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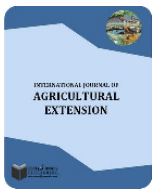

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KNOWLEDGE MANAGEMENT FOR RICE FARMING IN THE COMMUNITY OF KHUAN RU SUB-DISTRICT, RATTAPHUM DISTRICT IN SONGKHLA PROVINCE, THAILAND

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ABSTRACT

This study aimed to develop the knowledge management process of rice-growing farmers through participatory action research (PAR). The sample group of 10 participants used for the study involved community leaders of farming rice organizations, village sages, and mill committees. Focus group discussions, in-depth interviews, and observations were used for data collection. Descriptive analysis and content analysis were used for data analysis. Knowledge management for rice farming was composed of 6 steps which were 1) identifying the scope of knowledge needed, 2) searching for knowledge, 3) creating and acquiring knowledge, 4) organizing and collecting knowledge, 5) systemizing knowledge, and 6) transferring and disseminating the knowledge. The main output of this study was the knowledge management of rice farming in the Khuan Ru community which knowledge consisted of the following: 1) soil preparation, 2) rice seed preparation, 3) rice cultivation, 4) rice caring, 5) rice harvesting, and 6) rice post-harvesting. From the practical implementation in their rice fields, rice-growing farmers joined the learning for the entire study activities to preserve the rice farming knowledge of this community.

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INTRODUCTION

Thai people have had a close relationship with rice for a very long time. Rice is fundamental to the Thai economy, society, culture, and Thai lifestyles (Kwanjai Gomet *et al.*, 2003). According to a report from the Ministry of Agriculture and Cooperatives and the National Economic and Social Development Council (2020), 8,094,954 farmers and 4,646,357 farming families were growing plants while 3,497,827 families were cultivating rice. The total farming area covered 43,293,410 rai (Office of Agriculture and Cooperatives Songkhla Province, 2021). Songkhla province locates on the eastern coast of the lower south of Thailand. The area of the province is the third-largest in Southern Thailand, with a rice farming area of 148,403.44 rai from 2020 to 2021 (Office of Agriculture and Cooperatives Songkhla Province, 2021). The popular rice varieties among farmers in Songkhla are Pathumthani fragrant rice 1, GorKhor 41, GorKhor 43, GorKhor 79, Jasmine fragrant rice 105, and other local rice varieties such as Chor Khing, Horm Jan, Look Pla and Shiang. The Thai government supplies the seeds and handles some activities to improve the life quality of farmers' livelihoods (Songkhla Provincial Public Relations Office, 2020). In the Khuan Ru sub-district and Rattaphum district, Songkhla province, most of the farmers grew in-season rice as the main occupation. The yields of rice were good in taste, aroma, and softness. Farmers can sell the rice yields to be the main income for their families. Then rice cultivation is a major economic crop in this community. However, when the

government issued a policy to promote rubber planting and high-priced rubber products, the study found that most of the farmers in Khuan Ru turned their rice fields into rubber plantations which these consequences decreased the rice farming fields and the rice yields. Also, people in the community needed to buy rice from other places for consumption. The food security of the community was declining. In addition, the topography of the community, which was a plain area and therefore was not suitable for rubber plantation and caused farmers to receive not much rubber production. The incomes were not enough for the needs of the households. Most labourers moved to work outside the community to earn enough money to cover their family expenses. Most of the population in the community were children and the elderly who were unable to work in agriculture. Labour needed young and skilled workers in rubber plantations. For those reasons, community leaders and farmers had the same opinions that rice farming had to be restored to become the main activity of the people living in the community so that their livelihoods would be better with more food security in the community. Furthermore, those also decided that the community rice farming had to be farming activities producing rice safe for consumption. Rice production that exceeded the consumption demand in the community could be sold to generate more income and create jobs for members of the community. By trying to transfer and maintain the knowledge of the past and present community's rice farming for food security in the community, community leaders and farmers thought about knowledge management. In the past, farmers had transferred the rice farming knowledge to be learned by telling or teaching and doing in the field from generation to generation. Their rice-farming knowledge was scattered among the community farmers making knowledge difficult to be maintained. Currently, the study found that the community employed knowledge management within the community to create products, planning, and problem-solving (Pumduang and Sommatat, 2013). Mahaprom (2010) suggested that knowledge management helped restore the traditional wisdom system and combine knowledge with newly acquired external knowledge, especially knowledge management to develop or solve problems for the community. From the mentioned problems, the researchers and farmers in the Khuan Ru sub-district community, Rattaphum district in Songkhla province were interested in collecting the community's rice farming knowledge by using the knowledge management approach and using the knowledge management process as a tool in solving the problems by gathering, categorizing, compiling, and disseminating knowledge through various media and channels.

Objectives

1. To develop a participatory knowledge management process for rice farmers in the Khuan Ru community.
2. To assess the output and outcome of the participatory knowledge management process of rice farmers in the Khuan Ru community.

MATERIALS AND METHODS

This qualitative study involved the collection of rice farming knowledge in the community to ensure its effective management by the farmers. The sample group was obtained using purposive selection according to the following criteria: 1) the target group had to be residents of Khuan Ru sub-district, Rattaphum district in Songkhla province; 2) farming rice had to be their main occupation with the relevant land cultivated in Khuan Ru sub-district; 3) the target group had to have at least 30 - year experiences in farming rice; 4) those were accepted as experts in farming rice or leaders in rice farming formally or informally. Based on the criteria, the leaders were selected accordingly: 1) the chairman and five members of the mill committee from Ban Nong Oan community in Moo 6; 2) three villagers with extensive experience in rice farming based on the GAP standard as a single type; 3) two members of the mill from Ban Nong Oan community in Moo 6. Then the sample of the study consisted of 10 participants in total. The knowledge management process for farming rice in the community proposed by Ash (2016) and Earl (2015) was reinforced and applied. The process involved 6 stages: 1) to ascertain the scope of knowledge required by the farmers. Focus group discussions took place in the community with the cooperation of community leaders, agricultural community group leaders, and rice farming representatives in the community; 2) to search for knowledge from the information sources related to rice farming in the community from primary and secondary sources. Snowball sampling was used to select the primary sources by interviewing the agricultural leaders who introduced other farmers in the community. When interviewing the rice farmers referred by the

agricultural leaders, the researcher asked those farmers to refer other farmers to join the chain until those names were repeated. The names were then recorded for further study. The secondary sources consisted of documents and memorandums from organizations, including the internet and pictures relating to rice farming in the community; 3) to create and acquire knowledge through the collection of data relating to rice farming. In-depth interviews and the data givers in 21 were used to extract the tacit knowledge while further knowledge of rice farming was obtained from documents. All data were investigated using data and methodological triangulation. Data triangulation was used to investigate the observations and interviews. Results were recorded relating to rice farming at different locations and times from data providers by checking for likability and similarity. Methodological triangulation was used to investigate the observations along with interviews, focus groups, and documents to determine whether the data were correct and relevant. All gathered data were found to be complete and relevant in the same direction; 4) to store the knowledge gained. Following collection and investigation, researchers categorized the data and stored documents, images, videos, and voice files; 5) to systematize the knowledge of rice farming in the community using typological analysis and summarized the rice farming community. The community data were then investigated as a triangulation review. The community focus group with different people discussion was revised, adjusted, and altered of the relevant knowledge for correctness and completion; and 6) to transfer and disseminate knowledge by systematizing the data on rice farming in the community. The knowledge was able to be finally transferred and disseminated through the created media to the relevant people involved.

RESULTS AND DISCUSSION

The General Geography of Khuan Ru Sub-district

The area of the Khuan Ru sub-district covers 24,394 rai or 44.13 square kilometres and locates in the northeastern direction of the Rattaphum district, 10 kilometres from Rattaphum District Office. Generally, the area from the south to the north is flat land close to a hillside. A few canals lie on the borderline between the Khuan Ru sub-district and other sub-districts. The lateral canal in the area provides water to the agricultural farms. These farms are mainly rice fields and rubber plantations and have been farmed by the villagers living in the area for many years. For the development of knowledge management process of rice farming in Khuan Ru sub-district community. The findings indicated that the implementation of the knowledge management process consisted of the following 6 steps:

Step 1: Scoping the knowledge necessary for the community

The focus group discussion and brainstorming method were used to identify the relevant knowledge required for rice farming as a guideline for the researcher and farmers in the community. The sample group consisted of leaders, agricultural organization leaders, and rice farming representatives living in the community. The important community knowledge required for rice farming was summarized into 6 steps: 1) soil preparation, 2) rice seed preparation, 3) rice cultivation, 4) rice plant caring, 5) harvesting, and 6) rice post-harvesting. Rice farming has been the main occupation of the community for many years. Although the farmers wanted to preserve the traditional rice farming methods, farmers had to adapt to the changing environment and society. This resulted in the community being selected as the model for rice farming in Songkhla province. Farmers have transformed their chemical rice farming into organic rice farming. This causes many people outside the community to have continuously interested in rice farming, and the area has now become a learning centre for organic rice farming. Farmers want to develop the area into an agricultural learning and tourist attraction centre in the future.

Step 2: Searching for knowledge

The primary data source for rice farming in the community was provided for this study by participants from the community through discussions, in-depth interviews, and observations. The ten participants consisted of 1) the Chairman and four members of the mill committee from Ban Nong Oan community in Moo 6, 2) three villagers with extensive experience in adapting their rice farming to meet the GAP standard (a single type), and 3) two members of the mill group from Ban Nong Oan community in Moo 6. For the secondary data source, the researcher obtained the data from documents, memorandums, and other materials inside and outside the community.

Step 3: Creating and acquiring the relevant knowledge on rice farming

In-depth interviews along with observations and the actual practice of rice farming were used as tools. The rice farmers created a fieldwork record with the help of data provided by villagers in the community and online research using documents, media, and images. The results confirmed that there were 6 steps to rice farming in the community. Those steps were 1) soil preparation, 2) rice seed preparation, 3) rice cultivation, 4) rice plant caring, 5) harvesting, and 6) rice post-harvesting. The data were analyzed using triangulation to ensure the content was complete in all categories. The study also used the triangulation method to investigate the data by comparing rice farming in the community with various tools such as observations, in-depth interviews, and documents. The data obtained using the different tools were found to be similar. Data triangulation was then used to check the differences, relevance, and similarities of the data according to the type of documents, observation records, and in-depth interviews with people at various places and times. The results revealed that the data gained from these sources were relevant and similar.

Step 4: Storing the knowledge

For this stage, the data from stage 3 were organized into categories based on the 6 steps involved in rice farming. The data were stored on Google Drive in the form of documents, images, videos, and voice files for further use.

Step 5: Systematizing knowledge management

The rice farming data were categorized and systematized using typological analysis. The data were then summarized into the following 6 rice farming steps: 1) soil preparation, 2) rice seed preparation, 3) rice cultivation, 4) rice plant caring, 5) harvesting, and 6) rice post-harvesting. The other 15 people were allowed to revise, adjust, and alter the data to ensure the accuracy and completion of the rice farming knowledge according to those who participated in the focus group discussions. The 15 people involved were as follows: 1) the Chairman and four committee members of the mill group from Ban Nong Oan community in Moo 6; 2) three villagers with extensive expertise in adapted rice farming to meet the GAP standard (a single type); 3) two members of the mill group from Ban Nong Oan community in Moo 6 and five rice farming representatives of the mill enterprise group of the community Moo 6 from Ban Nong Oan. Therefore, knowledge of the 6 steps involved in rice farming was corrected, organized, and systematized.

Step 6: Transferring and disseminating rice farming knowledge.

During the acquisition of knowledge on rice farming from the community of Khuan Ru sub-district in stage 5, the researcher surveyed channels and methods for its distribution, including farmers, students, and people interested in rice farming. Interviews were used to collect data on the need for media in distributing rice farming knowledge throughout the community. Based on 22 members engaging with this step 6 of the mill enterprise group in the community from Ban Nong Oan in Moo 6 were trainers, the study found that 81.82% required videos, leaflets, and posters rather than other media. The preferred methods for distributing the relevant rice farming knowledge were divided into demonstrating or simulating (36.36%) and exhibiting (4.55%) shown in Table 3. Thus, the researcher and a team of trainers used these media and methods to disseminate knowledge to raise awareness in learners. Similarly, the results of the study by Williams *et al.* (2017) on the Extension Needs for Pineapple Production of Farmers in Nong Khai Province revealed that the farmers' needs for the journal of agricultural extension included demonstrations, a community radio program, and field trip. Regarding the media and method required for learning, Dale (1969) explained that the broad base of the cone illustrated the importance of direct experience for effective communication and learning. Real and concrete experiences are necessary to provide the foundation for their permanent learning. Edgar mentioned that the Cone of Experience contained various sets of media selection guidelines. Edgar believed that audio-visual materials could help students learn from the first-hand experiences of others or vicarious experiences. Edgar concluded that audio-visual materials could provide a concrete basis for learning concepts while heightening students' motivation, encouraging active participation, giving reinforcement, widening student experiences, and improving the effectiveness of other materials. Therefore, the media and methods proposed by the community lecturers in this study were deemed suitable for disseminating knowledge to learners.

Table 1. The need for media and methods in disseminating knowledge about farming rice in the community of Khuan Ru Sub-district (N=22)

The need for media and methods in disseminating knowledge of farming rice to the community	Number	Percentage
Media for the knowledge distribution		
Published materials (flyers and posters)	18	81.82
Videos	18	81.82
Exhibitions	2	9.09
Line	2	9.09
Facebook	2	9.09
YouTube	2	9.09
Radio	1	4.55
Website	1	4.55
Methods for knowledge dissemination		
Lecturing/explaining	8	36.36
Demonstrating/simulating	5	22.73
Practising	1	4.55

* Remark * More than one answer can be provided.

The study found that the knowledge management teams were able to accumulate more knowledge and there was a growing relationship among farmers within each person. In addition, rice-growing farmers implemented the derived knowledge to solve their rice-growing problems. The knowledge management process of rice-growing farmers in the Khuan Ru sub-district with the assessment result revealed that the outputs derived from the knowledge management process were the knowledge of rice farming in the community. The rice-growing farmers obtained the needed skill sets to self-conduct research and took part in every step. The sample group that participated in this study was ranging from setting research problems, data collection, problem-solving design, and performance evaluation.

Knowledge of Rice Farming in the Community of Khuan Ru Sub-district Based on the Knowledge Management Process

The study indicated the following 6 steps of rice farming from the knowledge base for Khuan Ru Sub-district, Rattaphum district in Songkhla province:

1) Soil Preparation

The farmers started preparing the soil from August to September each year by ploughing the rice fields three times; the first was removing the weeds on the soil surface or burying some plants to nourish the soil. The plants that many farmers preferred to grow for soil nourishing were green beans and sunn hemp (Crotalaria juncea L.). After the first plough, farmers would leave the soil for one to two weeks to let the weed roots be removed, and the soil gained more oxygen. For organic rice farming, farmers would add more organic fertilizer into the soil at the ratio of 500 kilograms per rai. The second plough was aiming to break down the soil nutrients into smaller pieces and smoothen the soil surface. The second plough took place one to two weeks after the first. The farmers would release water into the rice fields 5 centimetres higher than the soil surface. The water would be blocked there for 10 to 15 days before ploughing for the third time. The third plough was required to spread the flooded soil further, take away the weeds growing in the water, and set a way for the water to flow in and out of the rice fields. The farmers would release the water to flow in each field to control the water level. After ploughing, the farmers would release the water from the fields. The soil would then be softened and soaked with water. The farmers used tractors to prepare the soil at the expense of 700 baht per rai.

2) Rice seed preparation

Farmers would soak the rice seeds in water and the floating seeds would be removed. The rice seeds would be wrapped in hemp sacks, soaked in water for 1–2 nights, and taken out of the water. The seeds were then poured out and stacked in a dry, water-free, and well-ventilated place. Farmers would cover the piles of rice seeds with hemp sacks and water them to maintain

humidity. After 30–48 hours, the grain would take root and be planted in the fields by the farmers. In the Nadam period (the field where seeding rice was transplanted), the farmers scattered the prepared rice seeds in the rice farming fields. After 30–45 days, the rice plants would be pulled out (this plant period was called "Torngla" in Thai) and planted in the completely ploughed field. If the farmers performed Nawan (where the rice seeds were scattered which seed fields were not required), farmers just scattered the seeds in the ploughed field. The scattered seeds would grow naturally while the farmers were taking care to keep an equal distance among rice plants to avoid intensive growth. Otherwise, some rice plants had to be pulled out and planted in a less dense field which an equal distance among rice plants would help them grow well. Some farmers kept their selected rice seeds for rice farming when others asked for some rice varieties' support from the Thai government. The rice seeds were given by the government to reduce the complication of identifying the origin. However, rice seeds would require identification in the future for certification purposes.

3) Rice cultivation

When the young rice plants had been growing for 30–45 days, young rice plants would be pulled out and replanted in the prepared fields. The rice cultivation period in Khuan Ru Sub-district was from October to November. The farmers would pull out the young rice plants and tie them in bundles. If some rice leaves were long, those would be trimmed into a convenient size for tying into bundles.

4) Rice plant caring

Both chemical and organic fertilizers were used to grow rice in the community of the Khuan Ru sub-district. The farmers scattered the fertilizers into the rice fields after planting the young rice plants twice with the first fertilization taking place after 15 days. The chemical fertilizer used was 16-20-0 or 16-8-4 at the approximate rate of 20–25 kilograms per rai. For organic rice, organic fertilizer was used at the rate of 50 kilograms per rai. The rice plants will receive full nutrients and grow healthy. The second fertilization application took place one to two months before the harvesting period depending on the rice breed. The chemical fertilizer used was 46-0-0 at the approximate rate of 10–15 kilograms per rai. At this point, since the soil had been initially nourished. Organic rice farmers would not be able to use any more organic fertilizer. In the rice field, the farmers would ensure that the water level was 5 centimetres higher than the soil, thus enabling the rice plants to grow well. If the water level was higher, water would be released through the exit of each rice field.

5) Harvesting rice

When rice plants had been growing for 50–60 days, the rice stalks would be fat, round, and sprouting. Pests would be out to destroy and eat the grains. Farmers had to be wary and paid greater attention to their rice fields. During the final stage of harvesting at 110–120 days, the tip of the spike would be yellow while the root of the spike was still green. The rice grains were fully ripened and could be harvested from January to February. If the farmers harvested rice too quickly, the rice seeds which were still light, damp, and unhealthy could be broken. Alternatively, if the farmers harvested them too slowly, the paddy would be dry, crispy, and sear which might cause consequences of destroying the remaining rice plants by the different pests such as birds, rats, and insects. The paddy of late harvesting would be broken easily after milling resulting in lower rice quality. About 7–10 days before harvesting to make the process easier, the farmers would release water from the rice fields. Farmers would use a combined harvester for harvesting to avoid the expense of hiring labour and save time.

6) Rice post-harvesting

The farmers reduced the moisture content of the grains by either drying them in the sun or using a machine. In the case of sunlight drying, the paddy would be placed on plastic netting or cloth on the ground and spread to a height of about 5–7 centimetres, and the paddy was turned over once or twice during the drying process. When the paddy was sufficiently dry, the paddy would be stored in a closed container or taken to a mill for further consumption.

CONCLUSION AND RECOMMENDATIONS

Knowledge management is essential to the community. The tacit knowledge will be examined, collected, stored systematically, and disseminated to others correctly and completely. The preserved knowledge will help enhance the effectiveness of the farming community. Villagers living in the community will disseminate this knowledge through a variety of media and methods which enhances

the process to be more convenient. However, government organizations should provide more channels of knowledge and skill development for producing other types of media for the community such as online media to help spread knowledge more widely. The study followed a guideline and was based on Dale (1969) knowledge management framework to develop the knowledge management process which is a model that emphasizes problem-solving and work development. In the knowledge exchange among rice-growing farmers, the researcher as a facilitator acted as a motivator fostering the knowledge management team to make use of experiences. Those experiences were shared with others which eventually led to multiple perspectives and conclusions. All the knowledge gained is obtained through practical action and experimentation in farmers' rice fields. This is consistent with Poowipadwat (2001) who stated that learning from experiences would allow learners to relive the experience and make reflections that formed new skills, attitudes, or thinking methods. This exhibited the stages of attitude development toward behavioural modification through systematic learning and problem-solving. The creation of knowledge came from the integration of original knowledge with the knowledge derived through the process of reflection, discussion, knowledge exchange, training, field trip, actual practice, experience sharing, etc. These knowledge management activities create the knowledge usable in problem-solving applications on rice growing for farmers. This is based on the principle of participatory action research (PAR). Ministry of Education (2003) mentioned that this application was a knowledge-generating approach by combining academic knowledge with folk wisdom or local wisdom. This knowledge management is called co-generative learning which takes place between villagers and researchers to create mutual knowledge through the integration of both theoretical and practical knowledge.

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