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Development of Energy Security Management for Rural Community

DEVELOPPEMENT DE LA GESTION DE LA SECURITE ENERGETIQUE POUR LES COLLECTIVITES RURALES

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Abstract

Energy plays an important role in the national security of any given country as a fuel to empower the economic sector. Access to cheap energy has become essential to the functioning of modern economies. Long term measures to increase energy security on reducing dependence on any one source of imported energy should be implemented. Therefore, biogas, biodiesel and solar cell are the alternative energy for Thai people since Thailand is agricultural country and locates in tropical zone. If Thai agricultural people bring theses energy to practice in their community, they will receive both individual benefit and environmental conservation. However, these are not accepted widely overall the country, therefore, it needs to educate them by adopting the environmental education process. The objective was to develop the energy security management for rural community through environmental education process.

The mixed method research was employed to collect data. The qualitative research with focus group discussion and participatory action research through Participatory-Appreciation-Influence-Control (PAIC) were implemented. Particularly, PAIC can be accounted as an environmental education process. The sample group was selected by purposive sampling method. The 30 participants of community leaders were used as sample group based on the commitment to share knowledge, experiences and willingness to devote time for the whole process of training and to educate other peoples in the community after received the training.

The finding revealed that after training, the mean scores of the participants in terms of knowledge, understanding, and attitude change were higher than before training with statistically significant respectively ($p<.001$, $p<.001$ and $p<.001$. Three Dimension Evaluations (TDE) were congruent among, Self-evaluation, Friend-evaluation, and Facilitator-evaluation ($p>.05$). They proposed two projects for implementation that were biogas development project and biodiesel development project for their community and the budgets were supported by community peoples and their Municipality.

Key words: Development; Energy Security Management; Rural Community

Résumé

L'énergie joue un rôle important dans la sécurité nationale d'un pays donné comme le combustible pour l'habiliter le secteur économique. L'accès à l'énergie bon marché est devenu essentiel au bon fonctionnement des économies modernes. Des mesures à long terme pour accroître la sécurité énergétique sur la réduction de la dépendance à une source unique d'énergie importée devrait être mis en œuvre. Par conséquent, le biogaz, le biodiesel et de cellules solaires sont les énergies de remplacement pour les Thaïlandais depuis que la Thaïlande est le pays agricole et localise dans la zone tropicale. Si les gens thaïlandaise agricoles apportent une énergie thèses de pratiquer dans leur communauté, ils recevront à la fois un bénéfice individuel et de conservation de l'environnement. Toutefois, ce ne sont pas largement acceptée globale du pays, par conséquent, il a besoin de les éduquer en adoptant le processus d'éducation environnementale. L'objectif était de développer la gestion de la sécurité énergétique pour les collectivités rurales à travers le processus d'éducation environnementale.

La méthode de recherche mixte a été employée pour collecter des données. La recherche qualitative avec des groupes de discussion et de recherche-action participative à travers participative-Appreciation-Influence-Control

(PAIC) ont été mises en œuvre. En particulier, la PAIC peut être représenté comme un processus d'éducation environnementale. Le groupe échantillon a été sélectionné par la méthode d'échantillonnage raisonné. Les 30 participants de leaders communautaires ont été utilisés comme groupe de l'échantillon repose sur l'engagement à partager les connaissances, les expériences et la volonté de consacrer du temps pour l'ensemble du processus de formation et d'éduquer les autres peuples dans la collectivité après reçu la formation.

Le constat a révélé qu'après la formation, la moyenne des scores des participants en termes de changement des connaissances, la compréhension et l'attitude étaient plus élevés qu'avant la formation aux statistiquement significative ($p < 0,001$, $p < 0,001$ et $p < 0,001$. Trois dimensions. Les évaluations (TDE) étaient conformes parmi les auto-évaluation, ami-évaluation, et animateur-évaluation ($p > 0,05$). Ils ont proposé deux projets de mise en œuvre qui ont été le développement de projets de biogaz et de projet de développement du biodiesel pour leur communauté et les budgets ont été soutenus par les peuples communauté et de leur municipalité.

Mots clés: Développement; Gestion de la sécurité énergétique; Communauté rurale

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INTRODUCTION

The alternative energy is introduced to both developing and developed countries. Particularly, in developing countries that could not produce fossil fuel within their countries, therefore bioenergy such as biogas, bioethanol, biodiesel, fuelwood and charcoal can be the dominant energy source for most households. Wood energy is derived not only from woody residues but also from woodfuels produced as a primary product through reforestation and afforestation. Moreover, liquid biofuels (bioethanol and biodiesel) have gained importance in the last decades in Brazil and more recently in Europe, the USA, Japan and other OECD countries, particularly in the transport sector. At the same time, the role of agriculture as a source of energy resources is gaining in importance. A technology for producing bio-alcohol or biodiesel production is simpler processes based on sugars, starch and palm oils. The governments and the private sector in developed countries and in many developing countries, in expanding the use of biofuels derived from agricultural and forestry biomass. Increased utilization of biofuels, if properly managed, can help to provide cleaner energy services while contributing to sustainable development and the alleviation of environmental concerns (FAO, 2005; Vepa, S S and Bahavani R.V., 2001 ;World Resources Institute, 2007).

Thailand also recognize to the importance of bioenergy such as biogas, bio-ethanol, biodiesel, fuelwood, charcoal and solar cell energy since it is an agricultural country and locates in the tropical zone. Even though, at present, the Electricity Generating Authority of Thailand (EGAT) can provide electricity entire country but the main energy resource for electricity production is imported from different neighboring countries.

Especially, for Thailand in both agricultural areas of rural and urban community, they still need the cheaper energy to access for daily surviving. The agricultural occupation in I-Sarn (or Northeastern region) is a majority with 80 percents of the whole country. During this few years, they have faced with different insecurity whether political conflict of interest is the main cause of other problems such as social security, economic security and cultural distort of Thai people in terms of smile, cheerfulness and peaceful belief and value. In economic aspect, there has been some recession in important sector like as tourism industry because it is the majority income of country. This situation directly impacted to the vulnerable group in aspect of decreasing purchasing power.

Environmental education is a learning process that increases people's knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address the challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action (UNESCO, 1978 and Thiengkamol, N., 2011e), including for developing people to understand that they have a relationship with the environment and that whatever they do affects it. This education is there to help create consciences within people and stimulate them into responsible behavior by using technology of education to develop the quality of the environment (Stapp and Dorothy. 1981; Schmieder and Allen, 1977a; Chunkao, K., 1993; Thiengkamol, N., 2005a; Thiengkamol, N., 2010b).

As far as it has been recognized, at present the sustainable rural development should be implemented in both developing and industrialized countries. The appropriate techniques to meet the goal of better health status via the household energy security with increase their income, diverse energy knowledge, and proper energy consumption behavior. It requires the harmonized collaboration of the stakeholders in the rural community, particularly in rural community so they need to participate in participatory training that integrated the Participatory-Appreciate-Influence-Control technique (PAIC) with the integration of brain storming in small focus group discussion to develop different activities for implementing to achieve the energy security at rural community as proposed shared vision, action plan, and projects getting

from the training process (Thiengkamol, N., 2011a; Langly, A., 1998; Weiss, J.W., 1995; Sproull, N.L., 1988).

During the training process with PAIC is implemented; all participants will be assessed with the Tree Dimensional Evaluation (TDE) included Self-evaluation, Friend-evaluation, and Facilitator-evaluation (Thiengkamol, N., 2011a).

RESEARCH OBJECTIVE

The objective of this research was to develop the energy security management for rural community.

METHODOLOGY

The research implemented as followings.

1) Constructed handbook was used for training with content of biogas, biodiesel, and solar cell energy, knowledge and understanding, economized energy consumption behavior and environmental education concept on awareness, attitude, belief, skill and participation.

2) Tools composed of test, questionnaire and evaluation form. The questionnaire was used for determining and evaluating, attitude about energy security and energy consumption behavior.

3) Test was employed for testing their achievement of energy security, bioenergy knowledge and understanding.

4) Evaluation form of TDE was used to evaluate for participant participation.

5) Community leaders were selected with purposive sampling from the target community from Tambon Khamriang, Kuntaravichai District of Mahasarakham Province. They would be recruited according to the setting criteria included willingness, time, devotion, and public mind.

6) 30 participants (community leaders) were employed for testing of bioenergy knowledge and understanding, and determining the energy consumption behavior based on environmental education concept through brain storming in small group discussion.

7) Pretest-Posttest One Group Design is used to test for before and after training process with PAIC.

8) TDE was used to determine the congruence of three aspects of evaluation; Self-evaluation, Friend-evaluation, and Facilitator-evaluation for training participation (Thiengkamol, N., 2011a).

RESEARCH RESULTS

PAIC technique was implemented for community leaders on the concept energy security and principle of environmental education on attitude and behavior changing including the SWOT analysis technique, and brain storming process. The result of one group pretest-posttest design was used to determine the training achievement of 30 participants with PAIC technique for energy security knowledge achievement, attitude on energy security and energy consumption behavior. The result illustrated that posttest mean scores of participants was statistically significant higher than the pretest mean scores in all aspects of knowledge about energy security, attitude on energy security, energy consumption behavior, and training achievement ($p<.001$, $p<.001$, .001 and $p<.001$) as shown in Table 1.

Table 1
Achievement of the Pretest-Posttest of 30 Community Leaders

Experimental Group	Number(n)	Mean	S.D.	t	Sig.
Pretest of Knowledge	30	14.53	1.79	15.104	.000***
Posttest of Knowledge	30	18.10	1.55		
Pretest of Attitude	30	23.07	2.05	15.940	.000***
Posttest of Attitude	30	27.30	1.60		
Pretest of Behavior	30	23.33	2.23	13.724	.000***
Posttest of Behavior	30	26.63	1.59		
Pretest of Training	30	60.93	2.03	14.346	.000***
Posttest of Training	30	72.03	1.58		

*** Significant Level at the .001 level

Three Dimensional Evaluation were employed for determination the opinions of 30 community leaders in three aspects evaluation; Self-evaluation, Friend-evaluation, and Facilitator-evaluation by using One-way ANOVA in order to investigate the mean scores difference of three groups. The results of One-way ANOVA illustrated that there were no different of mean scores about participation in training process through brain storming on energy security management with significant level of .05 as illustrated in Table 2. This meant that the opinions on participation of community leader himself, his friend and his facilitator were not different.

Table 2
Three Dimensional Evaluations of Community Leaders

Source of Variation	Sum of Squares	df	Mean Square	F	Sig.
Between Group	.067	2	.033	.026	.975
Within Group	112.433	87	1.292		
Total	112.500	89			

* Significant Level at the .05 level

Therefore, it might indicate that the community leaders understood and gained more knowledge about energy security knowledge, attitude on energy security and energy consumption behavior. Moreover, they were able to propose the action plan and projects for practicing from brain storming at training based by using brain storming to indicate that the strength of their rural community in rural area was the community energy security in terms of energy resource accessibility, energy availability and energy production of biogas and biodiesel but the weakness of rural community was in terms of energy security knowledge, lack of positive attitude and proper

energy consumption behavior. In aspects of opportunity, they had more chances to gain alternative energy such as biogas and biodiesel from their local community and appropriate energy consumption behavior from mass media communications through different channels such as television, radio, magazine, newspaper, and personal media from the Faulty of Environment and Resources Studies, Mahasarakham University. In the aspect of threats, they were faced with high cost of living because their community located nearby university.

DISCUSSIONS

The results indicated that the rural community at Tambon Khamriang, Kuntarawichai District, Mahasarakham Province gained more energy security knowledge, attitude and energy consumption behavior changing after participating in the PAIC training. It was congruent to these studies of Thiengkamol, 2005b; Jansab, S., 2006 and Thiengkamol, N, 2010b. This might connote that the studying with PAIC technique is effective for raising knowledge in various issues and for different target groups.

The results of TDE of 30 community leaders was employed for determination of the congruence of three aspects of evaluation; Self-evaluation, Friend-evaluation, and Facilitator-evaluation. It illustrated that there were no difference of mean scores of participation in training process with statistically significant at the .05 level (Thiengkamol, 2005a; Thiengkamol, 2005b, and Thiengkamol, N., 2010b). Moreover, it revealed that PAIC training is effective for brain storming for developing a shared vision, action plan and projects in different issues such as energy consumption behavior, urban community energy security, energy conservation, natural resource conservation, strategies for the development of women's political participation in Pattaya City and community strengthen (Thiengkamol, 2005a; Thiengkamol, 2005b; Jansab, S., 2006; Thiengkamol, N., 2010b).

Focus groups discussion and SWOT analysis were integrated to implement in PAIC training process. These clearly expressed the strength, weakness, opportunity, and threats of rural community energy security. Regarding to their strength, it revealed that their community is an agricultural community; therefore, they are able to have a change to produce bioenergy from cultivation of sugars, starch and palm oils by themselves. Additionally, their community has a good opportunity to receive knowledge transferring from educational institute, especially from both faculties of Environment and Resource Studies and Technology of Mahasarakham University because it locates nearby the university. Meanwhile, their community has a weakness in terms of land decreasing due to increasing the land price so some of them had sold entirely and some of them had no their own land. Considering on their threat, it was found that their community stands adjacent to university, therefore, their livelihood is rising higher than the past so they must spend more money for daily living. Finally, it is obviously seen that they need to search the way to maintain the two proposed projects with different ideas being suggested during this training process in order to meet their energy needs. Particularly, energy security in their daily living, it should be regarded as the most essential element to meet the healthier quality of life to meet the really sustainable development (Thiengkamol, 2005a; Thiengkamol, 2005b; Jansab, S., 2006; Thiengkamol, N., 2010b).

Furthermore, in accordance with different studies of Thiengkamol, N. (2005a), Thiengkamol, N. (2005b), and Thiengkamol, N., (2010b), the findings revealed that PAIC can initiate and stimulate the participant to develop a creative thinking to propose the projects to implement and attitude changing will be able to cause behavior change for environment conservation such as consumption behavior of food and proper behavior of consumption of energy and water in their daily living and participation, and even though, through political participation or health aspect that was found from those studies as mentioned above. Furthermore, the results indicated that PAIC training is able to give knowledge and understanding of energy security knowledge, stimulate awareness, sensitivity, positively change attitude, provide participants with real participation situation and take responsibility to work together in focus group discussion including providing action of brain storming for participants to be able to solve the facing problem and to correctly make a decision for creating a shared vision, action plans and pilot project to promptly implement after training process finished.

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