Environmental Education Factors Affecting Waste Management Behavior of Villagers
ปัจจัยสิ่งแวดล้อมศึกษาส่งผลต่อพฤติกรรมการจัดการขยะมูลฝอยในครัวเรือนแบบของชาวบ้าน

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Abstract

The research objectives were to study knowledge, awareness, participation of waste management, and waste management behavior levels, and effects of independent variables comprising of knowledge, awareness and participation of waste management affecting waste management behavior. This survey research used questionnaire was conducted to collect 300 people from population of Ban Kanhug, Si Kaew Sub-district, Muang District, Roi-et Province. Multiple Regression Analysis was used for determine the relationship between independent variables and dependent variable. The findings illustrated that in holistic view of study knowledge, awareness, participation of waste management, and waste management behavior were at most level in all aspects. Moreover, independent variables of knowledge, awareness, participation of waste management, effected to dependent variable of waste management behavior of community people with 64.30 percents of power prediction (Adjusted $R^2 = 0.643$). The knowledge of waste management was the highest effect with 0.395 and subsequence was participation with 0.313. Recommendation of the research, the knowledge and participation of waste management are the most important factor to affect to waste management behavior. Therefore, the local administrative organization should hold the activities to give knowledge and persuade villagers to gain more knowledge and participate to join waste management in village.

Keywords: environmental education, behavior, waste management, villager

บทคัดย่อ

วัตถุประสงค์การวิจัยเพื่อศึกษาระดับปัจจัยความรู้เรื่องขยะมูลฝอย สิ่งแวดล้อมศึกษาประกอบด้วยความรู้ ความตระหนัก การมีส่วนร่วมการจัดการขยะมูลฝอย และพฤติกรรมการจัดการขยะมูลฝอยในครัวเรือนแบบของชาวบ้าน บ้านคานหัก ตำบลสีแก้ว อำเภอเมือง จังหวัดร้อยเอ็ด และเพื่อศึกษาอิทธิพลปัจจัยความรู้เรื่องขยะมูลฝอย สิ่งแวดล้อมศึกษาประกอบด้วยความรู้ เจตคติ และการมีส่วนการจัดการขยะมูลฝอย ที่มีต่อพฤติกรรมการจัดการขยะมูลฝอยในครัวเรือนของชาวบ้าน การวิจัยนี้เป็นการวิจัยเชิงสำรวจ โดยใช้แบบสอบถามเก็บจากกลุ่มตัวอย่างจำนวน 300 คน ที่อาศัย ณ บ้านคานหัก ตำบลสีแก้ว อำเภอเมือง จังหวัดร้อยเอ็ด และใช้สถิติการถดถอยเชิงเส้นตรงเพื่อทดสอบสมมติฐานการวิจัย ผลการศึกษา พบว่า ความรู้เรื่องขยะมูลฝอย สิ่งแวดล้อมศึกษาประกอบด้วยความรู้ เจตคติ การมีส่วนร่วม

การจัดการขยะมูลฝอย และพฤติกรรมการจัดการขยะมูลฝอยในครัวเรือนของชาวบ้าน อยู่ในระดับมากทุกด้าน นอกจากนี้ ตัวแปรอิสระของความรู้ ความตระหนัก การมีส่วนร่วมในการจัดการขยะมูลฝอย มีอิทธิพลต่อตัวแปรตามของพฤติกรรมการจัดการมูลฝอย ของชาวชุมชนร้อยละ 64.30 (Adjusted R^2 = 0.643) ความรู้และการมีส่วนร่วมการจัดการมูลฝอย มีผลเท่ากับ 0.395 และ 0.313 ตามลำดับ ข้อเสนอแนะของการวิจัย คือองค์กรปกครองส่วนท้องถิ่นควรจัดกิจกรรม ควรจัดกิจกกรมให้ความรู้การจัดการขยะ และชักชวนชาวบ้านให้เข้าร่วมกิจกรรมการจัดการของเสียซึ่งเป็นปัจจัยสำคัญที่ส่งผลต่อพฤติกรรมการจัดการขยะมูลฝอยของหมู่บ้าน

คำสำคัญ: สิ่งแวดล้อมศึกษา, พฤติกรรม, การจัดการขยะ, ชาวบ้าน

Introduction

Currently, environmental problem in both urban and rural have trended to be gradually more seriousness such as air pollution, solid and liquid wastes accumulation. Each year of different sectors use huge budget to solve these problems and the budget has been increased for succeeding year. Particularly, the budget for waste disposal management, it might be due to efficiency and effectiveness of waste management with lack of systemic approach either people collaboration, collection process, inadequate and improper of waste transportation, disposal site or methods of elimination. In addition, lacks of knowledge and understanding, awareness, and responsibility for waste problem without regarding to their health and quality of life. The problem of waste management has become to diverse pollution and nuisance situations in numerous areas whether urban and rural areas, thus it is an urgent issue that should be paid attention by various sectors to solve the problem in order to meet safe guard for clean and safe environment (Thiengkamol, 2011e; Boonrueng, et al., 2013; Office of Natural Resources and Environmental Policy and Planning, 2015).

The progress of sciences and technologies are accelerating factors of population growth due to better modern medicine and health care so the elderly people number is critically rapid growth, therefore it causes to a land utilization for industry and agriculture to produce a large number of products, foods, shelters, and other basic needs to response for the population growth including the waste accumulation every year because of poor management of waste. Therefore, the rapid growth of number of population is a major origin of economic and waste expansion in the same time in both cities and country areas. Managing and solving the waste accumulation, particular toxic waste and water, soil, air and in food chain and natural resources and food contaminations, cause different risks of a large numbers of environmental health diseases including cancer, genetic disorder diseases, diarrhea, malaria, dengue, bubonic plague and leptospirosis (WHO, 2014; Kaewhao et al., 2015; Thiengkamol, 2009c; Thiengkamol, 2011e).

The situation of solid wastes and disposal problem are significantly environmental problem of Thailand that is spreading and causing the health state of people in both urban and rural areas. It is more rigorous and widely expansive over the country, therefore all sector in society of government, private, local administrative organization and popular sectors must collaborate, participate and pay attention with environmental awareness and proper attitude to assist each other to search strategy, policy and plan to set projects and activities to solve this serious problem together. Reaching effective solid wastes and disposal decrease, they need to initiate the continued projects and activities covering effective collection, transportation, selection of waste elimination methods

and techniques with minimization of environmental impacts, protect quality of life and balance the ecosystem. Nevertheless, the beginning step of waste collection of people is an essential initial step of waste management. Thus, the community people or villager should gain more knowledge and understanding with positive attitude and sincerely participation in waste management with real responsibility. This will lead to the successful waste management. Even though, local administrative organization has good policy and plans to manage the waste disposal but lack of people participation, the success depends on the cooperation and people behavior (Office of Natural Resources and Environmental Policy and Planning, 2015).

From the report of Si Kaew Subdistrict Municipality (October 25, 2014), it was found that there was no implementation of solid waste and disposal but it let the people to get rid of the solid waste and disposal by themselves. Moreover, the local peoples or villagers lack of corrected knowledge and understanding for managing the waste, therefore, the problems of waste management including people lack of knowledge and consciousness to manage the waste, the waste management methods are improper and there is no waste separation before disposing, thus this causes impact of waste to environmental quality and the people quality of life.

Studying on factors of knowledge, awareness and participation of household waste management affecting their waste managing behavior of villagers at Bann Kanhug, Si Kaew Subdistrict, Muang District, Roi-et Province as holistically view for environmental conservation, this would be a mean to subjectively solve household waste management.

Objectives

1. To study levels of knowledge, awareness, participation of waste management, and waste management behavior of villager at Bann Kanhug, Si Kaew Subdistrict, Muang District, Roi-et Province.

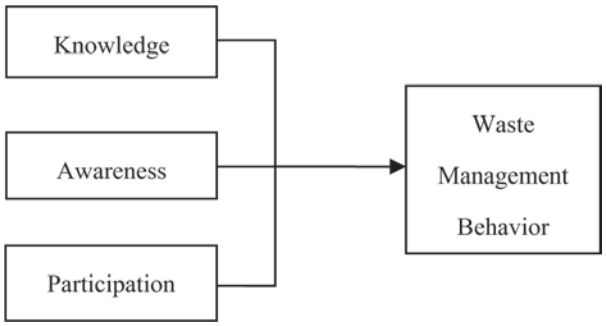
2. The effects of independent variables comprising of knowledge, awareness and participation of waste management affecting waste management behavior of villager at Bann Kanhug, Si Kaew Subdistrict, Muang District, Roi-et Province.

Literature Review

The literature review involved the principle of environmental education covering knowledge, awareness, and participation. They are important components of this principle that was proposed since1987 at United Nation Conference on Human and Environment and another United Nation Conference in 1992 on "Environment and Development". This emphasized on using environmental education to drive the sustainable development through Agenda 21 with concept of "Think Globally, Act Locally" with the aim of changing human behavior through all channels of education including formal, informal, non-formal and lifelong education practices (Thiengkamol, 2011e; WCED, 1987; Volker, 2007; Watkinson, 2009). Moreover, the waste management behavior is recognized as internal issue because the rapid growth of population reach at 7 billions population in 2012. Human is essential factor of waste accumulation, therefore if we can properly manage waste at the household level. It will research the effective reduction of waste (Boonrueng, et al., 2013; Office of Natural Resources and Environmental Policy and Planning, 2015).

Conceptual Framework

The independent variables comprising of knowledge, awareness and participation of waste management affecting waste management behavior of villager as followings.



Research Hypothesis

1. The levels of knowledge, awareness, participation of waste management, and waste management behavior of villager at Bann Kanhug, Si Kaew Subdistrict, Muang District, Roi-et Province are at moderate levels.

2. The independent variable of environmental education comprising of knowledge, awareness, and participation of waste management positively affecting waste management behavior of villager at Bann Kanhug, Si Kaew Subdistrict, Muang District, Roi-et Province.

Methodology

Population and Sample

Population were 895 villagers from 2 villages covering Moo 11 and Moo 21 of Ban Kanhug, Si Kaew Sub-district, Muang District, Roi-et Province. Sample of 300 villagers were selected from Population were 895 villagers from 2 villages covering Moo 11 and Moo 21 of Ban Kanhug, Si Kaew Sub-district, Muang District, Roi-et Province by opening the table of Krejcie & Morgan (Krejcie & Morgan, 1970).

Research Tool

Questionnaire was constructed by data and information from concepts theories and related literatures including the present waste management problems of Ban Kanhug, Si Kaew Sub-district, Muang District, Roi-et Province. After the 5 experts returned the results of item objective congruent, the item more than 0.5 would be selected to use in questionnaire (Rovinelli & Hambleton, 1977) and it was tried out with 50 villagers of adjacent sub-district of Si Kaew Sub-district. The reliability was determined by Cronbach co-efficient (Cronbach, 1951). The reliability of whole questionnaire was 0.860 respectively.

Data Collection

The questionnaire was used to interview with 300 villagers of 2 villages covering Moo 11 and Moo 21 of Ban Kanhug, Si Kaew Sub-district, Muang District, Roi-et Province. The 300 questionnaires were checked for completeness before coding to analyze.

Data Analysis

Description statistics of frequency, percent, mean and standard deviation were employed for analysis. Multiple Regression Analysis was conducted for determine the effect and relationship among variables (Hair, et al., 2010).

Results

1. Results of waste management knowledge level

The results of waste management knowledge level of 300 villagers had total mean score at more level with 4.06 while considering on each aspect, it was revealed that rain washes the dung to water sources, it causes the water pollution was at more level with 4.25 was the highest mean and subsequence were waste is an origin of nuisances such bad odor, and bad views and waste separation before throwing away is a way of environmental problem solving with 4.13, and 4.11 respectively as presented in Table 1.

Table 1

Waste management knowledge level

Waste Management Knowledge Level	$\overline{X}$	SD	Level
1. Solid waste is a unwanted debris with decay and non-decay things including ashes, dead animals, dung, dust and discard materials.	3.99	1.16	more
2. Paper, tin, plastic, metal, and aluminum debris are reusable.	3.95	1.08	more
3. Blue garbage bin is for plastic bag of dessert bag, flexible packaging, and foam container.	3.96	1.07	more
4. Waste separation means process or activity to split or separate the waste into different types according to its component such as glass, paper, plastic, metal and aluminum.	4.03	0.97	more
5. Using the cloth bag reduces the waste.	4.07	0.96	more
6. Waste makes the degraded environment and community disorders an distributes the diseases.	4.09	0.97	more
7. Dumping waste on ground makes soil pollution.	4.05	0.97	more
8. Waste is an origin of nuisances such bad odor, and bad views.	4.13	1.03	more
9. Rain washes the dung to water sources, it causes the water pollution.	4.25	0.89	more
10. Waste separation before throwing away is a way of environmental problem solving.	4.11	0.85	more
Total Mean	**4.06**	**1.00**	**more**

2. Results of waste management awareness level

The results of waste management awareness level of 300 villagers had total mean score at moderate level with 4.02 while considering on each aspect, it was revealed that every time of dropping waste with correctly mean, is a good awareness was at more level with 4.09 was the highest mean and subsequence were Every human produces the waste, thus it is his duty to decrease the waste, use natural resources with economization, is a way to decease waste and bad views and Realization of reuse is a good awareness with 4.03, 4.02 and 4.02 respectively as presented in Table 2.

Table 2

Waste management awareness level

	Waste Management Awareness Level	$\overline{X}$	SD	Level
1.	Use natural resources with economization, is a way to decease waste.	4.02	0.84	more
2.	Every human produces the waste, thus it is his duty to decrease the waste.	4.03	0.91	more
3.	Every time of Dropping waste with correctly mean, is a good awareness.	4.09	0.88	more
4.	Realization of reuse is a good awareness.	4.02	0.91	more
5.	Repair thing instead of buy the new one, aids to decrease waste.	4.00	1.00	more
6.	Donate the unused thing is a mean to decrease the waste.	3.98	1.07	more
	Total Mean	**4.02**	**0.94**	**more**

3. Results of waste management participation level

The results of waste management participation level of 300 villagers had total mean score at moderate level with 4.08 while considering on each aspect, it was revealed that to participate in correctly waste drop, is a way of environmental problem solving was at more level with 4.12 was the highest mean and subsequence were participation in home and community wastes are an environmental conservation, everyone should participate in activity of community waste collection and waste management participation at home is everyone duty with 4.10, 4.10 and 4.09 respectively as presented in Table 3.

Table 3

Waste management participation level

	Waste Management Participation Level	$\overline{X}$	SD	Level
1.	Waste Management Participation at home is everyone duty.	4.09	0.91	more
2.	Participation in home and community wastes are an environmental conservation.	4.10	0.93	more
3.	Everyone should participate in activity of community waste collection.	4.10	0.92	more
4.	To participate in correctly waste drop, is a way of environmental problem solving.	4.12	0.90	more
5.	Everyone must join the project of waste bank at school and community.	4.05	1.06	more
6	Participation in community planning of waste management is a good thing.	4.03	0.94	more
7	If anyone see someone drops the waste in public space, everyone must promptly tell him to stop doing so.	4.07	0.97	more
	Total Mean	**4.08**	**0.95**	**more**

4. Results of waste management behavior level

The results of waste management behavior level of 300 villagers had total mean score at moderate level with 4.01 while considering on each aspect, it was revealed that practice according to measurement and policy of waste disposal is a good behavior was at more level with 4.18 was the highest mean and subsequence were consumption behavior as much as body need, it is a good mean to reduce waste and food consumption with natural packaging aids to reduce the toxic waste with 4.12 and 4.11 respectively as presented in Table 4.

Table 4

Waste management behavior level

Waste Management Behavior Level	$\overline{X}$	SD	Level
1. Consumption behavior as much as body need, it is a good mean to reduce waste.	4.12	0.92	more
2. Food consumption with natural packaging aids to reduce the toxic waste.	4.11	0.89	more
3. Everyone must correctly separate waste.	4.02	0.93	more
4. Elimination plastic waste with burning, destroys the environment.	4.08	0.95	more
5. Use the refill product decrease the waste of packing.	4.04	1.04	more
6. Introducing the model of waste management obtained from training course, is a good practice.	3.95	1.14	more
7. Practice according to measurement and policy of waste disposal id a good behavior.	4.18	0.92	more
8. Consume buffet by taking just only for eat, reduces waste.	4.01	0.87	More
9. Everyone must separate the waste that can be recycled.	4.05	0.93	more
10. Bring the remained cloth to us such as tissue box or doormat, aids to reduce waste.	3.91	0.95	more
11. Reuse the plastic bottle aids to reduce waste.	3.88	1.02	more
12. Reuse the remained book in the next semester, aids to reduce waste.	3.92	0.98	more
13. Eating food without left, aids to reduce waste.	3.88	1.03	more
14. Everyone must warn his friends to properly drop waste.	3.95	0.98	more
15. Suggestion the mean of waste disposal for closed people, reduces the waste.	4.04	1.04	more
Total Mean	**4.01**	**0.98**	**more**

5. Results of environmental education factors affecting waste management behavior

The relationship between independent variables of Environmental Education covering knowledge, awareness and participation affecting dependent variable of Waste Management Behavior of villagers as presented in table 5 and 6.

Table 5

Result analysis prediction power of environmental education factors affecting waste management behavior

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.804	0.645	0.643	0.372

a. Predictors: Constant and environmental education

b. Dependent variable: Waste management behavior

Table 6

Multiple linear regression analysis between environmental education factors affecting waste management behavior

รูปแบบ		Sum of Squares	df	Mean Square	F	Sig.
2	Regression	75.116	3	25.039	180.486	0.000**
	Residual	41.064	296	0.139		
	Total	116.180	299			

a. Predictors: Constant and environmental education

b. Dependent variable: Waste management behavior

Table 7

Relationship between Environmental Education Factors Affecting Environmental Waste Management Behavior

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
3	Constant	0.526	0.153		3.440	0.000**
	Knowledge	0.395	0.040	0.441	9.831	0.000**
	Awareness	0.149	0.046	0.157	3.216	0.000**
	Participation	0.313	0.42	0.343	7.524	0.000**

a. Predictors: Constant, knowledge, awareness and participation of waste management

b. Dependent variable: Waste management behavior

From Table 7, linear regression equation, it was revealed that independent variables of Knowledge, Awareness and Participation of Waste Management affecting dependent variable of Waste Management Behavior of villagers with statistical significance at level of and 0.01. Independent variables of Knowledge, Awareness and Participation of Waste Management are able to predict Waste Management Behavior of villagers, therefore, the equation 1 can be written as the following.

$$y = a+b1x1+b2x2 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

When

y = Waste Management Behavior as Dependent Variable

a = constant value

b_1 = Coefficient relation of Knowledge of Waste Management

x_1 = of Knowledge of Waste Management as Independent Variable

b_2 = Coefficient relation of Awareness of Waste Management

x_2 = Awareness of Waste Management as Independent Variable

b_3 = Coefficient relation of Participation of Waste Management

x_3 = Participation of Waste Management as Independent Variable

Therefore, the prediction equation of relationship between independent variables of Knowledge of Waste Management, Awareness of Waste Management and Participation of Waste Management affecting dependent variable of Waste Management Behavior. It can be explained that Knowledge of Waste Management was the most effect to Waste Management Behavior with 39.50 percent with statistical significance at level of 0.01. Subsequences were Awareness of Waste Management and Participation of Waste Management with 31.30 percent and 14.90 percents with statistical significance at level of 0.01 as the following equation 2.

$$Y = 0.526 + 0.395X1 + 0.149X2 + 0.313X3 \ldots..(2)$$

Discussion

The findings illustrated that in holistic view of study knowledge, awareness, participation of waste management, and waste management behavior of villagers at Bann Kanhug were at most level in all aspects.The knowledge of waste management in this study is at most level. This is pertinent to the study of Boonpitak (2014) who studied on Factors Associating Waste Management Behavior of Personnel of Local Administrative Organization in Lopburi Province, he also revealed that knowledge was at most level. Moreover, from this study, it was also found that the awareness of waste management was at most level. This is congruent to the studies of Thiengkamol, N. (Thiengkamol, 2011b; Thiengkamol, 2012c; Thiengkamol, 2013g) revealed that the high level of awareness affected to the better environmental conservation behavior.

Additionally, the finding of this study indicated that participation of waste management of villagers was at most level. The results is in the line with the study of Donkonchum, et al, (2012a), they found that environmental education including participation affected to environmental conservation behavior for global warming alleviation and it is congruent to the study of Gonggool et al., (2012b).

Level of waste management behavior of villagers in this study was found at most level. It is not pertinent to the study of Boonpitak (2014), who disclosed that waste management behavior of personnel in local administrative organization was at moderate level. The differences of these two studies might be due to the difference of sample groups since in this study, the sample groups are villager and sample groups of Boonpitak are personnel in local administrative organization.

From the second hypothesis set that the independent variable of environmental education comprising of knowledge, awareness, and participation of waste management positive affecting waste management behavior of villager at Bann Kanhug, Si Kaew Subdistrict, Muang District, Roi-et Province. It was found that the prediction equation of relationship between independent variables of Knowledge of Waste Management, Awareness of Waste Management and Participation of Waste Management affecting dependent variable of Participation of Waste Management Behavior. It can be explained that Knowledge of Waste Management was the most effect to Waste Management Behavior with 39.50 percent with statistical significance at level of 0.01. Subsequence were Awareness of Waste Management and Participation of Waste Management with 31.30 percent and 14.90

percents with statistical significance at level of 0.01. This implied that Knowledge of Waste Management and Participation of Waste Management are two important factors for changing Waste Management Behavior of villagers, since they have enough knowledge and have an opportunity to participate in community waste management would inspire them to realize the importance of waste management with public mind. This is relevant to concept of Thiengkamol (Thiengkamol, 2009a; Thiengkamol, 2009b) and her numerous studies that carried on environmental education covering knowledge, awareness, and participation that affected to environmental conservation behavior in terms of waste management and recycling behavior (Thiengkamol, 2011i, Thiengkamol, 2012e. However, the results are also relevant to the study of Thiengkamol and her colleagues such as the study on "Development of Environmental Education Volunteer Model through Inspiration of Public Consciousness for Sustainable Development (Gonggool et al., 2012b), "Casual Relationship Model of Biodiversity Conservation" (Saisunantharom, et al., 2013a), "Environmental Education and Public Mind Affecting Forest Conservation Behavior" (Kamin et al., 2014a), "Casual Relationship Model of Forest Fire Prevention." (Kotchakote et al., 2013a), " Causal Relationship Model of Environmental Conservation Behavior Integrated with LCA Knowledge." (Donkonchum et al., 2012a), "Causal Relationship Model of Electrical Energy Conservation." Pimdee, et al., 2012a), "Causal Relationship Model of Community Strength." (Phinnarach, et al., 2012a) and "Effects of the learning of public participation in waste management at Wangbo sub district, Nong Bua district, Nakhon Sawan Province" (Thongkanta, C., 2015)

Suggestion

The research results explicated that knowledge, awareness, and participation of waste management are critical factors that affect to waste management behavior; therefore the local administrative organization should establish the policy, plan and implementation in terms of training courses to provide the corrective knowledge of waste management, and projects to raise their awareness including holding regular activities to persuade villagers to participate in waste management by demonstrating the proper and effective waste management techniques. Additionally, they should operate the waste disposal system with providing the garbage bin, adequate car transportation, and dumping site or recycling the waste by setting waste bank to make profit for villagers.

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