

Development of Hospital Environmental Management Model through PAIC Process

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Doi:10.5901/mjss.2012.v3n11p303

Abstract: *The most importance of hospital environmental management must be pay attention on worker behavior in their everyday practicing at hospital. Therefore, the most rapid and cheapest mean is to challenge the worker to collaborate energy effectively utilization, waste management, wastewater management and landscape architectural environment via the human resource strengthening with the worker based on the concept positive thinking like as owner. Environmental education concept is pertinent to sustainable principles that covers knowledge and understanding, awareness, attitudes, values, and belief, responsibility, participation, and skill necessary to build a sustainable hospital management. The objective of this research was to develop hospital environmental management in Roi-Et Province through PAIC Process. The integrative research will be done with quantitative in terms of survey research and participatory action research with Participatory Appreciate-Influence-Control technique (PAIC)) and qualitative focus group discussion. Populations are all hospital workers. The sample was selected according to purposive sampling technique. The PAIC was implemented with hospital workers integrating with SWOT Analysis and brain storming in the process. During training, Three Dimensional Evaluation (TDE) covers self-evaluation, friend-evaluation, and facilitator evaluation. One -Way-ANOVA, and t-test were used for data analysis. The research results illustrated that before and after PAIC process implemented, the mean scores of posttest of knowledge of environmental education principles, energy conservation, waste water management, solid and infectious waste management, green landscape and training achievement were higher than pretest with statistical significance ($p < .01$, $p < .01$, $p < .01$, $p < .01$, $p < .01$, and $p < .01$). Three Dimensional Evaluations were employed for determination the perceptions of 32 hospital workers in three aspects evaluation covering Self-evaluation, Friend-evaluation, and Facilitator-evaluation by using One-way ANOVA in order to investigate the participation of hospital workers showed that there were no difference of mean scores about participation in training process through brain storming with statistical significance ($p > .05$).*

Key Words: *Development / Hospital /Environmental Management / PAIC Process*

1. Introduction

Environment and development are the conflict philosophies but human beings can not escape from the real situations that are facing in the present, therefore, we must take the responsibilities of our activities in daily living that cause the environmental problem. In order to solve environmental together with real participation, we would overcome the noise pollution, air pollution, land degradation, fresh water shortage for consumption, deforestation, solid waste accumulation, toxic chemicals, and hazardous wastes, increased of green house gases that are important factors of global climate change and ozone depletion in stratosphere atmosphere including degrading of non-renewable natural resources with

rapid rate. In addition, loss of biodiversity affects to balance of Ecosystem. These environmental problems have impacted to whole biosphere because one thing changes and then affects to others like as chain reaction (Thiengkamol, 2011e). In accordance with the population growth, the more population grow the more poverties are because of the imbalance of equality in change of income gaining, it builds pressures to natural resources. The United Nations, predicted that in the last half of twenty first century, ninth of tenth of world population would be in the poorest countries of the world. Those poor people will lack of fresh water for consumption including lacking of other natural resources. The unstable status of agriculturists, the chance of dearth will occur together with natural resource degradation due to soil erosion (Thiengkamol, 2011e). This extends the gap between the rich and the poor wider. Even though, the cost of health care is also higher, consequently the high rate of death in some region of the world. The attempt to overcome the poverty through the birth control is not really successful because most of poor people often lack of knowledge due to illiteracy (Thiengkamol, 2011e).

Currently, the situation of pollutions, the pollutants are released and accumulated in the environment such as heavy metal in the water resources or toxic gases in the air. These cause the deprivation of environmental quality to affect to human health and life and other living organism. The environmental diseases become more vigorous at present. Such as lead toxicity, silicosis from construction activity, flu occurred from air pollution, headache, cancer, migraine, heart disease, and skin disease are commonly found in people who lived in the degraded environment (Thiengkamol, 2011e). The decrements of waste and toxic substances in the environment are important parts to effectively maintain environment and natural resources, therefore, it is essential to give knowledge and understanding and to raise awareness and public consciousness for everyone to participate in waste decreasing by recycling and toxic substance decreasing, particularly, Thailand as agricultural country, the agriculturists should minimize to use insecticide, herbicide, and pesticide because it is obviously seen from health reports that numerous people got health problems of liver cancer and other toxicity disease due to the utilization of these chemical substances (Thiengkamol, 2011e).

The meaning of "Environmental Management" was given by Zhongsuntharawong (Zhongsuntharawong, 2003), that referred to the process of work plan arrangement or activity to allocate the utilization of natural resources in order to respond the requirement of human being to accomplish the highest goal of development. It is a stability of economic, social and maintenance of good environmental quality based on the principle of maximization of utilization with sustainability and caused a less damage to environment as most as possible. Punjasuwan, J., (2005), compiled and gathered the meaning of "Environmental Management" that referred to method of implementation or way of practice systemically for sustaining environment as long as possible through prevention, conservation, and improvement to maintain the good environment. He also suggested that the best way of natural resources and environmental management is prevention, which is process or action to diminish and eliminate the environmental impact before causing damage to humans.

EPA New England, issued check list of hospital environmental assessment in accordance with the different acts such as Resource Conservation and Recovery Act, Clean Air Act, Federal Insecticide, Fungicide & Rodenticide Act, Clean Water Act, Toxic and Substances Control Act. In addition, solid waste with recycling concept, toxic waste and infectious waste management, energy and water conservation, and environmental topic training courses for workers such as general compliance, Clean Air Act (CAA), solid waste recycling, energy management systems, Resource Conservation and Recovery Act- hazardous waste (RCRA), Spill Prevention Control Countermeasure Plans (SPCC), red bag waste reduction, energy conservation, universal waste, EPA Audit Program, resource management, green buildings, mercury, water conservation, Environmental Management System (EMS), Integrated Pest Management, and green purchasing also are paid attention as well (EPA, 2004).

In during 5 decades of social and economic development of Thailand, governments announced different policies of environmental quality promotion and maintenance to prevent and solve the environmental problem but there is only governmental sector took the role but it lacked of real participation of all sectors, especially the people participation. Therefore, it might be needed to give environmental conservation knowledge through all systems of educations covering formal, non-formal, informal and lifelong education process based on concepts of environmental education that included lacked of knowledge and understanding, awareness, consciousness, attitude and belief to practice themselves towards environment and natural resource protection because they do not realize that they are an important part to take a responsibility for natural resource and environmental conservation (Thiengkamol, 2011e).

In Thailand, there is having no specific for hospital environmental management (HEM) clearly but some of them applied the Theoretically, ISO 14001 could serve as a comprehensive framework for significantly improving performance in an organization with minimal environmental management capacity, especially according to legal compliance or as a set of common sense guidelines for enhancing performance in an organization to effectively implement for environmental quality maintenance for well being of human. The most common of environmental problems included 6 aspects including

energy consumption, waste water management, solid waste management, green area increment, safety, and facilities (Wattanasaroch, & Thiengkamol, 2012).

Therefore, the environmental education principle for hospital workers should be introduced to them to practice until it becomes a part of their habit in daily living. In order to educate people to gain more knowledge and understanding on natural resource and environmental conservation, it need to use environmental education process through Participatory-Appreciation-Influence-Control (PAIC) training technique, which comprises of the similar features in terms of stimulation of awareness and consciousness raising, attitude and practice changing, inspiration on and public mind creation and participation through the focus group discussion and brain storming process integrating during PAIC training process implementation. Hospital environmental management, it also required the knowledge of HEM based on principle of environmental management system and environmental education principle to integrate into the training process of PAIC in order to meet the better practice and behavior of environmental conservation (Thiengkamol, 2010b, Thiengkamol, 2011a, Thiengkamol, 2011e, Thiengkamol, 2011g, Thiengkamol, 2011h, Thiengkamol, 2012, & Arunrimorakot, 2005).

Even though, Roi-ed Thonburi Hospital is operated with ISO 14000 but the most importance of hospital environmental management must be pay attention on worker behavior in their everyday practicing at hospital. Therefore, the most rapid and cheapest mean is to challenge the worker to collaborate energy effectively utilization, waste management, wastewater management and landscape architectural environment via the human resource strengthening with the worker based on the concept positive thinking like as owner. Environmental education concept is pertinent to sustainable principles that cover knowledge and understanding, awareness, attitudes, values, belief, responsibility, participation, and skill to make proper decision for solving the facing environmental problem correctly and repeatedly until it becomes permanent behavior in everyday living that leads to successful management to build a sustainable hospital management with minimization of energy and water utilization and management of waste water and solid with effectiveness and safety including get rid of risk and increasing security for patient and workers (Thiengkamol, N., 2010, Thiengkamol, N., 2011a, & Thiengkamol, N., 2011b).

2. Objective

The objective of this research was to develop hospital environmental management in Roi-Et Province through PAIC Process.

3. Methodology

The research design was implemented in steps by step as follows:

Construction of handbook for water conservation through environmental education principles including knowledge and understanding of environmental behavior, waste water management, solid and infectious waste management, energy conservation, green landscape and security management (Charoensilpa, & Thiengkamol, 2012, UNESCO, 1978, InWent-DSE-ZEL, 2002, Thiengkamol, 2004, Thiengkamol, 2009a, Thiengkamol, 2009b, Thiengkamol, 2011a, Thiengkamol, 2011e, & Wattanasaroch, & Thiengkamol, 2012).

2) The research tools composed of test, questionnaire and evaluation form. The test was used for determining their knowledge and understanding of environmental behavior, waste water management, solid and infectious waste management, energy conservation, green landscape and security management.

3) The evaluation form of Three Dimensions, Four Dimensions were constructed to assess the participant practice during PAIC implemented.

4) 32 hospital workers were selected with purposive sampling from workers of Roi-ed Thonburi Hospital. They would be recruited according to the setting criteria (willingness, time, devotion, commitment, and participation).

5) The 32 participants were employed for testing of environmental education principles including knowledge and understanding of environmental behavior, waste water management, solid and infectious waste management, energy conservation, green landscape and security management. The systematic operation of 32 participants were trained with PAIC. The focus group discussion included brain storming and Training of Trainer (TOT) (Langly, 1998, Weiss, 1993, Sproull, 1988, InWent-DSE-ZEL., 2002, Thiengkamol, 2004, Thiengkamol, 2005b). The Three Dimensional Evaluation (TDE) was used to determination the congruence of three aspects evaluation, Self-evaluation, Friend-evaluation, and Facilitator-evaluation for training participation (Thiengkamol, 2004, Thiengkamol, 2005a, Thiengkamol, 2008, Thiengkamol, 2011a, Thiengkamol, 2011b, Thiengkamol, 2011c and Thiengkamol, 2011e).

4. Results

4.1 General Characteristics of Sample Group

The sample group of this study was 32 hospital workers that were selected by purposive sampling technique from hospital workers of Roi-ed Thonburi Hospital. The selected sample was workers who were interested in environmental conservation activities. Most of them were female with 78.12%, studied at high school level with 75.00% , work position as nurse aid with 46.87%, marriage status with 71.88%, average of age with 30.62 years and average of work duration with 5.56 years as shown in table 1.

Table 1 Demographic Characteristics of Sample Group

Characteristics	Hospital Worker	
	Frequency	Percent
Sex		
Male	7	21.88
Female	25	78.12
Education Level		
Primary School Level	1	3.12
Secondary School Level	3	9.38
High School Level	24	75.00
Bachelor	4	12.5
Higher than Bachelor	0	0
Work Position		
Nurse	4	12.5
Nurse Aid	15	46.87
Receptionist	3	9.38
Account	2	6.25
Labor Worker	8	25.0
Marital Status		
Marriage	23	71.88
Single	7	21.87
Divorce/Separate/widow	2	6.25
Average of age = 30.62 years		
Average of work duration = 5.56		
Total	32	100

4.2 Results of Pretest and Posttest with PAIC technique

PAIC technique was trained for hospital workers about knowledge of water conservation. The research results revealed that before and after PAIC training process implemented, the mean scores of posttest knowledge of environmental education principles, energy conservation, waste water management, solid and infectious waste management, green landscape and training achievement were higher than pretest with statistical significance ($p < .01$, $p < .01$, $p < .01$, $p < .01$, $p < .01$, and $p < .01$), as illustrated in table 2.

Table 2 Pretest and Posttest of Sample Group

Experimental Group	Number	Mean	S.D	t	Sig
Pretest of Knowledge of EE	32	5.65	0.55	3.458	.00**
Posttest of Knowledge of EE	32	6.09	0.39		
Pretest of Energy Conservation	32	3.06	0.99	3.749	.00**
Posttest of Energy Conservation	32	3.78	0.42		
Pretest of Waste Water Management	32	2.59	0.79	9.188	.00**
Posttest of Waste Water Management	32	3.94	0.25		

Pretest of Solid and Infectious Waste Management	32	3.00	1.01	4.605	.00**
Posttest of Solid Infectious Waste Management	32	3.81	0.59		
Pretest of Green Landscape and Security Management	32	4.06	0.91	4.190	.00**
Posttest of Green Landscape and Security Management	32	4.91	0.53		
Pretest of Training Achievement	32	18.37	2.72	8.742	.00**
Posttest of Training Achievement	32	22.53	1.04		

** Significant Level at .01

4.3 Results of Three Dimensional Evaluations for Participation

Three Dimensional Evaluations were employed for determination the perceptions of 34 hospital workers 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 group. The results of One-way ANOVA showed that there were different of mean scores about participation in training process through brain storming with statistical significance ($p > .05$) as illustrated in table 3. This meant that the perceptions of hospital workers about themselves, their friends in the group and their facilitators were no different for their participation during the focus group discussion during training process as presented in table 3.

Table 3 Three Dimension Evaluation of Sample Group Participation

Source of Variation	Sum of squares	df	Mean Square	F	Sig.
Between Group	44.771	2	22.385	2.165	.121
Within Group	961.719	93	10.341		
Total	1006.490	95			

** Significant Level at .01

TDE was used to evaluate the participation of participant, the finding revealed that the mean scores of Self-Evaluation and Friend-Evaluation, Friend Evaluation and Facilitator Evaluation, and Self-Evaluation and Facilitator-Evaluation showed no statistical difference, and between showed statistical difference ($p > .05$, $p > .05$, and $p > .05$) respectively as illustrated in table 4.

Table 4 Scheffe' Analysis of Each Pair Comparisons

Each Pair of Variables	Mean Diff(I-J)	Std. Error	Sig.	95% Confidence Interval	
				Lower Bound	Upper Bound
Self-Eva. and Friend-Eva.	-.62500	.80394	.740	-2.6250	1.3750
Self-Eva. and Facilitator-Eva.	-1.65625	.80394	.126	-3.6562	.3437
Friend-Eva. and Facilitator-Eva.	-1.03125	.80394	.422	-3.0312	.9687

* Significant Level at .05

Considering on mean scores of Three Dimensional Evaluation, the total mean scores of 5 aspects of evaluation items covering Participation in Asking Questions, Participation Asking Questions, Participation in Discussing, Participation in Activity Doing, and Participation in Activity Evaluating during focus group discussion with brain storming process, the findings discovered that 5 aspects of participations and total mean scores of Self Evaluation were lower than Friend Evaluation and Facilitator Evaluation as presented in table 5. Therefore One-Way ANOVA was employed to analyze the differences of mean scores of three aspects, it was found that there were no difference with statistically significant at level of .05 as presented in table 4.

Table 5 Mean Scores of Three Dimensional Evaluations

Evaluation Items	Self Evaluation			Friend Evaluation			Facilitator Evaluation		
	\bar{X}	S.D.	Level	\bar{X}	S.D.	Level	\bar{X}	S.D.	Level
1. Participation in Asking Questions	3.79	.66	high	3.9	.64	high	4.04	.68	high
2. Participation Asking Questions	3.82	.66	high	3.98	.72	high	3.98	.69	high
3. Participation in Discussing	3.98	.72	high	4.15	.69	high	4.23	.56	high
4. Participation in Activity Doing	4.15	.74	high	4.16	.66	high	4.18	.55	high
5. Participation in Activity Evaluating	4.12	.59	high	4.23	.63	high	4.02	.72	high
Total	3.97	.62	high	4.08	.64	high	4.09	.42	high

5. Discussions

The results indicated that the hospital workers had knowledge of water conservation through environmental education process covered knowledge and performance of environmental education, global warming, environmental education characteristics, inspiration of environmental conservation and environmental behavior after participating in the PAIC training. These were congruent to a variety of studies of Thiengkamol, N., (2004, 2005a, 2005b, 2010b, 2011b, 2011c, 2011g, 2011h, 2011i: in press & 2012). It might be explained that the training with PAIC technique is able to raise knowledge in various issues and for different target groups and it can be used for stimulation the knowledge and understanding of environmental behavior, waste water management, solid and infectious waste management, energy conservation, green landscape and security management after participating in the PAIC training through genuine practicing behavior in their daily life activities for environmental conservation. The findings are also pertinent to the results from the study of to different studies of Thiengkamol, and Thiengkamol colleagues (2004, 2005a, 2005b, 2010b, 2011b, 2011c, & 2011a) and researches of Sukwat, & Thiengkamol, 2012, & Wattanasaroch, & Thiengkamol, 2012, & Jumrearnsan, & Thiengkamol, 2012 that the participation is affected HEM to meet sustainable development through environmental education process covered knowledge and understanding of environmental behavior, waste water management, solid and infectious waste management, energy conservation, green landscape and security management. The results of TDE of 32 participants were employed for determination of the congruence of three aspects evaluation, Self-evaluation, Friend-evaluation, and Facilitator-evaluation. The mean scores three aspects were no difference among three aspects ($p > .05$, $p > .05$, and $p > .05$). The mean scores of Self-Evaluation was lower than mean scores of Friend-Evaluation and Facilitator-Evaluation, so it indicated that the participants evaluated themselves lower than friend and facilitator because they are humble persons that are general style of Thai children. Additionally, TDE was used to evaluate the participation of secondary school students, it was found that the mean scores of Self Evaluation, Friend Evaluation and Facilitator Evaluation were at high level as illustrated in table 5. It might be concluded that hospital workers during training process as illustrated in table 5 paid attention for training process participation at very good level. The result of training was pertinent to different studies of Thiengkamol, (2004, 2005a, 2005b, 2010b, 2011b, 2011c, & 2011a) and researches of and Thiengkamol colleagues such as Sukwat, & Thiengkamol, 2012, & Wattanasaroch, & Thiengkamol, 2012. Furthermore, it was found that PAIC training is effective for training with integration of brain storming process to develop a shared vision, action plan and projects in different issues of training such as energy conservation, urban community food security management, environment and natural resource conservation, development of health cities network for Mekong Region, development of women's political participation in Pattaya City, community strengthening, environmental management in dormitory, and soil and water conservation (Thiengkamol, 2004, Thiengkamol, 2005a, Thiengkamol, 2005b, Thiengkamol, 2010b, Thiengkamol, 2011b, Thiengkamol, 2011a, Wattanasaroch, & Thiengkamol, 2012, & Sukwat, & Thiengkamol, 2012).

During, the PAIC training implemented, focus groups discussion and brain storming were integrated, therefore, it is obviously seen that after training they had intended to run 4 pilot projects from 6 projects. They search the way to maintain the four pilot projects with different ideas being suggested during this brain storming process in order to meet their intentions of water conservation to prevent fresh water shortage and in order to alleviate global warming, especially in accordance with the action plan of "Energy Conservation" across the Northeastern region. The four pilot projects including the first project was "Monitoring Waste Water Management", the second project was "Monitoring Infectious Waste Management", the third project was "Build Green Landscape" and the fourth was "Training for Risk Prevention".

Additionally, the result was congruent to numerous studies of Thiengkamol, (2005a, 2005b, 2010b, 2011b, 2011c), and Thiengkamol colleagues Wattanasaroch, & Thiengkamol, 2012, Sukwat, & Thiengkamol, 2012, Jumrearnsan, & Thiengkamol, 2012, Saenpakdee, & Thiengkamol, 2012, Sukserm, & Thiengkamol, 2012, and study of Jansab, 2006.

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