International Journal of Sustainable Development and Planning
Vol. 18, No. 5, May, 2023, pp. 1565-1572
Journal homepage: http://iieta.org/journals/ijsdp

Empowering Sustainable Energy Communities in Thailand: Unveiling the Knowledge Transfer Process

Thanakanit Thanyajaroen*, Wisakha Phoochinda

Graduate School of Environmental Development Administration, National Institute of Development Administration, 148 Serithai Road, Klong-Chan, Bangkapi, Bangkok 10240, Thailand

Corresponding Author Email: thanakanit.tha@stu.nida.ac.th

https://doi.org/10.18280/ijsdp.180527

Received: 20 February 2023
Accepted: 24 April 2023

Keywords:
knowledge transfer, knowledge management, community energy management

ABSTRACT

This study explores the knowledge transfer process in community energy management in Thailand, with the aim of developing a sustainable approach. Qualitative research methods, including documentary studies and in-depth interviews, were used to analyze the energy management practices of three model communities. Data analysis was conducted using a cross-case analysis method until information saturation was achieved. The study found that the knowledge transfer process in Thailand's Community Energy Management involves establishing objectives, identifying responsible parties, defining knowledge subjects, selecting tools, implementing, assessing, and archiving. Community leaders' encouragement and residents' active engagement were identified as crucial components of a successful knowledge transfer process. The study's findings offer insights for communities seeking to develop sustainable energy resources in Thailand. A customized strategy for each community's objectives can be developed using the conceptual framework for knowledge transfer presented in this study. The significance of knowledge transfer in community energy management is underscored, highlighting its potential to promote sustainable development in Thailand.

1. INTRODUCTION

The development of community energy has increased in parallel with the country's energy consumption; this can be attributed to the growing interest in sustainable development. The result not only satisfies the energy requirements but also cultivates the potential for the community to become self-sufficient. Residents are directly responsible for both the production and consumption of energy when energy management in a community allows them to own and operate the generation systems that supply their homes [1].

The potential of the development offers a tangible and proximate link between energy supply and use that is beneficial for raising awareness and education [2]. Shaw and Mazzuchelli found that when communities saw the need for energy development, they were ready to increase their abilities [3]. For communities to effectively employ energy technologies, a variety of knowledge and clear recommendations regarding technology selection and use are essential [4]. Moreover, community energy management provides knowledge and skills related to installation and maintenance, strengthens local capacity, and raises community members' awareness of energy use [5]. The energy problem in Thailand is a consequence of the fundamental knowledge and understanding of energy management. Currently, Thailand's energy planning is a centralized system in which the general public does not participate in energy management planning. When most people lack knowledge and understanding about their local energy, energy management is less successful. In 2006, the Ministry of Energy created a Local Energy Plan (LEP) project to develop renewable energy production within communities. LEP is a tool for solving energy problems and improving the well-being of communities. There is also a forum for community energy learning, creating knowledge and understanding about energy, and enhancing the knowledge and capability of the local community. Sustainable community energy planning problems and obstacles arise from a lack of knowledge. In Thailand, a general lack of awareness about energy shortages leads to a lack of participation. Knowledge helps community members to participate in planning and selecting the right technology for their communities. Otherwise, the right technology and energy planning may not suit the community [6]. Proper conditions of knowledge transfer are essential for community learning. If knowledge transfer is blocked, knowledge gained by one person cannot inform or improve the practices of other community members [7].

Communities are nonprofit enterprises, but their performance must be evaluated to guarantee the well-being of their members. Consequently, communities are essential for the effective development of community infrastructure. Moreover, each community and its members have unique, specialized knowledge due to their distinct establishment aims. In specific communities, knowledge management has been used to facilitate the dissemination of knowledge. Therefore, substantial and continual knowledge should be shared and transferred. Proper conditions and process of knowledge transfer are essential for community learning. If knowledge transfer is blocked, knowledge gained by one person cannot inform or improve the practices of other community members [6]. In Thailand, the community is one of the distinctive organizational structures, and the distinctions

between the government and the private sector exist within a single community. Therefore, there should be a community-appropriate procedure for sharing knowledge. Knowledge-transfer procedures include implementing the 10-step community energy development plan to create knowledge transfer in the energy development process, resulting in sustainable energy development in the community.

This research intends to examine the process of transferring successful communities' knowledge of community energy management. The objective of this research was to examine the process of transferring knowledge about energy management that is integrated into the energy management process before integrating the results into a procedure for transferring knowledge about sustainable community energy management. The researcher describes a project designed to evaluate the learning and transfer of learning in community energy management using the knowledge transfer process with four phases: Initiation, Implementation, Ramp-up, and Integration. Consequently, to comprehend the process of knowledge transfer in community energy management that is effective in helping communities become model communities' energy management with an emphasis on formulating rules for knowledge transfer to boost productivity. In the future, communities who desire to develop energy will be able to utilize this study's findings as a reference to create a conceptual framework for knowledge transfer that will help community energy development. Communities should start the knowledge transfer process promptly as energy development starts since it is essential to the sustainable achievement of energy development. This knowledge transfer strategy will assist interested communities in establishing policies in effect to guarantee the growth of sustainable community energy is successful.

2. THEORY

2.1 Community energy management in Thailand

Energy management includes establishing policy, objectives, and a responsible organization or individual. Implementation necessitates forethought, comprehension, follow-up, and evaluation to ensure efficient management. The Ministry of Energy must maximize the efficacy of the nation's energy consumption and develop renewable energy. The development process must prioritize the building mechanisms for constructive participation at the provincial and local levels. At all levels, the community must be encouraged to participate in the formulation of energy policies and plans aimed at community-level energy self-management. The government initiated a new pattern of national energy planning focusing on public participation (the bottom-up approach instead of the traditional top-down approach). The objective was to improve Thailand's energy consumption efficiency and balance energy development and environmental protection [8].

2.2 Definition of knowledge and knowledge transfer

The explicit versus tacit distinction refers to the degree to which knowledge is articulated versus whether it is implicit [9]. Nonaka asserts that explicit knowledge can be expressed in words and numbers and shared as data, scientific formulas, and specifications [10]. This type of knowledge is codifiable, easily transferable, and context-free. Conversely, tacit knowledge is difficult to articulate and communicate.

Knowledge transfer is an entity's attempt to copy a particular type of knowledge from another entity. In other words, knowledge transfer refers to transferring knowledge to a location where it is required and can be utilized [11]. According to Davenport and Prusak [12], Transfering is sending or presenting information to a person or group. Knowledge is only really imparted when it is completely absorbed, which is what absorption means for the person or group. Knowledge transfer aims to strengthen an organization's potential by using and applying knowledge and transmitting and absorbing it [12].

Szulanski [13] suggested a model with four phases: Initiation, Implementation, Ramp-up, and Integration. This paradigm is based on an extensive empirical study on technology transfer, social transformation, innovation dissemination, and implementation [13]. The components of the knowledge transfer process include:

Step 1 Initiation: The initiation stage is the beginning of knowledge sharing. At this stage, the demand analysis and matching suitable partners, finding knowledgeable people for Feasibility Analysis [14].

Step 2 Requirements: Select an effective knowledge management mechanism and information sharing strategy [15]. There are two primary ways to share knowledge:

(1) Methods for Knowledge Documentation that are provided by written or electronic correspondence and which are self-learnable.

(2) Methods of Interaction is an information exchange technique involving human interaction.

Step 3: Implementation: The phases involved in implementation first prepare and convey the essential information, after which the knowledge receiver attempts to assimilate and use the knowledge as needed.

Step 4: Follow-Up: Throughout the follow-up stage, the knowledge provider and the information receivers are evaluated on pertinent problems during the knowledge-sharing process.

This work develops a four-stage model based on their concept, as illustrated in Figure 1.

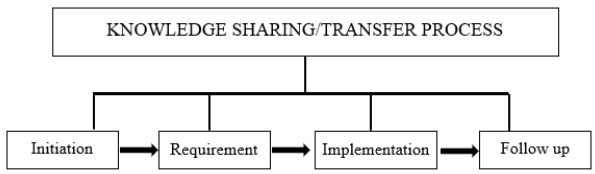

Figure 1. A model of the knowledge transfer process

3. METHODOLOGY

This study was conducted to choose a model community in energy management by means of a purposive sampling method based on the following four criteria: 1) Consistent participants in community energy development communities for at least five years. 2) Community energy development has an impact on the local economy, society, and environment. 3) Energy development produces local energy expertise. 4) A curriculum on community energy development is available in the area. Therefore, the three chosen communities represent

the study's most accurate representation of those communities. In the study of representatives of the three communities, the researcher conducted in-depth interviews to collect data covering all 22 stakeholders in community energy management along with observations and studies from the document until the data were saturated and covered the issues to be studied. To improve the reliability of the data that would be utilized to interpret the study outcomes, the researcher used a triangulation technique in addition to interviewing participants.

This qualitative study uses a multi-case study to collect extensive data that can be quickly evaluated and summarized. Before approaching the field, researchers study relevant papers and research papers and select the organization to explore by choosing a purposive option. Sampling, which is the selection of informants according to the objectives of the research. Three communities that are representative and can serve as models of community energy management were selected as follows:

(1) Pa Deng community has outstanding achievements in producing electricity from solar energy and producing biogas instead of LPG. Pa Deng Model is a model for other communities to apply in areas without electricity or for projects that aim to reduce energy costs.

(2) Tha Manao community thrives through joint energy development with the community and public and private sectors. The biogas system from pig farms drives the use of alternative energy. In addition, it creates technical knowledge for the construction of community gas pipe systems and maintenance of technical knowledge for other communities.

(3) San Hok Fa community, San Sai subdistrict, Phrao district, has a biogas system learning center from a pig farm in the northern region that has received a form of alternative energy management from the Tha Manao community. Communities improve the process to be suitable for local resources and use innovation to upgrade production. Since their beginnings, the three model communities have implemented the process of transferring energy management knowledge from training and experts.

Each community is a model for transferring knowledge between members and other communities and networks. This qualitative research was used in a multi-case study. The researcher investigated three villages and evaluated the data more efficiently.

The researcher employed observation, interview, and document approaches to gathering data, and methodological triangulation was performed to ensure the data quality [16].

The researcher used a two-step data analysis process. Step 1: Case analysis data is prepared for comparison with other case studies by first collecting, coding, and extracting to search for significant patterns. Step 2: Cross Case Analysis compares the likenesses and distinctions among the case studies [17]. Create a study report with a linear format that describes the results and discusses the knowledge transfer and sharing process for community energy management as it was investigated in 3 communities.

4. RESULTS

4.1 Pa Deng community, Kaeng Krachan district, Phetchaburi province

Pa Deng community focuses on human resource development through education and the development of human potential. Knowledge is one of the key factors in the process of successful community development. The critical development process in this community is learning by doing the many functions. Members have worked together to develop by exchanging learning and sharing experiences throughout the development. The most important factor is a community meeting that provides knowledge transfer, encourages members to try and learn, and is a model for others. In addition, the Pa Deng community offers opportunities for students interested in researching the working process and technology in the community, which increases knowledge exchange. The community applied knowledge from the observation site and educational institutions to be suitable for the local area so successfully that it has become known as the "Pa Deng Model." It is now a sufficient economy learning institution and center of alternative energy, providing regular energy training courses. The Pa Deng community has been established as part of its mission to serve as the community's information hub for renewable energy management. To accomplish the task, Communities and their members require comprehensive, up-to-date knowledge to effectively communicate with the outside world. By emphasizing and sharing knowledge among community members, Pa Deng Community implements knowledge management applications.

"Knowledge transfer in the community through learning exchange activities to cultivate responsible individuals by a group of community technicians tasked with knowledge transfer. The primary objective is to share the knowledge of each individual, which is the foundation of human and organizational development." Community Leaders.

"In the beginning, the knowledge transfer is sending community technicians to seminars to learn how to perform technical repairs. When they return, they must report to community leaders and other community technicians with whom community members have not been acquainted. Community leaders recognized the opportunity and benefit of knowledge transfer and began to share their knowledge with interested members. The community began by organizing knowledge-sharing activities during monthly meetings and mandating that members share their knowledge. Members have had the opportunity to attend seminars or outside training to share. A summary of the work in the community will be presented so that members are aware of the work situation." Community Member.

The action plan summary for the Pa Deng community begins with sharing the initial knowledge, in which the community leader assigns community technicians to be responsible for knowledge management. The chief engineer of the community then focuses on the issue of community knowledge transfer as a tool to help develop people and increase the potential for renewable energy management. Therefore, knowledge-sharing activities allow members to interact, converse, and modify their learning through practice. Each month, members gather to generate ideas and take action, with community technicians facilitating and categorizing knowledge as a learning process so that members can comprehend and implement it in their homes. For example, a group of community technicians created a table outlining the knowledge required to make energy development steps practical, including solar cell repair and biogas energy development issues from household waste. Once energy development issues have been identified, leaders send members on training or study tours to increase their knowledge.

Following the study visit, the acquired knowledge was implemented and shared with the community through knowledge-sharing activities at monthly meetings and coffee councils. In addition, there will be knowledge storage on intranets and materials for the energy competition.

4.2 Tha Manao subdistrict, Chai Badan district, Lop Buri province

Tha Manao community collaborated with the PTT Ministry of Energy and the National Innovation Agency to implement the production and distribution of biogas from pig farms at a community level to solve wastewater problems from pig farming systems. In addition, Tha Manao community leaders who recognize the advantages of knowledge management on renewable energy have started sharing knowledge about renewable energy. As a result, they contribute their expertise and experience while also picking up new skills from outside the community to develop knowledge management.

"Before beginning that biogas project, I was briefly introduced to knowledge management. Tha Manao Subdistrict has experience in knowledge transfer because he has been working with PTT since 2009. The Tha Manao people were invited to investigate the economic and energy data at the household level as part of the project to use the data as a starting point for creating the district development plan. I have participated in activities with university professors to learn about energy and knowledge management. Speakers from various agencies were invited to the project to impart their knowledge. Being a learning community is the primary objective of the community. Giving people a culture of knowledge transferring and exchange is the sub-goal." Community Leader.

It will emphasize naturalness, develop a culture of knowledge transferring, expand knowledge from what is already known in the community, and add a balanced system. Creating a forum for participants to discuss and exchange knowledge with one another marked the beginning of sharing/transferring knowledge on renewable energy management among community members.

"Knowledge transferring must be introduced organically into the community. Create a work-based learning environment in which systematization and acculturalization are balanced. Knowledge transferring is a component of work and not a concept in and of itself. Members initially shared knowledge by recounting instances in which they had generated energy during meetings and activities. Start by informing other members of their accomplishments." Community Leader.

"In the past, members transferred knowledge by storytelling. The group members share their interests and experiences." Community Member.

During the initial phases of the project, participation in the knowledge-sharing activity at the monthly community meeting was effortless. Community leaders have charged every community member with disseminating information about energy management, beginning with their interests. The local government is primarily responsible. However, it becomes apparent that neither the activities nor the shared things engage. Moreover, they do not know what to share. The expansion of the energy development group necessitates a modification of the strategy. As a result, the community of Tha Manao established a committee whose primary responsibility is the transfer and dissemination of information regarding energy management. Concerned with utilizing the personnel's knowledge, the community.

"Community has a well-defined, structured policy to create and drive project development, as well as a plan to develop individuals. The first objective or goal is to create a knowledgeable workforce and increase productivity in the workforce, workplace, and community. After receiving the energy development policy, the community began designing the system development system, discussing the design objectives at each stage. Before planning an event each year, the community reviews the committee's previous year's work. Through regular activities, leaders, academics, and community members at all levels can concretize the abstract." Community Member.

In conclusion, the Community Renewable Energy Management Tha Manao Knowledge Management process begins with the leader and focuses on personnel development. The community leader then appoints the accountable individual as the head of knowledge management, primarily responsible for collaborating with diverse community structure development groups. In the development of renewable energy, the person in charge of knowledge management also oversees operations. The person in charge then designs the activities by the objectives and proposes that the plan be approved and implemented by the community leaders. Identifying search topics and collecting the knowledge necessary to develop renewable energy in the community are the primary steps of a knowledge-sharing plan. The next crucial step is selecting the target audience, activity patterns, and tools to transfer energy management knowledge. Then, inform the event participants and those primarily responsible for coordinating the event's activities. If an activity or tool is included in the event, the community leader must notify the appropriate personnel and be available to guide participants. Finally, actions in activities or regular practice are evaluated and reviewed to determine the implementation's outcomes and any necessary adjustments.

4.3 Ban San Hok Fa, San Sai subdistrict, Phrao district, Chiang Mai province

Ban San Hok Fa is considered a thriving community and a prototype of the northern region for the production and distribution of biogas at the community level. This project was the result of community leaders desiring to address the problem of the smell from pig farms disturbing the community. Members met to discuss and find a solution. At first, members disagreed due to security concerns. Then the Tha Manao community became involved as educators transferring energy knowledge. The Tha Manao community became mentors and coaches throughout the development process. The principle of operation of the Phrao community is to provide knowledge and understanding about how to use and maintain the equipment safely, encouraging learning about energy technologies that can be adapted to improve the quality of life. Since joining the PTT development project, the Ban San Hok Fa Community has managed knowledge of renewable energy management in the community in a concrete manner. The community has acquired knowledge on biogas energy development from the Tha Manao community by utilizing various tools to collect knowledge and create community-specific practice guidelines. After the successful development of the biogas project at the pig farm, the community collaborated with Mae Jo University to increase gas production. In this regard, the model of

knowledge transfer operation during the period and energy development brought community leaders from Tha Manao to provide knowledge and organize knowledge transfer activities. Using the Tha Manao model, a team is assembled to fulfill all roles. Learning exchange meetings are the primary method for acquiring the necessary tools for each activity.

"The San Hok Fa community was originally comprised of practitioners. Community-based energy speakers impart knowledge on energy generation. Members share responsibilities in areas of facilitation such as location, food, and journaling." Community Leader.

"Lecturers who come from PTT and the Tha Manao Community to impart knowledge" Sometimes, the speakers are university professors. Come to request a study visit while exchanging information." Community Member

"Transfer of knowledge activities" Focus on developing an understanding of biomass and gas piping systems; the business is frequently the focus of the narrative and the workshop manual preparation. The majority of members did not act. However, only working groups are involved." Community Member.

The current knowledge transfer model includes knowledge management on biomass gasification and in-process implementation, such as transcribing research lessons. This body of knowledge is a specific body of knowledge that is not transmitted to community members but transferred to members of Baan Makiang Nuea and academic groups with interest. Members who attended the event did nothing but listen. All community members participated in a model for facilitating knowledge transfer in which interpersonal interactions could only be cognition-building activities. At the beginning of the action, the lessons learned during the group's work were shared when personnel returned from training outside. Members can ask questions and share knowledge if they are uncertain. In addition, the knowledge-sharing operation occurred when outsiders came to Tha Makiang Nuea Village to study or during the transfer of knowledge to the villagers. The community of San Hok Fa has participated in research and development to increase the production efficiency of biomass gas. It is an opportunity for academics to document their research findings on various topics in the form of informational documents for interested parties to study and exchange knowledge. The situation of the Ban San Hok Fa community can be summed up as follows: The process starts with the leaders of the target community, defining policies as action guidelines, and identifying the key parties responsible for driving the action. Consequently, community leaders and committees collaborate to determine the knowledge required for developing renewable energy.

Community leaders then appoint committees in each area of knowledge, most of which involve knowledge-related tasks. First, the working group is responsible for creating and acquiring knowledge through community regulations regarding the distribution of administrative work and the scope of the department's responsibilities. Next, collecting, studying, analyzing, and synthesizing research is necessary to generate new data sets for operational performance and properly manage knowledge. Then, proceed to compile a summary of research reports, extract lessons, store them in the database of those accountable, and share based on online libraries, including the creation of knowledge-sharing activities. The number of activities and the success of energy development projects indicate knowledge transfer.

Following this, the researcher summarized the knowledge transfer processes of the three communities by emphasizing the similarities and differences in Table 1.

The goal-setting comparison table reveals that in the Tha Manao Community, community leaders, and the Energy Development Working Group collaborate to set goals first, fostering mutual understanding and acceptance. Setting goals collectively can aid in gaining various perspectives but can delay decision-making. In addition to the success of renewable energy development, the desired outcome for the Tha Manao community is the development of people, which will lead to job growth, improved quality of life, and the enhancement of members' skills. It also requires a knowledge management system that will foster an energy management learning community. After each task, the Pa Deng community and the Ban San Hok Fa community appoint a responsible individual responsible for establishing goals and submitting them for director approval. This work style can make decisions quickly, but the disadvantage is that the plan may come from a single perspective and not be accepted or felt as part of the objective. The desired outcome is a body of knowledge used to develop people and work.

Regarding the designation of responsible persons for the Tha Manao and Ban San Hok Fa communities, it has been suggested that a person should be accountable for continuously directing the operation and extracting the knowledge utilized for the community's benefit. The advantage is that the responsible individual assumes total responsibility for the work, while the disadvantage is that adding more responsible individuals may result in more processes. Regarding the Pa Deng community, the idea is that it is a component of human development, so community technicians have been assigned responsibility. The cost-effectiveness of utilizing the technician is a benefit of this strategy, but the disadvantage is that the person in charge may place less emphasis on the primary task.

The subsequent step is to define the body of knowledge and then search for and collect the necessary information. All three communities know the necessity for developing renewable energy in the community at the time. This strategy can be transparent in areas of knowledge crucial to the organization, not storing useless information and wasting resources. Next is selecting target groups, including locating a model and tools for knowledge transfer. Each of the three communities has been determined based on the type of knowledge. In the case of explicit knowledge, knowledge document formats such as reports, public relations forums, libraries, online libraries, and intranet knowledge bases are utilized. In the case of ingrained knowledge, the use of interactive methods from community members, such as meeting-specific activities, teamwork, mentoring, Etc.

As for the target group, the Tha Manao community comprises three subgroups: community members, academic groups, and community leaders and designers. Activities are tailored to each group member, and tools are integrated into each action. In addition, the environment is designed to encourage knowledge transferring, such as by creating a meeting room or meeting pavilion with tables, chairs, and cooking utensils for dining together, allowing members to come together and share their knowledge.

Table 1. Summarizes the data collection findings on the three communities' knowledge transfer processes

Tha Manao Subdistrict	San Sai Subdistrict	Pa Deng town, Kaeng Krachan District
Goal Setting		
• Subdistrict Administrative Organizations and organizations responsible for community energy development collaborate to establish energy development objectives and strategies. • The energy development objectives align with the community development objectives. • The community aspires to become an educational hub for renewable energy.	• Subdistrict Administrative Organizations and organizations responsible for community energy development collaborate to establish energy development objectives and strategies. • The energy development objectives align with the community development objectives. • Using gas from pig farms, the community aspires to become a learning hub for renewable energy in the northern area.	• A group of community technicians and energy development leaders jointly set community energy development objectives. • The energy development objectives align with the community development objectives. • It is anticipated that the community will become a model for generating and using renewable energy without depending on external energy sources.
Identify the Person in Charge		
• The sub-district Administrative Organization and the individual in charge amass all information on community energy development. • The subleader groups are responsible for knowledge transfer.	• The sub-district Administrative Organization and the individual in charge amass all information on community energy development. • The subleader groups are responsible for knowledge transfer.	• The Community Technician Team and the Energy Development Group are responsible for knowledge transfer and accumulation.
Identify Knowledge		
• Determine the needed expertise based on the sort of renewable energy outlined plans. • Supply of instructional materials	• Determine the needed expertise based on the sort of renewable energy outlined plans. • Supply of instructional materials	• Determine the needed expertise based on the sort of renewable energy outlined plans. • Supply of instructional materials
Identify Activities and Tools		
• Identify the target audience and divide it into specialists and generalists. • Determine appropriate knowledge transfer activities.	• Identify the target audience and divide it into specialists and generalists. • Determine appropriate knowledge transfer activities.	• Determine appropriate knowledge transfer activities.
Transferring Knowledge Activity		
• The SAO is in charge of knowledge transfer operations. • Each sort of knowledge holder facilitates the organization of activities.	• The SAO is in charge of knowledge transfer operations and facilitates the organization of activities.	• The Community Technician Team and the Energy Development Group are in charge of knowledge transfer operations and facilitate the organization of activities.
Evaluation of Knowledge Transfer Process		
• Once a year, based on the fiscal year, evaluate knowledge transfer efforts.	• Once a year, based on the fiscal year, evaluate knowledge transfer efforts.	• Once a year, based on the fiscal year, evaluate knowledge transfer efforts.
Process of knowledge storage		
• The community stores knowledge in the form of performance reports. • The community collects knowledge and produces media such as posters, brochures, and billboards to communicate the project through the Internet. • The community has courses on energy development.	• The community stores knowledge in the form of performance reports. • The community collects knowledge and produces media such as posters, brochures, and billboards to communicate the project through the Internet.	• The community stores knowledge in the form of performance reports. • The community collects knowledge and produces media such as posters, brochures, and billboards to communicate the project through the Internet. • The community has courses on energy development.

The advantage is that members see the value in participating in the activity. The disadvantage is that there must be communication between groups on related issues, which can result in errors. The objective for the Pa Deng community and the Ban San Hok Fa community is for all community members to participate in community-wide activities. The disadvantage is that the person may not pay attention and believe that some issues do not pertain to them, resulting in wasted resources in organizing activities that may not achieve the desired outcomes.

The next step is to inform those involved in the knowledge-sharing process by having the primary responsible party facilitate and act as a consultant. At the same time, the knowledgeable person or speaker summarizes the knowledge issues and leads the knowledge-sharing activities. Regarding the evaluation of the Tha Manao community, supports who supported the evaluation participated in knowledge-sharing activities and evaluated the outcomes of output factors. By considering the quality of life and well-being of the community's residents and the data from the knowledge management system,

Evaluation of the Pa Deng community emphasizes systematic assessment and implementation. Furthermore, Ban San Hok Fa communities evaluate the system based on the number of knowledge-sharing activities of each sector and the output or output factor, such as the number of Lesson transcriptions and the amount of knowledge representing the best practice method. The final step is to store all three communities in the appropriate database, such as a knowledge base or online library. In addition, the Tha Manao community has a knowledge recorder, which summarizes the knowledge and sends it via email to PTT personnel, with the added benefit

of being able to review it whenever desired.

5. CONCLUSION AND DISCUSSION

A summary of the knowledge transfer process in community renewable energy in Thailand. The following steps comprised each of the three case studies, as shown in Figure 2.

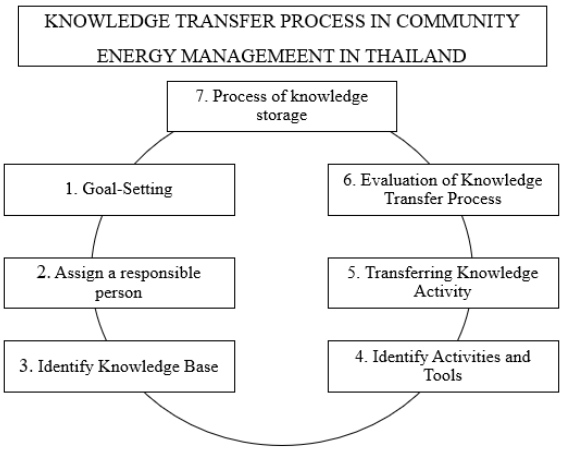

Figure 2. Knowledge transfer process in community energy management in Thailand

(1) Goal setting: Establishing operational objectives is a crucial first step. Panich suggests using knowledge management as a tool in a systematic manner. The goals must include strategies for success in community energy management [17]. Community development has clearly defined objectives and a plan to drive the community, should aim to meet the community's strategic goals, and serve the use of members' knowledge leading to the community's ultimate objective or vision.

(2) Identify the Person in Charge: The assignment of responsible parties is based on community action. According to Panich, an intermediary should provide a central communication structure that enables people to exchange and upgrade their knowledge and communicate their expectations [17]. In addition, the researcher discovered that the assignment of responsible individuals significantly impacts the operation because, if it is the primary task, the responsible individual will continuously improve the process. Nevertheless, if it is a secondary or tertiary job, the dedication may be less because the primary job already requires responsibility. Referral planning also plays a crucial role in ensuring that knowledge-sharing operations are not interrupted due to members' confusion and unwillingness to collaborate.

(3) Identify knowledge: Tabrizi and Morgan define the body of knowledge to be searched and gathered in step 1 as the initial step at which knowledge transferring begins [14]. The needs assessment includes interviews with recipients, sources, or knowledgeable individuals. It is determining the necessary or required body of knowledge for an organization so that the community can find and collect knowledge with a clear scope. It affects the selection of a mode of action because the required knowledge may be implicit or explicit. In addition, knowledge assignment, acquisition, and application directly impact a community's success [12].

(4) Identify Activities and Tools: Select the intended audience, activity type, and knowledge transfer instrument—this step selects the most beneficial knowledge-sharing methods and management mechanisms [12]. The selection of target audiences and activities is based on the action design concept of the individual responsible, which will group knowledge, styles, and tools according to the target audience. Additionally, the category of knowledge must be selected, with implicit knowledge employing Methods of Interaction and explicit knowledge Methods of Knowledge Documenting. The knowledge-sharing model is included and excluded from the standard job duties. The nature of any organization whose form is not included in the work may be its activities. Finally, justifications and benefits of the action must be articulated.

(5) Knowledge transfer Activity: The procedure entails imparting knowledge to others and learning from others through activities or actions that are a part of the work [18]. Technology can be used to enable a broader distribution that members can quickly access when they need it in the implementation of explicit knowledge transfer. Because of the activities of some communities, other educators or broadcasters must define the scope and provide a concise summary of the body of knowledge in the case of tacit knowledge so that the knowledgeable person can quickly understand it. So as not to interfere with regular business, there might be a set period. The knowledge transfer should have a recorder, extract knowledge, and summarize the knowledge from the activities as explicit knowledge. The event does not include knowledge transferring. Sharing knowledge is a tool, not an action, so it is important not to emphasize it to the point where participants feel burdened.

(6) Evaluation of Knowledge Transfer Process: The assessment enables knowledge management programs to align with the organizational strategic goals to realign the knowledge management course of action and produce tangible benefits for the company [12]. Assessments can be evaluated in four ways: by measuring activities and processes efficiently, transactions and outcomes, and intellectual capital gains. According to the case studies, there are only two ways to measure it: the number of interested members and the activity system organized. Once the community has been operating, the export factor should be used to measure its success. Both metrics enable communities to track the status of their initiatives and monitor their results to enhance their action plans. The most challenging aspect of measuring outcomes and intellectual costs is using knowledge, but the organization's management must do it.

(7) Knowledge storage: To diligently preserve significant knowledge bases within the organization. Additionally, it serves as a knowledge base that current members can consult and learn. The body of knowledge will also serve as a resource for individuals from other communities eager to support the ongoing spread of renewable energy. Systematic collection is a knowledge management technique that directly impacts how well community operations go. Technology can be used to make knowledge storage systems more accessible for searches and revisits as needed [12]. The case studies are reported summaries that are kept in a private database. Additionally, the database is kept in a central database or shared by all community members—Internet-based libraries, intranets, libraries, etc.

This study was conceived as qualitative research, as it required information to create clear guidelines for the transfer of knowledge, which did not provide information on the needs of the members in the development of community energy.

For the future study of the model of knowledge transfer on

the management of community energy, quantitative studies should be carried out to determine member needs in terms of knowledge transfer, in order for the appropriate process of knowledge transfer for the development of community energy.

REFERENCES

[1] Walker, G., Cass, N. (2007). Carbon reduction, 'the public' and renewable energy: Engaging with socio-technical configurations. Area, 39(4): 458-469. https://doi.org/10.1111/j.1475-4762.2007.00772.x

[2] Walker, G., Devine-Wright, P. (2008). Community renewable energy: What should it mean? Energy policy, 36(2):497-500. https://doi.org/10.1016/j.enpol.2007.10.019

[3] Shaw, S., Mazzucchelli, P. (2010). Evaluating the perspectives for hydrogen energy uptake in communities: Success criteria and their application. Energy Policy, 38(10):5359-5371. https://doi.org/10.1016/j.enpol.2009.03.042

[4] Devine-Wright, P., Walker, G., Hunter, S., High, H., Evans, B. (2007). An empirical study of public beliefs about community renewable energy projects in England and Wales. Manchester: Manchester Architecture Research Centre, School of Environment and Development. https://doi.org/10.1016/j.enpol.2007.10.019

[5] Walker, G., Hunter, S., Devine-Wright, P., Evans, B., Fay, H. (2007). Harnessing community energies: Explaining and evaluating community-based localism in renewable energy policy in the UK. Global Environmental Politics, 7(2): 64-82. https://doi.org/10.1162/glep.2007.7.2.64

[6] Phoochinda, W. (2012). Implementation of the Sufficiency Economy Philosophy of Environmental Management in the Manufacturing Industry. University of the Thai Chamber of Commerce Journal.

[7] Dee, J., Leisyte, L. (2017). Knowledge sharing and organizational change in higher education. The Learning Organization, 24(5): 355-365. https://doi.org/10.1108/TLO-04-2017-0034

[8] Bhagat, R.S., Kedia, B.L., Harveston, P.D., Triandis, H.C. (2002). Cultural variations in the cross-border transfer of organizational knowledge: An integrative framework. Academy of Management Review, 27(2): 204-221. https://doi.org/10.5465/amr.2002.6588000

[9] Nonaka, I. (1994). A dynamic theory of organizational knowledge creation. Organization Science, 5(1): 14-37. https://doi.org/10.1287/orsc.5.1.14

[10] Rogers, E. (1983). The Diffusion of Innovation. New York: The Free Press. https://doi.org/10.2307/2573300

[11] Davenport, T.H., Prusak, L. (2000). Working Knowledge: How Organizations Manage What They Know (pp. 1-7). Boston, MA: Harvard Business School Press. https://doi.org/10.5860/choice.35-5167

[12] Szulanski, G. (1996). Exploring internal stickiness: Impediments to the transfer of best practice within the firm. Strategic Management Journal, 17(S2): 27-43. https://doi.org/10.1002/smj.4250171105

[13] Tabrizi, N.M. and Morgan, S. (2014), Models for describing knowledge sharing practices in the healthcare industry: Example of experience knowledge sharing. International Journal of Management and Applied Research, 1(2): 48-67. https://doi.org/10.18646/2056.12.14-004

[14] Akhavan, P., Rahimi, A., Mehralian, G. (2013). Developing a model for knowledge sharing in research centers. Vine, 43(3): 357-393. https://doi.org/10.1108/VINE-06-2012-0020

[15] Richardson, L., Norman, D., Lincoln, Y. (2000). Handbook of Qualitative Research (2nd ed.). Thousand Oaks California: Sage Publications. https://doi.org/10.1046/j.1365-2648.2001.0472a.x

[16] Miles, M.B., Huberman, A.M. (1994). Qualitative data analysis: An expanded Sourcebook (2nd ed.). Thousand Oaks California: Sage Publications. https://doi.org/10.1177/002076409704300109

[17] Yin, R.K. (2014). Case study research: Design and methods (5th ed.). Thousand Oaks California: Sage Publications.

[18] Van Den Hooff, B., De Ridder, J.A. (2004). Knowledge sharing in context: The influence of organizational commitment, communication climate and CMC use on knowledge sharing. Journal of Knowledge Management, 8(6):117-130. https://doi.org/10.1108/13673270410567675