

รูปแบบการรักษาคุณภาพอากาศด้วยจิตสาธารณะ

Model of Air Quality Maintenance Behavior with Public Mind

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บทคัดย่อ

การวิจัยมีวัตถุประสงค์เพื่อศึกษา ระดับความรู้มลพิษทางอากาศ แรงบันดาลใจในการมีจิตสาธารณะเพื่ออนุรักษ์สิ่งแวดล้อม และระดับพฤติกรรมในการรักษาคุณภาพอากาศของประชาชนและศึกษาอิทธิของตัวแปรอิสระ ประกอบด้วย ความรู้มลพิษทางอากาศ และแรงบันดาลใจในการมีจิตสาธารณะเพื่ออนุรักษ์สิ่งแวดล้อม ที่ส่งผลต่อตัวแปรตามคือ พฤติกรรมในการรักษาคุณภาพอากาศของประชาชน การวิจัยนี้เป็นการวิจัยเชิงปริมาณซึ่งเป็นการวิจัยเชิงสำรวจ เก็บรวบรวมข้อมูลโดยใช้แบบสอบถาม กลุ่มตัวอย่างคือผู้ประชาชนที่อาศัยอยู่ในเขตอำเภอบ้านผือ จังหวัดอุดรธานี จำนวน 400 คน โดยและใช้สถิติการถดถอยพหุคูณเชิงเส้นตรงเพื่อทดสอบสมมติฐานของการวิจัย ผลการวิจัย พบว่า ระดับความรู้มลพิษทางอากาศ แรงบันดาลใจในการมีจิตสาธารณะเพื่ออนุรักษ์สิ่งแวดล้อม และระดับพฤติกรรมในการรักษาคุณภาพอากาศของประชาชนโดยภาพรวม อยู่ในระดับมากที่สุด 3 ด้าน อีกทั้งยังพบว่า กลุ่มตัวแปรอิสระ ซึ่งประกอบด้วย ความรู้มลพิษทางอากาศ และแรงบันดาลใจในการมีจิตสาธารณะเพื่ออนุรักษ์สิ่งแวดล้อม ส่งผลต่อพฤติกรรมในการรักษาคุณภาพอากาศของประชาชน โดยมีอำนาจในการพยากรณ์ ร้อยละ 60.60 (Adjusted R² = 0.606) อย่างมีนัยสำคัญทางสถิติที่ระดับ 0.01

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Abstract

The research objectives were to study the air pollution knowledge, public mind inspiration of environmental conservation and air quality maintenance behavior levels, and to study the independent variables comprising of air pollution knowledge and public mind inspiration of environmental conservation affecting dependent variable of air quality maintenance behavior of people. The research was survey research. Data collection was gathered from 400 peoples who live at Ban Phue District, Udon Thani Province. Questionnaire was used as instrument. Multiple Regression Analysis was used for predicting the relationship between independent variables and dependent variable. The findings illustrated that in holistic view of air quality maintenance behavior of people was at most level in all aspects. Moreover, independent variables comprising of air pollution knowledge and public mind inspiration of environmental conservation affected to dependent variable air quality maintenance behavior of people with 60.60 percent of power prediction (Adjusted R² = 0.606).

Keywords: model, air quality maintenance behavior, public mind inspiration, environmental conservation



Introduction

Air is an intermediate for particulate matter and dust. Moreover, air is generally a mixture of different gases. The pure air will not have color, odor, and taste. The important mixture with volume are nitrogen with 78.09 percent, oxygen with 20.94 percent, and inert gases are majority of argon with 0.93 percent, carbon dioxide with 0.03 percent and mixture of helium, neon, krypton, xenon, methane, water vapor and others with 0.01 percent. Air is essential for all living creatures including humans, animal, plant and micro-organism. Its quantity and quality affect other resource occurrences in various terms of forest, mineral, wind and rain. Air pollution is the preamble into the atmosphere of chemicals, particulates, or biological materials that cause discomfort, disease, or death to humans, damage other living organisms such as food crops, or damage the natural environment or built environment. Vegetation, in some regions, emits environmentally significant amounts of volatile organic compounds (VOCs) on warmer days. These VOCs react with primary anthropogenic pollutants, especially, nitrogen oxides (NO_x), sulfur dioxide (SO₂) and anthropogenic organic carbon compounds to produce a seasonal haze of secondary pollutants (Thai Intelligent Storage, 2012; Goldstein et al., 2009).

Thailand is an agricultural country; therefore the rural areas have been used for cultivating different products such as rice, corn and sugarcane. These types of agricultural farming processes need to burn to demolish the rice stubble, corncob and sugarcane leaves, therefore it causes the air pollution unavoidably. The air pollution has

increasingly been important environmental problem. This air pollution unintentionally affected to the agriculturist themselves and the other peoples. However, there is another mean to diminish the dust to cause air pollution but it takes time to eliminate these agricultural wastes (Tulayasatien, 2001).

Theory of dust dispersion in the atmosphere and impact to burden site, it can be explained that the factor affecting to the severity of receptor will be depended on the size and component of dust, quantity, duration, contact, and physical state of receptor. Moreover, the air pollutant also directly affected to human health (Panich, 2007; Moolmanee et al., 2013).

Ministry of Science, Technology and Environment of Thailand announced the standard vale of dust in the general atmosphere along with criteria of Particulate Matter (PM) with an aerodynamic diameter less than or equal to a nominal 10 micrometers; PM₁₀ within 24 hours should not exceed 120 microgram/m³ and during one year should not exceed 120 microgram/m³. Total Suspended Particulate Matter (TSP) within 24 hours should not exceed 300 microgram/m³ and during one year should not exceed 100 microgram/m³. The current situation of dust problem in the Northern region of country illustrated by Department of Air Pollution that the air quality of diverse provinces, it was found that their standard exceeded the standard up to level of health impact (Department of Pollution Control, 2012).

Dust that cause human health problem are coarse dust (with size not larger than 10 microns: PM₁₀) and fine dust (with size not exceed 2.5 microns: PM_{2.5}). This fine dust will be able to penetrate the body immune

system to irritate inside organ such as skin, eye and respiratory tract, especially lung. This is congruent to prior research was revealed that dust with smaller than 5 microns would be able to attach to lower respiratory tract and penetrate to the lung and made lung dysfunction and caused the asthma disease, heart and lung disease. Particularly, it occurred more often in the elderly people who is sick with heart disease and asthma besides the child will be high risk rate than adult (Keerativasi, 2000; Department of Pollution Control, 2012).

One simple way to begin to understand this gap between knowledge and behavior is by thinking of this example: most people know they should eat five to seven servings of fruits and vegetables a day, yet their actual behaviors often do not reflect this knowledge. Similarly, various studies have shown that knowledge of an environmental issue is unlikely to be sufficient to change behavior. For example, Katzev and Johnson (1987) conducted a series of studies demonstrating that individuals who received pamphlets or tip booklets containing information on energy conservation did not significantly change their energy conservation behaviors. It's also important to note that research has shown that if individuals are provided with too much information about environmental problems, they may experience "overload", causing them to feel helpless, and leading to an immobilization of action (Kaplan, 2000). Overall, the research demonstrates that there is a gap between environmental knowledge and actions. Stronger sources of motivation are needed, as human behavior is often difficult to change (Kollmus & Agyeman, 2002, McKenzie-Mohr et. al., 2012). In contrast, while

"declarative knowledge" about environmental problems or issues is unlikely to be sufficient for fostering behavior change, other types of knowledge may be important. This includes "procedural knowledge," or information on how to perform environmentally-responsible actions, and "behavioral competence", or the feeling of being confidence and able to take action (Hines, Hungerford, and Tomera, 1987; Zeleny, 1999).

Lastly, only revealing one to nature has not been exposed to have a direct connection to environmentally responsible behaviors. Much of the research on the effect of exposing one to the natural environmental, therefore far has focused on changes in knowledge and concern. However, the mentioned are not strong predictors of future behavior. Programs get people out into nature, while favorable on many levels may not be the most effectual trail for changing people's actions in their daily lives (Mayer & Franz, 2004). While Chawla (1999) recommends that many environmentalists quality their present career paths to experiences in nature as a child. The reverse disagreement can also be made that many other people who had related experiences as children do not become environmentalists.

It is significant to note that the foundation of research in this area is not particularly strong for either argument, and more research is needed. Emerging research may propose more insights into the ways that one's link to nature can result in environmental actions (Schultz, 2002). This research suggests that one's level of interconnectedness with nature may influence future environmental actions, particularly for young children. Other factors, such as social influences or action skills,

may be much stronger determinants of behavior than spending time in nature, and therefore more vital influences to leverage in environmental outreach programs (Hungerford & Volk, 1990; Cialdini, 2001). Programs may be more effective in encouragement such behaviors if they are based on research-supported strategies rather than ones focused on exposing people to nature.

However, only knowledge could not lead to behavioral alteration. Therefore, diverse studies indicated that the public mind inspiration mediator to change environmental behavior. The studies conducted by Thiengkamol and her colleagues using the structural equation model proving these relationship. Such as the study of Thiengkamol on “Causal Relationship Model of Environmental Education”. It revealed that environmental knowledge is an observed variable of environmental education latent variable affected through inspiration of public mind for environmental conservation to environmental behavior for global warming alleviation. Regarding to other various studies of her colleagues, they also found the similar results (Thiengkamol, 2012e, Donkonchum et al., 2012a; Gonggool et al., 2012b; Kotchachote et al., 2013a; Morrasri et al., 2012b; Mongkonsin et al., 2013b; Phinnarach et al., 2012a; Ruboon et al., 2012a; Tumpracha et al., 2012b; Udonboon et al., 2012b; Waewthaisong et al., 2012a; Lawan et al., 2013; Petchang et al., 2013a; Prasertsri et al., 2013a; Saisunantharom et al., 2013a; Suebsing et al., 2013a).

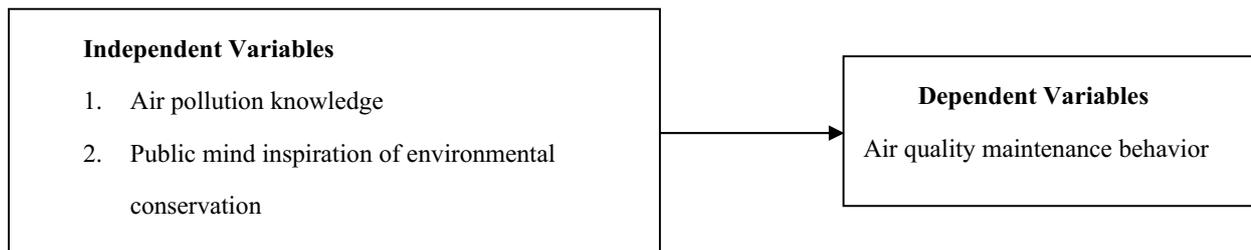
Therefore, this research introduced the public mind inspiration of environmental conservation together with knowledge of air quality maintenance that are

affecting to air quality maintenance behavior at what level by conducting with survey research before implementation to raise air quality maintenance behavior and public mind inspiration of environmental conservation to achieve better practice in agricultural waste decreasing in order to meet the better quality of rural people in the Northeastern region of Thailand (Thiengkamol, 2012e, Donkonchum et al., 2012a; Gonggool et al., 2012b; Kotchachote et al., 2013a; Panich, 2007; Moolmanee et al., 2013).

Objective

1. To study air pollution knowledge, public mind inspiration of environmental conservation and air quality maintenance behavior levels.
2. To study the independent variables comprising air pollution knowledge and public mind inspiration of environmental conservation affecting dependent variable of air quality maintenance behavior of people

Conceptual Framework



Picture 1 Conceptual Framework

Methodology

The research design was implemented in steps by step as the followings.

Population and Sample

The populations were 102,126 peoples who were living at Ban Phue District, Udon Thani Province in Northeastern region of Thailand (Thailand Information Center, 2014). The simple random sampling technique was employed to collect the sample for 400 peoples from at Ban Phue District, Udon Thani Province

Research Tool

The research instrument was the questionnaire and it was used for data collection. The questionnaire consisted of 7 items of demographic characteristics and 30 questions with 5 rating scales of air pollution knowledge, public mind inspiration of environmental conservation and air quality maintenance behavior. The content and structural validity were determined with Item Objective Congruent (IOC) by 5 experts in the aspects of psychology, social science and social research methodology (Rovinelli & Hambleton, 1977). The

reliability was done by collecting the sample group from 50 peoples of Hai Sok Sub-district, Ban Phue District, Udon Thani Province which was the similar characteristic of people and location and they were not sample group. The reliability was determined with Cronbach's Alpha (Cronbach, 1951). The reliability of air pollution knowledge, public mind inspiration of environmental conservation, air quality maintenance behavior and total questionnaire were 0.935, 0.932, 0.941 and 0.956 respectively.

Data Collection

The questionnaire was used for data collecting from Phue District, Udon Thani Province during February to April in 2013.

Statistical Analysis

1. The descriptive statistics were used that included frequency, percentage, mean and standard deviation. The rating for explanation of level of knowledge, public mind inspiration and behavior were as the followings:

Table1*The rating for explanation of level of behavior*

| Rating | Level of behavior |
|-----------|-------------------|
| 0-1.50 | very low |
| 1.51-2.50 | low |
| 2.51-3.50 | moderate |
| 3.51-4.50 | more |
| 4.51-5.00 | most |

2. The inferential statistics used was Multiple Regression Analysis (Hair et al., 1998) by considering confident interval at 0.05 and 0.01.

Results

1. General Characteristics of Sample Group

The 400 peoples who live at Ban Phue District, Udon Thani Province in the year of 2013. They were collected by Multistage random sampling technique. Most of them were female (59.50%) with the age average of 37.13 years old. They graduated at lower secondary level with 141 (35.25%), and were agriculturist (56.00%). They had family income per month with average of 10,431.73 baht and they had duration of living with average of 25.64 years.

The distance between house and air pollution sources is in an average of 2.87 kilometers,

2. Results of Air Pollution Knowledge Level

The results of air pollution knowledge level of 400 peoples had total mean score at more level with 3.90. Considering on each aspect, it was revealed that Air pollution means the state that air contaminates with

pollutant, toxic substances or toxic gases in a dangerous amount, Pollutant is gas which is contaminant in the atmosphere or pollutant in terms of gases, and Family members should have environmental conservation behavior, particularly air pollution prevention were at more level with 4.16, 4.16 and 4.16. Subsequences were sugarcane Leaf burning causes dust that affects to air quality, People should pay attention to monitor the information of air pollution in community through village broadcast tower, Smoke is particles of carbon dioxides that occurred from fuel combustion such as petroleum, coal, wood and dried grass and Sugarcane leaf burning cause less pollution with 4.09, 4.09, 3.79 and 3.79 respectively as presented in table 2.

Table 2*Air Pollution Knowledge Level*

| Air Pollution Knowledge Level | | \bar{X} | S.D. | Level |
|---------------------------------------|---|-----------|------|-------|
| 1. | Air pollution means the state that air contaminates with pollutant, toxic substances or toxic gases in a dangerous amount. | 4.16 | 0.91 | More |
| 2. | Sugarcane leaf burning causes dust that affects to air quality. | 4.09 | 0.91 | More |
| 3. | Smoke is particles of carbon dioxides that occurred from fuel combustion such as petroleum, coal, wood and dried grass. | 3.79 | 0.97 | More |
| 4. | Pollutant is gas which is contaminant in the atmosphere or pollutant in terms of gases. | 4.16 | 0.90 | More |
| 5. | People should pay attention to monitor the information of air pollution in community through village broadcast tower. | 4.09 | 0.91 | More |
| 6. | Sugarcane leaf burning cause less pollution. | 3.79 | 0.97 | More |
| 7. | Family members should have environmental conservation behavior, particularly air pollution prevention. | 4.16 | 0.90 | More |
| 8. | Peoples did not pay attention to the pollution problem from sugarcane leaf, corncob and rice stubble burning. | 3.51 | 1.22 | More |
| 9. | Member of the House of Representatives, community leaders, experts, local governmental officers are the prototype and being good inspiration for air pollution problem solving. | 3.39 | 1.01 | More |
| 10. | Participation on air pollution problem solving of sugarcane leaf, corncob and rice stubble burning would inspire people to collaborate. | 3.77 | 0.92 | More |
| Mean of Air Pollution Knowledge Level | | 3.90 | 0.83 | More |

3. Results of Public Mind Inspiration of Environmental Conservation Level

The findings revealed that public mind inspiration of environmental conservation level of 400 peoples in holistic view was at more level with 4.07. While considering on each aspect, it was revealed that One participates in the meeting, seminar about current

environmental situation, and then one would be inspired to conserve the environment was at most level with 4.74.

Subsequences were Actor and singer should be a good role model and inspiration creating for environmental conservation, One praises and gives honor for one who practices as good role model for environmental conservation, Teacher should be a good role model for

student for environmental conservation and One feels environmental conservation with 4.16, 4.13, 4.09 and 4.09 good impression for closed person who express for respectively as presented in table 3.

Table 3

Public Mind Inspiration of Environmental Conservation Level

| Environmental Conservation Inspiration Level | | \bar{X} | S.D. | Level |
|---|---|-----------|------|-------|
| 1. | Teacher should be a good role model for student for environmental conservation. | 4.09 | 0.91 | More |
| 2. | Country and community leaders should be a good role model and inspiration creating for environmental conservation. | 3.79 | 0.97 | More |
| 3. | Actor and singer should be a good role model and inspiration creating for environmental conservation. | 4.16 | 0.90 | More |
| 4. | One feels good impression for closed person who express for environmental conservation. | 4.09 | 0.91 | More |
| 5. | One admires and is inspired to follow the famous people practice on environmental conservation. | 3.96 | 0.81 | More |
| 6. | One learns from fauna and flora conservation and one would be inspired for environmental conservation. | 4.00 | 0.72 | More |
| 7. | One is impressive in environment of national forest park. | 4.06 | 0.89 | More |
| 8. | One feels happy when participates in environmental conservation activity. | 3.96 | 0.85 | More |
| 9. | One praises and gives honor for one who practices as good role model for environmental conservation. | 4.13 | 0.84 | More |
| 10. | One participates in the meeting, seminar about current environmental situation, and then one would be inspired to conserve the environment. | 4.74 | 0.77 | Most |
| Mean of Public Mind Inspiration of Environmental Conservation Level | | 4.07 | 1.26 | More |

4. Results of Air Quality Maintenance Behavior Level

The findings revealed that air quality maintenance behavior level of 400 peoples in holistic view was at more level with 4.01. On each aspect, it was revealed that Community must have projects and activities to prevent air pollution was at more level with 4.18. Subsequences were One advises the agriculturist to

decrease sugarcane leaf burning to eliminate air pollution problem, One cultivates and maintains the tree to increase clean air, One expresses the behavior as model for pollution prevention and Agriculturist does not burn sugarcane leaf to eliminate air pollution problem with 4.16, 4.16, 4.09 and 4.09 respectively as presented in table

Table 4*Air Quality Maintenance Behavior Level*

| Air Quality Maintenance Behavior Level | | \bar{X} | S.D. | Level |
|--|--|-----------|------|-------|
| 1. | One expresses the behavior as model for pollution prevention. | 4.09 | 0.80 | More |
| 2. | One advises the agriculturist to decrease sugarcane leaf burning to eliminate air pollution problem. | 4.16 | 0.80 | More |
| 3. | One advices the agriculturist to control sugarcane leaf burning to eliminate air pollution problem. | 3.92 | 0.88 | More |
| 4. | Agriculturist does not burn sugarcane leaf to eliminate air pollution problem. | 4.09 | 0.91 | More |
| 5. | One should participate for planning to solve the air pollution in community. | 3.79 | 0.97 | More |
| 6. | One cultivates and maintains the tree to increase clean air. | 4.16 | 0.90 | More |
| 7. | One must prevent oneself from dust to enter to body. | 3.96 | 0.88 | More |
| 8. | Dust prevention should start at oneself, family and community firstly. | 3.86 | 0.86 | More |
| 9. | Community must have policy and plan to prevent air pollution. | 3.90 | 1.09 | More |
| 10. | Community must have projects and activities to prevent air pollution. | 4.18 | 0.90 | More |
| Mean of Air Quality Maintenance Behavior Level | | 4.01 | 0.90 | More |

5. Effect of Air Pollution Knowledge and Public Mind Inspiration of Environmental Conservation on Air Quality Maintenance Behavior

The air pollution knowledge and public mind inspiration of environmental conservation affected to air quality maintenance behavior as presented in table 5 and 6.

Table 5

Result Analysis Prediction Power of Air Pollution Knowledge and Public Mind Inspiration of Environmental Conservation Affecting Air Quality Maintenance Behavior

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|--------------------|----------|-------------------|----------------------------|
| 1 | 0.780 ^a | 0.608 | 0.606 | 0.3718 |

- a. Predictors: Constant, Air Pollution Knowledge, Public Mind Inspiration of Environmental Conservation
- b. Dependent Variable: Air Quality Maintenance Behavior

Table 6

Multiple Linear Regression Analysis between Air Pollution Knowledge and Public Mind Inspiration of Environmental Conservation Affecting Air Quality Maintenance Behavior

| | Model | Sum of Squares | df | Mean Square | F | Sig. |
|---|------------|----------------|-----|-------------|----------|--------------------|
| 1 | Regression | 85.323 | 2 | 42.616 | 308.1817 | 0.000 ^a |
| | Residual | 54.898 | 397 | 0.183 | | |
| | Total | 140.131 | 399 | | | |

a. Predictors: Air Pollution Knowledge, Public Mind Inspiration of Environmental Conservation

b. Dependent: Variable: Air Quality Maintenance Behavior

From table 5 and 6 when Multiple Linear Regression was analyzed between independent variable of air pollution knowledge, public mind inspiration of environmental conservation affecting to dependent variable of air quality maintenance behavior, it was found that regression coefficient equaled to 0.780 (78.00%) and coefficient of R Square was 0.608 (60.80 %) at statistically significant with level of 0.01. After it was adjusted, the coefficient of R Square with power of prediction was 0.606 (60.60%).

6. The Relationship among Air Pollution Knowledge and Public Mind Inspiration of Environmental Conservation on Air Quality Maintenance Behavior

Relationship among air pollution knowledge and public mind inspiration of environmental conservation on air quality maintenance behavior, the result illustrated in table 7.

Table 7

Relationship between Air Pollution Knowledge and Public Mind Inspiration of Environmental Conservation Affecting Air Quality Maintenance Behavior

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---------------------------|-----------------------------|------------|---------------------------|--------|--------|
| | B | Std. Error | Beta | | |
| Constant | 0.369 | 0.148 | - | 2.486 | 0.013* |
| 1 Air Pollution Knowledge | 0.804 | 0.046 | 0.672 | 17.502 | 0.00** |
| Public Mind Inspiration | 0.123 | 0.028 | 0.166 | 4.321 | 0.00** |

a. Predictors: Air Pollution Knowledge, Public Mind Inspiration of Environmental Conservation

b. Dependent: Variable: Air Quality Maintenance Behavior

From table 7, linear regression equation, it was revealed that independent variable of air pollution knowledge and public mind inspiration of environmental conservation affecting to dependent variable of air quality maintenance

$$y = a + b_1x_1 + b_2x_2 \dots \dots \dots (1)$$

When

y = Air Quality Maintenance Behavior as Dependent Variable

a = constant value

b1 = Coefficient relation of Air Pollution Knowledge

x1 = Air Pollution Knowledge as Independent Variable

b2 = Coefficient relation of Environmental Conservation Inspiration

x2 = Public Mind Inspiration of Environmental Conservation as Independent Variable

The prediction equation of relationship air pollution knowledge, public mind inspiration of environmental conservation affected to dependent variable of people air quality maintenance behavior. It can be explained that air pollution knowledge was the most effect to people air

$$y = 0.00 + 0.672x_1 + 0.166x_2 \dots \dots \dots (2)$$

Discussions

The results indicated that the air pollution knowledge, environmental conservation inspiration, and people air quality maintenance behavior were at more levels. Moreover, the prediction equation of relationship of air pollution knowledge, public mind inspiration of environmental conservation affecting to dependent variable of people air quality maintenance behavior but the air pollution knowledge was the most effective prediction. This implies that air pollution knowledge was the most effect to people air quality maintenance behavior

behavior with statistically significant at level of 0.01, and 0.01.

The equation 1 can be written as the following.

quality maintenance behavior with 67.20 percents with statistically significant at level of 0.01. Subsequence was public mind inspiration of environmental conservation with 16.60 percents with statistically significant at level of 0.01 as the following equation 2.

with 67.20 percents, therefore people who has more knowledge of air pollution would be more understanding to take responsibility to participate to maintain air quality, moreover if local peoples are added with public mind inspiration of environmental conservation, therefore they would have better behavior of air quality maintenance. The results were harmonious to the studies of Lawan et al., 2013; Gonggool et al., 2012b; Morrasri et al., 2012b; Mongkonsin et al., 2013b; Petchang et al., 2013a; Phinnarach et al., 2012a.



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