

Development of Food Security Management Model through PAIC Process

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Abstract: During the past few decades, Thailand has agricultural development policy that has emphasized on the nation's food security and export income. It is also a food surplus country at the macro level, but at the household level remains a problem in food security. According to FAO, food security refers to availability, accessibility and utilization, especially, nutritional knowledge and understanding. But in the educational institute like as school, it should pay attention to quantity, quality, safety, and good taste which is the concept of Ministry of Public Health of Thailand. Therefore, the upper secondary school students in Northeastern Region, lack of nutritional knowledge, attitude, awareness, value and behavior. The objective of this research was to develop food security management model for upper secondary school student. The integrative method research was done participatory action research with Participatory Appreciate-Influence-Control technique (PAIC) and qualitative with focus group discussion. Populations were upper secondary school students of academic year 2012 of Kalasin Province. The sample was selected according to purposive sampling technique. The questionnaire and evaluation forms were used as tool for data collection. PAIC was implemented with the integration of SWOT analysis and brain storming during the training process. 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 environmental education process covered knowledge of food security management, nutritional knowledge, proper consumption behavior, and training achievement were higher than pretest with statistical significance ($p < .01$, $p < .01$, $p < .01$). Three Dimensional Evaluation was employed for determination the perceptions of 48 upper secondary school students in three aspects evaluation of Self-evaluation, Friend-evaluation, and Facilitator-evaluation by using One-way ANOVA in order to investigate the participation of upper secondary school students showed that there were no difference of mean scores about participation in training process through brain storming with statistical significance ($p > .05$).

Key Words: Food Security Management / PAIC Process

1. Introduction

According to the United Nations Food and Agriculture Organization's (FAO's) widely accepted definition, "Food security" means that food is available at all times; that all persons have means of access to it; that it is nutritionally adequate in terms of quantity, quality and variety; and that it is acceptable within the given culture. Only when all these conditions are in place can a population be considered "food secure." In addition to, food security may be defined as access by all people at all times to the food required for a healthy life; at the household level, at issue is the household's ability to secure enough food to ensure adequate dietary intake for all of its members (Von Braun et al., 1993).

The concept of food security has been undergoing an evolutionary change during the last 50 years. In the 1950s, food security was considered essentially in terms of production. It was assumed that adequate production would assure

adequate availability of food in the market as well as in the household. In the 1970s, it became clear that availability alone did not lead to food security, since those who lacked purchasing power were not able to have access to balanced diets. Purchasing power again is related to jobs or livelihood opportunities. Moreover, recently, it is becoming evidence that even if availability and access are satisfactory, the biological absorption of food in the body is related to the consumption of clean drinking water as well as to environmental hygiene, primary health care and primary education. Additionally, there are micro and macro issues cause food insecurity such as political instability, poor economic government, poverty, and lack of sustainable household income (GECAFS, 2008).

Despite remarkable success in economic growth and poverty reduction in Asia, many Asia-Pacific countries have faced with problems of food insecurity. During 2003-2005, 541.9 million people in this region were undernourished even though many countries do have policies for ensuring an adequate availability of basic food products, particularly staple food grains. Each country in the region has enhanced food accessibility with minimum food requirement at the household level (FAO, 2009, & Thiengkamol, 2009c).

Over the last 50 years, the main global food issues have been famine, chronic hunger and protein-energy malnutrition (PEM). These problems interact with other problems and, as they retreat, expose new problems. Hence, attention is paid increasingly to nutrition security. Although undernourishment still contributes to the deaths of 6 million children each year, other goals cannot be brushed aside: anemia increases the mortality risk for more than 1.5 billion people worldwide; obesity (Body Mass Index: BMI >27.5) affects about a third of adults in the United States and will help kill at least another third. Paradoxically, nutrition problems of late development, such as obesity, are genetically and behaviorally rooted in those of underdevelopment, such as PEM. Moreover, a growing majority of countries are seriously affected by both sets of problems (FAO, 2001).

Thailand has agricultural development policy based on increases in productivity and incomes is a key driver to achieve national and household food security, moreover export of surplus production for the global food security has also emphasized as well. The production of food in Thailand, particularly rice, has enormously increased far more than the domestic demand therefore the surplus production is exported. While it is a food surplus country at the macro level, food accessibility at the household level remains a problem, particularly remote rural areas (Isvilanonda, & Bunyasiri, 2009, Thiengkamol, 2011b; Thiengkamol, 2011c, Thiengkamol, 2009c).

Food availability and accessibility have been impacted by the global economic crisis, climate change and the expansion at the production of food-fuel crops. Additionally, the rise of global food price in recent years has induced a sharp increase in the domestic food price, causing a high inflation rate, especially, for the poor, food constitutes is considerable as an important portion of expenditure of household income. The high food price and inflation rate directly affect their livelihood status (Isvilanonda, & Bunyasiri, 2009, & Thiengkamol, 2009c).

The household food poverty line, on average in 2007 was at 779 baht (22.58 US\$)/person/month, or approximately 54 percent of the total poverty line. Using the official food poverty line, it was found that 416,410 people in Thailand or 0.65 percent of the population were affected by food poverty. The problem of food poverty in Thailand is highly concentrated in the rural North and Northeast. Even though the poorest subsistence farmers generally consume more than half of their own production but all their food needs cannot be met by their production. For example, while purchased rice expenditures of the poorest subsistence farmer accounted for 12 percent of total rice expenditures, purchased meat and vegetable expenditures accounted for 92 percent of total meat expenditures and 86 percent of total vegetable expenditures respectively. Overall purchased food expenditures of the poorest subsistence farmers accounted for 59 percent of total food expenditures and 47 percent of the total money income. Where prices of other foods, such as meat increase dramatically relative to staple grains, some farmers cannot afford to purchase what they do not produce (Isvilanonda, & Bunyasiri, 2009).

Considering on food stability, vulnerable households have not accessed to adequate food at all times even though Thailand has action plan to greatly reduced food poverty during 1988-2007. The numbers of people were affected by food poverty increased during 1998-2000 (in the wake of the financial crisis in 1997) and during 2004-2006 because of food price inflation) (Isvilanonda, & Bunyasiri, 2009).

It's also not clear whether current research on food insecurity reflects students' experiences. Current research suggests that there are psychological, social and physical consequences of food insecurity. It is not clear whether food insecure students experience these consequences or if there are additional consequences unique to students. There was a research tried to explore the food insecurity experience of postsecondary students in Canada with the research objectives of document the severity of food insecurity in first-time and repeat users, describe the factors that explain the clients' usage level and identify strategies that Campus Food Bank clients use for coping with food insecurity including describe the relationship between Campus Food Bank clients' well-being including health and academic performance) and food insecurity (Krista, 2007). This indicated that even though in the developed country, it also has problem of food

insecurity that might be due to their consumption behavior or their knowledge and understanding of nutritional component requirement of body.

Therefore, to develop people, especially, new generations to have proper consumption behavior by minimizing ready-to-eat food such as potato chip, fried chicken, fried beef, and unwell cooking, it needs to cultivate them with environmental education process through different channels of educational system whether with Formal Education System, Non-Formal Education System, Informal Education System, and Lifelong Education System (Chotechuan, 2006, & Thiengkamol, 2011e). Particularly, the youths who are students by providing teaching and learning process with various activities to raise their knowledge and understanding, awareness, positive attitude, public consciousness and responsibility for natural resources and environment conservation including water resources, it will lead to success mean of active learning process through brain storming of group dynamic activities. Therefore, it will assist them to aware the importance of food security and it will a good process for attitude and behavior changing to conserve natural resources and environment conservation to meet food security (Thiengkamol, 2011e, UNESCO, 1978, Thiengkamol, 2011g, Thiengkamol, 2011h, Thiengkamol, 2011i, Thiengkamol, 2011j, Thiengkamol, 2012a, & Thiengkamol, 2012b).

As mentioned above, particularly, for Northeastern region, most of people prefer to eat unwell cooking beef and fish, the problems of food insecurity, it is because of lacking knowledge and understanding, awareness, positive attitude, public consciousness and responsibility for consumption behavior changing to practice in accordance with awareness of better nutritional composition (Thiengkamol, 2009c, & Thiengkamol, 2011e). Moreover, over consumption without economization by following capitalism concept and materialism, they should turn back to traditional Thai food that contains various herbs and vegetables to meet healthier. This research emphasized on development of food security management through PAIC process for upper secondary school student under the Office of Kalasin Educational Area Zone 24 to encourage them with proper consumption behavior change in their daily living (Thiengkamol, 2011a).

2. Objective

The objective of this study was to develop a prototype of food security management model for secondary school student of Kalasin Province through PAIC Process.

3. Methodology

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

- 1) Construction of handbook for food security through environmental education process covered knowledge of food security management, nutritional knowledge, and proper consumption behavior (UNESCO, 1978, InWent-DSE-ZEL, 2002, Thiengkamol, 2004, Thiengkamol, 2009a, Thiengkamol, 2009b, Thiengkamol, 2009c, Thiengkamol, 2011a, Thiengkamol, 2011e).
- 2) The research tools composed of test, questionnaire and evaluation form. The test was used for determining their environmental education process covered knowledge of food security management, nutritional knowledge, and proper consumption behavior.
- 3) The evaluation form of Three Dimensions was constructed to assess the participant practice during PAIC implemented.
- 4) 48 secondary school students were selected with purposive sampling from secondary school students under the Office of Kalasin Educational Area Zone 24. They would be recruited according to the setting criteria (willingness, time, devotion, commitment, and public mind).
- 5) The 48 participants were employed for testing knowledge of food security management, nutritional knowledge, and proper consumption behavior. The systematic operation of 48 participants was 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 48 secondary school students that were selected by purposive sampling technique from secondary school students under the Office of Kalasin Educational Area Zone 24 in the academic year of 2011. The selected sample was student who were interested in food security management and proper consumption behavior to participate food security management and environment conservation. Most of them were female with 67.67%, studied at level five with 35.42 % as shown in table 1.

Table 1 Demographic Characteristics of Sample Group

Characteristics		Secondary School Student	
		Frequency	Percent
Sex	Male	16	33.33
	Female	32	67.67
Education Level	Level 4	15	31.25
	Level 5	17	35.42
	Level 6	16	33.33
Total		48	100

4.2. Results of Pretest and Posttest with PAIC technique

PAIC technique was trained for secondary school students about knowledge of water conservation. The research results revealed that before and after PAIC training process implemented, the mean scores of posttest environmental education process covered knowledge of food security management, nutritional knowledge, proper consumption behavior, training achievement were higher than pretest with statistical significance ($p < .01$, $p < .01$, $p < .01$ 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 Food Security Management	48	15.42	2.65	8.983	.00**
Posttest of Knowledge of Food Security Management	48	19.71	2.75		
Pretest of Nutritional Knowledge	48	14.62	2.34	7.888	.00**
Posttest of Nutritional Knowledge	48	18.94	2.56		
Pretest of Proper Consumption Behavior	48	15.52	3.66	10.123	.00**
Posttest of Proper Consumption Behavior	48	19.23	2.84		
Pretest of Training Achievement	48	44.85	3.63	15.656	.00**
Posttest of Training Achievement	48	57.68	3.75		

** Significant Level at .01

5. Results of Three Dimensional Evaluations for Participation

Three Dimensional Evaluations were employed for determination the perceptions of 48 secondary school students 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 secondary school students 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	1.750	2	.875	2.302	.235
Within Group	53.580	141	.380		
Total	55.330	143			

** 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.	-1.25142	.75451	.094	-3.2023	-.1515
Self-Eva. and Facilitator-Eva.	-1.81251	.75451	.068	-3.2233	-.2335
Friend-Eva. and Facilitator-Eva.	-.56256	.75451	.878	-1.4567	1.2312

* 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 in Answering 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 slightly 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	3.74	.65	high	3.89	.75	high	4.03	.68	high
2. Participation in Answering Questions	3.78	.66	high	3.97	.74	high	3.95	.67	high
3. Participation in Discussing	3.98	.78	high	4.35	.68	high	4.36	.63	high
4. Participation in Activity Doing	4.16	.71	high	4.45	.66	high	4.55	.64	high
5. Participation in Activity Evaluating	4.14	.75	high	4.33	.75	high	4.23	.75	high
Total	3.98	.65	high	4.20	.68	high	4.22	.69	high

6. Discussions

The results indicated that the upper secondary school students had environmental education process covered knowledge of food security, nutritional knowledge, and proper consumption 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, 2011j, 2012a & 2012b). 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 performance of environmental education, global warming, environmental education characteristics, inspiration of environmental conservation and environmental behavior after participating in the PAIC training through genuine practicing behavior in their daily life activities for global warming alleviation. The findings are also relevant to the results from the study of different studies of Thiengkamol, (2004, 2005a, 2005b, 2010b, 2011a, 2011b, 2011g, 2011h, 2012a, 2012b) and researches of Thiengkamol colleague, Sukserm, et al, 2012, Saenpakdee, and Thiengkamol, 2012, Sukwat, et al, 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 through environmental education process covered knowledge of food security, nutritional knowledge, environment and food.

The results of TDE of 53 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 upper 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 secondary school students 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, 2011a, Thiengkamol, 2011b, Wattanasaroch, & Thiengkamol, 2012, & Sukwat, et al, and Thiengkamol, 2012a).

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 environmental education process covered knowledge of food security, nutritional knowledge, environment and food, especially in accordance with the action plan of "Food Security Management" across the Northeastern region. The four pilot projects including the first project was "Decreasing Junk Food Consumption", the second project was "Cultivation Plants for Household Consumption", the third project was "Nutritional Knowledge Transferring" and the fourth was "Better Food Consumption Practice". Additionally, the result was congruent to different studies of Thiengkamol, (2005a, 2005b, 2010b, 2011b, 2011c, 2011g, 2011h, 2012a and 2012b), and Thiengkamol colleagues, Wattanasaroch, & Thiengkamol, 2012, Sukwat, et al, 2012, Saenpakdee, & Thiengkamol, 2012, Sukserm, et al, & Thiengkamol, 2012, and study of Jansab, 2006.

References

- Krista Rondeau, RD. (2007). *Hunger on Campus: Understanding Food Insecurity in Post-Secondary Students*. MSc Candidate, Centre for Health Promotion Studies, School of Public Health, University of Alberta, Edmonton, Alberta.
- Chotechuan, P. (2006). *Knowledge on potential carcinogen in ready-to-eat food and Food behaviors secondary school students*. Thesis of Master of Science (Community Health), Faculty of Graduate Studies of Mahidol University.
- FAO. (2001). *The State of Food and Agriculture 2000*. Retrieved from <http://www.fao.org/docrep/x4400e/x4400e11.htm>
- FAO. (2009). *Statistical Year Book*. Retrieved from <http://www.fao.org/economic/the-statistics-division-ess/publications-studies/statistical-yearbook/fao-statistical-yearbook-2009/en/>
- Global Environmental Change and Food Systems (GECAFS). (2008). *A food-secure future for those most vulnerable*. Retrieved from <http://www.gecafs.org/>
- Hair, J.F., Anderson, R.E., Tatham, R.L., Black, W.C. (1998). *Multivariate Data Analysis*. New Jersey : Prentice Hall.
- InWent-DSE-ZEL. (2002). *Regional Training Course "Advanced Training of Trainer"*. Grand Jomtien Palace. Pattaya City. Thailand.

- Isvilanonda, S. and Bunyasiri, I. (2009). *Food Security in Thailand: Status, Rural Poor Vulnerability, and Some Policy Options*. A paper presented at the international seminar on "Agricultural and Food Policy Reforms: Food Security from the Perspective of Asian Small-scale Farmers" held in Seoul on 24-28 August 2009.
- Jansab, S. (2006). *Strategies for the Development of Women's Political Participation in Pattaya City*. Thesis of Master of Art Master of Art (Women Studies), Office of Women and Youth Studies of Thammasart University.
- Langly, A. (1998). "The Roles of Formal Strategic Planning" *Long Range Planning*. Vol. 21, No.1.
- Office of Natural Resources and Environmental Policy and Planning. (2009). *Report the Situation of Environmental Quality*. Bangkok: Bejapol.
- Pimdee, P., Thiengkamol N., Thiengkamol T., (2012) Psychological Trait and Situation Affecting through Inspiration of Public Mind to Energy Conservation Behavior of Undergraduate Student, *Mediterranean Journal of Social Sciences* Vol 3 (3)
- Saenpakdee, A. & Thiengkamol, N. (2012). Formulation of Community Forest Act for Thailand. *The Social Sciences*, 7: 71-76.
- Sariwat, L. (2010). *Psychological Work in Community*. Bangkok: Se-education Limited.
- Sproull, N.L. (1995). *Handbook of Research Method: A Guide for Practitioners and Scientific teachers in the Social Science*. (2nd ed.). Metuchen, NJ: Scarecrow Press.
- Saenpakdee, A., and Thiengkamol, N. (2012). Formulation of Community Forest Act for Thailand. *Journal of the Social Sciences*, 7 (1):71-76.
- Sukwat, S. Thiengkamol, N., Navanugraha, C. and Thiengkamol, C. (2012). Development of Prototype of Young Buddhist Environmental Education. *Journal of the Social Sciences*, 7 (1):56-60.
- Sukserm, T., Thiengkamol, N., & Thiengkamol, N. (2012). Development of the Ecotourism Management Model for Forest Park. *The Social Sciences*, 7: 95-99.
- Thiengkamol, N. (2004). *Development of A Learning Network Model for Energy Conservation*. Doctoral Dissertation of Education (Environmental Education) Faculty of Graduate Studies, Mahidol University, Thailand.
- Thiengkamol, N. (2005a). Strengthening Community Capability through The Learning Network Model for Energy Conservation. *Journal of Population and Social Studies*, 14 (1), 27-46.
- Thiengkamol, N. (2005b). Development of Health Cities Network for Mekong Region. In *Proceedings of the International Conference "Transborder Issues in the Grate Mekong Sub-Region" Ubon Ratchathani, Thailand, 30 June-2 July 2005* (pp.111-119). Ubol Ratchathani: Nevada Grand Hotel.
- Thiengkamol, N. (2009a). *Environment and Development Book 2 (Food Security)*. Bangkok: Chulalongkorn University Press.
- Thiengkamol, N. (2009b). *The Great Philosopher: the Scientist only know but Intuitioner is Lord Buddha*. Bangkok: Prachya Publication.
- Thiengkamol, N. (2009c). *The Happiness and the Genius can be Created before Born*. Bangkok: Prachya Publication.
- Thiengkamol, N. (2010b). Urban Community Development with Food Security Management: A Case of Bang Sue District in Bangkok. *Journal of the Association of Researcher*, 15 (2), 109-117.
- Thiengkamol, N. (2011a). *Holistically Integrative Research (2nd ed.)*. Bangkok: Chulalongkorn University Press.
- Thiengkamol, N. (2011b). Development of Energy Security Management Model for Rural Community through Environmental Education Process. In *Proceedings of the 1st EnvironmentAsia International Conference on "Environmental Supporting in Food and Energy Security: Crisis and Opportunity" Bangkok, Thailand, 22-25 March 2011* (pp.11). Bangkok: Rama Garden Hotel.
- Thiengkamol, N. (2011c). Development of Food Security Management Model for Undergraduate Student Mahasarakham University through Environmental Education Process. In *Proceedings of the 1st EnvironmentAsia International Conference on "Environmental Supporting in Food and Energy Security: Crisis and Opportunity" Bangkok, Thailand, 22-25 March 2011* (pp.12). Bangkok: Rama Garden Hotel.
- Thiengkamol, N. (2011e). *Environment and Development Book*. (4th ed.). Bangkok: Chulalongkorn University Press.
- Thiengkamol, N. (2011f). *Nurture Children to be Doctors*. Bangkok: INTELLUALS.
- Thiengkamol, N. (2011g). Development of Energy Security Management for Rural Community. *Canadian Social Science*, 7 (5), October 31, 2011.
- Thiengkamol, N. (2011h). Development of a Food Security Management Model for Agricultural Community. *Canadian Social Science*, 7 (5), October 31, 2011.
- Thiengkamol, N. (2011i). Development of Model of Environmental Education and Inspiration of Public Consciousness Influencing to Global Warming Alleviation. *European Journal of Social Sciences*, 25 (4):506-514.
- Thiengkamol, N. (2011j). Model of Psychological State Affecting to Global Warming Alleviation. *Canadian Social Science*, 7 (6):89-95, December 31, 2011
- Thiengkamol, N. (2012a). Development of A Prototype of Environmental Education Volunteer. *Journal of the Social Sciences*, 7 (1):77-81.
- Thiengkamol, N. (2012b). Development of Food Security Management for Undergraduate Student Mahasarakham University. *European Journal of Social Sciences*, 27 (2):246-252.
- UNESCO. (1978). Intergovernmental Conference on Environmental Education Organized by UNESCO in Cooperation with UNEP Tbilisi (USSR) 14-16 October 1977. Final Reports. Paris: UNESCO.
- Von Braun, J.; McComb, J.; Fred-Mensah, B.K.; Pandya-Lorch, R. (1993). Urban food insecurity and malnutrition in developing countries. International Food Policy Research Institute, Washington, DC, USA.
- Wattanasaroch, K. and Thiengkamol, N. (2012). Training ISO 14001 to Develop Green Dormitory Standards. *The Social Sciences*, 8: 98-110.

Weiss, J. W. (1995). *Organizational Behavior and Change: Managing Diversity, Cross Cultural Dynamics and Ethics*. Anaheim, CA: West Publishers.