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The Community Participatory in Solid Waste Management in Khongchai Pattana Municipality Khongchai District Kalasin Province, Thailand

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Abstract: This study was a research and development study, aimed to develop the learning process and improve the participation in community waste management in Khongchai Pattana municipality, Kalasin province. The samples comprised 92 households selected through a simple random-sampling method. This study trailed participatory action research as a method for community participation in waste management, conducted under four participatory frameworks including decision making, practice, benefit gaining and evaluation. The research instruments included questionnaires, group discussions organization and community meetings and observation. The data was analyzed by mean ($\bar{x}$), Standard Deviation (SD) and t-test. The results showed that the learning process and the participation in community waste management of the participants before and after training, each was different after training the participation significantly increased ($p<0.05$) and the learning process in terms of knowledge, attitude and practice in solid waste management also showed a significant increase ($p<0.05$). After the training program, the quantity of solid waste which significantly less than before training ($p<0.05$). Factors that contributed to the improvement of participatory action and the learning process were having a strong community leading team, access to information, social interaction morale of a group as well as social networking. Other factors that interfered with the development of the participation and the learning process were such as personnel limits and budget.

Key words: Knowledge, attitude, practical, participation, solid waste management, municipality

INTRODUCTION

Industrial and household waste has become a major environmental problem for several countries all around the world, especially for developing countries (United Nation Center for Human Settlements (Habitate), 2001). Thailand, one of those developing countries is undeniably encountering rigid waste problems. Countless tons of wastes are generated each day by a variety of causes such as community expansion, increase of population and economic growth. In recent years, the problems have even worsened due to inefficiency of waste collection.

Factors hindering development of community waste management include ineffective solid waste management system, weak policy for waste removal as well as insufficient budget (WHO, 1992). Khongchai Pattana municipality has obtain the area of 29.52 km^2 which consists of 11 community and the populations is 6,771 people (3,308 males and 3,403 females) recorded on 31st December, 2009. The numbers of residences are 1.18 kg/person/day. The majority of solid waste are organic waste, recycling waste, general waste and hazardous waste (Hunchaisri *et al*., 2011). The people have no ideas in managing, since they get used to their own daily practices. The government the proper way to regulate an appropriate solution in order to remove all solid waste, especially at Khongchai Pattana municipality. The problem continue to become more serve.

Therefore, a joint effort by government and local community is very crucial for waste prevention and reduction waste separation system as well as waste reuse. Successful rigid waste management can be done through active engagement and serious practice. The local community is responsible for waste management. Providing sufficient learning process in waste management helps encourage the local people to keep their community clean and healthy. Taking these into consideration, it is necessary to improve participation and to promote the learning process in waste management for each individual community (DEQP, 2002) and if the

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administrators have knowledge and awareness about how to manage the waste products, it would help increate the quality of waste management system (Polat and Olgun, 2007). The training program is the process for improving the abilities of each person in many aspects such as knowledge, attitude and skills that happen systematically. If some of them know and understand clearly in each topic they would change their behavior according to the experiences that they have learnt under the condition of the situation and appropriate time (Jansamood *et al*., 2010).

This study aimed at implementing Participatory Action Research (PAR) serving as the link between problem-solving skills experiences and active participation to minimize community's waste problems in a particular domain. Community groups were bound together placing an emphasis on investigation of the causes of waste problems existing to create a strategic plan to eliminate wastes in the community areas. This cooperation could reflect as a community's strong commitment for sustainable waste management and the findings will benefit the development process to create a strong community witch is the first development to have continuity and sustainable level of community to become. The purposes of this study are 2-fold:

- To implement participatory action and enhance the learning process in community waste management
- To examine problems and limitations of waste management in the community

MATERIALS AND METHODS

The research design was Participatory Action Research (PAR) using a combination of methods to collect data. The population was 112 households in Don kaen community, Khongchai Pattana sub-district, Khongchai district, Kalasin province. The samples, each >5 years old, consisted of 92 households selected by using simple random sampling. Questionnaires were given out to examine the waste problems that had existed in the communities of Khongchai Pattana sub-district. A variety of methods (observation, interview, group discussion and community meeting) were used to determine the development of the participation and the learning process regarding community waste management. The study was carried out as the following steps:

Step 1: Preparation, setting up the research team aimed to establish and build relationships with the target community.

Step 2: Survey, using a questionnaire survey to identify waste problems currently arising in the community.

Step 3: Operation, improving participation in community waste management through four PAR approaches including decision making, practice, benefit gaining and evaluation.

Step 4: Evaluation, employing questionnaires to evaluate the effectiveness of the process of the training program as well as to examine the outcomes of the research results. They were analyzed for collecting data by mean ($\bar{X}$) Standard Deviation (SD) and t-test.

RESULTS AND DISCUSSION

Building learning process in community waste management with the Participatory Action Research (PAR): The learning process in community waste management was carried out through the PAR steps, perception, critical thinking, planning, going according to the plan throughout assessment of community solid waste management. The empirical data revealed that in the context of Don-kaen community it was no surprise that the local people are still bound up with I-san old traditions and practices. In the preparation phase, it attempted to encourage people to gain knowledge and comprehension about community solid waste management, so the local residents would agree to help in solving waste problems existing in their community. Studying the conditions of the existing waste in the community can be a reflection on the predicament of solid waste management. So, the people in the community increased awareness in solid waste management and systemic thinking to solve community waste problems.

The planning phase employed an operation-plan which was based on the A-I-C and SWOT analysis techniques and in this stage, community waste management were operated through six projects. The evaluation phase aimed to see the effectiveness of the process of the particular projects as well as to examine their final outcomes. After 2 months that the researchers had left the community, the outcomes of those projects could be considered as successful because of the locals' determining goals and high participation in community solid waste management as well as continuous assessment of waste management.

Participation in community waste management: The results of the study (Table 1) revealed that after training the participants had showed higher participation ($\bar{X}$ = 4.42) than before training ($\bar{X}$ = 3.48) at the significance level of 0.05. By independently considering

Table 1: Comparison on participation in community solid waste management before and after the developing

	Participation in community solid waste management			
	Before	After		
Factors	$\bar{X}$ ±SD	$\bar{X}$ ±SD	t-values	p-values
Decision	3.48±0.61	4.45±0.48	-17.47	0.000*
Practice	3.38±0.60	4.44±0.43	-17.03	0.000*
Benefits	3.61±0.40	4.60±0.32	-20.30	0.000*
Evaluation	3.18±0.80	4.23±0.60	-13.90	0.000*
Total	3.48±0.48	4.42±0.40	-18.70	0.000*

*Statistically significant at the level of 0.05; Low = 1.00-2.33; Medium = 2.34-3.67; High = 3.68-5.00

each dimension of the participation domain, it was found that benefit gaining in terms of social and environmental benefits was at the highest level ($\bar{X}$ = 4.60) while evaluation (of the progress of the training program) was at the lowest level ($\bar{X}$ = 4.23) (Table 1).

The participation in community waste management is higher than before taking training because of the PAR training program was higher than before training in terms of beach individual dimension as well as the overall. So, researchers might conclude here that with the implication of PAR approaches in the waste management (including activities, community study, decision making, practice and evaluation) all significantly contributed to improvement of the participation in community waste management. These were consistent with earlier findings about improvement of community waste management in Myanmar from the research of Minn *et al.* (2010). His study suggested the greater tendency towards public participation in waste management by constantly raising awareness and providing sufficient environmental knowledge to people. However, increasing motivation within the public to actively cooperate with government agencies was still insufficient due to a certain social limit.

The learning process in waste management

Knowledge: Table 2 shows that the overall knowledge about community waste management was at the high level ($\bar{X}$ =19.85); higher than before training ($\bar{X}$ = 15.97) at the significance level of 0.05. By independently considering all dimensions of the learning process, the knowledge on waste removal had the lowest mean score ($\bar{X}$ =19.71); the highest mean score was the knowledge on sources of waste ($\bar{X}$ = 19.91).

Attitude: The participants' attitudes toward waste management in the community was at the very high level ($\bar{X}$ = 4.66); the attitudes increased ($\bar{X}$ = 3.71) better than before receiving the training at the significant level of 0.05 as showed in Table 3.

Practice: After taking the training program, the results shown a significance increase in practice in community

Table 2: Comparison on knowledge in community solid waste management of before and after the developing

	Participants' knowledge in community solid waste management			
	Before	After		
Factors	$\bar{X}$ ±SD	$\bar{X}$ ±SD	t-values	p-values
Source of waste	11.91±4.59	19.71±1.37	-15.27	0.000*
Type of waste	16.09±5.13	19.78±1.47	-6.71	0.000*
Impact of waste	17.64±2.73	19.86±0.68	-7.67	0.000*
Utilization of waste	18.72±2.30	19.91±0.66	-4.71	0.000*
Option for waste management	15.43±6.53	20.00±0.00	-6.70	0.000*
Total	15.97±1.82	19.85±0.51	-18.81	0.000*

Table 3: Comparison of the participants' attitudes toward community waste management through PAR approaches before and after training

	Participants' attitudes toward community waste management			
	Before	After		
Factors	$\bar{X}$ ±SD	$\bar{X}$ ±SD	t-value	p-value
Attitude Total	3.71±0.40	4.66±0.28	-20.54	0.000*

Table 4: Comparison of the participants appropriate behavioral practices in community waste management before and after training

	Participants' practices			
	Before	After		
Factors	$\bar{X}$ ±SD	$\bar{X}$ ±SD	t-values	p-values
Reduce	3.08±0.50	4.23±0.37	-19.81	0.000*
Reuse	3.67±0.78	4.63±0.45	-10.68	0.000*
Repair	3.45±0.77	4.51±0.41	-12.48	0.000*
Recycle	3.83±0.75	4.77±0.36	-11.57	0.000*
Reject	3.40±0.72	4.42±0.43	-12.61	0.000*
Total	3.50±0.48	4.51±0.31	-18.95	0.000*

waste management which was at the very high level ($\bar{X}$ = 4.51); it was reported moderately higher than before training ($\bar{X}$ = 3.50) at the significant level of 0.05. Considering each dimension of the practice domain independently, the findings revealed that the maximized mean score was a dimension of waste recycling ($\bar{X}$ = 4.77) the minimized mean ($\bar{X}$ = 4.23) was rejection of materials that are difficult to eliminate (Table 4). The learning process in waste management in terms of knowledge, attitude and practice in solid waste management when comparing among the knowledge, attitudes and practices in community waste management before and after training, the improvement of the three domains was different. After training, the participants had showed an increase in knowledge, attitudes and practices at the significant level of 0.05. The study results were consistent with the study of Sriharuksa *et al.* (2011). The findings of their study suggested that after taking the training program on community waste management, the village health volunteers had significantly showed an

increase in the overall knowledge, participation skills and practices at the significant level of 0.05. The results of the study claimed that implementing PAR approaches offered greater opportunities for the community to exchange knowledge and experience to each other, thus resulting in improved knowledge and realization of the importance of waste problems in their community. The community was able to appropriately change their behaviors by means of group cooperation for motivating and intensifying a variety of activities to eliminate waste problems in their community areas.

The quantity and generation of solid waste: After taking the training program, the results shown a significance decreased in the quantity of community solid waste which was at 2.80 kg/household/day; it was reported moderately lower than before training (6.28 kg/household/day) at the significant level of 0.05 (Table 5).

Factors contributed to improvement of the learning process in community waste management: Many factors that contributed to improving better participation and the learning process in waste management of the community included having an effective local administration team who helped greatly to change attitudes, opinions and behaviors for a better access to information upon the provision of information about waste management along with the project plan strategies (i.e., participatory action research meetings) released out to the community this could considerably gain the interest from the people in the community.

Then started up the research study, interaction with the community using PAR methods to establish and build relationship with the local people in the community thus, gaining trust and familiarity which could facilitate in data collecting process and promoting responsibility and realization of the importance and purposes of the activities being organized, morale of a group-emphasizing to promote new community researchers by a variety methods provided along the learning process together with group activities and social networking emphasized intercommunication to make individuals understand themselves and groups; enhanced consistency and continuity; created mutual understanding, encouragement and support among groups which could lead to effective cooperate between the community and the research team. Factors that interfered with the development of the participation and the learning process in solid waste management. Such factors were personnel limitations and funding. As Khongchai Pattana is a new and small municipal district it is received little budgets each year. This seemingly limits opportunities of putting any activities or plans into the reality. So, the community had to struggle so hard to find financial aids from other sources to administer its local communities.

Table 5: Comparison on the quantity of community solid waste before and after training

	Quantity of community solid waste (kg/household/day)			
	Before	After		
Type of waste	$\bar{X}$ ±SD	$\bar{X}$ ±SD	t-values	p-values
Organic	4.94±5.34	2.35±2.09	-4.40	0.000*
General	0.29±0.48	0.09±0.17	-3.74	0.000*
Recycle	0.93±1.58	0.27±0.39	-3.88	0.000*
Hazardous	0.12±0.21	0.96±0.25	-0.88	0.382
Total	6.28±5.60	2.80±2.16	-5.52	0.000*

CONCLUSION

Implication of Participatory Action Research (PAR) Methods helped improve the learning process and the participation in rigid waste management of the community. After training, the participation and the learning process significantly increased ($p<0.05$). The results of the study suggested that PAR approaches allowed the community to take part in every single stage of the development process. The communities were encouraged to share opinions on a variety of topics thereby gaining more knowledge and realizing waste problems as the responsibility of their community.

The people in the community adjusted their behaviors in more suitable ways. Group process also enabled the community to effectively solve not only waste-related problems but also feasible problems that may be arising. Besides, the developers who had attempted to create a positive interaction with the community also served as a key role in promoting and facilitating development procedures. When motivation within individuals was developed, the members of the community would have more encouragement and better improvement of self-efficacy to administer and operate the community on their own.

RECOMMENDATIONS

Implication of Participatory Action Research (PAR) Methods helped improve the learning process and the participation in rigid waste management of the community. The agencies in the state sector who have responsibilities for community environment should implement this program to help to eliminate environmental problems associated with rigid waste for sustainable waste management as well as to create good quality of the community's environment.

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