The Mobilization of Small Scale Fisheries Community with Knowledge Management for Conservation and Restoration of the Marine and Coastal Resources in the Gulf of Thailand, Songkhla Province

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Abstract
This research aimed to study knowledge management model and mobilize a small scale fisheries community through knowledge management for conservation and restoration of marine and coastal resources in the Gulf of Thailand, Songkhla Province. A qualitative research method and action research were used. Data collections were done by document study, observations, interviews and small group discussion. Thirty key informants: the chair, the committee and leaders of the community. Data analysis was conducted through content analysis. The research findings were: 1) the knowledge management model for conservation and restoration of marine and coastal resources of a prototype small scale fisheries community included six stages; (1) knowledge identification, (2) knowledge acquisition, (3) knowledge creation and compilation, (4) knowledge storage, (5) knowledge transferring and sharing, and (6) knowledge application, 2) mobilization of small scale fisheries community through knowledge management for conservation and restoration of marine and coastal resources, it was found that the community had good plans for knowledge dissemination in driving the community. After an implementation of knowledge management, the community took more action in marine and coastal resources conservation and restoration. There were good signs of coastal ecology and an increase in numbers of aquatic animals affecting an increase in community income due to increasing numbers of aquatic animals in the areas taken care by the community.

Keywords: Mobilization, Small Scale Fisheries Community, Knowledge Management, Conservation and Restoration, Marine and Coastal Resources

Introduction

The problem regarding the decrease in number of aquatic animals was caused by the introduction of modern tools for fishery. More animals were caught, both fully grown and young ones, leading to tremendous destruction of the ecological system. The introduction of modern technology in fishery such as sound navigation and ranging or sonar can help spot locations of sea animals. The use of illegal fishery tools like trawl boats, pushing nets, surrounding nets, and generator boats to catch anchovy, destroys young aquatic animals resulting in reduction of marine and coastal resources of Thailand. The Department of Fisheries has enacted a law to the effect that within the distance of 3 sea miles or 5.4 kilometers away from shore commercial fishing boats are not allowed to operate because it is a spawning and breeding zone and a food source for young aquatic animals, especially phytoplankton and zooplankton. Unfortunately, There are still fishery smuggling problems caused by commercial fishing boats resulting in a decrease in numbers of aquatic animal resources in each area and an adverse effect on folk fisheries. (Nasae, 2015)

Sustainable problem solutions will support the community in increasing numbers of aquatic animals and raising awareness of community's problems in using illegal fishery tools. The introduction of knowledge management will serve as a tool for the community to build up body of knowledge and encourage their consciousness in conservation and restoration of marine and coastal resources of the community. Knowledge management is a systematic process in constructing the knowledge of indicating existing context, knowledge identification, knowledge acquisition, knowledge creation and compilation, knowledge storage, knowledge transferring, knowledge sharing and exchanging, applying knowledge appropriately and further developing and constructing new knowledge. This practice is a key to successful mastery of knowledge and helps solve community's problems (Kucza, 2001; Davenport and Prusak, 1998). The introduction of knowledge management in the prototype small scale fisheries communities to mobilize Balasoh Khao Saen folk fisheries community at Khao Seng beach, which has been facing problems regarding aquatic animal resources, will help solve its real problems effectively. It will also lead to responsible fishery, awareness raising and appreciating the value of using resources sustainably within the human resource and community development concept.

Research Objectives

The objectives of this research were to study knowledge management model and mobilize a small scale fisheries community through knowledge management for conservation and restoration of marine and coastal resources in the Gulf of Thailand, Songkhla Province.

Research Methods

A qualitative research method and action research were employed to investigate knowledge management model in conserving and restoring of marine and coastal resources of a prototype small scale fisheries communities for further application in driving small scale fisheries community. The study consisted of two stages;

Stage 1: Studying the knowledge management models for conservation and restoration of marine and coastal resources of prototype small scale fisheries communities.

The areas where research was conducted were Ban Huakhao small scale fisheries community, Tambon Huakhao, Singhanakhon District, Songkhla Province, which was successful in sea crab restoration, and Panare small scale fisheries community, Tambon Panare, Panare District, Pattani Province, which was successful in frontage resource management consisting of community crab bank, fishery free zone, fish house building, and community's regulations.

Both prototype communities serve as complete learning resource centers accredited by local and other government and private sectors.

Twenty-five key informants, consisting of nine chairperson and committee of Crab Bank of Por Sap-anan small scale fisheries community and sixteen chairperson and committee of Panare small scale fisheries community, participated in this study. Research tools consisted of a semi-structured interview form and observation. Data collections were done by document study, observations, interviews and small group discussion. Data analysis was conducted through content analysis.

Stage 2: Mobilization of the small scale fisheries community. The practice in knowledge management for conservation and restoration of marine and coastal resources was introduced and applied in the small scale fisheries community located on the bank of the Gulf of Thailand, Songkhla Province, through the following steps; 1) planning, 2) action, 3) observation, and 4) reflection.

The mobilization of the community was Balasoh Khao Saen small scale fisheries community at Khao Seng beach, Boryang, Muang District, Sonkkhla Province. Key informants were five folk fisheries leaders of the community. Research tools comprised field note, observation form and interview form and data were collected through observations, interviews, group discussions and reflection meetings. Content analysis and data triangulation were used in the study in order to obtain accuracy and reliability of data from different sources leading to accurate and reliable results.

Results

Part 1: Results of the studying of the knowledge management model for conservation and restoration of marine and coastal resources of two prototype small scale fisheries communities.

The analytical study was concluded that the model of the knowledge management for marine and coastal resources conservation and restoration of two prototype small scale fisheries communities consisted of six steps as shown in Table 1.

Table 1 The model of the knowledge management for conservation and restoration of marine and coastal resources of two prototype folk fishery communities.

Steps in knowledge management	**Ban Huakhao folk fishery community**	**Panare folk fishery community**	**Summary of management models in two prototype communities**
1. Knowledge identification	Knowledge Identification of the community was crab eggs hatching.	Knowledge Identification of the community was crab eggs hatchery.	Knowledge identification of the communities were crab eggs hatchery and crab releasing.
2. Knowledge acquisition	Method in knowledge acquisition of the community was educational trip to Coastal Aquatic Animals Culture Research in Krabi.	Method in knowledge acquisition of the community was educational trip to Por Sap-anan Crab Bank of Ban Hua Khao community.	Knowledge acquisition of the communities by making visits to learn from experts and successful organizations.

Table 1 (Con.)

Steps in knowledge management	Ban Huakhao folk fishery community	Panare folk fishery community	Summary of management models in two prototype communities
3. Knowledge creation and compilation	The community applied knowledge from educational trip into practice and was able to create body of knowledge in crab hatching. Experimental study was also conducted to study crab life cycle from reproduction to breeding and became expert in crab hatching-knowledge constructed by the community.	The community applied knowledge from educational trip into practice successfully and productively. They could construct new knowledge and local wisdom to make more and safe habitats for aquatic animals including identifying conservation and restoration zone equipped, fish house building, fishery free zone, and regulations setting.	The communities applied knowledge from educational trip into practice and was able to construct unique body of knowledge. They could construct new knowledge in crab hatching and understood that survival rate of young crabs. Panare community could create the following works; crab bank, conservation and restoration zone, fish house building, and regulations setting. leading to balanced marine ecology.
4. Knowledge storage	Knowledge storage of the community kept their knowledge by recording in documents (such as brochures, postures) computers, photos, videos, multi-medias, mobile phones. Also they set up a complete crab hatchery learning center so that information was easily accessed.	Knowledge storage of the community kept their knowledge in different ways; keeping notes, photos, documents, computers, mobile phones. They set up two learning centers called Crab Bank, and Rong Rian Chao-le.	Knowledge storage of the communities kept their knowledge by recording in documents (such as brochures, notes, postures) computers, photos, videos, and multi-medias. The crab hatchery learning center, and Rong Rian Chao-le were easily accessed.

Table 1 (Con.)

Steps in knowledge management	Ban Huakhao folk fishery community	Panare folk fishery community	Summary of management models in two prototype communities
5. Knowledge transferring and sharing	The community was changed to community of practice leading naturally to knowledge transferring and sharing. Pamphlets, database, and lectures were provided for visitors who wished to learn from the community. There was also a demonstration on crab eggs removing for hatching. Exchange of knowledge was done through facebook and presentations on TV.	The community was changed to community of practice leading naturally to knowledge transferring and sharing. Exchanges of knowledge were done through discussions and presentation of model in frontage resources Management consisting of four aspects; crab eggs hatchery, fishery free zone, fish house building, community's regulations.	The communities were changed to community of practice leading naturally to knowledge transferring and sharing. Pamphlets, database, lectures, demonstration, and practice were provided. Exchanges of knowledge were open through discussions, social media, and TV program.
6. Knowledge application	The knowledge application in crab hatching into other aquatic animals such as mantis shrimp, spotted Babylon, and giant freshwater prawn. Based on conclusion and lesson learned, the community was able to construct new body of knowledge continuously.	The knowledge application in crab hatching into other aquatic animals such as mantis shrimp, spotted Babylon, and squids. The community was able to learn continuously.	The knowledge application in crab hatching into other aquatic animals breeding led to new knowledge for the community. The practice led to the formation of community of practice and learning community.

The employment of the model of knowledge management for conservation and restoration of marine and coastal resources of the two prototype communities can solve the problem of reduction of marine resources in the area and give rise to a balanced marine ecological system.

Part 2: Mobilization of a small scale fisheries community through knowledge management for conservation and restoration of marine and coastal resources in the Gulf of Thailand, Songkhla Province.

From the study of the model of knowledge management in prototype small scale fisheries communities to mobilize the Balasoh Khao Saen small scale fisheries, which is an area with the problem of loss of aquatic animals leading to a crisis for the occupation of fishery in the area. The conduct of driving made use of the line of operational research consisting of four stages: 1) planning, 2) action, 3) observation, and 4) reflection, with the following details.

1. Planning

The researcher held a meeting to plan jointly activities by the six stages of knowledge management, namely, 1) knowledge identification, 2) knowledge acquisition, 3) knowledge creation and compilation, 4) knowledge storage, 5) knowledge transferring and sharing, and (6) knowledge application. The meeting was also joined by five folk fisheries leaders of the community. The conclusion was that all the participants agreed to apply the model of prototype knowledge management. The planning to determine the knowledge identification about crab eggs hatching, fish house building, fishery free zone, and community's regulations. Also planned was knowledge acquisition by means of study of various small scale fisheries communities such as Hua Khao Fishery Community, Panare Fishery Community, and the Network of the Department of Marine and Coastal Resources.

"We want the resources in front of our houses to increase or be as abundant as in the past. To learn the way of rejuvenation from the successful prototype community can solve the problem of aquatic animals in our area." (Leaders and members of the small scale fisheries group of the Balasoh Kao Saen Community)

2. Action

After the meeting to plan the operation of knowledge management and determine knowledge identification, knowledge acquisition began by study tours of the above-state units, with the results in Table 2.

Table 2 Results of knowledge management operations in the Basaloh Kao Saen Community

Activities	**Results**
1 Knowledge acquisition on crab eggs hatching, fish house building, conservation and restoration zone and community's regulations through study tours.	1) Crab eggs hatching, egg laying by mother crabs outside shells. 2) Fish house building areas are of two types: 1) bamboo tied to coconut frond, rope, and sand bag, 2) rope tied to coconut frond or rope tied to sand bag. 3) Conservation and restoration zone starting from beach area in front of one's house 1500 meters in length and 500 meters in width with area marks throughout. 4) Community's regulations meaning joint community agreement marking an area where fishery is prohibited. Violation is subjected to warning, confiscation of fishing tools and 2,000 Baht fine, and legal prosecution.
2.Knowledge creation and compilation	The community leaders created and compiled knowledge for the community from the study tours, in particular the method of crab hatchery through egg moving and hatching by mother crabs. A body of knowledge is created of baby Crab hatchery and life cycle of crabs from hatching to further growth, with the knowledge about the length of each egg color from yellow to orange, brown, grey, and black, with time spent from nine, seven, five, three, and one days respectively. Knowledge is created of fish house building using rope and bamboo suited to an area, with the building of a line of house-front territory of conservation and restoration 1500 meters long and 500 meters wide. Community rules are established and jointly accepted by all, with three rules for violation: first time, entry on daily record with warning given; second time, 2,000 baht fine and confiscation of fishing tools; and third time, legal prosecution.

Table 2 (Con.)

Activities	Results
3.Knowledge storage	The community leaders have stored knowledge about crab eggs hatching, fish house building, conservation and restoration zone and community's regulations in writing and on online media such as Facebook by the name of community folk fishery cooperative of the community of Balasoh Kaosaen. A bank of aquatic animals was set up for the community. The house-front territory marking was a true learning source out of the conservation and restoration of marine animals.
4. Knowledge transferring and sharing	After knowledge storing the knowledge is transmitted to fishermen and family members by first demonstration, teaching, and lecturing, and all begin actual practice with group leaders serving as guides showing knowledge about crab eggs hatching, fish house building, conservation and restoration zone and community's regulations, including lecturing, demonstrating, and actual practice on crab eggs hatching and fish house building and conservation area marking. Presentations were then made on the exchange stage of the network of the Department of Marine and Coastal Resources. Consultation and knowledge extension were then made available to nearby folk fisheries communities in Songkhla Province.
5. Knowledge application	Local fishermen put to practice themselves the knowledge transmitted, e.g., extracting crab eggs hatching and taking crab mothers back for sale, pitching in to help make fish house building to fit an area of conservation, with a rope trap laid where there is no obstacle to navigation, while outside a bamboo trap may be laid. All in a community accept community rules jointly agreed upon, with evidence of success in conservation and restoration. All will pitch in next year to speedily make fish house building, as those who finish first will forge ahead in benefit gained from fishing.

3. Observation

The researcher observed the application for driving the model of knowledge management by prototype community through observation, interview, and small-group discussion. The results include 1) community people's knowledge (affective domain) 2) community learning center 3) creating a process of community participation 4) creating a balanced system of marine ecology 5) creating security and durability for fishermen in community 6) factors in favor of the operation, and 7) obstacles caused by the application of knowledge management to driving.

4. Reflection

After conservation and restoration of marine and coastal resources by knowledge management model for community use, the researcher and those concerned consisting of folk fisheries leaders of the community, and representatives of folk fishermen of Balasoh Kaosaen Community held a meeting to reflect on the whole picture of knowledge management operation made up of three points, namely,1) attitude change of the people in a community, 2) benefits for a community, 3) broader application, 4) factors in favor of success, and 5) problems and obstacles.

Discussion

The mobilization of the Balasoh Kao Saen small scale fisheries community by the action research methodology of Stephen Kemmis et. al. (2014), where in community driven by knowledge management the beginning of work plan, especially preparations and planning, is very important to the determination of a work target, in particular the readiness of data and community core groups as well as a knowledge management team. This is in accordance with the idea of Nutrada Wongnaya (2012), who said that knowledge management preparation is a vital step to lead to knowledge creation and learning goal setting, this being the heart of application for problem solving. But a trial-and-error practice slows problem solving and is time wasting. Knowledge acquisition is vital especially study tours especially of successful communities with clear types of operation. This will inspire and provide incentives for an observing community to practice with success. This is in accordance with the research by Sanor Klinngam (2008), which found that a vital factor in knowledge management is one's acquisition for knowledge for precisely correct data. If a community wants to learn aquatic animal hatching of various kinds that are caught for propagation, and so it is necessary to seek more knowledge and apply it all the time. Real application of knowledge from knowledge acquisition so as to generate more knowledge, with the knowledge compilation into a set of community knowledge. This is in accordance with the works of Kucza (2001); Davenport and Prusak (1998), saying that knowledge management is a process of systematic knowledge creation with knowledge storing and sharing with present condition and needs specified, and improvement of the process affecting knowledge management, this being the main key to success in acquiring suitable knowledge for suitable people at proper time. It helps people to exchange knowledge and use information together in work performance born out of synergy between individuals. Knowledge is adjusted with new things learned all the time to top off what has been acquired. This is in agreement with the work of Prawase Wasi (2007) and the work of Wijarn Panich (2016) stating that knowledge management is a process of continuous cycle giving rise to continuous and regular work development, proceeding in stages of gathering, systematization, storage, and access to data to make a body of knowledge to be applied for creation of innovations and reaching out continuously and dynamically for things useful to society, leading to upgrading toward new conscience and basic transformation and to at least four aims at the same time, namely, attainment of targets of work, human development, development of organization toward learning organization and state of community and esprit de corps, with knowledge and the process of knowledge management as tools, with factors in favor of success in knowledge management consisting of leadership, knowledge and intellect, creation of a network of cooperation, organizational culture, and basic structure.

Conclusion

The research findings may be summed up as follows. 1) The model of knowledge management for conservation and restoration of marine and coastal resources of prototype small scale fisheries communities consists of six following stages. (1) Knowledge identification: the aim of learning must be clear and is the most important step of knowledge management toward speedy success. It can be used to remedy problems in a community in time. (2) Knowledge acquisition by study tours of successful communities will inspire action. (3) Knowledge creation and compilation from actual practice if successful will yield a set of new knowledge for the community concerned. (4) Knowledge storage in various forms leads to easy access to data for immediate application and benefit to others. (5) Knowledge transferring and sharing with others to know, understand, and solve problems of each community. And (6) Knowledge application to learn new things, or application must be

adapted to the context of each unique area, with the same goal of problem solving in a community. And 2) mobilize a small scale fisheries community through knowledge management for conservation and restoration of marine and coastal resources in the Gulf of Thailand, Songkhla Province by the form of action research cycle of Stephen Kemmis et. al. (2014) made up of four steps: 1) Planning, with a clear aim set before action to lead to the target of problem solving for a community; 2) Action, involving proceeding by a set plan changeable as deemed proper, with an operational outcome that fulfills its goal, i.e., the solution to the decrease of marine resources adds abundance to the good signs of coastal ecology, and fishermen can catch more aquatic animals. 3) Observation, to gather effects of action, observing favorable and unfavorable factors in action by the steps of knowledge management.4) Reflection, with analysis made of results whether they meet the objectives set and whether there are problems and obstacles in implementation. A new plan of problem solving may be made. The result of step-by-step operation of knowledge management for conservation and restoration of marine and coastal resources brings about an abundant coastal system of ecology, with more aquatic animals that generate more income for communities from the increasing number of more aquatic animals caught in community areas. This phenomenon has spread to nearby communities leading to conservation and restoration of marine and coastal resources, with application of the same model of knowledge management in other communities.

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