

CHAPTER TWO

REVIEW OF LITTERATURE

To find out relationship between Environmental Awareness and Environmentally Friendly Behavior, the researcher conducted a study of Solid Wastes Management in Department of Environmental Quality Promotion. Furthermore, the researcher has studied the documents, concepts, theories and related researches to support the study which are listed as follows:

2.1 THEORY OF SOLID WASTES

2.1.1 Knowledge on Solid Wastes

Meaning of Solid Wastes

According to the Public Health Act of 1992, “Solid Wastes means remains of a meal; cloth; plastic bag; beverage carton; carrion; and animal feces, and including any object kept from street, market or farm.”

Solid wastes means the compostable and non-compostable unwanted material from households, workplaces, and industrial manufactures; for instance, leavings of a meal, clothing, and materials from the demolition or from construction such as remains of a car and sediments of wastes. (Chamroon Yasmutra,1984:137)

National Environmental Board (สำนักงานคณะกรรมการสิ่งแวดล้อมแห่งชาติ, 2532: 136-137) defined “Solid wastes” thus:

Solid Wastes are all kinds of unwanted objects from human beings’ activities that people leave comprising vegetable; feces; carrion of animal; ashes; dust; pieces of cloth; remnant of food; ashes; and also materials that were kept from house; building; street; fresh market; farm; and manufacture.

Garbage is the remains of food, vegetable, carrion of animal, and materials left from cooking mostly founded in fresh market. Garbage is easily decomposed because it comprises organic matters. If garbage was left unintended for a long period, it would decay and produce bad smell.

Rubbish means both flammable and inflammable wastes which are not easily decayed such as pieces of paper; glass; can; bottle; pieces of wood; metal; branch; ash and dust.

Compostable Wastes means organic matters in wastes that can be decomposed by micro organism, the Bio-chemical reaction.

Non Compostable Wastes means inorganic matters that are hardly decomposed by bio-chemical reaction such as remains of metal and plastic bag, etc.

Combustible Refuse is the flammable wastes such as pieces of paper and wood

Non Combustible Refuse is the inflammable wastes such as pieces of metal and glass.

2.1.2 Classification of Solid Wastes

Solid wastes can be classified into 3 categories by place of its origin, type, and characteristic of wastes

2.1.2.1 Place of Origin: it is subdivided into 3 categories

1. Community wastes
2. Agricultural wastes
3. Industrial wastes

2.1.2.2 Types of Wastes

1. General wastes are generated from human beings' consumption such as leaving of a meal; vegetable; plastic bag; pieces of cloth; metal; glass; wood; tire; rubber; stone; sand, and gravel, etc. Most of them come from restaurant, fresh market, shop, public place and workplace.

2. Hazardous wastes are released from the community, industrial manufactory, agriculture and business sector. They involve the usage of the flammable; toxic; explosive; radioactive; or corrosive substances causing the effects on health and security of life of human beings and living creatures. (อภิศักดิ์ ทองไข่มุกด์, 2534: 1-2)

2.1.2.3 Characteristics of Wastes

1. **Chemical Characteristics** are classified by the crucial chemical components in wastes consisting of the quantity of water, the flammable substances, and ashes

2. **Physical Characteristics** are identified by the important physical components of wastes comprising the flammable materials such as pieces of

cloth, remains of a meal, leaf, dried grass; and the inflammable materials such as metal, glass stone, gravel, etc. (ឧបទ្ទេស ឧបទ្ទេស, 2532: 27)

2.2 CONCEPT OF SOLID WASTES MANAGEMENT

2.2.1 Factors affecting the increase of quantity and the characteristics of solid wastes

General wastes comprise the remains of food, vegetable, pieces of paper and glass, and can, the quantity and the component of which depend on the following factors:

2.2.1.1 Location of community: if the community is located in a suburban area, the compostable wastes will be less because it would be used for hog feeding, for example.

2.2.1.2 Season: in season of plenty fruits, the compostable wastes like peel, skin, and shell of fruits will be plentiful

2.2.2 Effects on Inaccurate Solid Waste Management

2.2.2.1. Water Resources: littering solid wastes in the water way, streams, and canals causes severe effects on the on-land and underground water. The degree of seriousness depends on the components in wastes and the geography of those areas. Solid wastes, for example, left untended can fly away and fall into the river causing the uncomfortable water way; furthermore, wastes accumulated in the rivers and streams will block the running of water and make it dirty.

2.2.2.2. Air Pollution: Burning wastes discharges ashes and smoke through the air and atmosphere, and importantly it distributes Carbondioxide and Dioxin, the toxic containing Chlorine such as PCB (Polychlorinated Biphenyls) and PVC (Polyvinyl Chloride)

2.2.2.3 Sources of Infection: piles of solid wastes provide the good sources of infection, that is, they can be the habitat of disease's carriers like rats, cockroaches, and insects

2.2.2.4 Perspective Pollution: mountains of wastes cause the awful scenery in the community.

A good sound solid wastes management policy is “Classifying wastes at places of its origin”. The analysis of wastes in Bangkok Metropolis in 1988 revealed the highest amount was of paper and plastic (14.21% and 12.76%) both of which were the recycled wastes. Plastic, the durable material, is non compostable; however, we can reduce the degree of its seriousness by classifying at the place of its origin. In short, the effective wastes management can reduce cost, gain more incomes, and strengthen the effective use of natural resources.

2.2.3 Concept of Solid Wastes Management

2.2.3.1 Refuse Collection: the effective strategy is the refuse collection at the beginning stage since the well organized wastes collection plan will motivate other relevant procedures run systematically. This is the reason why every house should have one trash can for the household’s wastes management.

1. One-Can System: All kind of wastes will be collected in only one can
2. Two-Can System: One can is for the Garbage, which officer will collect daily and another for the Rubbish which will then be destroyed by incineration.
3. Three-Can System: This system suites the community having various kinds of solid wastes management. Moreover, the system should be in relation to the characteristics of solid wastes in the area. The first can is for garbage which will then be hog feed, and be decomposed. The second is for the combustible refuse, and the third one is for the non combustible refuse.
4. The collection of hazardous wastes: The collection of infectious wastes generated from the hospitals, clinics, and health centers have to be conducted carefully concerns, lest it should be contaminated and spread out. Practically, infectious wastes needs to be tightly wrapped in plastic bags with rope

2.2.3.2 Solid Wastes Management

The sanitary solid wastes management comprises 3 methods:

1. **Incineration** is a system designated to reduce the amount of hazardous wastes by burning at the temperature not less than 800 Degree Celsius for the complete burn. However, the system should have a good sound environmental

management when releasing ashes and smoke through the air during and after the burning process. The incineration is widely recommended for infectious wastes.

2. **Composting** is appropriate for the compostable wastes. The process is started by cutting the wastes into small pieces before composting. Problems of composting are “the quality of the compost” and “contamination of the non compostable wastes”

3. **Sanitary Landfill** the process starts from extracting and squeezing the wastes, aiming to increase its density before filling up the landfill. During the processes, indented wastes will be wrapped with covering material and soil, each layer of which is not less than 60 centimeters high. However, after the procedures, solid wastes would decompose, and then generate methane, the combustible gas, so the installment of tube for releasing methane through the air is very important. Leachate, the wastes water produced from compostable wastes, percolates into soil layers causing serious soil pollution; as a result, the wastes water treatments are needed in order to amend the leachate problem occurring after the landfill solution. (อุษณีย์ อุษะเสถียร, 2532)

2.2.3.3 Transformation and Making the Most of Wastes

Generally, solid wastes are the unwanted materials that people litter; however, we can make another use of them by recovering. For instance, wastes can provide sources of energy, reused materials, and covering material for landfill. Not only does the wastes management concept aim to eradicate the refuse, but also it tries to make advantages on every object effectively. The increasing number of population in Bangkok have reflected a great quantity of solid wastes; as a result, degree of severity will be multiplied if we still ignore its significances, thus the effective sanitary solid wastes management is very much demanded to control and reduce the amount of wastes. In short, reducing is the best practice of solid wastes solution since it helps decrease the amount of the refuse by trying not to produce wastes as much as we can.

2.2.3.4 Material Recovery (เกรศ ศรีสถิตย์, 2532:107-109)

Material recovery can be practiced in several ways which can be summarized into 3 main groups as follows:

1. **Material Recovery** is the process of bringing back the advantages of wastes after classifying them. The recovered materials consist of plastic, paper, wood, metal, and leaving of a meal. Materials can be recovered by putting them into the transformation and non transformation process before making another use of them.

1.1 **Non Transformation:** glass bottle

1.2 **Transformation:** paper, plastic, and metal (and including leavings of a meal for hog feeding)

2. **Energy Recovery** is a process of transforming wastes into heat energy and Bio-fuel gas. The burning of wastes will distribute heat energy for generating electricity. Small pieces of wastes will be a source of fuel energy for industrial manufactory; moreover, composting will produce biological gas, Methane, for example.

3. **Composition and Land Reclamation** is the process of composting aiming to produce soil conditioning. Farmers do not like it too much because of its low quality and having only few nutrients; however, it is considered a creative solution for reducing wastes

4. **Limitation of Material Recovery**

4.1 Knowledge and technology

4.2 Economy problems: lack of funding and unworthy investment

4.3 Cooperation of Stakeholder

2.2.3.5 Process of Classifying Wastes

The best practice of classifying wastes can be started at the place of its origin especially at household (Cannon and Smith, 1975: 305-306). The community should provide cans in respect to the categories of wastes. Also, the community should offer the Group-off Centers, where all kinds of trash cans are placed for people in the community to access. The Buy-Back Center is for purchasing the reused materials; moreover, the Recycle Bank is established for solving the wastes problem and generating incomes for the community. Wastes can be divided into 6 main categories based on the characteristics and advantages after classifying. (EPA,1989: 62-65)

1. Paper: Newspaper, Hard paper, A4 paper, Box paper
2. Aluminum: Soda pop cans, Window frame, etc.
3. Glass bottle: clear colored bottle and beer bottle
4. Metal: Remains of a car and engine, metal, and pieces of metal
5. Plastic: Beverage carton and plastic
6. Battery: Battery of automobile, dry cell battery, lithium ions battery for cell phone, and alkaline battery

2.3 CONCEPT OF KNOWLEDGE AND AWARENESS

2.3.1. Meaning of knowledge:

Good (1973: 325) stated that knowledge is a kind of fact, truth, rule, and information that people have accumulated. Webster expanded that knowledge related to fact, rule and framework which were developed from the studying and research. Moreover, knowledge is related to places and objects and is received from observation, experience and reporting. All the perception of knowledge depends on the duration (Webster 1977:531). Webster's definition resembles Wichai's saying that knowledge is primary behavior that learners can remember or recall by seeing or hearing. The knowledge in this stage is fact, rule and definition (Wanchai Wongyai,1980: 130).

In short, knowledge means fact, truth and rule that people have directly and indirectly accumulated from perceptions and experiences. Knowledge, moreover, can be developed by study and research the quality of which depends on duration of informative collection.

2.3.2 Level of Knowledge

Bloom, Thomas, and George separated the level of behavioral knowledge into 6 levels starting from easy to hard level

2.3.2.1 Level 1: **Recall** is the stage of the brain having ability in maintaining memories

2.3.2.2 Level 2: **Comprehension** is the ability in communicating with people, and in understanding desires and needs of self and others

2.3.2.3 Level 3: **Application** is the capability to apply knowledge, recall, and comprehension in solving problems. It is the capacity of people in applying knowledge for practical use

2.3.2.4 Level 4: **Analysis** is the competency in systematically criticizing problems and recognizing relationships among small parts in each issue

2.3.2.5 Level 5: **Synthesis** is the capacity in accumulating knowledge systematically to gain more profit

2.3.2.6 Level 6: **Evaluation** is the capacity in assessing the values of objects or choices correctly

2.3.3. Instrumentation for Measuring Knowledge

Knowledge measurement is process of measuring the capability of recall including the experiences measurement. The instrument of knowledge measurement having been satisfyingly employed is the “Test” (Chawal Paerattakul, 1983:201)

Test comprises several features; however, the implementation depends on the specific objectives and goals (Boontham Kijpreedaborisuth, 1991: 68-70). The instrumentations for knowledge measurements can be classified as follows:

2.3.3.1 Psychological Measurement:

1. Achievement Test: the test measures the comprehension developed from learning

2. Aptitude Test: the test measures the capability of the brain of a person at what level one has knowledge and comprehension, or what special knowledge and competency that a person possesses.

3. Personal-Social Test: the test measures personal characteristics and adaptation in society of a person

2.3.3.2 Style of Answering Question:

1. Essay Test: respondents will provide personal answers

2. Short Answer and Multiple Choice Test: the test offers questions and answers. The respondents have to choose one from a group of multiple choices provided in each question

2.1 Short Answer Item

2.2 True-False Item

2.3 Matching Item

2.4 Multiple Choice Item

2.3.3.3 Answering Method: divided into 3 types

1. Performance Test: It's the practical test in which respondents will be asked to perform an activity such as performance show, carving, typing, etc.

2. Paper-pencil Test: The general test in which the repliers need to write all answers down.

3. Oral Test: The test gives opportunity to repliers to talk such as interviewing test.

2.3.3.4 Duration: divided into 2 types

1. Speed Test: the test is provided with number of questions but short time for answering, the test is regulated by time limitation

2. Power Test: the test is not fixed by time. The replier can spend as much time as he or she prefers.

2.3.3.5 Criteria: divided into 2 types

1. Criterion-Referenced Test: The test measures respondents' comprehension on objectives or lessons learned

2. Norm-Referenced Test: The test compares the results of the test among the repliers

2.3.4 Awareness

2.3.4 1. Meanings of Awareness

Bloom, Thomas, and George gave the definition that awareness is the “**Affective Domain**” (ขั้นต่ำสุดของอารมณ์และความรู้สึก) resembling the meaning of knowledge in that neither knowledge nor awareness emphasize on stimulus. The difference is that awareness is not a phenomenon; on the other hand, the awareness is generated when it is stimulated and motivated. Runes asserted that awareness is the action with consciousness (Runes 1971:32). Awareness is an action expressing personal emotion or the expression of responsibility in problems (Good, 1973:54). Moreover, awareness means the situation in which people comprehend or recognize something from experiences. Good purposed that awareness means any action

illustrating the recall and perception of a person toward things, and also means the stage of having knowledge and consciousness (Good,1973, กล่าวถึงใน จิตติมา นิยมสรวณ ,2537)

Awareness, therefore, means the expression of behaviors that are related to the thought and consciousness encouraged by surrounding stimulus. This process will help lead through learning system. If a person realizes the value of an action and prepares to do it , it shows that that person has the awareness in mind set. However, the degree of awareness depends on the personal thought, personality development, popularity, experience.(Jasmin and Trygstad, 1979, กล่าวถึงใน จิราภรณ์ ทิพยศกุลลักษณ์, 2547).

Nelson stated that awareness means that a person gains experiences and then takes them into consideration to evaluate how experiences contribute to their awareness.

In summary, awareness is the consciousness and comprehension generated from personal experiences, happening when a person is stimulated and motivated. It strengthens the personal perception, and then leads to the total perception, learning, and awareness.(จรัสพิมพ์ อรรณนพพร,2539)

2.3.4.2 Awareness measurement

Since awareness is the delicate behavior relating feelings and emotions, the measurement needs specific concepts, methods and techniques for accurate and believable results (Chawal Paerattakul: 201-223). The methods of measuring awareness are purposed as follows:

1. Interview

1.1 Structured Item: interview with prepared questions and answer choices

1.2 Unstructured Item: The interview provides only the main questions, so the respondents can deliver the answer freely

2. Questionnaire

2.1 Closed end

2.2 Opened end

2.3 Closed and opened end

3. Checklist: the tool aims to find agreement or disagreement of respondents by giving comments

4. Rating Scale: the instrument aims to measure the intensity of feelings and emotion

5. Semantic Differential technique: the material aims to find the meanings of attitudes by trying to illustrate the attitudes. The perspectives will be regulated by providing definition such as word, phrase, and sentences: good; bad, true; false, pretty; ugly, strong; weak, etc.

In this research, the researcher employs the closed end and rating scale test to measure subjects' knowledge, recall, and comprehension. These tests will be employed to measure behavior by following the theory of Bloom, Thomas, and George. The researcher will also measure only 4 levels, namely, Recall, Comprehension, Application, and Analysis to find out the relationship between awareness and environmentally friendly behavior on solid wastes management. The awareness will be measured by the rating scale measurement

2.4 RELEVANT RESERCH

Umadee Tanaponpadunkul (1995) studied the factors affecting the acceptance of solid wastes separation: a case study of condominium residents in Bangkok. The research analysis revealed that there were 5 factors affecting the acceptance the wastes separation, that were, number of people in a family, religion, education, intention to change their residence and occupation. Obviously, all the significant factors clarified that we would like to strengthen behavior of a person in conserving and protecting environment and natural resources. As a result, mentioned factors affecting the motivation of participatory behavior were needed for consideration. Thus, awareness is an interesting factor. We should find out whether it relates to environmentally friendly behavior. If we find the relationship between both variables, we will be able to conduct activities strengthening the positive changes of human beings' behavior.

The research on the construction of Environmental Education Training Curriculum on Household Solid Wastes Management for the community committee in Nakhonprathom Municipality conducted by Somsuoi Sarangbin (1995) employed the constructed environmental education training model with the target group. The findings suggested that the constructed training was approved and improved in order that it helped increase knowledge and awareness on household wastes management. The research built up the training by employing the learning cycle of environmental education goal, that is, awareness, knowledge, attitude, skill, evaluation ability, and participation, aiming to achieve the goal of building up the environmental awareness.(UNESCO,1976)

The relevant researches showed that awareness was a crucial factor that came into consideration of the international organizations like UNESCO, so conducting the research relating to the awareness and behavior might show the motivation of people's mind set, awareness, or attitude, all that will make changes on the behavior in conserving the environment and natural resources.