two types. There are basically two kinds of knowledge: explicit and tacit that can be summarized as follows:

Explicit knowledge is knowledge that can be measured, documented, and archived. Expressed in language or captured in drawings, it is the kind of information found in databases, filing cabinets, and strategic plans. This type of knowledge includes information that has been documented or can be shared with someone. For
example, a trainer may not have conducted web-based training before, but based on what the trainer has read and heard from others, he or she may know the exact sequencing of steps to log in to the web session and conduct the training.

Tacit (or implicit) knowledge on the other hand is human brain power—the information and know-how that lives inside people's heads. It is derived from intuition, perception, senses, physical experience, and more. This type of knowledge refers to personal knowledge in one’s head-knowing how to do something based on experience. It includes judgment, insights, experience, know-how as well as personal belief and values. For example, when conducting web-based training for the first time, a trainer can read documented information about how to conduct this training but at this point lacks tacit knowledge.

These two types of knowledge should work collaboratively. Information (the data a computer produces) does not generate much potential for strategic action. When it is combined with human interpretation and individual contexts and experiences, however, it can inform and drive organizational success.

Thus, KM is the explicit and systematic management of intellectual capital and organization knowledge as well as the associated processes of creating, gathering, organizing, retrieving, leveraging, and using intellectual capital for the purpose of improving organizations and people in the organization.

2.1.4 The important role of knowledge worker in KM model

KM is a kind of participatory activity or work as a team, not working alone, so it needed to understand the meaning and each role of knowledge worker that would describe as below (Panich, 2005):

*Knowledge Vision:* The k-vision will provide a strategic roadmap, prepare the ground for future research, development activities, and provide recommendations towards organizational knowledge management.
Knowledge Facilitator: The k-facilitator is seen as a critical role for the efficient organization of learning schemes, including to provide input to relevant colleagues of learners before, during and after program undertaken by the organization. Usually, the k-facilitator is a knowledge builder, and fostering learning and knowledge leverage.

Knowledge Practitioner: The persons who real practice on KM that involvement of local resource users allowed for sharing local and traditional knowledge in the cases. They have implicit and explicit to share and provide the knowledge toward on successful organization’s target.

Knowledge Asset: It is the accumulated intellectual resources of organization like an information, ideas, learning, technique skill or capacities and can apply to software, database, people ware, documents, or policies, etc.

Knowledge Based Area: To creating an area or environment which is more favorable to learning and sharing the knowledge for organization, such as training area, meeting, chatting room or web board, etc.

The target of KM is a group of people working together on KM, they are together to build up, create, experiment, or experience their own knowledge in order to take the benefit for themselves development and utilizing daily.

2.1.5 Model and process of KM

1) General Model of Knowledge by Newman and Conrad

Newman and Conrad (1999) provided the primarily on the General Knowledge Model. Knowledge flows comprise the set of processes, events and activities through which data, information, knowledge and meta-knowledge are transformed from one state to another. The model organizes knowledge flow into four primary activity areas: knowledge creation, retention, transfer and utilization (Figure 2-1).
Steps and process of model

**Knowledge Creation**: It comprises activities associated with the entry of new knowledge into the system, including knowledge development, discovery, and capture.

**Knowledge Retention**: It includes all activities that preserve knowledge and allow it to remain in the system once introduced. It also includes those activities that maintain the viability of knowledge within the system.

**Knowledge Transfers**: It refers to activities associated with the flow of knowledge from one party to another. This includes communication, translation, conversion, filtering, and rendering.

**Knowledge Utilization**: It includes the activities and events connected with the application of knowledge to the business process.

The model allowing to analyze and trace individual knowledge flows by helping them to examine and understand how knowledge enables specific actions and decisions within each activity phase exists other, smaller knowledge flows and cycles. These layers span a wide range of macro- and micro-behaviors, ranging from broad organizational and multi-organizational processes to discrete actions and decisions, and include all the various intervening layers: activities, tasks, workflows, systems, interfaces, and transformations.
2) Model of Individualism Knowledge Management Window (IKMW) by Dr. Prapon Pasukyud

Pasukyud (2006) explained that the Model of IKMW emphasis on management of human knowledge focus to manage individual’s knowledge. He has developed and given the detail as follows:

<table>
<thead>
<tr>
<th>Known Area</th>
<th>Unknown Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explicit Knowledge</td>
<td>Implicit Knowledge</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hidden Area</th>
<th>Blind Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tacit Knowledge</td>
<td>Ignorance</td>
</tr>
</tbody>
</table>

Figure 2-2 Model of Individualism Knowledge Management Window (IKMW) by Dr. Prapon Pasukyud
Source: Pasukyud (2006)

Steps and process of model

From figure 2-2, it is called that Individualism Knowledge Management Window, it is consisting of 4 windows: Window 1: it is an area to study about “I knows what I know”. It is called Known Area and consists of two types of knowledge: Explicit Knowledge is knowledge come from books, document, file in computer, etc. Implicit Knowledge is knowledge that hidden inside human, and it is difficult to explain out and need time to transmit into the form of documents or explicit knowledge.
Window 2: it is an area to study about “I do not know what I know”. It is called Hidden Area that we know that something is important hidden inside us but we do not know what it is. This is called Tacit Knowledge. It is a kind of in-depth knowledge of human (we do not know ourselves what we know). This window is very important of this model because this model’s concept needs to take benefit and utilize the tacit knowledge through action whether can lead to develop the quality of work or innovation.

Window 3: it is an area to study about “I know what I do not know”. It is called Unknown Area. In this window shows that we do not have any knowledge until we have chance to learn more knowledge, and then it could skip to “Known Area” of window 1. Due to the window 3 is transferred to window 1, the individual gain more knowledge but the proceeding of this window could not completed until there are encourage and manage the implicit knowledge through action.

Window 4: it is an area to study about “I do not know what I do not know”. It is called Blind Area or ignorance that this area is danger to KM and difficult to manage the knowledge due to individually having high ego, or ignorance. The best method to solve this problem is the learner opened mind, listening by without bias. If accepted any knowledge or experience by learners, this blind area is shifted into window 3 automatically or may be changed to window 1 that ready to adapt and occur knowledge immediately.

3) The Model of Socialization-Externalization-Combination-Internalization (SECI) by Nonaka and Takeuchi

Nonaka and Takeuchi (1995) designed the SECI model that consists of three elements: SECI, Ba (Chatting area), and Knowledge Assets. They propose a model of the knowledge creating process to understand the dynamic nature of knowledge creation, and to manage such a process effectively. These three elements are interacted with each other organically and dynamically. The knowledge assets of an organization are mobilized and shared in Ba whereas the tacit knowledge held by individual that is
converted and amplified by the spiral of knowledge through: socialization, externalization, combination, internalization (Figure 2-3).

**Figure 2-3** The SECI model by Nonaka and Takeuchi
Source: www.12manage.com, retrieved May 2, 2007

Steps and process of model

**Socialization mode:** During the socialization mode, tacit knowledge is transferred through interactions between individuals, which may also be accomplished in the absence of language. Individuals may learn and gain a sense of competence by observing behavior modeled by others. For example, mentoring and apprenticeships instruct tacitly through observation, imitation, and practice.

**Combination mode:** The combination mode of knowledge conversion embodies the aggregation of multiple examples of explicit knowledge (Nonaka, 1994). Explicit knowledge may be exchanged during meetings or conferences in which a diversity of knowledge sources combines to shape a new and enhanced conception.
Externalization mode: The externalization mode of the knowledge conversion spiral references the translation of tacit knowledge into explicit. Because the conversion of tacit to explicit knowledge involves the reification of an esoteric, cognitive abstraction into a concrete concept, metaphors are recommended as a way to facilitate this translation (Nonaka, 1994). Metaphors assist individuals in explaining concealed (i.e., tacit) concepts that are otherwise difficult to articulate by assisting individuals in forming impressions based on imagination and intuitive learning through symbols. In other words, metaphors create networks of related concepts as prototypes to facilitate the ability to understand abstract, imaginary concepts. The conversion of explicit to tacit knowledge (i.e., the internalization mode) occurs through a series of iterations in which concepts become concrete and ultimately absorbed as an integral belief or value.

Internalization mode: Where externalization utilizes metaphors to facilitate knowledge conversion, internalization represents an active process of learning. Nonaka (1994) describes this as “participants sharing explicit knowledge that is gradually translated, through interaction and a process of trial-and-error, into different aspects of tacit knowledge. Tacit knowledge is thus mobilized through a dynamic entangling of the different modes of knowledge conversion”.

4) The Knowledge Management Approach by Collision and Parcell.

The KM method of Collision and Parcell (2005) is a framework that can be used for learning, capturing, sharing and exploiting knowledge, experience and good practices (Figure 2-4).
Figure 2-4 The Knowledge Management Approach by Collision and Parcell
Source: Collision and Parcell (2005)

Steps and process of model

- People and teams agree to the set of goal together, and then they use knowledge to deliver against their targets and ultimately creating value. Where do you begin to intervene with KM?

- Focus on the Using Knowledge Circle. What if you could inspire your organization to learn before, during and after any significant activity. Simply learning processes like assisting a colleague, retrospect (post project reviews) and after action reviews make their contribution here, and help to elicit new knowledge which would have remain in the heads of the individuals concerned.
- All this learning activity needs to be connected to some kind of knowledge bank. If you want to learn before doing, you will want to make a withdrawal. And when you have learned lessons which you want to contributes, you will need to make a deposit.

- That is meant where the ability to capture and distill knowledge becomes important, but that is not the whole story. It is impossible to capture everything, so it is important to link the people and network, and people hold key knowledge and insights, and to encourage them to own and update any knowledge which is made explicit-capture as information.

- The environment or culture within your organization surrounds the model, which is critical to get started and sustain knowledge-sharing. This will be reflected in the right leadership behaviors, and the way in which KM becomes embedded into core processes so that ultimately it becomes an unconscious competence.

5) Model of Knowledge Management by Knowledge Management Institution

![Figure 2-5 Model of Knowledge Management by Knowledge Management Institution](source: KMI, 2006)
Steps and process of model

The right angle of model presents the relationship among three dimensions: knowledge, job, and people and cultural organization. A big circle presents a main important cycle of knowledge sharing process and knowledge leverage, and working among people in organization that start and move their knowledge.

According to knowledge moving, it leads any users necessary to capture more knowledge, this step is equal to dimension of knowledge. Capture and choosing more knowledge in both inside and outside of organization, it is necessary to choose the data or information from outside by checking, modifying to apply in appropriated situation and jobs. In addition, the knowledge asset is very important information for people in organization, e.g. experience and knowledge inside organization, most of them are overlooked and ignored, however, it is able to draw knowledge back and use again as it is called “Best Practice” that can be benefited on organizing learning. It is not waste time to search the new outside knowledge because the best knowledge come from people inside and pass through the best practice of that organization. Then, the knowledge asset needs to collect, modify, and discovery them efficiently how they could be utilized, and also needs to review analysis and modify the new Knowledge Leverage always.

Next, dimension of people and cultural organization is the most important on KM process because the factor of people will create and develop knowledge, e.g. learning process and system thinking. Human has role in both a builder and a user that the knowledge are gathered and become to be a part of organization. The culture of organization is people’s custom and behaviour inside organization, so human are both in the builder and practitioner on cultural organization. There are four factors that effect on people’s sharing knowledge in cultural organization (KMI, 2006):

1) Time: Spending the time to share knowledge, develop on working, create the new idea, and solve the problem together.
2) Heart: It expects to spend time together, the people expose their heart to share the knowledge, pleasure to listen from each other, and change their unlearning skill to fully acknowledging skill.

3) Place or stage for sharing: It is a place or stage, e.g. informal and formal meeting, seminar, and small group discussion, etc. for sharing the knowledge, it is a good opportunity to open mind. This process is called ‘Community of Practice or CoPs’ that meant a group of people who has the same interest issue that able to share their knowledge and any experience in order to develop the new useful knowledge for organization.

4) ICT: It is another efficiency communication tool providing the network wider and faster by sharing knowledge and communication through internet network, e.g. on-line and electronic mail, etc.

According to review the six KM model, it could be concluded that each model depended on the different principle, objective, characteristic, and many details described inside of those models. Meanwhile most models presented the main important point that was the sharing and learning the development of knowledge among people inside organization, and sometimes capture and exchange the knowledge from outside. In addition, each model had other different components depending on the objective that they used to manage their KM.

Therefore, this research chose the KM model by KMI that was considered to be appropriated concept to be used as the guidance for study. This model was developed by the Thai organization and has been practiced for a process of trail-and-error by Thai society many times. There were many case studies presented and applied this applicability, for example, Pasukyud (2006) studied the case of Ma Saruay-Vieng Pa Pow community, Chaingrai for the success on eco-culture KM, the studied the background and history of community in order to understand and learn about the relationship of local community located in Ma Lao river in the past time. After sharing the experiences among the stakeholders, everyone started to understand and participate to solve the problem together. The KM was the important tool to create the knowledge development and solve the problem of people’s live, build up the participation of
community, and synthesis the implicit knowledge of community by collecting the local and indigenous knowledge.

Another example, Panich (2007) studied that KM could be applied successfully to farmers who had very limited formal education. The Khao Kwan Foundation (KKF) in Suphan Buri province had applied KM with the learning of students in “Farmer School”. Each “school” had about 40 “students” who were practicing farmers. Some of them were older than 70 years old. KKF provided a full-time learning facilitator for each school. Students learned theoretical knowledge by lecturer from the Office of Agricultural Extension and visited some related centers and university laboratories. KKF’s facilitator also did as tutorials for them. Then each student interpreted the knowledge and applied it in his or her rice field and collected data. The students learned that their routine farming practice were their life-long learning opportunity. As the result, the students gained self-confidence and respected for each other, the production cost was reduced by more than half. More than 90% of their illness disappeared and they spent less time in the field. At present, they could organize community cultural events together like in the old days. After harvesting for a few crops, their productivity got better than working on chemical farming, they gained more higher yield, lower cost, and also got more income with less labor work.

In addition, Panich (2007) mentioned that there were many programs for rural development and poverty alleviation initiated by government units, quasi-government organizations and NGOs. The management of the programs and the facilitators in the field work learned KM principles and practiced and applied them in their work. Meetings for sharing success stories and how to achieve the success (best practices) by storytelling, dialogue, appreciative inquiry and positive atmosphere were widely applied. In this way tacit knowledge was being shared and recognized. Many of those were local wisdom. KM tools were used to collect tacit or practical knowledge and prepare reports of community development projects. For example, OPDC collaborated with the Thailand Productivity Institute (TPI) in supporting pilot organizations in applying KM to develop a learning organization. Among 227 government units, at least 6 units were found to have great
success in applying KM to improve their work. Therefore, the KM is being applied to many development activities initiated by local people themselves.

### 2.1.6 Related research

There are many scholars proven that KM can gather the local people’s knowledge by sharing the knowledge among themselves. The result of the working process, people will understand the background of the problem, the history of community, get better relationship and reduce the conflict through learning by doing, and also many case studies conclude that applying KM in any organization, it can help the people are able to create and discovery successfully the practicing on that purpose. The related research is as follows:

Neef (2005) found that local knowledge is recognised and investigate by a wide array of disciplines and the focus has shifted from a static description of indigenous knowledge to a perception of local knowledge as a dynamic concept and a principal foundation of decision-making processes. Understanding local knowledge as the information base for a society which facilitates communication and decision-making enables the creation of an environment that is conducive to participatory approach which seeks to bridge the divide between local and scientific knowledge.

Pasukyud (2006) studied the case of the Prak Nam Dang community in Ampawa district, Samut Sogram province finding that the process of KM was used to solve the problem conflict of river among three groups of people. Refer to Thailand Research Fund (TRF), the result of KM study found that the people had participated in solving the conflict among themselves. They could learn the experience through group discussion and meeting group on how the community in the past could live on river, what the background of their community about river, what Indigenous Knowledge could manage in the river, and what the expectation of water utilization of community were. Those knowledge could apply to manage their problem, get better relationship and reduce the conflict among them, and also was able to design the model of participatory KM.
Bunyat (2006) studied “Applying technique of KM to develop Tak Hospital’s knowledge” He used the knowledge vision and knowledge sharing from Tuna Model to manage the quality of hospital. He found that KM and Learning Organization could not work separately. At the beginning every staffs had not understood any process of KM, but they learned that the development of organization was the learning process, learning by doing later, and they developed and adapted their action along with the dynamic process. The model of KM could be defined into four steps; learning, action, sharing, and assets, and was able to apply and benefit to ability of working not only organizing development.

Sririrat et al. (2006) studied the Learning Process to encourage the potential of teenager in order to sustain and conserve the Baan Huay Sa Pan Samukkee Forest Community, the study used the qualitative research by interview, focus group, record and observation. The technique of learning process could be able to discovery and create successfully the practicing on forest conservation by teenager participants in the Baan Huay Sa Pan Samukkee Forest Community, and including the handout’s knowledge for Baan Huay Sa Pan Samukkee Forest Community.

Gerke and Evers (2006) found that thinking and writing on one’s own society is part of a reflections of modernization which implies the frequent construction, deconstruction, and reconstruction of image of society that necessary for the development of a society whether of this process of reflection on social process and structures take place within society or whether intellectuals and scholars elsewhere take care of this important task. The measurement of knowledge production is beset by many problems especially when knowledge is in its tacit or secret form, in this case we will not be able to measure it as it is not published and made accessible to a wider publish. It found that some countries in Southeast Asian, such as Cambodia, Vietnam, Myanmar and Laos have low knowledge class with a high level of dependence on outside knowledge or foreign sources for the interpretation and construction on one’s own society. Singapore, Brunei, Malaysia have high local output rate, and Philippines and Thailand are increased local output but also increasing dependence. Therefore if any countries are able to development their own output more than foreign dependence, the knowledge-based society are increased and lead to development and implementation of economic and so on.
From literature review, it concluded that in any society or communities have their own local knowledge-based or local wisdom, if they have a good learning process among themselves, and gathering and discovering the local knowledge-based by themselves, it gain a high potential for them to sustain and conserve their sustainable community including environmental development. However, there is some gap of knowledge is in term of tacit, secret form, whether tacit knowledge or scholars need to be take care of this important task. KM is kind of tool that can help to collect the tacit and explicit knowledge, develop the experience and knowledge, and community can learn many activities among their groups. Providing the technique of KM with local community is able to collect the local knowledge-based and practical knowledge managing well, it can receive the background and experience of the community that lead to better develop and to solve the problem in each community. Their knowledge may be reflecting to meaning of their culture and tradition, beliefs, system thinking, etc.

2.2 Relevant Information about Biodiversity

2.2.1 Definitions of biodiversity

Many scholars defined the term of biodiversity as follows:

WCMC (1992) explained that the word Biodiversity is a contraction of biological diversity. Diversity is a concept which refers to the range of variation or differences among some set of entities; biological diversity thus refers to variety within the living world. It is indeed commonly used to describe the number, variety and variability of living organisms. This very broad usage, embracing many different parameters, is essentially a synonym of Life on Earth.
CBD (2007) defined the meaning of Biological diversity, or biodiversity that refers to the variety of life on Earth. Biodiversity, the combination of life forms, their interactions with one another and with the physical environment makes the Earth habitable for humans.

Convention International (CI) (2004) gave the meaning of Biodiversity that the variety of all forms or life, from genes and species to ecosystems – is our living natural heritage, our natural resource base. Short for biological diversity, biodiversity is the variety of all life in a given area—it could be as small as your backyard, or as large as the entire planet. Biodiversity includes not only the variety of species of plants and animals (species diversity), but also the variety of genes contained in all individual organisms (genetic diversity), and the variety of habitats, biological communities, and ecological processes (ecosystem diversity). Geographers have concentrated their attention on species and ecosystem diversity.

To conclude that diversity is a concept about range of variation or differences among entities. The word ‘Biodiversity’ is a contraction of biological diversity. Thus biological diversity refers to variety within the living world. It is commonly used to describe the number, variety and variability of living organisms. Biodiversity is essential for our existence; the earth’s biological systems and processes provide us with food, materials for clothing and shelter, fuel, medicine, clean water, and clean air. Biodiversity also provides all other species with the resources required for their survival. In fact, given the interdependence of the Earth's living organisms, ecosystems, and biological processes, without biodiversity, life on Earth would become extinct.

2.2.2 State and important of biodiversity

The loss of biodiversity, and especially of genetic and species diversity, represents a loss to all people, today and in the future. Moreover, the impacts of ecosystem and habitat degradation reach beyond national boundaries. Climate regimes, river flows, sediment deposition patterns, and migratory species are all
affected. The interconnections in the world environment are important issue because of the way the whole world shares crop plants, medicinal plants, and other living resources, and because of the increasing interlinkage of the global economy. There is no longer vulnerable only to local ecological and economic factors, the people’s livelihood now depends on international commodity agreements, market forces, and many other factors that make the world economy function as a single system.

Although ecological and economic realities mandate a global response to biodiversity loss, global cooperation faces three obstacles (WRI, IUCN, UNEP, 1992b). First, biodiversity is not a part of the global commons in the sense that the high seas and the atmosphere area. To the contrary, the bulk of genes, species, and habitats lie within the sovereign jurisdiction of individual nations. Second, threats to biodiversity are not evenly distributed among nation, the costs of conserving biodiversity globally will fall more heavily on some nations than on others. Third, the technical and financial abilities to respond to biodiversity loss vary greatly among nations. Indeed, Earth’s most threatened natural ecosystem lie within the developing countries, which posses the least resources to conserve them.

The world’s great forests contain critical habitat for biodiversity, provide clean sources of water, serve as repositories of natural resources, and store carbon to mitigate global warming. High plants occur in virtually all ecosystems of the worlds, even in the sea, but their distribution is very uneven. As well as the more obvious plant provide the products such as food, medicines, and ornamental plants and timber, plants provide a wide variety of resources used in industry and commerce. The GBO2 report suggests, among other things, that the global demand for resources now exceeds by 20% the biological capacity of the Earth to renew these resources. These areas of global concern include deforestation. Due to effecting of deforestation, the conversion of forests into agricultural land is happening at a very high rate. The loss of primary forest-the most biodiversity-has been estimated at six million hectares annually since 2000 (CBD, 2007). One of the main threats to biodiversity is deforestation. Tropical forests also support a wider variety of habitats than other ecosystems and can host a wider variety of species. Perhaps most importantly, the majority of the world's land mass lies in the
tropics (CI, 2004). Tropical climates also tend to be more stable, decreasing the chance of weather-related extinction there. Tropical forest are being destroyed at a rate of over 11 million ha/year (or 21 ha/minute). Much of this is due to shifting cultivation but commercial logging, cattle ranching, plantation farming and road clearance are also important. Scientists argue that each country should protect at least 10% of their habitat and up to 20% of key habitats, such as rainforests (Oxford University, 2000).

It is a fact that the tropical rainforest regions of the world are disappearing due to a multitude of commercial interests. Today, many medicinal plants face extinction or severe genetic loss. Plant species and traditional knowledge are important for the utilization of herbal medicines, either traditionally, through trade or through the pharmaceutical industry (Okello and Ssegawa, 2007). With this destruction comes the loss of cultural habitat and indigenous knowledge which has been gained and utilized for millennia. Less than 1% of all flowering plant species in the world has been exhaustively studied for their potential pharmacological activity (cited Balick, 1990). Although the use of medicinal plants in developed countries has declined over the years, about 25% of prescriptions from community drug stores still contain materials from higher plants (WHO, 1977). According to the WHO (2002), as many as 80–85% of the world’s people in the tropics depend on traditional medicine for their primary health care.

Out of the estimated 422,000 flowering plant species of the world, nearly 35,000 to 70,000 species are used for medicinal purposes all over the globe and at least 6,500 plant species in Asia which is one of the largest biodiversity regions of the world. The continent has diverse plant flora but species richness is concentrated mainly in the tropical and subtropical regions. Six of the world’s eighteen biodiversity hot spots namely the Eastern Himalaya, North Borneo, Peninsular Malaysia, Sri Lanka, the Philippines and the Western Ghats of South India are located in Asia. The countries of the region such as China (30,000 species of higher plants), Indonesia (20,000), India (17,000), Myanmar (14,000), Malaysia (12,000) and Thailand (12,000) have large floras. Medicinal plants are the richest bio-resource of drugs of traditional systems of medicine, modern medicines, nutraceuticals, food supplements, folk medicines,
pharmaceutical intermediates and chemical entities for synthetic drugs (UNIDO, 2005).

Worldwide, for example, the commercial value of medicines based on natural products is over US$20 billion a year. Over 60% of the world’s population depend on traditional medicines and most of these are derived from plants. Quinine, for example, is used to fight malaria, and digitalis from foxglove is used to treat heart disorders. Animals’ species are also important. The Madagascan rosy periwinkle produces vincristine and vinblastine which are used to treat childhood leukemia and Hodgkin’s disease, while bee venom is used to treat arthritis (Oxford University, 2000). In addition, the Rainforest as a source for new pharmaceuticals, one of the most fascinating explanations for this vast array of chemical diversity, which resides within the biological diversity of tropical plant species, is the science of chemical ecology. Plants living in tropical forest habitats have had to develop and survive under intense competition for resources and nutrients. They have also had to develop an extraordinary array of defenses, most of them chemical, to protect themselves from viral diseases, fungal pathogens, insects and mammalian predators. The biodiversity of tropical forest plant species, coupled with the chemical diversity found within each plant leads one to the conclusion that tropical plants are perhaps the most valuable source of new bioactive chemical entities (Bierer et. al., n.d.).

2.2.3 Conservation of biodiversity directly concern on people’s participation

Much of the world’s biodiversity is in rapid decline. The loss of biodiversity today is occurring at a rate of up to a thousand times faster than the natural background rate according to the recent ground breaking Millennium Ecosystem Assessment (MA) which says that a full two-thirds of the ecological services provided by biodiversity ecosystems are being badly degraded. The conservation and sustainable use of biodiversity is essential for poverty eradication in economically developing countries (CBD, 2007). Therefore, concerning of global on the biodiversity crisis, the Convention on Biological Diversity (CBD) represents the first time that biological diversity has been comprehensively addressed in an international treaty. Negotiated under the auspices of the United Nations Environment Programme, that
was opened for signature on 5 June 1992 at the Rio Earth Summit, and entered into force on 29 December 1993. The CBD has three objectives—the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits arising from the utilization of genetic resources. It addresses issues relating to research and training for the public.

For successful action, a conservative biodiversity must address the full range of cause of its current loss and embrace the opportunities that genes, species, and ecosystems provide for sustainable development. Because the goal of biodiversity conservation-supporting sustainable development by protecting and using biological resources in ways that do not diminish the world’s variety of genes and species or destroy important habitats and ecosystems.

Conservation can success only if people understand biodiversity’s distribution and values, see how it figures into their own lives and aspirations, and know how to manage bioregions to meet human needs without damage. Thus in 1992, the United Nations Conference on Environment and Development focused on the plight of the poor and the need for sustainable development to alleviate poverty and provide ways to avoid environmental destruction (Cunningham and Saigo, 1995). As well as the environmental education is the first goal to improve understanding among general public of the natural and built environment and the relationship between humans and their environment, including global aspects of environmental problems and to encourage postsecondary students to pursue careers related to the environment.

In addition, the loss of biodiversity is closely related to forest loss. This is because the forests, especially those in tropical areas, are a major source of diversity in plant and animal habitats and of ecological systems. Thus, the failure of the laws and policies on forest conservation has direct an impact on the loss of biodiversity. From the perspective of the need to impose control on the trading, importing, and exporting of wild animals and their carcasses, the Wildlife Preservation and Protection Act, 1992 is a positive development and would have an important role in the conservation of wild animals (Verstegen, 2002). Under this circumstance, the concept of the Forest
Community is a challenging alternative for the forest management. There is evidence that communal forest management has customarily existed in many locations and therefore the proposed law on Forest Community will give legal recognition to such custom. The concept of the Forest Community, which would allow members of the community concerned to participate in the use and maintenance of the forest would provide some incentive for rural people to conserve the forest more effectively than the state bureaucracy does now.

The loss of biodiversity impoverishes the world and humankind. It reduces the quality of life for all people and may in fact be a survival issue for communities who depend directly upon healthy and productive natural lands to meet their daily needs. In the Global issue at the first United Nations Conference on the Environment in 1972 in Stockholm, Prime Minister Indira Gandhi of India mentioned that the poverty is the greatest danger to the environment. The connection between poverty and the environment has been a major focus of biodiversity loss (Cunningham and Saigo, 1995). Worldwide, it is estimated that the number of individuals using medicinal plants is now increasing with increasing population in both developed and developing countries. Over 60% of the world’s population, 80% in developing countries depends directly on plants for their medical purposes. MP have been harvested from the wild since ancient times. Traditional medicine is still recognized as the primary health care system in many rural communities because of its effectiveness, lack of modern medical alternatives, and cultural preferences. Many rural peoples possess traditional knowledge of medicinal plants. Such knowledge survives because it is transferred from one generation to another (Shrestha and Dhillion, 2003).

This in turn has raised doubts concerning the sustainable use of wild resources of medicinal plants – the conservation of their biodiversity, appropriate forms of local cultivation and production of safe and effective natural medicine and the regulation of the environment. The resolution passed by the World Health Assembly (WHO, 2002) in studying and recognizing the importance of medicinal plants was based on the assumption that plants will always be available (Okello and Ssegawa, 2007). In addition, the 1992 Convention on Biodiversity (CBD) recognizes the importance of
practices of indigenous peoples and local communities for the conservation and sustainable use of biological diversity.

Also, Cultural diversity is closely linked to biodiversity. Humanity's collective knowledge of biodiversity and its use and management rests in cultural diversity; in contrast, conserving biodiversity often helps strengthen cultural integrity and values. (WRI, IUCN, UNEP, 1992b). Consequently, indigenous knowledge and biodiversity are important to human development. Indigenousness is close relationship with biodiversity so the ways different ethnic group performs their social life and culture through one nature setting or another. Culture refers to the bodies of knowledge that human being live by and defines the qualitative of human life and production that reflect to their value and based on their judgment. So here, it will show that the culture is represented as an indigenous knowledge and intellectual heritage of indigenous people. Cultural practices is linked to the environment because indigenous peoples use natural products in many of their traditional activities, such as the use of medicinal plants, consumption and commercial trade in order to continue these practices in the long run.

Therefore, the appropriate environmental knowledge and understanding is obtained through environmental education. The acquired knowledge and understanding should be applied with wisdom to obtain valuable impacts to oneself and to the entire community. Indigenous and local communities, and the knowledge they hold, are pivotal to the conservation and sustainable use of biodiversity. These cultural communities have in common is a long-term association with the lands and waters on which they depend. Meanwhile, indigenous and local communities are stewards of the world’s biological resources. To conclude that to support the long term of sustainable environmental conservation, it requires greatly strengthen of indigenous and local communities through management of knowledge, understanding, awareness of the local people.
2.2.4 Study area of the western biodiversity center in Thailand

1) Background of biodiversity center

The center is located at moo 8, Ta-Soa subdistrict, Sai Yok district in Kanchanaburi province that set in the front of Baan Phu Toei school as a primary level, and is a parted from center around 200 meters and connected with a main road of Kanchanburi-Sai Yok, UTM grid at 497125E-498000E, 1583100N-1584450N. There are five high schools and ten primary schools located around the center and surrounding many villages, e.g. Phu Mut Lang, Phu Mut Bon, Phu Lad, Phu Ang Ka, Phu Ta Kian, and HadGney. Department of Environmental Quality Promotion (DEQP) under the Ministry of Natural Resources and environment (MONRE) in 1985-2005 has concerned and set up the 59 Provincial Environmental Education Centre around Thailand: North (18), Central (13), Northeastern (12), and South (16). Their objectives are: 1) to educate the involving people working on the environmental education both inside and outside of school system, 2) to develop and implement the learning technique and activity, handbook, media, or curriculum of environmental education according to the condition of the local area, 3) to develop and implement environmental education works in cooperating with the local community and other related organizations in order to formulate the working linkage, 4) to provide service through media, training, or any means about environmental education for university and local community within the province. In addition, regional biodiversity center has been set up in 2005, the goal of environmental education is to provide awareness and concern about the environment so that people have been motivated to care for their environment.

The process of center requires the local community and organization that have relevant role on environmental education center’s working, such as people, data, place, equipment, expert, or budget, etc. in order to develop and take the advantage on the diversity of natural resources. The relevance of role depends on each of different kind of environmental education organization; such as colleague, consultant, supporting service, etc. The center has been set up by identifying of school, concerned people,
and school’s policy. The school is set up as an environmental education center that provides some services on the data collection, such as handbook, media, or equips for studying environment, and also represent the good environmental surrounding to push the people’s learning and implement the awareness’ teachers, students, and publicity on the environment. Selecting person who is hasten and intended on working, has capacity on team working, and awareness on the environment has been identified as suitable person for the center. In addition, the schools’ policy could also provide equipments and services, such as exhibition or any supplies to be used within their community area.

The physical characteristic surrounding the center has high mountain, red and black soil color, and fully density of plants along foothill, high sea level 300-400 hectares and the center boundary connects as: North connect to a public village road. South and East connect to Phu Toei Home Resort. West connects to local agricultural village. In addition, another natural condition of Dry Dipterocarpus has variety index dominant species, e.g. *Xyilia xylocarpa, Dipterocarpus tuberculatus*, and *Cycas siamensis*. Besides, *Pandanus militaris* and *Caryota bacsonensis* have been found in fresh water area ecosystem in flat area along the stream.

Since the forest has full of flora diversity, many people had been related to the forest for long time, especially the medicinal plant utilization. Also, some wise people and interested people related to MP were migrated to PTFC and has important role as the knowledge-based management on MPU or called traditional healers. There are many peoples involved and interested in the MP, for instance, Mr. Boonma Punsang who is the oldest traditional healer, he moved to PTFC in 1993. He is specialist on flora, herb and livestock. Another person is Mr. Somkiet Buuyaleka, he is the second important traditional healer who has the local knowledge-base on the medicinal plant utilization and he had moved from Nakornprathom province since 32 years ago.

In additional, there have other people who indirect related to MPU, they support and cooperate about the activities of MP, for instance, Mr. Vikit Kaewjitkungtong, Head of the Agriculture Cooperative Center in Ta-Sao subdistrict, Mr. Pipat Kaewjitkungtong,
Head of Forest Community, and Mr. Viklom Keawjitkugtong as the secretary of Phu Toei Forest Community. Moreover, Mr. Preecha Tippaboon, the director of Baan Phu Toei School, who is the important focal point to contact with in order to get the data collection inside the PTFC.

### 2.2.5 Related research

There are many studies shown that people play the important role whether developing environmental sustainability or destroying the natural resources, depends on many factors as following:

Jingsathianthump (1996) studied on medicinal plant utilization behavior and found that the older people use medicinal plants more than other groups as a result of their experience and knowledge. In contrast, Caro T. et al. (2003) examined the factors that influence on how people subscribe to different reasons for conservation of biodiversity, they found that being educated about conservation had a strong influence on the extent to which students became to commit to the arguments for conserving biodiversity. Course and grade that students attained influenced the extent to which made students differentially sympathetic to many arguments to conserve biodiversity but gender had no effect.

Meanwhile, Katitummanit (1993) found that the value of biodiversity necessary to realize on the factor of humans who related to traditional knowledge. Consideration on the value of biodiversity, many researches in the past could be only specific studied on physical or biology that might not potential and efficiently in the present. But in fact, to complete studying of biodiversity should learn the holistic of phycho-social, physical, and also self-realizations to understand and concern in the whole idea that related to values and norms on biodiversity. Shrestha and Dhillion (2003) studied that the harbors area with a high diversity of medicinal plants, the knowledge of the use of species reported here belongs to the people of the villages studied. Any benefits derived from the use of this knowledge might be shared with the inhabitants of the nine villages. Despite gradual socio-cultural transformation, local communities still
posed substantial knowledge of plants and their uses. The reliance on folk medicines for health care was associated with the lack of modern medicines and medication, poverty and the traditional belief of its effectiveness.

In addition, Katitummanit (1993) (cited in Ramitanon, 1990) found that culture and Indigenous Knowledge could have impact on natural resources and biodiversity conservation. In the past, many people believed that local communities were called primitive people who lacking of knowledge as hill-tribe, in contrast the knowledge occurred by transferring, accumulating, modifying the information and experience from the antecedents of the primitive people that were related to the nature and environment. This traditional knowledge supposed to similar to scientists’ study that there were many generations experiments as using, eating for many times until they got the best of utilization on biodiversity. Searching for foods, medicines, clothing, and housing were the beginning point of human’s culture and system thinking, so the culture and system thinking influenced and related to environment.

Katitummanit (1993) also found that losing of the cultural diversity was brought to biodiversity losing. As studying of the social development was occurred in the past of Thailand, changing the conventional agriculture of farmers from consumption to trading caused to those farmers ignored and gave up to grow the species rice and vegetables originally by transfer knowledge from antecedents. Most biodiversity were destroyed and extinct as the reason of the local and indigenous knowledge losing of management on biodiversity’s utilization and values. Not only close relationship between community and biodiversity, but also the local community’s livelihood could develop and conserve the sustainable biodiversity.

From literature review, it was found that the factors of human has mostly influence on the biodiversity conservation due to people who live around the valuable natural resources and utilized the benefit of such NR. The community’s livelihood and utilization of those resources concern with influencing of culture and learning process that present by the transferring, accumulating, sharing the information and experience from the antecedents to the others, that is called the indigenous knowledge
and local knowledge-base. Also some studies found that education is the strong factor that makes people to understand the conserving biodiversity. However, there is a gap shown that among the local communities still lacks of knowledge transferring from ancestors to the new generation in the past. Each community’s culture could provide different experience and knowledge management on the biodiversity’s utilization depending on their management, so it is necessary to manage and sustain these local knowledge-base for themselves.

2.3 Participatory Approach (PA)

2.3.1 Definition of participants

Wilde and Mattila (1995) indicated the characteristic of participants in the research process as the meaning below:

- **Villagers**: The person who participate as experts on living conditions in the case study area. They have mostly important key to provide the relevant the information.

- **People who work in the area**: People participate as sectoral managers (Forest, agriculture, etc.) or technical professionals who work for the government, private enterprise, or development agencies. They can contribute by linking micro and macro information.

- **The researchers**: The people who depend on the other participants for accurate information and who participate by using participatory research tools to collect or organize and present information for discussion by all participants.

2.3.2 Definition and concept of participatory approach

The participative approach is that the community and stakeholders are collaborators in a project at every stage of project development. Thus, participative methods are meant to generate a sense of ownership of decisions and actions. This is in contrast to the alternative model of development where project conceptualization,
objectives and design are imposed on the community by people external to the community who are characterized as experts. PA can also challenge perceptions, leading to a change in attitude and agendas. They can also provide new and sometimes surprising insights (Odhiambo, 2002).

Prichalai (2002) defined that giving people’s opportunity to express their feeling, telling about their needs for creative thinking, decision making, consideration, shared practice and responsibility, implementation to achieve the goal of every level of things and every pattern of activities by themselves. It is not determination from outside viewpoint. The thing people participated in often effect themselves.

Participatory methods and tools have been incorporated into development manuals and workshops throughout the developing world and rural development project today are rarely funded unless they contain a strong component of community involvement in design and implementation (Neef, 2005).

It emphasizes a participatory mode of action based on an inventory of stakeholder groups and the nature of their interests, and in an interactive manner elicits their input to the curriculum (e.g., through interviews, consultations, post-hoc evaluations). This process can be guided by outside curriculum development "experts" or staff internal to the educational institution. It recognizes the need for concrete participation by curriculum stakeholders and makes provisions for their ongoing involvement in curriculum innovation. It also recognizes the key role of teaching staff and the need to develop their skills to carry out curriculum development and to evaluate/monitor the outcomes (Crowder, 1997).

Therefore, PA could mention as working process of stakeholder group influencing and sharing of knowledge and experience with the different perspectives to achieve their goals. The process involves working in teams on practical tasks and an open-ended creative learning process by using of visualization and analytical tools. The development of shared understanding will provide the capacity and self-assessment.
2.3.3 Technique of participatory approach

Together, the many methods of participatory work are now often referred to as Participatory Learning and Action (PLA). As the studied of Pretty and et al. (1995) provided an excellent overview in his Trainers Manual for Participatory Learning and Action, available from International Institute for Environment and Development (IIED). Despite a wealth of alternative and often confusing names, participatory research methods could be conveniently classified into four main types: Participant Observer, Rapid Rural Appraisal (RRA), Participatory Rural Appraisal (PRA), and Participatory Action Research (PAR). Each with a distinctive style and ethos as follows:

1. Participant Observing

The "participant observer" field technique is well established in anthropology and has been adopted by other disciplines. The method derives from the insight that you derive from a community's values, dynamics, internal relationships, structures and conflicts best from their observed actions, rather than from their (normative) statements of what "is". Participant observation has a quite distinct history from that of the positivist approach to research. Positivist researchers employing questionnaires and surveys assume that they already know what is important. In contrast, participant observation makes no firm assumptions about what is important. This method encourages researchers to immerse themselves in the day-to-day activities of the local life in order to understand and document how things work. In contrast to testing ideas (deductive), they may be developed from observations (inductive) (IISD, 2007).

2. Rapid Rural Appraisal (RRA)

RRA is another type of Participatory Research Method. Both practice and theory of RRA vary greatly according to the context in which it is used. It should be stressed that RRA at its most participatory has the following characteristics (Wilde and Mattila, 1995). The research process aims to include the perspectives of all interest groups. It
can subvert the traditional roles of researcher and researched if both participate in
determining research goals. Its functions through communication among those bound
together by common problems. This communication becomes a tool for identifying
solutions.

Wilde and Mattila (1995) suggested that at first everything may seem confusing
in the field. The researchers follow the field operation principles of fieldwork as three
simple principles: 1) observe: Researchers should keenly watch for patterns of crop
production, land use, and farm/farmer behavior, 2) converse: Researchers should stop
and talk to farmers and listen to their concerns and views, and 3) record: Researchers
should write everything down. Complete field-notes are crucial. This is especially
essential in the early stages of the appraisal to help organize thinking.

2.1) Techniques and Tool of Rapid Rural Appraisal

The techniques of RRA, Crawford (1997) suggested various of them, for
example, interview and question design techniques for individual, household and key
informant interviews, methods of cross-checking information from different sources,
sampling techniques that can be adapted to a particular objective, methods of
obtaining quantitative data in a short time frame, group interview techniques,
including focus-group interviewing, methods of direct observation at site level, and
use of secondary data sources.

Using RRA purposely creates opportunities for participation. Conventional
research tools, such as surveys, keep control in the hands of the researchers. With
RRA, in its most participatory form, all the participants share control by using RRA
tools to present their perspectives. Each RRA tool described here is followed by an
example of how it can be used and of how it was used in different research situations
all over the world (Wilde and Mattila, 1995).
Transect walk: A walk taken by researchers with villagers during which problems and opportunities related to the physical geography and topography of a community are documented, producing a type of map. It usually presents a “summary” of a larger area than a village map does.

Mapping/modeling: Participatory mapping is a process by which the villagers produce a visual image of a village they live in. In modeling the representation is three dimensional. Group discussion of a map or model can help identify trends. It can also reveal what villagers think will happen in the future.

Seasonal analysis: A representation of recurring patterns in village life which contrast the differences in seasonal patterns of people’s lives. This representation is based on divisions of time which can be long (e.g. a generation), or short (e.g. a week, a month). The most common seasonal analysis is one which provides detailed information on agricultural cycles.

Trend diagramming: a representation of the changes in village life and the community’s resources base. It provides an analysis of gender specific changes in who has access to resources or control over them.

Mind map: The map will provide the priority step of ideas and sharing experience of community. For example, villagers can present and analyze information on utilize and knowledge management of herbs and other resources.

Matrix ranking: It is a grid which represents relative value or preferences, by creating hierarchies of activities or items. It reveals the categories villagers use for ranking. Participatory matrix ranking is used to check or probe for information. During the ranking exercise the researchers begin to understand the villagers’ alternatives and options.

Wealth ranking: A tool to determine relative wealth of each community member, including gender-based differences in wealth. Relative wealth information is often easier to obtain because participants are less sensitive about revealing their wealth in
relation to other community members, then they would be if they were asked to give absolute figures.

**Chapatti diagrams (or Venn diagrams):** They are representations of social relationships in a community. The round shapes, which resemble chapattis, are used to indicate the relative importance of individuals and groups within a community. Chapatti diagrams are used to identify the main actors in the community, whether organizations or individuals, and to identify the links between these actors and community activities.

**S.W.O.T. analysis:** It is a tool to document villagers’ evaluation of an activity, including its Strengths, Weaknesses, Opportunities and Treats.

3. **Participatory Rural Appraisal (PRA)**

PRA is a short-cut method of data collection. It is a methodology for action research and utilizes a range of techniques. It involves local people and outsiders from different sections and disciplines. Outsiders facilitated local people in analyzing information, practicing critical self-awareness, taking responsibility and sharing their knowledge of life and conditions to plan and to action (Bhandari, 2003).

PAR is a tool specifically the visualization of information through maps and diagrams. Campbell (2001) criticizes the PRA practitioners to use the information generated, by focus group interviews for example, as if the results speak for themselves and need some acknowledge to provide detailed records of discussion processes within groups and to critically reflect on the role that outside facilitators play in constructing information.

The term PRA is used to refer both to quite standardized set if field exercise and also as a term for every qualitative approach. Standard PAR combines a series of characterization tools (tructs, land mapping, Venn diagrams, wealth-ranking, etc.), originally from agro-ecology research to describe local agrarian reality in a few day.
Together this relies on a qualitative approach based on dialogue with rural populations. This is supposed to lead to knowledge and assessment shared by rural populations and outside contributors (Neef, 2005).

It concluded that participatory methodology often emphasis on diagnosis and appraisal. The goal of participatory appraisal is twofold: to build an analysis of the situation that is shared within the target populations and between them and field agents, and to define relevant actions and establish trust between these different categories of stakeholders. Participatory appraisals, therefore, raise all the problems of participatory: the purpose of intervention and surveys, the farmer-outsider relationship, the political and social stakes of development interventions, conflicts of knowledge and language, the conception of community, the ability to grasp diversity, the dynamics of a survey situation, and the reality of farmers’ ability to express themselves and assert their opinions in such a context (Neef, 2005).

4. Participatory Action Research (PAR)

Wadsworth (1998) defined PAR as research which involves all relevant parties in actively examining together current action (which they experience as problematic) in order to change and improve it. They do this by critically reflecting on the historical, political, cultural, economic, geographic and other contexts which make sense of it. PAR is not just research which is hoped will be followed by action. It is action which is researched, changed and re-researched, within the research process by participants. Instead, it aims to be active co-research, by and for those to be helped.

Greenwood and Levin (1998) described action research as social research carried out by a team encompassing professional action researchers and members of organizations or community seeking to improve their situation. Together, the professional researcher and the stakeholders define the problem to be examined, co generate relevant knowledge about them, learn and execute social research techniques, take action and interpret the results of actions based on what they have learned. And Brien (1997) simply considered action research as "learning by doing" where a group
of people identifies a problem, does something to resolve it, sees how successful their efforts were, and, if not satisfied, tries again. Finally, PAR is an approach to research and learning that uses different methods to address issues or possibilities identified and defined by a community. It is ultimately about the improvement of practice and the creation of knowledge in social groups. It creates new ways of working, interacting, and knowing.

Therefore, it was concluded that this study interested the technique of RRA that purposely creates opportunities for participation. RRA dependents upon the multidisciplinary approach, a core concept of RRA is that research should be carried out not by individuals, but by a team comprised of members drawn from a variety of appropriate disciplines. Learning from and with the rural people: this means learning directly, on-site, and face-to-face, gaining from indigenous physical, technical, and social knowledge. RRA is a bridge between formal surveys and unstructured research methods such as depth interviews, focus groups and observation studies. There is often a scarcity of baseline data, poor facilities for marketing research (e.g. no sampling frames, relatively low literacy among many populations of interest and few trained lists) as well as the lack of appreciation of the need for marketing research. The nature of RRA is such that it holds the promise of overcoming these and other limitations of marketing research. With conscious exploration of the learning process, flexible use of methods, opportunism, improvisation, iteration, and cross-checking, not following a blueprint program but adapting through the learning process. A fundamental principle is the making of contact with the rural population in a learning process. This aspect must be one of the focal points.

2.3.4 Concept of Appreciation, Influence and Control (AIC)

1) Definition and concept of AIC

AIC is a kind of the rapid rural appraisal-a set of informal techniques used by development practitioners in rural areas to collect and analyze data. RRA developed in the 1970s and 1980s in response to the perceived problems of outsiders missing or
miscommunication with local people in the context of development work (World Bank, 1996).

AIC is a workshop-based technique that encourages stakeholders to consider the social, political, and cultural factors along with technical and economic aspects that influence a given project or policy. AIC helps workshop participants identify a common purpose, encourages to recognize the range of stakeholders relevant to that purpose, and creates an enabling forum for stakeholders to pursue that purpose collaboratively. Activities focus on building appreciation through listening, influence through dialogue, and control through action (WBI, 2003).

AIC is a self-organizing process and an approach to collective planning and action that recognizes the complexity of communities and importance of power relationships. AIC is both a philosophy and a model for action. It is a process that recognizes the centrality of power relationships in development projects and policies (Smith, 1991). AIC is a workshop-based technique that encourages stakeholders to consider social, political, and cultural factors along with technical and economic aspects that influence a given project or policy. AIC helps workshop participants identify a common purpose, encourages to recognize the range of stakeholders relevant to that purpose, and creates an enabling forum for stakeholders to pursue that purpose collaboratively. Activities focus on building appreciation through listening, influence through dialogue, and control through action.

AIC is a Workshop-Based Methods to support participatory development. Collaborative decision making often takes place in the context of stakeholder workshops. Sometimes called “action-planning workshops”, they are used to bring stakeholders together to design development projects. The purpose of such workshops is to begin and sustain stakeholder collaboration and foster a “learning-by-doing” atmosphere. A trained facilitator guides stakeholders, who have diverse knowledge and interests, through a series of activities to build consensus. (IOL, 2005).
AIC is not a specific tool, nor is it attached to a particular methodology. It is a framework that guides the efforts of organizers and planners to design methodologies and tools that are specific and appropriate to local conditions and each phase of a planning or organizing cycle of a particular program (MacNeil, n.d.).

Therefore, AIC is a technique to build and encourage the people’s collaboration that is specific and appropriate to local condition by collect and analysis data among themselves. The process will bring stakeholders together to design and brainstorming in a given planning and foster a learning-by-doing workshop to identify the common purpose.

2) The important of Appreciation, Influence and Control

AIC helps workshop participants identify a common purpose, encourages participants to recognize the range of stakeholders relevant to that purpose, and creates an enabling forum for stakeholders to pursue that purpose collaboratively. A typical three day workshop includes (IOL, 2005) inviting relevant stakeholders to design a plan with a clear goal. People are encouraged to envision clear outcomes, to make recommendations and commitments to transfer plan to action.

As the studies of Orapin (1994) found that using concept of AIC is lead to set an outline of present planning and thinking for the future plan according to Mr. Tereid Sato and Mr. William E. Smith’s concept combination. Alphabet A is Appreciation, I is Influence and C is Control. The main advantage of AIC’s principle as follows (Sopchokchai, 1994):

- To motivate participation of people’s awareness in developing their own community, they are able to assign the important priority of issue problem in order to identify fully option of solving problem.
- Following the action above by the representative of community’s participation who has the experience is able to discover and solve the problem inside the community.
- To develop and set up the target group’s creation.
- The community will have feeling that they are belong to that project and glad to join in the project’s development.
- Helping the developer and representative from government who can have more change to get closer with community.
- This process is easy and convenient to get the good qualitative information even just spending a few days in community.

3) Process of Appreciation, Influence and Control

On the process, according to the World Bank (1996) mentioned that stakeholder are selected and encourage doing through the AIC process of meetings, workshops, and activities (collectively referred to as the “conference” in AIC terms) as this follow:

- Appreciate through listening. Appreciate the realities and possibilities of the situation by taking a step back to gain perspective on the stakeholders and situation.
- Influence through dialogue. Explore the logical and strategic options for action as well as the subjective feelings and values that influence selection of strategies.
- Control through action. Enable the stakeholders to take responsibility for choosing a course of action freely, based on information brought to light in workshops, meetings, and activities.

Due to Appendix I of the World Bank (1996), AIC is described simply as a workshop-based process where diverse stakeholders are enabled to appreciate (A) each others' views by listening, influence (I) feelings, values and ideas through dialogue, and control (C) by taking responsibility for and committing to action.

Meanwhile, as the research of Sopchokchae (1994) added that the AIC would focus on target group (stakeholder), pattern and technique and principle, the utilization of AIC through planning development in Tambon and set up the workshop for 3 steps. The target...
group could be divided into 3 levels: 1) Village Level is representative of women, teenager, career, and utilize water, 2) Tambon Level is Tambon Administrator Committee, related Tambon Level, 3) Representative level of Tambon Administrator. The Pattern and Technique of AIC could be set up the place easily as round table or U-shape, and also popular Technique is drawing, card paper, big paper and dividing from big to small. During the process, the process could be arranged into three steps: step A-Knowledge creating, step I-Influence on Community’s Future, and step C- Control Future Expect, the activities could be described as this following:

Step A-Knowledge creating (Stage A1). This step invited all stakeholders from community to meeting and opened the opportunity for everyone have chance to speak equally with comfortable condition. Then, learning and sharing experience process in informal meeting, the representatives are able to present equally their opinion, listening, and finding the conclusion together by using drawing and activity that encourage a lot of local community join in meeting. In the activity, it would gain information, for example,

- rememorize and review the past experience by old local people as the reasoning for their learning and touching the development of community since in the past,
- understand a present issue, they realized how development of community condition in the present by let them draw a picture what any relevant on community about 10-15 minutes.
- then, individual group and a big group of presentation, mix up the various groups together, such as women, poverty, middle, and others in order to make them easy to discuss to each other. Each group would explain their picture individually by banning any question from other because it might be interrupted the speaker and lack of brain storming. Next, establish of a leader to present in conclusion what picture can be seen in each group. In addition, to motivate and create the good condition in participated group, they could propose and set up their name group to create feeling that group was belonging to them. At the end of stage, it is a big meeting of presentation for overall conclusion.
Step A-Knowledge creating (Stage A2). This step could help the target group learnt or image what condition of village in the future is. It would be divided into 3 steps: firstly, set up a group meeting and spending only 10-15 minutes, each of them must create their own image what type of village want to be in the future. Secondly, it would be divided into small group to present their own image by without criticism, and then making a critical analysis to find out what kind of conclusion each small group needed it. Thirdly, re-back to set up the big group again for receiving the idea of each small group in order to rearrange and put some idea into one picture.

Step I-Influence on Community’s Future. This step would build and set the priority planning for the locals what the first important of project should be. From the step A, it would get the whole idea from local people what plan should have expected for the community’s future, so this step would allow them rethinking what kind of plan could be real occur in the village. So, everyone needs to participate in this step by following three kinds of types: 1) working by local people, they could find resources and materials from their local, 2) the plan needs assistance by local agency, and 3) other plans are assisted by other agency. And then, it should separate the overview plan into the project, for instance, such as project of economic, society, basic structural, water plan, politic, natural resources, and quality of life. Finally, this would make the consensus to set up the priority of those projects.

Step C-Control Future Expect. After set the important priority of project, this step is found out the respondent on each project and the sustainable beginning of time. In case of any plan requires the assistance of local organization or other agency. It should follow this outline as following: 1) the name of project, 2) the expected result, 3) the place of project, 4) the process of project, 5) the materials using in the project, 6) the beginning date of project, 7) the named list who will respond on the project, and 8) the director and coordinator of project.

The AIC technique will encourage everyone’s participatory thinking and sharing about experience from the past to present. This participatory technique will remind and motivate their future planning, and also can be an annual report for each
community. The locals can consider any problem from that report in each year and also can adapt the new priority again.

In the development context, AIC proceeds along the following course: identifying the purpose to be served by a particular plan or intervention, recognizing the range of stakeholders whose needs are addressed by that purpose, and, through the AIC process, facilitating creation of a forum that empowers stakeholders to pursue that purpose collaboratively.

### 2.3.5 Related research

Many case studies revealed that the participatory approach could build up the knowledge management, especially local community’s participation should be the important role of managing and developing their local knowledge for community according to the following studies:

Voeks (2007) studied the possible role of gender as a feature of medicinal plant knowledge in tropical landscapes by establishing and censusing a medicinal plant trail bordering the Chapada Diamantina National Park in Bahia state, Brazil. Participants varied significantly in their ability to identify both the floral elements on the medicinal plant trail and their individual medicinal properties. The participants elicited a wide range of responses to the socioeconomic questionnaire. The results shown that both men’s and women’s knowledge of the medicinal properties of the local flora grew during their lifetimes. But it was also evident from the regression lines that women accumulate this knowledge of nature more rapidly throughout their lives than men—thus, in old age, women learned much more about the medicinal properties of plants than men.

Li et al. (2006) studied the medicinal baths were an important traditional way to prevent and cure common diseases among the traditional Yao communities of Jinping county, Yunnan province, South West China. Approaches of anthropology, ethnobotany, and participatory rural appraisal (PRA) were used to investigate the herbs used for
medicinal baths; and 110 medicinal plant species were found to be used by local people to treat a variety of diseases, such as rheumatic diseases, skin diseases. Of these 110 species, 6 (5%) had not been previously identified as having medicinal properties, while 87 (79%) were newly recorded for their use in medicinal baths. These new ethnobotanical and medicinal records were a rich source of further phytochemical, pharmacological, and clinical studies on folk herbs in South West China.

Mosses (1994), Mohan (2001), and Neef (2005) explained that knowledge has been constituted by the way in which people categorise, code, process and impute meaning to their experiences. Thus, knowledge is regarded as the outcome of a socially constructed process, involving a whole set of cultural and institutional factors. Local knowledge often reflects the power structures within local communities. It is false assumption that local knowledge is primarily mediated by language and can be understood through short-term PRA exercise. In fact, most local knowledge is not verbally transmitted but tacit and generated in practice. Local knowledge is a basis for sustainable natural resources use for the community, starting from knowledge held by rural populations about their situations and how they see them should be the goal.

MacNeil (n.d.) studied AIC process created an enabling environment for people to participate in brainstorming and for diverse opinions to be voiced. Regarding to Sopchokchai 1994 found that even in a short workshop, women's capacity and confidence in analyzing and articulating ideas appeared to increase. Men also had the opportunity to appreciate the role and potential of women in development planning. Women interviewed were usually pleased with the process, as they were able to voluntarily participate in programs-as thinkers and doers-and not merely assigned to the program as doers.

AIC Conference in Colombia leaded to commitments and action in the energy sector, with gathering the key stakeholders for a three-day AIC conference in Santa Marta, Colombia. It found that the AIC process encouraged participants to envision clear outcomes, make recommendations, and make commitments that would transform their conference plan into actions (World Bank, 1997).
From literature review it concluded that the role of participants is an important factor to accumulate the knowledge in nature but the most local knowledge-based has not been normally transmitted on their explicit and generated in practice. So applying the participatory approach in this research should create opportunity for participants to gain the experience and knowledge, as well as, the researcher has a chance to learn from the participants, this means the learning process between participants and research. In addition, using technique of AIC, that is a kind of RRA, provides the advantage principle for the development practitioners in rural areas, and AIC could create and gather a group of people’s sharing and building the knowledge together that every opinion and decision-making by participants could lead to outcome to arrange on purpose. It could also provide the close relationship between the researcher and local people.
CHAPTER III
METHODOLOGY

This study was the survey research that focused on Knowledge Management (KM) of biodiversity, especially usage of medicinal plants at Phu Toei Forest Community (PTFC) in Kanchanaburi province. This research applied the principle of the qualitative research that required many tools, such as in-depth interview, focus group discussion, and directly observation for data collection. The procedure and the methodology of this study could be described as the following:

3.1 Scope of the Study

Scope of this research was conducted by history, social and cultural studies about medicinal plant usage within PTFC in Kanchanaburi province in order to analysis the knowledge-based management about values and benefit of their medicinal plants usage. In addition, the research interested in the important target groups, such as local community, school, local agency or any users that related and linked with this article to identify how they managed their local knowledge-base on MPU. By analysis and synthesis the data collection from participatory community, it finalized to design a properly model of KBM-MPU for the Western biodiversity center in Thailand.

3.2 Research Design

As a qualitative research, this research was conducted by applying many means, e.g. secondary data and primary data that were applied along the line of the principle of Participatory Approach (PA) for a technique of the Rapid Rural Appraisal (RRA), the RRA is a kind of action research that able to use the outcome immediately and also
required on community’s participation during working. Under RRA, this research would allow the Stakeholder Analysis (SA) to identify key informants (KIs) who related to MP usage and to design the technique of Appreciation-Influence-Control (AIC). This technique would emphasis on the community’s participation to share data and experiences which provided a chance for them to be beneficial of learning process between the researcher and community in order to learn a new knowledge and analysis the data to solve the problem together.

3.3 Research Process

The research process involved three main related tasks: 1) under SA to find the sampling size, the snowball technique was conducted to identify KIs who related on MPs usage, and also exploring and surveying the study area under the principle of RRA. 2) Conducting the AIC activities to analysis the local knowledge-base on MPU among KIs, it would use many techniques, such as in-depth interview, focus group discussion, and observation on the process. 3) Summarizing and design the Model of KBM-MPU by using the S.W.O.T analysis, to identify the primarily data from evaluation of AIC activities, meanwhile, reviewing of KM model on secondary data.
**Figure 3-1** The stages of research process

- **Stage 1: Exploration of KM**
  - Document review and identify of the KM model

- **Stage 2: RRA for the KM-MPU**
  - Stakeholder Analysis
  - Participant observation
  - Snowball Technique by Interviews & survey
  - Focus Group Discussion

- **Stage 3: Evaluation**

**Model of KM-MPU**
3.3.1 Step of the study

Step 1: Stakeholder Analysis (SA) related to medicinal plant utilization

1.1 Identify key informants by using snowball technique

Stakeholder analysis (SA) is a process of systematically gathering and analyzing qualitative information to determine whose interests should be taken into account when developing and/or implementing an activities or program. There are four major important attributes for SA consideration, such as the stakeholders’ position on the reform issue, the level of influence (power) they hold, the level of interest they have in the specific reform, and the group/coalition to which they belong or can reasonably be associated with.

Therefore, under the principle of SA, the snowball technique was used to identify the KIs in the PTFC, the step followed a logical sequences. The researcher aimed to the focal point, and used the snowball technique to select the KIs by interviewing and searching every stakes whose name’s were mentioned until the name would be similar and static. Snowball sampling was not a stand-alone tool, in-depth interview and by telephone in some cases, it was also used for the selected participants form the snowball process. In addition, Mind Map technique was also used to identify the KIs. This step might take 4-5 times to collect the data in order to find the right KIs.

1.2 Pre-survey within the study area and preparing staff teams

Under the process of RRA, the next step was pre-survey at the study area, one of the most demanding was participant observation. It required the researcher to be acquainted with the local community in order to assure that the observations were taken place in the natural phenomenon due to the reasoning of intensive shortly works. The role of the researcher was being as a participant to collect and storage of field data notes, and then analysis the field data. In addition, pre-survey was beneficial for researcher to contact and
familiar with the local people throughout the study area. Some of them intended to take the researcher tour around the community.

Then, research team with the properly assigned job, and arrangement of materials for AIC activities were prepared. The interviewer with the assistant group for interviewing in order to achieving and observing the participants’ behavior in the site were also arranged. During the focus group discussion, the researcher needed some assistance working on the process, the responsibility of staff teams were direct observation who tended to be more focused than participant observation, not typically tried to become a participant in the context. One would observe the behavior and action of participants or quality of respondents. Another could videotape and through pictures, photos or drawings the phenomenon or observe from behind the process, looking especially for the nonverbal cues being used. In addition, the interviewers required and might work under the direction of a supervisor in order to assure the quality of the responses, the supervisor might have to observe the interviews or conduct follow-up assessments of interviews with the respondents.

**Step 2: Activities under AIC process**

The AIC process was composed of 3 stages: Stage 1-Appreciation (A), it would help the participants understanding on value and benefit toward social aspect on the MPs usage from the past to the present. Stage 2-Influence (I), the participants would have the opportunities to exchange the ideas and share the experience about MPU according to the method of community learning, and Stage 3-Control (C), it induced participants to be aware of the guideline of KBM-MPU associated with applying the utilizes model for developing sustainability in PTFC. Reaching the target group’s mission, the study would conduct as the following:
2.1 Formulation of scope and content of AIC

Scope and content of AIC were formulated and analyzed the knowledge management on medicinal plants usage for PTFC by using various techniques, such as observation, in-depth interview and focus group discussion with the target group related in MPU among the KIs. The content for conversation under AIC process was composed of three issues: the value and benefit on MPU of PTFC, the local knowledge-base on medicinal plants usage and the relevant problems, and finalize the model of KBM-MPU.

2.2 Focus group discussion using the AIC method at target group

This study would provide the principle of stakeholder analysis to arrange the focus group by using the snowball technique to identify the KIs who could be anyone in the community or local agencies as the target group.

2.3 Introduction and explanation the research mission to the target group

To explain mission to the target group, the study was conducted as follows:

*Describe the entire study:* It needed to describe the background and objective of the study, process on working, and the important of the study.

*Explain scheduling:* The target groups had to understand the demands being made on the schedules and how these were important to the study. It was necessary to inform them because of inevitable to conduct the entire set of interviewees within a certain time period. During studies, it was also important to have the target group available as the convenient of the respondents.

2.4 Guidelines of AIC process, duration, moderator, venue and equipment

In order to achieve the determined objectives, the guideline for implementing AIC process had been prepared as follows: 1) methods of AIC including group meeting, discussion, brainstorming, and in-depth interview, 2) under the AIC activity, it took at the
third time of the whole tasks for group discussion and in-depth interview for data collection, 3) researcher played a supportive role of moderating during the meeting and requiring the assigned supervisor to play a major role of moderator. The participants were KIs, leader, and stakeholder in Forest Community, 4) the target group from Ta-soa village, PTFC was selected attending in the meetings, and 5) materials, equipments, introductory document, flipchart, and interviewed form, matrix forms were prepared to link the opinions of the participants for analysis purpose.

2.5 Construct and design the Model of Knowledge-Based Management on Medicinal Plant Utilization (KBM-MPU)

After data collection was completed, these information was analyzed by using the technique of S.W.O.T analysis to identify the strengths, weakness, opportunity and threats involving in the present situation of MPU among the community. It was designed by gathering the information of participatory activities that followed the outline of research’s objective: awareness on value and benefit on biodiversity, utilization of herbs and MP, method of transferring knowledge among the community. The designed model was depended on the experience and exchange knowledge during the group discussion. Meanwhile, document was reviewed and identified for the Model of Knowledge Management, this stage would gain the lesson learn from studying the general information of KM and identified the definition, concept, type, and process of KM model that provided the important information how local knowledge had influence on the MPU.

In addition, it needed to study their local knowledge-base transferring among the community. It also required to study general information of PTFC, such as the background, ecology, culture, general data of key stakeholder, and cooperative organization with PTFC unit and the other relevance of biodiversity centers as the secondary data sources including the observational data during surveying. Besides, the important of the studying would focus on species and utilization of the medicinal plants from the secondary data, however, it needed to identify additional data collection with the focus group discussion under the process AIC to get the database of MP in PTFC, such as
name list, parts of utilization, methods and treatment by using medicinal plants, and methods of transferring knowledge by local people, etc.

Then, all information was integrated both for S.W.O.T analysis and model of KM identification in order to finalize the KBM-MPU. This stage would construct the KBM-MPU for PTFC in the Western biodiversity center, Thailand.

2.6 Present the guiding of model of KBM-MPU for the target group and adjust the model

The research would present the guideline of model to the participants under the activity of AIC process to discuss, and share their opinions between participants and researcher to get recommendations. Suggestions for the improvement of the model based on the experience gained while conducted this research was proposed for their KM’ development.

**Step 3: Evaluation of AIC process**

Since this study focused on participatory approach that emphasized on learning experiences of the target groups gained through AIC process, the results gained at the end of the process was evaluated. This process would identify and found the suitable process for the research study. The evaluation of AIC process of this study could be separated into two issues: 1) behavior observing of the participants and 2) satisfaction and benefits from AIC process. The study would conduct as the following:

3.1 Observing behavior of the participants

Evaluation was aimed to analyze the overall working process and systematically assessing the work accomplishment. It could be said that evaluation was a learning experience among the target groups, researcher, and the others involved and affected. Any opinions gained from the evaluation were useful for community, and including personal interview form was evaluated.
3.2 Satisfaction and benefit from AIC process

This study needed to evaluate the AIC process regarding satisfaction of the local community’s participation could provide the required data. And it would evaluate the benefit of AIC process that suitable for this research, if not it would have some properly suggestion or option for this study.

3.4 Validity

This research was a type of qualitative research, so the studying needed to analysis and synthesis how the knowledge management of local community had learning process of utilizing of MP. It could measure by observation, in-depth interview, focus group discussion and then the research would gather and collected the data to analyze and synthesis. The validity regarding with the stakeholder analyzing measured by a time or task of local community continue participating and attending the activities, such of their cooperation indicated their recognizing the relevant to the study process and understand the important of study. In addition, if the research process was really satisfactory with the local community’s need, it was the indicator to measure accomplishment.

3.5 Data Collection and Analysis

As the qualitative research, this study used the RRA technique under the participatory approach that is a fundamental principle for making contact with the target group in a learning process. So the evaluation of this study applied the technique of direct observation for all steps of the study by the researcher and team. The result then analyzed and discussed later.

The learning process of this study was obtained through the qualitative data within a short time frame, anyhow the local participants and researcher had learnt the process together
through the technique of RRA that was in-depth interview and focus group discussion. In result was analyzed and synthesized by using the variety of tools, such as Tread Diagramming, Seasonal Analysis, Mind Map, Cross-checking information, Venn Diagram, S.W.O.T Analysis, together with the personal information form, and those secondary data collection.
CHAPTER IV
RESULTS AND DISCUSSION

This research was identified as qualitative research which studied on the general information on Phu Toei Forest Community’s social and culture, the value and benefit of MPU, and Model of KBM-MPU by using observation, in-depth interviews, group discussion for qualitative data collection. The procedure and the methodology of this study could be analyzed and get the lesson learnt as the following:

4.1 The Result of Stakeholder Analysis related to Medicinal Plant Utilization

Under the principle of Stakeholder Analysis (SA), this study used the snowball technique to identify key informants (KIs) who related or involved in the medicinal plants utilization. To collect data for the Mind Map analysis the KIs were interviewed by the in-depth interview technique and through telephone communication. It took around three days to collect the data. The numbers of KIs were identified recording to the characteristic of the KI groups in order to categorize the priority, relevance, and relationship of KIs to MPU as detail follows:

4.1.1 Identifying the number and right key informants related to Medicinal plant utilization by snowball technique

This study used the snowball technique to find the suitable KIs. By such technique, the name list would be repeated and static then the tool of Mind Map was used to analyze the data. During conduct the snowball technique, the code numbers of names were told for counting until it searched 15 KIs who had undertaken and had interaction with MPs usage. The code numbers from S1-S15 were used instead of names listed below:
During the process running, the focal point of the Biodiversity Center was selected to be the first interviewed, and the others were contacted continuously to gain the right KIs including anyone who never knew before. The interviewing was stopped when the name list nominated in the Mind Map chart was similar as the pictures shown in figure 4-1 to 4-8. According to suggestion of the focal point as the director of Phu Toei school which is located within the Biodiversity Center, S1 mentioned the important four key informants who were interested and related in the KM-MPU inside PTFC, such as S2-Mr. Pipat Keawjitkugtong, S6-Mr. Somkiet Boonyalayka, S11-Ms. Venus In-kachan, and S10-Ms. Piyaporn Kong-aubon (Figure 4-1).

According to recommendation of S1, the researcher selected S2-Mr. Pipat Keawjitkugtong, the head of forest community group, he proposed another five more KIs; S12-Mr. Noop Niyumthai, S13-Mr. Cheing Bunton, S3-Mr. Somkiet Boonyaleka and S6-Mr. Boonma Pansang, and S7-Mr. Viklom Keawjitkugtong (Figure 4-2). To gain more KIs,
S3-Mr. Boonma Pansang as the traditional healer was continuously selected and he suggested another 7 of KIs as the Figure 4-3.

**Figure 4-1** Mind Map presenting the stakeholders identifying by Mr. Preecha Tippaboon

**Figure 4-2** Mind Map presenting the stakeholders identifying by Mr. Pipat Keawjitkugtong

**Figure 4-3** Mind Map presenting the stakeholders identifying by Mr. Somkiet Boonyalayka

**Figure 4-4** Mind Map presenting the stakeholders identifying by Mr. Akarin Bunton and Mr. Pipat Shuchan
Then, S4-Mr. Akarin Bunton and S5-Mr. Pipat Shuchan, both of them were the important key informants as the new generation who interested in the studying about MPU and they were being as the assistants. They provided 4 more key informants as the shown in figure 4-4:

![Figure 4-5](image1.png)  
**Figure 4-5** Mind Map presenting the stakeholders identifying by Mr. Boonma Pansang

![Figure 4-6](image2.png)  
**Figure 4-6** Mind Map presenting the stakeholders identifying by Mr. Viklom Keawjitkugtong

![Figure 4-7](image3.png)  
**Figure 4-7** Mind Map presenting the stakeholders identifying by Mr. Vikit Keawjitkugtong

![Figure 4-8](image4.png)  
**Figure 4-8** Mind Map presenting the stakeholders identifying by Mr. Anukun Shuchan
Then, the identification of KIs by using the snowball technique continuously searched for more stakeholders who related to MPs usage in PTFC until the name lists were repeated and static. This technique indicated the important KIs to be tracked and kept interviewed later on.

The presenting of the Mind Maps above showed the output of key informants that related and involved in the MPU by using in-depth interview technique. In some case, they needed to interview through telephone for some KIs because they were not personally available and limitation of time. However, the research study found some problems during doing the SA, it was difficult to interview some KIs, such as Mr. Boonrod, Ms. Piyaporn Kong-aubon, and Mr. Cheing Bunton because the time was limited and the above name were difficult to contact. So their data’s nominations were not available but it was still recorded on the name lists due to those mentioned.

According to the conducting of stakeholder analysis (SA), it also showed that KIs had close relationship among themselves. Even thought the KI could not refer to all name lists in the same time, the concluded result of Mind Map found that all 15 KIs knew each other and they were all related to MPU in PTFC.

4.1.2 Categorize of key informants (KIs)

Using the snowball technique, it was found that KIs could be identified and divided into three groups; 1) wise people/traditional healers (TH), 2) leader or local community, and 3) users or anyone who interested as shown in Table 4-1.
### Table 4-1 Categorize of Key Informants (KIs)

<table>
<thead>
<tr>
<th>Status</th>
<th>Type of Stakeholder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wise people/ Traditional</td>
<td>1. Expertise and experience on MPs more than 100 species</td>
</tr>
<tr>
<td>healers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leader/local community</td>
</tr>
<tr>
<td></td>
<td>1. Head of Agriculture Cooperative Center in Ta-Sao Sub-district</td>
</tr>
<tr>
<td></td>
<td>2. Head of forest community group and committee of Erawan National Park project</td>
</tr>
<tr>
<td></td>
<td>3. Secretary of PTFC</td>
</tr>
<tr>
<td></td>
<td>4. Member of agriculture cooperative center</td>
</tr>
<tr>
<td>Interested people/ Users</td>
<td>1. Researcher</td>
</tr>
<tr>
<td></td>
<td>2. Assistant to forest community and medicinal group</td>
</tr>
<tr>
<td></td>
<td>3. Assistant to village headquarter</td>
</tr>
<tr>
<td></td>
<td>4. Assistant to the medicinal group</td>
</tr>
</tbody>
</table>

In the table 4-1 shown three important groups were categorized to be the KIs related to MPs usage in PTFC, almost all of KIs were male, but only one was female. There were three wise people having expertise and skill on usage of MPs more than 100 – 1,000 species, most of them worked in the field and feeding animals due to low formal education. But this group was recognized on the relevance of their local knowledge-base on MPU among KIs. The second group was referred to the leadership of community or local community who worked in PTFC, most of them encouraged and related to support on MPs development. The third group was anyone who used or interested to use the service from MPs, for example, the researchers or scientists from university nearby interested to collect and study about the biological diversity of plants. KIs were characterized mostly suitable for the third group. The number of people were mentioned as the KIs mostly found in the third group more than others. In contrast, the group of wise people/TH was searched only few numbers of stakeholder, however, they had very high influences than the two groups of KIs.
4.1.3. Prioritizing and relevant of key informants (KIs)

It was the general information on priority of stakeholders to be interviewed with a justification for each group's as illustrated in Table 4-2. There were 15 people who related and interested in the MP. Then, counting the number of all stakeholders who were mentioned, it could be ranked from high to low influences of stakeholder in priority. The high number of counting for the best chosen who the group of wise people due to high influence of local knowledge-base on MPU. The result of choosing involved the relevant position of that nominee, such as, Mr. Boonma Pansang who has been an expert and has the most experiences on the MP treatment and has knowledge on MPU more than 1,000 species that called as the Traditional Healer (TH). Mr. Somkiet Boonyaleka was the second nominee because he has experiences on MPU as the TH and knew MP up to 1,000 species. In contrast, the name lists were nominated in the low score, it did not mean that their roles would not important. The position of KIs was relevant and influenced on MPU. For example, Mr. Pipat Keawjitkugtong has been respected by the people in PTFC as the Head of Forest Community group. He was the important Key Informant who supported and assisted any activities inside the community during the survey. The background of PTFC’s information was also supported by him.

In some cases, even the KIs were low counting but in the term of SA they supposed to be important group to support the local KBM-MPU for future. For example, Mr. Akarin Bunton and Mr. Pipat Shuchang were very important on KM on MPU. Both of them were chosen by TH who were being as the new generation interested to learn about MPU and they were transferred the local knowledge-base on MPs by wise people in nowadays as the new generation who worked for PTFC in the future development.
Table 4-2. Prioritizing of Key Stakeholders and the Reason of Choosing

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>No. to be nominated</th>
<th>Reason to choosing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mr. Boonma Pansang</td>
<td>8</td>
<td>His expertise and skills on medicinal plants and knows more than 1,000 species</td>
</tr>
<tr>
<td>2. Mr. Somkiet Boonyalayka</td>
<td>6</td>
<td>He is an expert on medicinal plants and knows more than 100 species</td>
</tr>
<tr>
<td>3. Mr. Vikit Keawjitkugtong</td>
<td>5</td>
<td>He supports the activities involving with the medicinal plants and also is the Head of Agriculture Cooperative Center in Tombon Ta-sao</td>
</tr>
<tr>
<td>4. Mr. Cheing Bunton</td>
<td>4</td>
<td>Assistant to Forest Community and member of medicinal plants group</td>
</tr>
<tr>
<td>5. Mr. Pipat Keawjitkugtong</td>
<td>3</td>
<td>Head of Forest Community group and the committee of Erawan National Park project</td>
</tr>
<tr>
<td>6. Ms. Piyaporn Kong-aubon</td>
<td>3</td>
<td>Researcher works on the biodiversity in the Forest Community</td>
</tr>
<tr>
<td>7. Mr. Pipat Shuchang</td>
<td>3</td>
<td>Assistant to medicinal plant group</td>
</tr>
<tr>
<td>8. Mr. Noop Niyumthai</td>
<td>3</td>
<td>Assistant to village headquarter</td>
</tr>
<tr>
<td>9. Mr. Viklom Keawjitkugtong</td>
<td>3</td>
<td>Member to Agriculture Cooperative Center</td>
</tr>
<tr>
<td>10. Mr. Akarin Bunton</td>
<td>2</td>
<td>Assistant to medicinal plant group</td>
</tr>
<tr>
<td>11. Mr. Monchai Sudvivej</td>
<td>2</td>
<td>Assistant to medicinal plant group</td>
</tr>
<tr>
<td>12. Mr. Boonrod</td>
<td>2</td>
<td>Assistant to medicinal plant group</td>
</tr>
<tr>
<td>13. Mr. Anukun Shuchan</td>
<td>1</td>
<td>Worker in Agriculture Cooperative Center</td>
</tr>
<tr>
<td>14. Ms. Venus In-kachan</td>
<td>1</td>
<td>Assistant of Director of Baan Phu Toei School</td>
</tr>
<tr>
<td>15. Mr. Preecha Tipaboon</td>
<td>1</td>
<td>Director of Phu Toei School</td>
</tr>
</tbody>
</table>
During the SA process, using Snowball technique to approach and locate the right KIs in order to gain more others who the researcher had never known. The analysis got the right persons who were the stakeholders with role of MP’s beneficial in their life. The relationship among themselves, and including stakeholders who directly interacted in the MPU, such as wise people/TH, and those whose relationship might be indirect, such as cooperative group, people in village, school, university, or other people from outside the area.

In addition, for the process of AIC, the numbers of KIs were not the same as the number of snowball technique’s identification. The result of Table 4-2 showed the characteristic of KIs who attended in the focus group discussion under the AIC process.

4.2 Value and Benefit of Medicinal Plants in Phu Toei Forest Community under AIC process (Result of A stage)

This step was Appreciation: Social aspect’s value and benefit on MPU would help the participants understand the value and benefit towards the MPU. It also provided the opportunity for the participants to present and look back how their background of MPU changed or developed. By using in-depth interview to the KIs, it found the data of MPU background in PTFC in the past 30 years and the species of MPs around PTFC. The detailed activity in stage A could be described as the following:
<table>
<thead>
<tr>
<th><strong>Stage 1:</strong> Appreciation (A) Social aspect’s value and benefit on Medicinal Plant Utilization</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Duration</strong></td>
</tr>
</tbody>
</table>

**Background and Justification**

This stage would help to make understanding on value and benefit toward social aspect on the MP. It should be a good opportunity for participants to present their opinions and experiences related to the activities benefited from MP. In this way, they would analyze the past and current situation of value and benefit on MP. It could be said that this stage would lead to make awareness of the importance on biodiversity.

**Objective**

To analyze the values and benefits of MPU, including to study the potential of society and culture aspect from the Forest Community;

**Analysis**

1. To identify value and benefit on MPU of TH relating to user groups in Phu Toei Forest Community.
2. To identify utilizing and managing problems of MP arising from social benefited in Phu Toei Forest Community.

**Activities**

Day 1: In-Depth Interview to the wise people

**Equipments**

1. Check list for MP
2. Personal Interview

Under this stage, most of participants were a part of KIs but some of them were the new comer and interested in this issue, the total of participants attended this stage around six persons due to requiring the special expert and experienced person who involved in MPU. They had the ability to provide the local knowledge-base about area of MPs collecting around the forest and background information of MPU since the past 30 years in PTFC.
4.2.1 General Information of Phu Toei Forest Community

Phu Toei is located at Moo 8, Ta-Soa subdistrict, Sai Yok district in Kanchanaburi province with 328 rai or 17 sq.km (Figure 4-9). The primitive people started to locate in this area around 1957, Phu Toei village used to combine with Pu Aung Ka village Moo 4, and was separated to be Moo 8 since 1981. In the formal time, this area used to be housing of Karen and some skeleton of people were found in the cave and chasm. After Second World War, this area was vacant and overgrown. Around 1957 another community migrated in and the number was increased, most people lived close by the river. The condition of river in this area is infiltrated from the rock and stone, and flow through the village. The volume of water is flowed all year round and caused the growing up a lot of natural plants around infiltrated water, so it is called fresh water forest. The most dominated plant species are *Pandanus unicornutus* and mixed with other species, so this area is called Phu Toei Forest Community (PTFC). It meant the community that has been fully of Pandanus forest.

![Figure 4-9 Map of Phu Toei Forest Community area in Kanchanaburi province](image)

PTFC covers area of the 328 rai, the large forest area is held as the Center of Biodiversity which is located at the back of Baan Phu Toei School and Phu Toei temple. This project was under the Administrative Committee of the Western Environmental
Education Development in Kanchanaburi province that consisted of a member of Rajabhat Kanchanaburi University group, committee of PTFC, and officer of the National Park with the responsibility to develop this area as the natural trial center and build up the linkage of learning system between community and local provincial schools nearby such as Kanchanaburi province, Supunburi province, and other western provinces.

Public and Transportation: From Phu Toei village there is a main road no. 323 Kanchanaburi-Sangkraburi, and far from city around 70 km. and from Sai Yok district 30 km. The road within the village are concrete and gravel roads. In addition, it is able to travel by train and connect with car for another 10 km, or travel by boat at Mae Klong river to Kawe Noi river and Pak Sang and then connect with car for another 13 km. The Kanchanaburi-Sanggaburi road is the main important road for traveling to Sai Yok district and to other places. This could help the people of Ta-Soa earning well on trading with the travelers. Publicity in Phu Toei village, there is only one school, Baan Phu Toei school, and two public health centers, Baan Phu Toei and Baan Ta-Soa public health centers. Also there is a hospital at Sai Yok district providing service for people in the village.

The area of Phu Toei village is a part of Ta-Soa subdistrict which physical area is flat area with foothill fully with stream and river, forest, and beautiful scenery. Along the river there has some relevant business to natural resources especially hotels and resorts that provide a lot of profit to the local community. The total population is 301 persons; 141 males and 160 females. However, major occupations are involved in agriculture, e.g. corn, eggplant, and economical crop plants, and livestock, e.g. cattle, native chicken, and fish cultures, also flora, and agricultural production trading, beside, home stayed in field and garden area easily seen. Nowadays, people rely on each other, to be loved and harmony, they have been set up cooperative organization at both subdistrict and district levels, such as community bank, community shop, cow feeding group, rice mill of the community, animal food housing. For more efficiency in gathering among communities, they have established many groups, e.g. saving groups, agricultural production conversion group, banana conversion group, bamboo conversion group, and cremation foundation group.
Culture: The ceremony place for religion is temple. There is only one temple, the Phu Toei Temple, and in the area peoples’ religion is Buddhist.

Since the forest area of Phu Toei village moo 8 is located at the back of Baan Phu Toei school and Phu Toei temple that located in Wang Tai reserved forest and Mae Nam Noi forest connected with Sai Yok National Park boundary. The condition of forest consists of variety of flora without anyone takes possession and invasion. The general condition is mixed forest with a density of bamboo and other species, e.g. *Pterocarpus macrocaspus*, *Dalbergia oliveri*, *Garcinia*. However, local people sometimes smuggled by cutting bamboo shoot, bamboo woods, and another wild plants, e.g. herbs, wild orchid, etc. Due to this area is out of the control of Sai Yok National Park, and people had less fear in the illegality action to collect the wild plants.

### 4.2.2 Background of medicinal plant utilization in Phu Toei Forest Community in the past 30 years

According to the activity in A process, it got the result as the Trend Diagramming that shown in table 4-3, it also found that at the beginning of period the local people had pay attention on MPU, there was no participating on MPU within the community. In 20 years ago, MPU was increased its role. Local people and agency interested in plants diversity increasingly, however, there was no appearing of wise people. In 1995 it was a time that the boundary of PTFC area was set up with the cooperation of local community and Rajabhat Kanchanaburi University that realized and interested in the value and benefit of biological diversity. In addition the beginning of MPU was happened when a TH migrated from Tamaka district and he has knowledge about the MP treatment, he preferred to collect the wild plants and MP for trading only.

With the condition of forest consisting of variety of flora without anyone’s possession and invasion, the general condition is mixed forest with a density of bamboo and other species, e.g. *Pterocarpus macrocaspus*, *Dalbergia oliveri*, *Garcinia*. It was found that Phu Toei Forest Community consists of three types of forest; mixed deciduous
forest, dry dipterocarp forest and spring forest. The benefits of plants have been the variety of medicinal plants, many kinds of fruits and vegetables. The remote area of the PTFC could find the abundant of biodiversity, flora or fauna. In 1995 the Centre of Biodiversity was established as the western learning center by support of the Committee on the Western Environmental Education Development in Kanchanaburi province. This project had encouraged and awake the local community interested and learned about the important of their biodiversity and also participated to conserve their natural resources. Also surveying and identifying the species of MP had been started that influenced some learned or wisemen and local people interested in the MPU. It provided a large natural classroom as database for locals, students and university, and interested people studying and learning with the real nature. After set up the Centre of Biodiversity, the number of the MP group was developed and increased according to the new generation appearing. By studying of Rajabhat Kanchanaburi University and group of local community, they found that PTFC consisted of 3 kinds of forest that combined with flora 141 species 107 family, and 60 groups and could divide into 107 perennial tree species (57.89%), 13 bush species (9.22%) 3 annual tree species (2.13%), 3 fern species (2.13%), 13 vine species (9.22%), and 2 bamboo species (1.22%).

The field survey and observation was started at the beginning of cold season, it could find around 30 species of MP along the natural trail in PTFC, and mostly found in both of mixed deciduous forest, and dry dipterocarp forest. Generally, the part of MP’s usage was divided into six types: bulb, root, leaves, fruit or seed, stem or bark, and the whole five things. Meanwhile the locals in Phu Toei, usage of MP’s part were mostly used only four parts: root, leaves, fruit or seed, stem or bark. The characteristic of MP found in PTFC being a type of perennial tree and bush. Generally qualification of MPs, there were many group of treatment used for locals, such as a group of relieve the pain, anesthetic or fever, a group of laxative, anti-flatulence, or digestion, a group of medicinal nourishment or a blood nourishment, a group of epidermis or poison, etc.

Around the year 2001, the important of MPs in PTFC had been known by the society outside about high efficiency of the local knowledge-base. The local wisemen/ TH
appeared to be recognized by local people and outsider. The *Murraya siamensis* was the first famous plants that could make good reputation and profit in the market. In 1995 the Biodiversity Center was set up, the wise people/TH was encouraged to set up a small group of MPs according to the abundance of flora and fauna diversity in the area to protect and keep their local knowledge-base on MPU be existed, and transmitted these knowledge to new generation. Later on, the wise man, Mr. Boonma Pansang, found out the new and scare of MP species, especially *Murraya siamensis*. Even though the numbers of plants in the group of MP were so many but the strong and important leadership of Mr. Boonma who has known a lot of MP for treatment and his finding the new plant species, *Murraya siamensis*, the outsiders came into the village to get such MPs in 2003. It was the first time that Mr. Boonma had to learn and share his experience’s knowledge-based with the outsiders. Also it could be found the others people related to the MPU in PTFC as shown in Appendix A.

**Table 4-3** Trend Diagramming about background of medicinal plant utilization at Phu Toei Forest Community in 30 years ago

<table>
<thead>
<tr>
<th>Years</th>
<th>Period</th>
<th>Situation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973</td>
<td>Basic treatment in household</td>
<td>With high of flora abundance, Phu Toei Forest Community started to use the MPU in household only.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- MP as basic treatment by locals</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Lack of local hospital and no road cut through the village</td>
</tr>
<tr>
<td>1995</td>
<td>Booming the value and benefit of MPs</td>
<td>Beginning of survey and boundary on Forest Community supported by Rajabhat Kanchanaburi University</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Needed to expand the farming area by locals.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Firstly collecting and trading the MP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Set up of Biodiversity Center</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- New migration of wise people/TH was Mr. Boonma Pansang who is expert and experience in MPs more than 1,000 species.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Trading the <em>Kaempferia parviflora</em> about 100-1,000 baht per kilograms.</td>
</tr>
</tbody>
</table>
Table 4-3 Trend Diagramming about background of medicinal plant utilization at Phu Toei Forest Community in 30 years ago (Cont.)

<table>
<thead>
<tr>
<th>Years</th>
<th>Period</th>
<th>Situation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001-02</td>
<td>Establishing cooperative group</td>
<td>Set up the Ta-Sao agriculture cooperative group by the leadership of Mr. Vikit Keawjitugtong and opened local shop within PTFC for selling all kinds of local products.</td>
</tr>
</tbody>
</table>
| 2002-03 | Found out the new MP                   | PTFC found out the new MP in the Phu Toei area and trade to outside.  
  - Originally, Mr. Boonma Pansang collected wild orchids.  
  - He found a new MP named *Murraya siamensis* that could remedy sore throat, and traded it.  
  - Price of *Murraya siamensis* is 150 baht per bucket with 50-60 cm.  |
| 2003   | Reputation of Medicinal plants        | Many outsiders asked for the new MP to do the research.  
  - Rajabhat Kanchanaburi University took the *Murraya siamensis* to study the essential oil, and conducted the research about biotic medicine for sore throat.  
  - Kasetsart University requested information for a treatment to people who needed to quit the cigarette.  
  - Ministry of Public Health recognized and campaigned the treatment of *Murraya siamensis* for cigarette quitting on TV in 3 months.  |
| 2004   | Protecting and conserving the biological diversity | There was survey and set up the Center of Biodiversity.  
  - Cooperation between Rajabhat Kanchanaburi University and group of local community in PTFC, such as Mr. Boonma Pansang, Mr. Somkiet Boonyaleka, and the officer attached to the Royal Forest Department, etc. Besides, observation and survey around the area of PTFC was done by the support of BRT, DEQP, and a group of Phu Toei people. |
**Table 4-3** Trend Diagramming about Background of Medicinal Plant Utilization at Phu Toei Forest Community in 30 years ago (cont.)

<table>
<thead>
<tr>
<th>Years</th>
<th>Period</th>
<th>Situation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>Protecting and conserving the biological diversity</td>
<td>• Joining with new generation to be as assistants and as interested person in this activity.</td>
</tr>
</tbody>
</table>
| 2006  | Beginning of establishing a small medicinal plant group | • Some new generation joined and attended the group of MP.  
• Developed the quality of *Murraya siamensis* treatment  
• More outsiders were increasing to order MPs, especially *Murraya siamensis*. |
| 2007  | Marketing on MP | Many kinds of MP has been sold gradually, such as *Andrographis paniculata, Murraya siamensis, Curcuma comosa, Kaempferia parviflora, Barleria Lupulina, Scheffera venulosa*, etc. |

Nowadays, the numbers of users in household have been increased more than in the past time but locals preferred to use the service from governmental hospital due to cheap and convenient for users. Therefore, the values of MPs were sold out to outsiders and many kinds of plants were needed and required by the trend of healthy food and herb medicinal pills from the Thai herbal society.

The information indicated that MPU at PTFC was formerly used in household only and after the wise people who had a lot of knowledge about the MPU came into the PTFC, the roles of the MPU were increased from household usage to trading. The development has been progressed very fast and also recognized from the outsiders, such as university, researchers and the other traditional healers as well.
4.2.3 The result of surveying and observing medicinal plants around the community

Under this stage, the activities were shown in Appendix C, it was the identification of the value and benefit of MPs among KIs by supplement the data collection during observing and surveying the MPs in natural trail at PTFC with assistance of few peoples of medicinal plant group. It took time to survey around three hours, and d good opportunity for the researcher leaning and observing the wisemen collected the plants samples from three types of forests; mixed deciduous forest, dry dipterocrap forest and spring forest.

For the result of surveying the MPs in two natural trail in PTFC, it was found 25 species plants of 12 families which was done in a period of the end of rainy season and begin of cold season. Most of MPs were some kinds of bulb plants, such as Zingiberaceae and Leguminosae easily found since they were spread throughout the dry diptrocrap and mix deciduous forests. In addition, it could find each family in each label (Figure 4-10) with three forests types, for example Compositae, Euphorbiaceae, Anacardiaceae, Bignoniaceae, Simaroubaceae, Acanthaceae, Rutaceae, Amarlyllidaceae, Dryopteridaceae, and Myristicaceae.
Natural Trail No. 1

Natural Trail No. 2

Start point

Exit

Baan Phu Toei school

Figure 4-10 Mapping of MP collection for natural trail in PTFC

Copyright by Mahidol University
Analysis the stage of A under the AIC process found that PTFC area had high abundant of biodiversity and local people knew how to live with nature and use the value and benefit from NR. As studies of Sodhi and Brook (2006) found that the tropical forests were the source of food, remedies, natural products and construction material for many local communities. At least 25% of western patented medicines were derived from MP identified and prepared through traditional indigenous techniques. Forest products have remained the only pharmaceutical option for certain remote local communities.

In addition, it was found that MPU has developed the compatible employment opportunities or introduction of alternative food sources for the impacted communities, if the area provided enough resources for them, then there would be less destroying the natural resources. As the result of Sodhi and Brook (2006) studied that the conservation management of protected areas in Southeast Asia would inevitably cause some disruption to the livelihood of indigenous communities that social issue needed better consideration for sustainable conservation. Recommendation a long-term and sustainable solutions that involved the development of compatible employment opportunities or the introduction of alternative food sources for the impacted communities, for example, if the protected areas provide some resources for local community with a viable means of earning their livelihood, then there would be less incentive for them to convert the park to agriculture. PTFC is a group of people who lives with forest area they could earn the benefit from this area directly including to issue and control their beneficial from the agreeable regulation. In some case it might be good to let the local living with nature which helps to sustain and conserve their own natural resources and biodiversity instead of society as well.

4.3 Medicinal Plant Utilization in Phu Toei Forest Community under AIC process (Result of I stage)

The stage of Influence (I): Creative model of KM on Medicinal Plant Utilization (KBM-MPU) and associated problems, this stage provided particularly issues concerning the utilization of MP by among group discussion that encouraged them shared knowledge-
based and experience on KBM-MPU, such as type of MP, quality of MP, the part of plants used for treatment, sources of MP, and their transmitting knowledge, etc. The detailed activity could be described as the following:

**Stage 2: Influence (I): Creative model of knowledge-based management on medicinal plants utilization (KBM-MPU) and associated problems**

**Duration** 1 Day

**Background and Justification**
This stage is to provide opportunities for discussion, requiring the moderator, the assistant mediator, and researcher involvement, and the participants in particular issues concerning the utilization of MP in order to create the process their KM system properly. The participants also have the opportunities to share the ideas about the method of culture learning of community and the preliminary guideline of KM model, e.g. structure and process of KM system, and also to find out the best solution to set up the model properly for community.

**Objective**
1. To create the model of KBM-MPU for PTFC, and to gain the problematic information for the joint development of KM.
2. To identify the characteristic and type of KM model on MPU in PTFC, Kanchanaburi province.

**Analysis**
1. To identify structure and process of KM system on MPU in PTFC
2. To study and identify KBM-MPU as the lesson learned with the stakeholder which arises from the activities benefited from PTFC participation.

**Activities**
**Day 1**: Brainstorming the stakeholders by focus group discussion in order to exchange ideas about KM of MPU, e.g. pattern of KM/ process of conserved knowledge transmitting. Presentation the idea of KM model by each group.

**Equipments**
1. Mind Map
2. Flipchart
4.3.1 The Result of local knowledge-base toward types and quality of treatment by medicinal plants usage among key informants

As the result of Appendix B, it could find 76 species MP of 34 families from three forests types and around households located within the community, for example *Murraya siamensis, Barleria Lupulina, Anaxagorea luzonensis, Stephania venosa, Tacca chantrieri*, etc. The characteristic of plants could be categorized into seven kinds; herbaceous stem/herb, shrub tree, small shrub, climber, fern, vine, and trees. Most of them were herbal plants that had value and benefit for local people’s treatment. The well efficiency quality of treatments had about 25 groups, such as groups of epidermis or allergies, anti-flatulence or digestion, laxative parasite, relieving the bodies painful or anesthetic, insect and snakes poisoning, beriberi, relieving painful of menstruations, etc.

The result of medicinal plants usage found that they used the benefit for all parts of MP as the common uses, it divided the components of plants into five parts: bulb or seed, roots, stem (bark or cord), leaves, and flowers (fruit), and some species required to use the whole part of plants that called 5 things. Each part of plants provided the different quality of utilizing depended on any kind of sickness. The treatment procedure depended on the skill and experience of wise people, they applied by many kinds of methods, such as medicinal bath, grinding, infusion, moist pill, alcoholic macerate, poultice, fresh herbal eating, etc. Each part of MP would give different qualifications depending on the procedure of making. It was difficult to specify or control the procedure, not only the bulb could be made grinded but also it could be boiled as well. For example, *Murraya siamensis*, its leaves have quality to recover sore throat painful meanwhile boiling five things together it could remedy illness of diabetes.

The most important usage the benefit of the MP in PTFC was for treatment and remedies the illness as the data shown in Appendix B. For instance, *Murraya siamensis* used for remedy of diabetes and relieving sore throat painful, *Curcuma comosa Roxb* used to reduce painful menstruation, *Millettia caerulea* remedied the symptom more than one subject, such as beriberi, cathartic, and liver nourishment, etc. Then, some kinds of MP
could consume with the common medicine, for instance, *Murraya siamensis* for diabetes, any patient who discharged from the hospital could boil such MP and drink as water daily it could control the disables symptom. The patient could also consume the MP water together with the common medicine. This result had already been experimented and confirmed by the traditional healer’s experience. Also there were many easily found kinds of MP in anywhere at household backyard like a household vegetable, such as *Cymbopogon citrates*, *Ocimum Sanctum*, *Zingiber officinale*, *Curcuma longa*, etc.

4.3.2 Seasonal collection of productive medicinal plants in Phu Toei forest community

Analysis the result of the group discussion, it was found that the KIs had their own local knowledge-base on source of MPs that they could collect from the three forest types; mixed deciduous forest, dry dipterocarp forest and spring forest, and around their household area, the activities of their group discussion was shown in Appendix C. However, there was only traditional healer or wise people known exactly where to find and gather the MPs, meanwhile the other local people and young people knew the plants only around their household. Therefore, the role of local knowledge-base on MPs needed to realize and aware on wise people/TH more than other groups.
For local knowledge-base on seasonal collection of productive MPs, group of wise people/TH supposed to have the most local knowledge on this issue. They could mention and describe the important data about properly time for plants collection. In the figure 4-11 shown the three main seasonal collections of productive MPs: 1) throughout the year of production, 2) rainy season (during April to September), and 3) cold season (during September to December). However, some species of plants could grow throughout the year but it was better to collect only in the specific season as in only winter, such as Minisperanaceae due to the best matured growing of productive plants. Some species could be well to collect in both of rainy and cold season, such as Compositae and Zingiberaceae. However, the growing of productive MPs’ nourishment, most of them was suited for collection at the ending rainy and the beginning of cold for the bulb of plants. The rainy season was the best period for plants to
accumulate food and be ready to collect in cold season. Also, the part of MP’s leaves, it has been suggested to eat it while it is fresh, if long conserving it would dissolve the quality of MP’s treatment.

4.3.3 Transmitted the local knowledge-base toward on medicinal plants in Phu Toei Forest Community

From the result shown in Figure 4-12, during the focus group discussion it was found that PTFC had its own local knowledge-base on medicinal plants usage. In the Venn-Diagram, each circle shown the different distances of spaces, it indicated the meaning of transmitted local knowledge-base on MPU among KIs. If any circle was far or keep space from the big center circle, it presented that the method of transmitted knowledge among KIs had few used, so there were six methods of knowledge transferring as follows:

![Venn Diagram](image-url)

**Figure 4-12.** Venn Diagram- Key informants involved in transmitting local knowledge-base on medicinal plant utilization
Method 1: By ancestors. Most of TH had been transferred the local knowledge-base by their ancestors or the old wise people; nowadays these knowledge-based has been gradually disappeared, TH attempted to search for the new generation or someone who interested in transmitted local knowledge-base in order to conserve and sustain these knowledge before it appeared.

Method 2: By new resources such as the wise people, textbook or medicinal plants books, etc. They tried to gather the traditional knowledge and new sources of knowledge to publish as the compiled medicinal books, such as formula of remedy the aching bodies and relieving of menstruating. Due to the old formula used only four kinds of MPs while the new one might add up to five or more plants mixing together, the output of this remedy was recognized and accepted by the society. In present, the treatment has been required by many people from outside. In another case, for example, *Murraya siamensis* was discovered accidentally in the forest by the wise man that it could remedy the symptom of sore throat by recommendation of the wise man as a monk living in PTFC.

Method 3: By own experience and experiment of any kind of new and old treatment, for example, many kinds of MPs already passed the experiment by TH, such as eating the fresh leaves like the *Andrographis paniculata* for 3 months – 1 year for its most effectiveness, and *Phyllanthus amarus* could remedy and suppress the symptom of woman painful menstruated successfully. In case of any kinds of MPs have been recognized for better cure the sickness, wise people/TH would grow those medicinal plants around their house. They have developed and discovered the new procedure of MPU some of them shown good results and have chances to distribute to the neighborhood.

Method 4: By own interesting, this was supposed to be the main problem of PTFC that a few new generations interested in the study on the beneficial of MPU because most of them have been lacked of trustfulness and believes on MP treatment including the slow effective treatment of MPs. So they relied on modern drugs from the hospital more than natural MP.
However, the development of MPU in PTFC has been gradually increased and many organizations start to support the study about the variety of plants.

Method 5: By mouth to mouth or storytelling. When the old people or wise people used the MPs over and over until the result of MP treatment was clearly shown successfulness. The value and benefit of that MP has been mentioned and told to others automatically. For example, the locals believed that *Barleria lupulina* could remedy only the protection of venom, but in the past 10 years of wise man experiences, he found that it was able to remedy the cancer of Cervix effectively. Due to his experiment that he cured a lady with the Cervix cancer by grinding and infusing of *Barleria lupulina* mixed with a glass of alcohol for three months. Nowadays she is still alive as the result of TH experienced treatment, and this story made the locals rumour and believed in utilization of MPs.

Method 6: By training and meeting. PTFC has been the centre as a learning centre for anyone who interested in, so many people visited and studied in this area. The local peoples as the wise people or group of MPs needed to be amateurish guides, when they worked in training and meeting that supported them to learn and practice with those visitors.

Analysis the stage of I under AIC process, it was found that the factor of indigenous knowledge or local knowledge-base were impact on NR and biodiversity conservation. Local community was ever called primitive people who lacked of knowledge, in contract, the knowledge occurred by transferring, accumulating, modifying the information and experience from the ancestors of the primitive people that were related to the nature and environments (Vivat, 1993). These traditional knowledge or local knowledge-base was similar to scientist study as many generation’s experiment and using in many times until they got the best usage of experiment for their daily. In addition, any benefit derived from the use of this knowledge might be shared with the inhabitants of PTFC. The result of Shrestha and Dhillion (2003) found that the nine villages of harbors area with the high diversity of MPs shared the use of their knowledge about the reliance on folk medicines for health care associated with the modern medicines, medication, poverty and traditional
belief of its effectiveness. The studies of Pasukkud (2006) found the indigenous knowledge could manage the problem of Prak Nam Dang community about conflict of river among three groups of people. This knowledge could solve the solution and conserve the Mae Klong river basin for Thailand. It could be concluded that the local knowledge-base or indigenous knowledge has been important and influence on conserving biodiversity by protecting and transmitting this knowledge from local community to the society.

4.4 Construct the Model of Knowledge-Based Management on Medicinal Plant Utilization (KBM-MPU) for Phu Toei Forest Community under AIC process (Result of C stage)

Process of the research for this stage consisted of two parts which was resulted from the S.W.O.T analysis in order to design the suitable model of KM. The collected data was finalized to be the guideline for the model of Knowledge-Based Management on Medicinal Plant Utilization (KBM-MPU) under the AIC activities. The detail data could be described as follows:

4.4.1 Construct and design the model of knowledge-based management on medicinal plant utilization

Exploration the basic of Knowledge Management, it was found that characteristic of KM model and composition of KM was important to study of MPU within the local community. It also found that the KM model was important for designers because knowledge has played a vital role in our life in which it reflects how we understand the world act upon it. The model could be applied to any fields and it depended on what present actual problem in any case. In addition, the one main important thing should realize that it was necessary to find out the people who should have the important responsible role in manage their knowledge successfully and could develop those relationship and linkage to be as the model. The model of KM was the important
technique to create and develop by the knowledge-base of local people’s cooperation especially the utilization of MPs that related and involved with the experience and expertise of wise people so it was important to treat and maintain these knowledge for users and new generation. The Model did not have the exactly figure depending on each properly management that could apply and benefit to each organization. Even though any organizations did have managed their knowledge-base, the Model of KM could help them manage well.

In addition, the learner should understand the meaning and important of each different roles. Even there were many roles of KM model, but the designer could select the important roles that support and help the model move successfully. Composition of each role might give different weight depending on mission of project. And also the designer had to be sure that he clearly understood the principle of KM. Thus, the important of KM needed to analysis the potential of people to organize their knowledge management, for example, k-vision or a leader of community who had the ability and knowledge on utilization of MP and could estimate vision or strategy of MPU within their community. Finding the k-facilitator was the ability to build up the participation of community as the Knowledge Sharing that the local people had opportunity to share and learn the knowledge and experience together. The k-practitioners had their duty to provide the implicit or explicit knowledge, and knowledge-based on MPU by collecting the data as the Knowledge Asset and then managed and collected this knowledge into database, books, files, etc. However, the management of local knowledge-base in PTFC had the weak point about lacking of collecting their knowledge-base and experience on MPU, so it should be focus on the case of Knowledge Asset more than other roles.

It was also learnt that the participation learning would help the people of organization to be unity and had good relationship among each other. Due to the main important point of KM is sharing and learning the development of knowledge among organization, it would identify and appraise the organization’s efficiency and provided the stage to share and learn knowledge and experience within the organization. According to the conducting the model of KM under the AIC activity, it gathered the harmony and
unity of people in organization in order to put forward their aim in the same target at the same time, and develop their work together successfully.

In addition, managing and changing organization’s paradigm, the concept of KM would reduce the role of leadership’s command and control, but they provided and supported the employee having chance to empower to make decision by themselves. Meanwhile they might not make the decision alone, but they have had their colleague’s assistance and share the knowledge among themselves and sometimes with outsiders. Some communities had ever like a closed system that did not adapt and modify themselves with outside environment changing, but technique of KM could be able to build up and encourage the people’s collaboration that was specific and appropriate to local condition. By collecting and analysis data among themselves and others it should enable them automatically as an open system which provide them chance to interact with surrounding outside continuously.

However, each model depends on the different principle, objective, characteristic, and many details described inside of that model but the overall KM models have the same concept about learning and developing of knowledge between individual up to party or organization. In this study, building up the Model of KM needed to identify the content or factors of community’s social involved to MPU. However, most of all models presented the main important point that is sharing and learning the development of knowledge among peoples inside organization, and sometime capture and exchange the knowledge from outside. Therefore, setting up the new model focused on the main important role of people in the community including the related problem finding during AIC process with the local community.

4.4.2 Guiding the model of KBM-MPU in Phu Toei Forest Community

This study required the technique of S.W.O.T analysis using to identify and consider PTFC’s internal factors of the strengths and weakness about KMB-MPU, and identify the external factors that PTFC would have opportunity to manage their local knowledge-based,
and including the external factors that caused the obstacle and risked to manage their local knowledge-base on MPU. As the result of S.W.O.T. analysis in Table 4-4, it was found that the strength points in this area was fully of a lot of medicinal plants diversity and local plants, the small group who related to MP were aware and realized on the important of MPU. And new generation could support and help the job of wise people that could train and teach them as assistants. Also, some local knowledge-base could be found in the medicinal books that have been developed to support their local knowledge-base and provided the benefit to PTFC.

For the weakness, it was found that local people were lacking of learning process and system thinking continuously, no linkage knowledge-base transmitting between wise people and local community, and also there was no development of data collection and no discipline or rule’s protection on variety of medicinal plants. In the part of opportunity issue, utilization of MPs depended on their daily custom and culture in local community. Nowadays the society has been interested in the health foods, herb foods and medicinal plants. This should be the opportunity for them to develop their skill and experience on MP usage to be more standardized. Now, there are many institutions/organization has been interested in and done many research studies in PTFC due to interesting of the world situation of conservative biodiversity. This area has high abundance of natural resources so they have chance to discover the new kinds of MPs and develop their method of treatment effectiveness. Also, the role of market inside the community begins to trade, not only sell and buy the local products but this is the good chance for them to exchange the knowledge of treatment or any skills to improve and develop their own MPs treatment with the society.

For the final point about threats on MPU in PTFC, there was no agreement in trading and marketing between local people and middleman. Also it was found that in PTFC the local knowledge-base of wise people/TH was unrecognized and has not yet get the license from the medical council regarding the MPs’ qualification due to the illiteracy of wise men. Moreover some policy of government support the locals use services from the government hospital, such as the project of 30 baht curing all remedy for poverty. This policy makes the local knowledge-base has been ignored and less value. Meanwhile, the role of private business in the term of
medicinal plant quality and treatment is higher competitive than local knowledge-base from community.

However, it was found that the wise people still have remained in PTFC, such as traditional healer, the old people, a group of MP or monk, etc. who have had the local knowledge-base of MPU, they could share the idea about types of MP, the benefit of MP, utilization of MPs’ part, method of treatment, source of collection, the quality of MP, etc. In contrast, the community has still lacked of learning process and thinking system because of the current of society’s changing, such as policy of government, the better result of remedy by modern medicine, etc.

Since the propaganda of government’s policy has motivated the poor people use the service of hospital and reduced the role of local wisdom in local community. The governmental project about 30 bath of remedy for all kinds of sickness, this has made the local people used service of the hospital which help them spend few money with the common medicine. In addition, the new generation migrated to city increasingly so their learning process and thinking system as the local knowledge-base were gradually lost. Also the modern education has changed the idea of new generation, they would not believe in the qualification of MP’s treatment whether the neighborhood or close people of wise people are rarely believed in MPU. Meanwhile, this study also found that most of wise people have had their own experiences and skill on MPU that has been able to be the effective successfully treatment.
Table 4-4. Analysis on utilization of medicinal plants in PTFC by using S.W.O.T Analysis

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weakness</th>
<th>Opportunity</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>- PTFC has fully a lot of medicinal plants diversity and local plants.</td>
<td>- Lacking of learning process and analysis continuously.</td>
<td>- Nowadays the society interest in the health foods, herb foods and medicinal plants.</td>
<td>- There is no agreement in trading and marketing between local people and middleman.</td>
</tr>
<tr>
<td>- KIs are sincere and aware on the important of MPU and realize the relevant on the local natural plants and MP conservation.</td>
<td>- Lacking of data linkage of transmitting local knowledge-base between medicinal healers and local community.</td>
<td>- Utilization of MP are related and linked to their custom and culture.</td>
<td>- The role of private business in the term of medicinal plant quality and treatment is higher competitive than local community.</td>
</tr>
<tr>
<td>- New generation can support and help the job of wise people that could be trained and taught as the assistant or new wise people.</td>
<td>- Lacking of qualitative development of local medicinal books continuously.</td>
<td>- The role of market inside the community is started the important to exchange local knowledge-base between community and outside.</td>
<td>- Local knowledge-base of wise people in PTFC are unrecognizing by the medical council qualification.</td>
</tr>
<tr>
<td>- A variety of MP and many kinds of medicinal plant books can develop their potential and provide the benefit to PTFC in the future.</td>
<td>- Lacking of recording data and there is no discipline or rule’s protection on variety of plants and MP books’ license.</td>
<td>- There are many institutions interested and done many research study in PTFC.</td>
<td>- The locals pay attention and rely on government policy such as project of 30 baht for curing all remedy more than recognized the local knowledge-base of wise people.</td>
</tr>
</tbody>
</table>
Then, design and set up the guideline for the model of KBM-MPU by using the S.W.O.T analysis. The result of guided Model was as in the Figure in 4-11. It also found the gap of local knowledge-base disappearing and how KM concept could manage their knowledge-base for PTFC. By using the S.W.O.T analysis it found many factors that should be supported and developed their KBM, especially the part of weakness factors that the local people had their own knowledge-base but they were still lack of learning process of KM and no transmitting knowledge to each other. So it needed to consider and pay attention to the role of people that could transmit knowledge to the relationship between person and person, person and group, group and community, and community and society. It could be divided the people who related to MPU into four groups as the following:

1) The leader/ head of MP took the role of k-vision that might encourage, support, and provide the vision to the community to meet the aims.

2) Traditional healers or wise people took role of k-practitioner, they might support, gather, and provide the data and transferring the knowledge-base to another or groups in order to keep knowledge-base be existed. In addition, they were responsible to learn, participate, and help to distribute the knowledge among themselves that get the direct and indirect experience from utilization.

3) Academy was a term of people/ organization that assisted and helped KM about activities, such as research, training, information technology, learning process, conference, etc. as known in the role of k-facilitator.

4) Local community or users took role of knowledge-base area that provide and managed their knowledge by sharing, learning, group meeting, and distribute the knowledge among the group.

According to the role and responsibility of four groups regarding providing and collecting the data, sharing and learning the information together, they were related and involved in medicinal plants’ knowledge-based. So they were took to the center of knowledge-base on MPs as known in Knowledge Asset. It was the area gathering and collecting information of MPU in form of database, such as files, documents, books, name tags of MP in the forest, etc. Also
lacking of data collection in PTFC, it was important to consider and put interesting in the important of knowledge-base of local people, and guiding the model of knowledge-based management on medicinal plants utilization in order to sustain this local knowledge-base before it disappeared from PTFC.

4.4.3 Finalize the model of knowledge-based management on medicinal plants utilization (KBM-MPU)

This step was Influence (I): Creative model of Knowledge-based management on medicinal plants utilization (KBM-MPU) and associated problems, this stage would bring the outcome into action. The guideline for data collection by stakeholders’ participation finalized the model of KBM-MPU, and the preliminary guideline of KM model, e.g. structure and process of KM system, and also to find out the best solution to set up the model properly for community. The detailed activity could be described as the follow:

Stage 3: Control (C): Finalizing the model of KBM-MPU

Duration 1 Day

Background and Justification

This stage would bring the outcome into action, the guideline for data collection by stakeholders’ participation created the model of KBM-MPU. The moderator induced participants to be aware of the pattern of KBM-MPU associated with developing sustainability in PTFC.

Objective

To guiding the model of KBM-MPU process in PTCF, Kanchanaburi province, and obtain the discussion results and suggestion by stakeholders to finalize the model.

Analysis

1. To introduce guideline of KM in order to adjust the pattern of KBM-MPU
2. To gain and identify the pattern of KBM related to medicinal plants.
Stage 3: Control (C): Finalizing the model of KBM-MPU (cont.)

Activities
1. Presentation the proposal model of KBM-MPU to PTFC and request for comments and suggestion from group discussion.

Equipments
1. Flip Chart

According to the focus group discussion, it was found that KI were satisfied and accepted the guideline of model as the Figure 4-13. The result indicated that it was necessary to cooperate among four important groups: TH, academic agency/organization, local agency, and local people who were support and encourage on local knowledge-base development. TH was the main group that had duty to transmit their local knowledge-base to local community, and also needed to record and collect the data into the document, books, or any files in the term of database. The academic agency might support on the technique or method of data collection into the standard database for everyone in PTFC. In addition, the local agency had responsibility to issue the regulation about MPU by supporting and cooperating with wise people and local people who were directly used the benefit of MPs.
Figure 4-13. Model of knowledge-based management on medicinal plants utilization for Phu Toei Forest Community

In addition, discussion of related problems on utilization of MPs in PTFC, collecting the raw data and database, such as files, document, people ware, catalog records, etc which were still lacking of the learning system development in PTFC. Because they had no experience and skill in KM so it was difficulty to distribute the knowledge-base to locals and the society. This problem could be solved by the government and other local organization support and interest in value of their knowledge-base distribution to the society. However, the leader of community concluded that even they did not have any support in both of academic technique and budget, but they would not stop and quit to develop their community. They realized and aware about the linkage of local Knowledge-based management encouraging and the sustaining of the community development for the
future by integrated all improving issues, such as eco-tourism, community-based development, or learning center, etc.

The result of C stage under AIC activity concluded that managing of local knowledge-base for local people would develop their own output more than the society outside did. The local knowledge-base has been increased and lead to the development and implementation of their economics and community as well. Gerke and Evers (2006) studied that thinking and writing on one’s own society was the part of reflections of modernization that implied the frequent construction, deconstruction, reconstruction of society’s image necessary for development of a society. Therefore, in this way, the tacit knowledge is being shred and recognized by conducts KM tool that should be able to discover and create successfully practice on local KBM-MPU by KIs in PTFC.

The conclusion of AIC activities found that even in a short period of time for workshop, KIs’ capacity and confidence in sharing and exposing ideas appeared to increase, they also had the opportunity to appreciate the role and potential in development on their skill and experience. KIs especially male in the focus group discussion were usually pleased with the process, as they were the voluntarily participants to envision clear outcome, make recommendations, but they made low commitments to transform their conference model into action.

4.5 Lesson Learnt about Utilization of Medicinal Plants in PTFC under AIC process

4.5.1 Lack of knowledge linkage between wise people and new generation

In PTFC, there has abundance of variety of plants together with many wise people who could provide the local knowledge-base on MPU related to the belief and culture of community. Their local KM mostly came from the past experience and indigenous knowledge in the community. Their lifestyle and culture were also indicated the composition of knowledge-base. One key informant mentioned that the dangerous and
harmful sickness occurred in the past hurt local people meanwhile the common medicine
did not developed or used. The ancestors applied the method of treatment by using MPs to
remedy the sickness. This meant that the past experience of ancestors’ treatment by MPs
happened before the common medicines have been developed in nowadays. It was learnt
that utilization of MPs by local people presented the practicing of belief and culture in
each community. For example, belief of PTFC about the magic treatment method mixed
with the MPs in the past time, when TH collected the MPs in the forest, they would ask
for the local ghost living or be a part of that plant to remedy the illness. Sometimes, they
would pray while boiling MPs and distributed to the patients. This magic knowledge was
kept secret only by the old wise people, TH and monk, etc.

However, it found that such mentioned local knowledge-base was disappearing with
the wise people. The one important fact influenced on knowledge-base’s losing has been blamed on the National economic and Social Development Plan (NESDP) that guide the
national development direction, Especially the exploitation of natural resources and
pollution caused of economic development, including young people moved to work in the
city. In the present day, it found that the young people pay much attention on their work
in the town more than working with the local community. The main factor change the
attitude of local people was the getting high salary and make comfortable working
atmosphere in the city. Therefore, the original knowledge-base in the community was lost
along with the old or wise people. In case of PTFC it was also difficult to encouraging the
local community to absorb on the value and benefit on MPU due to only a few expertise
and experience in knowledge-base on MPU. Sharing the experience and information about
MPU remaining in the small group, there were sharing skill, experience and information of
knowledge-base on MPU in PTFC within their small group. It also found that the
traditional healers or wise people had low level of formal education, there was only a few new generation interested in knowledge about this so the knowledge transferring remained in the small group. Also standard of collecting and managing about local knowledge-base on MPU were still lacking or none, since most of local knowledge-base remained in the old traditional healers who were difficult and less capacity to record and gather the data by themselves. However, they tried to develop and rely on the new
generation who are really interested and pleased in order to record and gather into the database. Now there has been a small working group taking care of it, but this research study found that the community still lacked of the standard form to record those databases. Therefore, database recording in PTFC has been considered very important for them because it found that each of local community they have the difference of knowledge-base with themselves.

In addition, illiterate of wise people and not properly standard of knowledge-based management, this was another main problem of management of knowledge-based. Besides, the best traditional healer in PTFC was lacking of writing ability, the MPU data could not be recorded since the past time resulted in PTFC’s database lacking. Moreover, the productive MPs’ development in the future was also difficult due to MPs’ qualification unrecognizing by the medical council. It learnt that such problem caused shortage of knowledge linkage between the wise people and new generation, so the government should find the practical solution to help the wise people’s illiteracy. The locals suggested that the government should provide the experiment examination of the human’s skill practicing more than paper-sitting examination. Since the knowledge of wise people/TH were derived from the experience and skill, and they had confident that they had much and enough to knowledge to be able to pass those kind of exam certainly.

4.5.2 Shifting the local knowledge-base to the society

The study found that the different knowledge-base depended on the different mean of knowledge transferring by each ancestors, some knowledge might find in somewhere but some knowledge might find in one certain place only. Therefore, management of knowledge-base depended on the wise people’s experience and skills. Each local area should have different knowledge-base such as utilized of MPs, the time period for collection or consumption, the qualification of MPs’ species. The local knowledge-base of such mentioned items depended on the experiment and accumulated experience of the wise people. For example, as the recommendation by wise people living in PTFC, he suggested that most of MPs might collect and eat them while it was fresh because the quality of fresh
plants would provide more medicinal quality higher than the dry one. Another case, Kasetsart University discovered that leaves of *Murraya siamensis* could help the addicted cigarette reduce and stop smoking. Such information presented that the quality of MPs depended on different method and procedure application. In contrast, TH in PTFC found that *Murraya siamensis* could relieve the sore throat painful and diabetes, it was not involved with treatment of stop smoking. Moreover, it was found that some kind of rare medicinal plants could grow in only in some certain place and there was a few local people having knowledge-base about it. For example, *Murraya siamensis* has been the scarcely specie which difficult to find in other areas. It was discovered by a monk living in PTFC, he knew that *Murraya siamensis* could remedy and relieve the symptom of sore throat. Another kind of MP was *Phyllanthus amarus*, the society believed that it could remedy the sickness of cancer, but locals in PTFC proved that *Phyllanthus amarus* could remedy the painful of menstruation problem. It could be said that the utilization of plants as MPs to cure the illness was depended on the own knowledge, experiment and experience of TH's wisdom.

Therefore, the shifting of knowledge-base of local people to the society has been important for sustain of the local knowledge-base before disappearing. It was found that the wise people or TH have much knowledge-based, such as the knowledge to identify the plants as the MPs, the quality of plant for treatment, utilization of MPs' parts, and collection and gathering location of MPs, etc. These local knowledge-base were the direct experience on MPU, and also the study of utilization of MPs by knowledge transferring from their ancestors’ notebook, by their own experiment or as a user. In contrast, this local knowledge-basewere limited and disclosed only in their area, without shifting these knowledge to the society. The study found that the local community did not build up the education or learning process in order to shift such knowledge to the society. Thai society has utilized most of knowledge-base from the western or learned from other countries that provided the good system facility for the youth, therefore, we should turn the point and pay much attention to local knowledge-base inside the society too.
4.5.3 Building up the figure of transmitting knowledge

As the result of shifting of the local knowledge-base to the society, it needed to build up the practical figure of knowledge transmitting. In the past time, the society interested and paid attention to the academy and recognized people with high educational degree level. Knowledge in local community was not recognized and did not pay attention on its important role. Nowadays, the compulsory educational system let children studying only in the classroom, it makes not only reflection of students’ bored, lack of meditation and creativity thinking but also it does not have linkage to the fields study as such jigsaw has been disappeared from the big picture. Therefore, the best linkage of education suggestion is the learners should study anything that is the most they like and continuously study in-depth, deeper and deeper in the details until it meets the core idea of that study. It seems like a blind man who touches on an elephant, at the first time he does not know what the characteristic of elephant look like until he learns and touches around the all parts of elephant’s body, and at least he will understand the meaning of elephant. If the learners understand what components are, how components relate to others and what else is still lacking, this understanding of learning process can find the correct in the relationship or linkage of studying.

In addition, it learnt that learning and studying along with the local people under the AIC activity, in fact they had their own academy or language, such as they had skill and experience’s knowledge in working with the natural resources; the variety of plants, MPs, livestock and transmitted these knowledge to their next generation and any people interested. Therefore, it should reduce the role of classroom studying and change to learn and practice with the local community as the wise people, traditional healers, monks, or general people working in the agriculture, etc. Those people could be a good teacher and gave the lesson learn to society, also even the teacher in the city could learn and studied with the wise people in the community. It means everyone can be both teacher and student that can interactive learning through action.
In conclusion, the term of education does not need to enter in the system of governmental education or only in the school or university as the studies of Sawing (2004), there should be another alternative choice. As comparing to the government policy issuing forest management, local community could provide their idea and manage on the forest relying on their livelihood and culture community’s practicing by without following the whole government policy only. As well as in this research found that learning utilizes of MPs could study and do real practice with the TH in PTFC during surveying and observing the MPs collection in the natural trail. Interpreting Knowledge Process (IKP) is the relevant working process, according to analysis of working process’s problem belonging to College of Social Management, Tongdeelert (2004) studied that IKP in Thailand found some factors of working process’s lacking, for example, lacking of local social learning problem, over looking and ignoring on the relevant of local knowledge, lacking of people’s skill factor, etc. Therefore, it is necessary to manage the knowledge-base area of community increasingly, not only the abstract area. With building up the model of knowledge transferring, the local organization and cooperation of government section should support local people in order to confirm that they have potential to solve the problem about learning process and could sustain the community development by themselves.

4.6 Evaluation of AIC process

The evaluation of AIC process in this study was made into two methods. These included 1) observing behavior of the participants and 2) satisfaction and benefits from AIC process.

4.6.1 Observing behavior of the participants

The research team evaluated the participants’ behavior by using the method of direct observation during AIC process. Due to this study used the RRA technique under the participatory approach that a fundamental principle is the making of contact with the target group in a learning process, so the team research took chance to observe the
behavior of participants or key informants (KIs) that could be divided into three groups: 1) a leader of community 2) local people and 3) the wise people or traditional healers. From stage A, there were only leader of PTFC and the wise people who related to the medicinal group, they were aware of medicinal plants utilization due to their responsibility involved directly working in PTFC and interested in MPU more than local community who could not present the background of their MPU. For stage I, during the focus group discussion it was found that the behavior of participants could be classified into three levels. However, the traditional healers were at the highest level of participation behavior because they had more experience and practice on MPU. So it was clearly that the wise people always had the opportunity to provide the knowledge more than other groups. Therefore, AIC process presented that it needed the potential of TH’s participations, this relevant to the selection process of KIs that would help to enable the potentially activity of knowledge transferring and experience on MPU of the participants.

4.6.2 Satisfaction and benefit from AIC process

Reaching the aim of satisfaction and benefit used to evaluate the process of AIC properly for this studying. During the AIC process it was found that some stages of AIC were not satisfied with the research study because there had only few KIs able to present the background of their MPU. But the expected result according to the principle of A under AIC process was to take step back for gaining and listening the perspective on the situation among stakeholder that lead to awareness of value and benefit on MPU in PTFC. For another more stages of I and C, it found the expected result and they were satisfied with the evaluation guideline of AIC process which was beneficial to the target group. Moreover, the outcome could be applied to the development process in practice into another issue in term of work plan or program.
CHAPTER V
CONCLUSION AND RECOMMENDATION

This part aimed to summarize the findings of the study, derived conclusions, and formulate recommendations that could contribute both to the learning process and for further studies. An attempt was made to conclude whether the study was successful in meeting its objectives of the research. Beside, this part would also discuss the limitations of the study as well as assess the potential contribution of the study results to make recommendations toward guideline of AIC process and developing the Model of KBM-MPU for the western biodiversity center in Thailand.

5.1 Summary of Major Finding

AIC was applied for participatory processes and the stakeholders were involved in participatory processes consisted of three groups of participants: 1) the wise people/Traditional Healers 2) local organization 3) local community. Their common activity during the participatory processes was the learning process such as knowledge providing, awareness of value and benefit on MPU relating to knowledge transferring and knowledge-based management, in order to develop and summarize the guideline for the model of KBM-MPU. Participatory processes were observed and evaluated concurrently.

According to the guideline of AIC process it was found that the stage of Appreciation (A) should be modified and adapted the activity to be suited with the situation of social in the local community. On the other hand, the activities of Influence (I) and Control (C) processes were satisfied with the aim of the principle and objective of the community. Overwhelming by majority of the stakeholders they were willing to do an environmental contribution and also indicated their strong interest to participate in
concerning with the utilization of MP through the participatory processes within PTFC. Based on the findings, it could be concluded that:

- The leader and local community and traditional healers were aware of value and benefit of MPU and were strongly willingness to participate during the activity was held.
- The traditional healers/ wise people had strong effort to provide the knowledge-based on MPU but they lacked of the ability of knowledge transferring to local community including knowledge in recording the data. However, stakeholders or local community attended all the participatory process in order to find the suitable alternative model and procedure for actions to develop their MPU.

Regarding AIC technique under the participatory process on KBM-MPU, it was found that stakeholders satisfied with attending in the meeting increasingly because they interested and aware of manage their knowledge-base and transferring knowledge on MPU inside the community, regarding to the AIC process provided the opportunity for participants to share their knowledge and experience, not difficult to collect the data their knowledge-based in the term of learning process between participants and researcher, easy to understand and more interesting. Since the existing data collection was developed though the learning process. It helped identify the activities and gather data requirements, and also lesson learn from learning process, so the level feedback of database content got high.

5.2 Limitation of the Study

Although the AIC process was applied for the participatory approach to develop KBM-MPU, the guideline for such process was adapted including the flexible activities in order to collect the completed data. So the research study had to adapt some stages of AIC process to be appropriated with the social situation in the study area. This process effected to the prepared questions and related materials. However, adapting the activity of AIC process, it could be as the lesson learn for this study.
5.3 Recommendation for Further Study

By experienced studying, some ideas are suggested as the following:

- For the context of the research study, it had been designed and guided the model of KBM-MPU to the small target group in PTFC so the next study should apply this model with the bigger numbers of participants of local community to participate in the activities in order to encourage them realizing and awareness on the relevant of medicinal plants utilization.

- Protecting the local knowledge-base before disappearing and developing variety of plants as MP in PTFC sustainability, it should identify and implement the education in the school, or initiates the appropriate local curriculum for the children in the community.

- As the result of snowball technique to identify the key informants related to MPU, it found that most of KIs were male more than female, so in next study it is suggested to encourage the group of female to support the activity regarding to the utilization of MPs in PTFC. It is able to find the other important data or information from them as well.

- During the focus group discussion under the AIC activities, most of the target groups were leader and wise people, there had some limitation of other groups’ linkage in the research study. Therefore, working successfully of center of biodiversity in the future, it should concern and involve in more group interactions that connected in the work of center, such as local agency or university nearby, etc.
BIBLIOGRAPHY


Appendix A

General Data of LTH and Discussion

1) Wise people/ Traditional Healers (TH)

1.1) Mr. Boonma Pansang

He was born in 1948, his age is 59 years. He lives at 6, moo 8, Ta-Soa subdistrict, Sai Yok district in Kanchanaburi province, he migrated from Prachukirikun province to Phu Toei village since 1993. He graduated in Grade 6 and specializes in flora, herb and livestock. He is the Head of Cow Feeding Group and wise man of MP.

1.2) Mr. Somkiet Boonyaleka

He was born in 1956, his age is 51 years. He lives at 67/1, moo 7, Ta-Soa subdistrict, Sai Yok district in Kanchanaburi province, his original hometown was in Nakornpatom province. He graduated in Grade 4 and specializes in flora and herb. He is a wise man of MP.
2) Local people interested and related on the MP

2.1) Mr. Pipat Kaewjitkungtong

He was born in 1958, his age is 55 years. He lives at 66, moo 7, Ta-Soa subdistrict, Sai Yok district in Kanchanaburi province, his original hometown was in Tamaka district in Kanchanaburi province. He graduated in Bachelor degree, and specializes in economical social and environmental community. He is the Head of Community Forest Group and member of the Committee on Erawan National Park Project.

2.2) Mr. Vikit Kaewjitkungtong

He was born in 1952, his age is 49 years. He lives at 2/2, moo 7, Ta-Soa subdistrict, Sai Yok district in Kanchanaburi province, his original hometown was in Tamaka district in Kanchanaburi province. He graduated in Grade 9, and specializes in livestock and economical community. He is the Head of Agriculture Cooperative Centre.

2.3) Mr. Viklom Keawjitkugtong

He was born in 1983, his age is 24 years. He lives at 213/1, moo 7, Ta-Soa subdistrict, Sai Yok district in Kanchanaburi province. He graduated in Grade 12. He is a secretary of Agriculture Cooperative Centre and working on community forest.
2.4) Mr. Cheing Bunton

He was born in 1951, his age is 51 years. He lives at 300/3, moo 8, Ta-Soa subdistrict, Sai Yok district in Kanchanaburi province. He graduated in Grade 4. He is an assistant to the community forest and MP groups.

2.5) Mr. Noom Niyomthai

He was born in 1948, his age is 47 years. He lives at 166, moo 11, Pulad village, Ta-Soa subdistrict, Sai Yok district in Kanchanaburi province, his original hometown was in Pungtaru, tamung district in Kanchanaburi province. He graduated in Grade 4, and specializes in wild flora and fauna and also the ceremony of community. He is an assistant of the village headman at moo 11, Pulad village.

2.6) Mr. Monchai Sudvivej

He was born in 1977, his age is 30 years. He lives at 193, moo 7, Ta-Soa subdistrict, Sai Yok district in Kanchanaburi province. He graduated in Grade 4. He is an assistant to the MP group.
2.7) Mr. Akarin Bunton

He was born in 1988, his age is 19 years. He lives at 303/3, moo 8, Ta-Soa subdistrict, Sai Yok district in Kanchanaburi province. He graduated in Grade 4. He is an assistant of wise people on MP and interested in forest and MP.

2.8) Mr. Pipat Shuchang

He was born in 1990, his age is 17 years. He lives at 149/1, moo 8, Ta-Soa subdistrict, Sai Yok district in Kanchanaburi province. He graduated in Grade 4. He is an assistant of wise people on MP and interested in forest and MP.
## Appendix B
### Classification of local medicinal plants in Phu Toei Forest Community

<table>
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<tr>
<th>No.</th>
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<th>Using process (4)</th>
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<th>Treatment (6)</th>
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*Note: The table includes information on the plant species, their common and English names, parts of usage, time of collection, types, and sources. The species are listed with their corresponding family names.
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Remark:

(1) Characteristics
1. Herbaceous stem, Herb
2. Shrub tree
3. Small shrub
4. Climber
5. Tree
6. Vine
7. Fern

(2) Time of collection
1. All year
2. April-September
3. September-December

(3) Composition of MP’s Part
1. Root (or root crop)
2. Stem, bark, core
3. Leaves
4. Seed, fruit
5. Bulb
6. Whole plants (5 things)

(4) Using process
1. Steam bath
2. Infusing
3. Alcoholic macerates
4. Moist pill
5. Poultice
6. To apply a compress
7. Grinding
8. Others e.g. ferment, fresh eating

(5) Sources
1. Mixed deciduous forest
2. Dry Dipterocarp forest
3. Spring forest
4. Household area

(7) To Treatment
1. A group of epidermis or allergies
2. Cholera, diarrhea, dysentery
3. A group of anti-flatulence or digestion
4. A group of fever or cold
5. Relieving the bodies painful or anesthetic
6. A group of laxative parasite, Antiparasite
7. Blood pressure
8. A group of medicinal nourishment or alcoholic macerates
9. Stork/Heart nourishment
10. Relieving the sore throat
11. Insect and snakes poisoning
12. Pesticide
13. Cancer
14. Scabies
15. Growth Hormone treatment
16. Cholesterol reduce/ Low cholesterol diet
17. Treatment of wound in mouth
18. Relieving painful of menstruation
19. Medicine of blood nourishment
20. Diabetes
21. Malaria
22. Bronchitis
23. Beriberi
24. Cathartic
25. Liver nourishment
Appendix C

Activities of key informants related on medicinal plant utilization attended in the Appreciation-Influence-Control (AIC) process

**Picture C-1 (left)** In-depth interview to the local wise was knowledgeable and aware on MPU in the process of stage A.

**Picture C-2 (right)** The important key informants, new generation attended in the activity in stage A.

**Picture C-3 (left)** The route of natural trial, the researcher and group of key informants participated to survey and observe the MPs along the trial under the activity of stage A.

**Picture C-4 (right)** Discussion between the researcher and key informant about the collection of MPs under the activity of stage A.
The research team introduced and explained the research mission to the target group.

Under the stage I, the key informants had discussed about the knowledge-based on MPU of their community.

Under the stage I, the participants would have the opportunities to exchange the ideas and share the experience about MPU according to the method of community learning.

After the key informants worked on the discussion, each group provided the conclusion about the local knowledge-based on medicinal plant utilization under the stage of I.
In the stage of C, the research would present the guideline of model to the participants in order to get recommendation and suggestions for improvement of the model.

Data of S.W.O.T analysis and model about knowledge-based management on medicinal plant utilization in PTFC were presented by the researcher in the activity of stage of C.

Under the stage C, the participants paid attention to listen the researcher made the conclusion about the guideline of model.

Between the participants and researcher made the discussion to improve and recommend about the model of knowledge-based management on medicinal plant utilization after presentation finished under the activity of stage C.
## BIOGRAPHY

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<td>Shiller-Stamford International University, 1997-2000: Bachelor of Art (Business English) Mahidol University, 2006-2008: Master of Science (Natural Resources Management)</td>
</tr>
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<td>Department of Environmental Quality Promotion Position: General Administrative Officer Tel. 02-278-8400 ext. 1820-21 E-mail: <a href="mailto:bajarees@yahoo.com">bajarees@yahoo.com</a></td>
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