

27 DEC 2000



**WASTE REDUCTION BEHAVIOR OF RESIDENTS
IN TOWNHOUSE VILLAGES IN CHATUCHAK DISTRICT,
BANGKOK METROPOLIS**

SOITHIP WEERASOONTHON

อธิษัณนากการ

จาก

บัณฑิตวิทยาลัย มหาวิทยาลัยมหิดล.....

**A THESIS SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR
THE DEGREE OF MASTER OF ARTS (ENVIRONMENT)
FACULTY OF GRADUATE STUDIES
MAHIDOL UNIVERSITY**

2000

ISBN 974-664-995-7

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Thesis
entitled

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IN TOWNHOUSE VILLAGES IN CHATUCHAK DISTRICT,
BANGKOK METROPOLIS**

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was submitted to Faculty of Graduate Studies, Mahidol University
for the degree of Master of Arts (Environment)

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ACKNOWLEDGEMENT

As a part of my success, I would like to express my special thanks to Expressway and Rapid Transit Authority of Thailand for granting me this invaluable advanced study.

Furthermore, this thesis would have not been carried out without kindly helps and supports of Assoc. Prof. Jiraporn Chuckpaiwong, Chairman of Thesis Committee, Asst. Prof. Pannipa Buraphacheep and Asst. Prof. Shutima Saengngern, Members of the Committee. I would like to express my deepest regards and sincerest gratitude to them for the completion of this thesis.

Appreciated thanks also go to Mr. Anuchit Charoensrisomchit for his generous helps and suggestions as the Thesis Committee Member, to Department of Public Cleansing, Bangkok Metropolitan Administration, to Chatuchak District Office and to all sample residents.

My heartiest gratitude is extended to all lecturers and all officials at Faculty of Social Sciences and Humanities, Mahidol University, including Silpakorn University where enables me to distillate my English knowledge to conduct this thesis.

For sympathetic supports, my heartfelt thanks go to Kai, Tick, Tab and all my colleagues at Central Administration Division, Expressway Project Department, ETA.

Extraordinarily, there are no words to describe the great journeys towards worth knowledge, joys and happiness created in my class. I wish to record my everlasting gratitude to all my classmates and Mrs. Cha-oun for filling me with wonderful discoveries.

I would like to express my appreciation to Acting Sub. Lt. Weresak Wongcong, Chat, Tong and Ying for sharing a spiritual journey towards the development of this thesis with me, for inspiring me to do the best I can do and for motivating me to higher achievement.

I thank my sister Nungduan for putting her hearts and souls into producing this thesis and supporting me through my difficult times.

Finally, I owe an enormous amount of all success in my life to my beloved parents, my brother, and my relatives for their sacrificed and morale supports. This thesis is dedicated with deepest love and affection to them.

4137337 SHEV/M : MAJOR : ENVIRONMENT ; M.A. (ENVIRONMENT)

KEY WORDS : BEHAVIOR / WASTE REDUCTION

SOITHIP WEERASOONTHON : WASTE REDUCTION BEHAVIOR OF RESIDENTS IN TOWNHOUSE VILLAGES IN CHATUCHAK DISTRICT, BANGKOK METROPOLIS. THESIS ADVISORS : JIRAPORN CHUCKPAIWONG, ^{B.Econ.} B.A., M.A., PANIPA BURAPHACHEEP, LL.B.(2nd Class Hons.), LL.M., SHUTIMA SAENGNERN, B.A., M.A. 110 P. ISBN 974-664-995-7

The objectives of this research were to study the level of waste reduction behavior of residents in townhouse villages in Chatuchak District, Bangkok Metropolis and to study the factors affecting residents' behavior including problems, obstacles and suggestions. Data were derived from the responses of questionnaires of 400 residents and from the interviews with the executives of Chatuchak District Office and with the village chairmen and committee members. Analyzed by Statistical Package for the Social Sciences, data were presented by percentage, mean, standard deviation, and One-Way Analysis of Variance.

The findings indicated that the waste reduction behavior of residents was at low level. These analyses showed that there were significant differences between experience of waste matters, occupation, knowledge on waste aspects, access to waste information, gender, income and waste reduction behavior (at $p < 0.001$). In addition, length of residence exerted a significant difference on waste reduction behavior (at $p < 0.01$).

The important implications drawn from the findings were to provide the effective processing to gain access to waste information and to disseminate relevant knowledge based on direct experience for contributing to the translation of the principle of waste reduction into practice because people's understanding and readiness will bring about solutions to waste problems.

4137337 SHEV/M : สาขาวิชา : สิ่งแวดล้อม; ศค.ม. (สิ่งแวดล้อม)

สร้อยทิพย์ วีระสุนทร : พฤติกรรมการลดปริมาณมูลฝอยของประชาชนที่อาศัยอยู่ในหมู่บ้านทาวน์เฮาส์ เขตจตุจักร กรุงเทพมหานคร (WASTE REDUCTION BEHAVIOR OF RESIDENTS IN TOWNHOUSE VILLAGES IN CHATUCHAK DISTRICT, BANGKOK METROPOLIS) คณะกรรมการควบคุมวิทยานิพนธ์ : จิราพร จักรไพวงศ์, ศ.บ., ศค.ม.(สิ่งแวดล้อม), พรรณีภา บุรพาชีพ, น.บ.(เกียรตินิยมดี), น.ม., ชุตินา แสงเงิน, กศ.บ., ศค.ม.(สิ่งแวดล้อม), 110 หน้า, ISBN 974-664-995-7

การศึกษานี้ มีวัตถุประสงค์เพื่อศึกษาระดับพฤติกรรม ปัจจัยที่มีผลต่อพฤติกรรมการลดปริมาณมูลฝอยของประชาชนที่อาศัยอยู่ในหมู่บ้านทาวน์เฮาส์ เขตจตุจักร กรุงเทพมหานคร รวมถึงปัญหา อุปสรรค และข้อเสนอแนะ เก็บรวบรวมข้อมูลโดยการใช้แบบสอบถาม สำหรับตัวแทนครัวเรือน จำนวน 400 ราย และโดยการใช้แบบสัมภาษณ์ สำหรับผู้บริหารของสำนักงานเขตจตุจักร จำนวน 4 ราย และประธานและกรรมการหมู่บ้าน จำนวน 4 ราย จากนั้นจึงนำข้อมูลมาวิเคราะห์ด้วยโปรแกรมสำเร็จรูปสำหรับการวิจัยทางสังคมศาสตร์ (Statistical Package for the Social Sciences – SPSS for windows) โดยใช้อัตราส่วนร้อยละ ค่าเฉลี่ย ค่าเบี่ยงเบนมาตรฐาน และการวิเคราะห์การผันแปรทางเดียว

ผลการศึกษา พบว่า พฤติกรรมการลดปริมาณมูลฝอยของประชาชนที่อาศัยอยู่ในหมู่บ้านทาวน์เฮาส์ เขตจตุจักร กรุงเทพมหานคร อยู่ในระดับต่ำ ปัจจัยที่มีผลต่อพฤติกรรมการลดปริมาณมูลฝอย ได้แก่ ประสิทธิภาพเกี่ยวกับมูลฝอย อาชีพ ความรู้เกี่ยวกับมูลฝอย การรับรู้ข่าวสารเกี่ยวกับมูลฝอย เพศ และรายได้เฉลี่ยต่อเดือน มีผลต่อพฤติกรรมการลดปริมาณมูลฝอยอย่างมีนัยสำคัญทางสถิติ ที่ระดับ 0.001 สำหรับระยะเวลาที่อยู่อาศัยมีผลต่อพฤติกรรมการลดปริมาณมูลฝอยอย่างมีนัยสำคัญทางสถิติ ที่ระดับ 0.01

ข้อเสนอแนะ หน่วยงานที่เกี่ยวข้องควรจัดกระบวนการเผยแพร่ข้อมูลข่าวสารที่สำคัญเกี่ยวกับมูลฝอยให้แก่ประชาชนอย่างมีประสิทธิภาพมากขึ้น รวมทั้งให้ความรู้เกี่ยวกับมูลฝอยโดยเน้นทั้งภาคทฤษฎีและปฏิบัติ เนื่องด้วยความรู้ความเข้าใจและความพร้อมของประชาชนจะนำไปสู่การแก้ไขปัญหามูลฝอยได้

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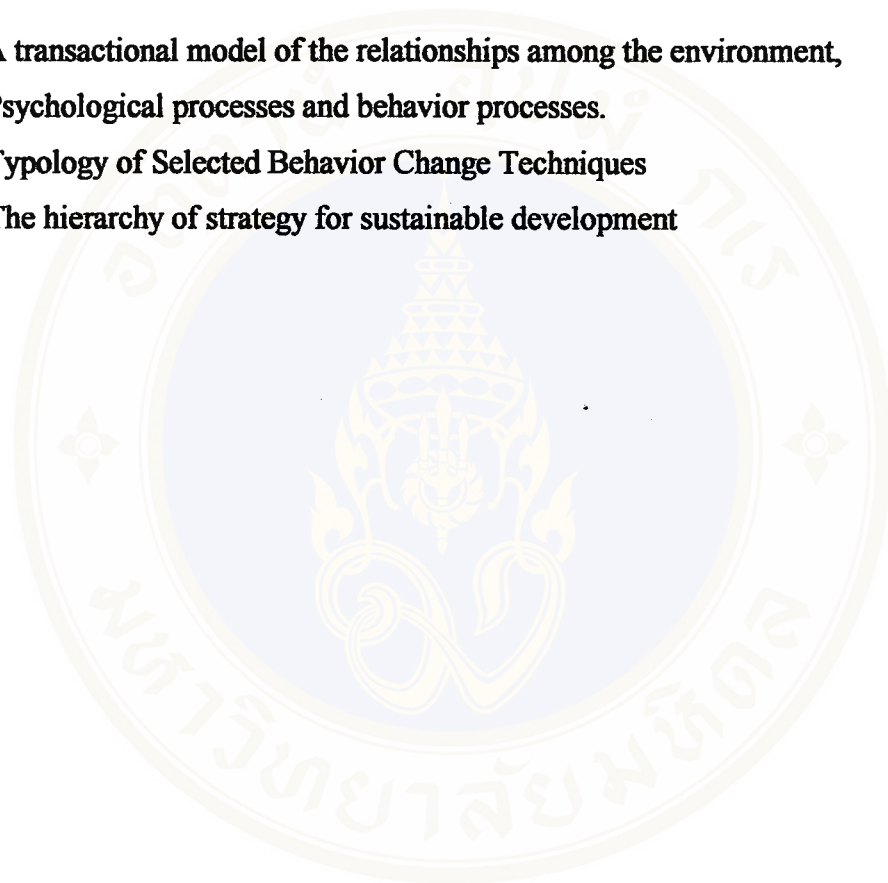
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CHAPTER I

INTRODUCTION

1.1 Background

Caring for the Earth, a Strategy for Sustainable Living, defines that the aim of development is to improve the quality of human life and that economic growth is only one part of development (IUCN et al.,1991:5). This principle is in compliance with Agenda 21 (UNDP,1992:178) recognizing that good environmental policies are good economic policies and vice versa, and that efficient growth need not be an enemy of the environment, and the best policies for environmental protection will help, not hurt economic development.

Environmental crises currently can be said to be the fruit of development emphasizing on the achievement of economic aim that has made living reach higher standard. Therefore, modernity and comforts have played an important role in several ways of living. In particular, consumption in simple and self-sufficient way has turned to consumerism system allowing consumption beyond necessity. Additionally, the manufacturers keep developing the new and convenient packages production to satisfy consumers' desire. The mentioned patterns of production and consumption have caused more complex waste structure. For this reason, waste is hard disposed of in the short time, such as, plastic products, foam products, aluminum cans etc.

These have a short usage period but long destructive process, for example, aluminum can spends 400 years on being disposed of (Department of Environmental Quality Promotion, 1999:3). It can not deny the fact that the Age of Convenience is also the Age of Waste.

Waste has far-reaching, long-term and irreversible consequences for human health and the environment. Waste problem is one of the most dramatic environmental problems in the world, especially, in developing countries where waste disposal has not reached the acceptable standard (Ministry of Foreign Affairs, 2537:53). There is a fact that waste is unavoidable to be produced in human routine activities. As pointed out by Kanti Majumder (1996:3), the nature of waste and magnitude of its detrimental effect depend on the sources which generate waste. The major sources are domestic waste, agricultural waste and industrial waste. Waste generation also depends on income, culture, behavior and practice of individuals. Consequently, this problem is not synthesized only in the crisis of controlling and managing waste, but also in the crisis of the prevention and conservation behavior of people.

Bangkok is one of the capitals in the developing countries encountering waste disposal problems considered as one of the important problems. In 1997, there was 13.5 million tons of waste in all parts of the country. The average quantity of waste individual produced was 0.8-1.2 kilograms a day (Department of Environmental Quality Promotion, 1999:3). In 1997, in Bangkok, there was about 8,900 tons a day increased from 800 tons a day in 1996. The waste collection service in its districts is proceeded by Bangkok Metropolitan Administration (BMA) within capacity of 3.23

million tons or 99 percent of all generated waste. For waste disposal, BMA has hired a private sector to operate (Pollution Control Department, 1998:6-3).

In 1998, Bangkok generated up to 8,576 tons of waste a day. If waste augmentation goes on without efficient control, waste volumes about 10,000 tons a day or 3,650,000 tons a year will be generated soon or sooner. (BMA, 1998:40) Rapidly multiplying urban households also generate far more waste than the authorities can handle. The problems of municipal solid waste management stem from several causes as follows (Pollution Control Department, 1998:1-2) :

- 1) Allocated budget of municipal solid waste management is always meager. Service fee collection is also ineffective.
- 2) No active planning on establishing common disposal facility among adjacent communities.
- 3) No definite regulation and guideline of municipal solid waste management hierarchy starting from source separation, collection, transportation, disposal and monitoring.
- 4) Lack of skillful personnel in operating an efficient waste collection and disposal practice.
- 5) Waste recycling program in communities is still scarce.
- 6) Associated existing legislations do not adequately facilitate the municipal solid waste management in an effective direction.
- 7) Public co-operation and participation are quite few, for instance willingness to pay service fee, littering habits, waste source

separation as well as positive support of new disposal facility projects.

Both ineffective waste management and nonenvironmental practitioners have caused environmental pollution and disgusting environment deteriorating our life's quality, environmental quality and national economic development. In addition, some solutions for significant amounts of waste brought about the dispute between government and people to determine where incineration and landfill would take place. However, these are considered as end of pipe solutions.

The effective way to relieve waste problems is waste reduction practice implying that waste reduction can take place either before the waste are generated or after, for example, the recently effective and acceptable ways in waste reduction of BMA's Development Plan Vol. 5 (B.E. 2540 – 2544), consisting of waste prevention, waste recycling and waste separation. However, it is also important to carry out waste reduction practice at the individual level. If individuals could control their desires and plan their lives considerately, massive volumes of waste would be reduced.

In trying to deal with this waste crisis as a problem at the individual level, the researcher has conducted the study on waste reduction behavior of residents applied from the waste reduction patterns of BMA's campaign plan. This plan covers 14 target groups and townhouse is one of them. In this study, townhouse in Chatuchak District, where there are the most amounts of households with regard to BMA's data in January 2000 (<http://www.bma.go.th/html/body-page72html>) as stated in Appendix,

was selected to analyze waste reduction practices comprising waste prevention, waste reuse and waste separation. This research is a contribution to the proposal of alternative data for community-based service organizations that are working toward solving waste problems and evolving policies to attain the best environmental policies upon the principles of Agenda 21 in the future.

1.2 Objectives of the study

1. To study the levels of waste reduction behavior of residents in townhouse villages in Chatuchak District, Bangkok.
2. To study the factors affecting waste reduction behavior of residents in townhouse villages in Chatuchak District, Bangkok.
3. To study the problems, obstacles and suggestions of waste reduction practices in townhouse villages in Chatuchak District, Bangkok.

1.3 Scope of the study

1.3.1 The scope of content

To study waste reduction behavior of residents emphasizing on the applied waste reduction patterns of BMA's Development Plan Vol. 5 (B.E. 2540-2544) of Department of Public Cleansing comprising waste prevention, waste reuse and waste separation.

1.3.2 The scope of population

The population sample is the household representatives, with more than 18 years of age, living at least one year in Bangkok.

1.4 Definitions

“Behavior” refers to perceptible and measurable human action.

“Waste” upon Public Health Act B.E. 2535, refers to pieces of paper, pieces of cloths, leftovers, pieces of goods, plastic bags, food containers, ashes, dung or carcass including any wasted materials along the street, the market, habitat or anywhere else.

“Waste reduction” refers to the amounts of waste are decreased by waste prevention, waste reuse and waste separation.

“Waste prevention” refers to the consumptive selection of the long life products or goods with little packaging, refillable products including the modification for making use of remainder.

“Waste reuse” refers to the use of an object. In reuse, objects are neither discarded nor reprocessed but keep their original form.

“Waste Separation” refers to the segregation of waste by categories for safe and comfortable disposal and for reducing the amount of waste. In waste separation, objects remain useful.

“Waste reduction behavior” refers to the perceptible and measurable actions of residents to reduce the volume of waste by the practices of waste prevention, waste reuse and waste separation.

“Residents” refers to the households representatives, with more than 18 years of age, living at least one year in Bangkok.

“Length of residence” refers to the amounts of residential time in Bangkok.

“Income” refers to the average amounts of money excluded cost residents earn monthly.

“Social status” refers to position or rank is elected or appointed by community, such as, village chairman, village committee member, senator, member of parliament, or member of Bangkok Metropolitan Assembly etc.

“Access to waste information” refers to the reception of all information concerning waste aspects through frequently accessible media.

“Knowledge on waste aspects” refers to data or fact concerning waste aspects obtained by studying, searching, having training, observing, being informed, experiencing directly or indirectly.

“Experience of waste matters” refers to positive and negative situations regarding waste matters residents got into, such as, making use of the reusables or suffering from waste problems etc.

“Awareness of waste problems” refers to residents’ recognition of impacts of waste problem and of their solutions including residents’ attitude and attempt to conduct positive behavior to prevent and solve this problem.

1.5 Variables of the study

1.5.1 Independent variables are divided into 2 groups as follows:

1. Socio-demographic variables include gender, age, occupation, education, length of residence, income, and social status.
2. Motive variables include the access to waste information, knowledge on waste aspects, experience of waste matters and awareness of waste problems.

1.5.2 Dependent variable:

Waste reduction behavior of residents in townhouse villages in Chatuchak District, Bangkok.

1.6 Level of Measurement

1.6.1 Independent variables

Measurement level

socio-demographic variables

- gender nominal
- age nominal, interval
- occupation nominal
- education nominal
- length of residence nominal, interval
- income nominal, interval
- social status nominal

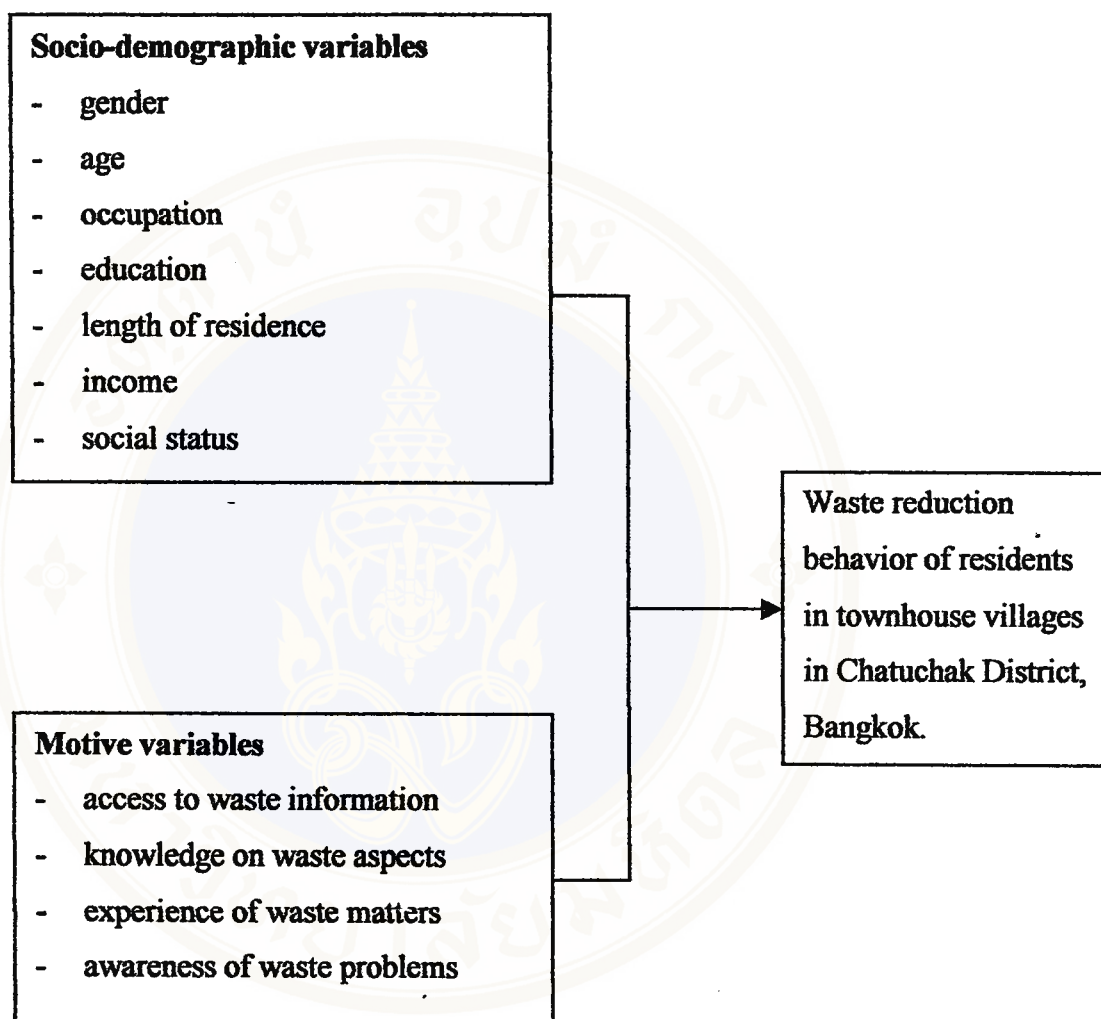
motive variables

- access to waste information nominal, interval
- knowledge on waste aspects nominal, interval
- experience of waste matters nominal, interval
- awareness of waste problems nominal, interval

1.6.2 Dependent variables

- Waste reduction behavior of residents nominal, interval
in townhouse villages in Chatuchak District,
Bangkok.

1.7 Conceptual Framework



1.8 Hypotheses

In this study, hypotheses are put forward as follows:

1. Waste reduction behavior of residents in townhouse villages in Chatuchak District, Bangkok is at moderate level.
2. Socio-demographic factors, consisting of gender, age, occupation, education, length of residence, income, and social status make difference to waste reduction behavior.
3. Motive factors comprising access to waste information, knowledge on waste aspects, experience of waste matters and awareness of waste problems make difference to waste reduction behavior.

1.9 Benefits of the study

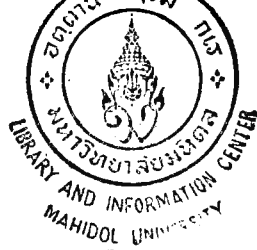
1. To realize the level of waste reduction behavior of residents in townhouse villages in Chatuchak District, Bangkok
2. To realize the factors affecting waste reduction behavior of residents in townhouse villages in Chatuchak District, Bangkok, including the problems, obstacles and suggestions.
3. To apply helpful information to promote more comprehensive domestic waste reduction practices.

CHAPTER II

LITERATURE REVIEW

Conducting study on waste reduction behavior of residents in townhouse villages in Chatuchak District, Bangkok, the researcher has reviewed and compiled data from relevant academic documents, books and researches of this study. This literature review contributes to the following indispensable guidelines:

- 2.1 Concepts of and Theories relevant to human behavior**
- 2.2 Knowledge on waste aspects**
- 2.3 Policy on municipal waste management of Thailand**
- 2.4 Waste Reduction Project of BMA**
- 2.5 The solutions to waste problems in Thailand**
- 2.6 The solutions to waste problems in the other countries**
- 2.7 Relevant researches and variables related to this study**



2.1 Concepts of and Theories relevant to human behavior

2.1.1 Concepts of human behavior

According to Moskowitz and Orgel (1969:9), "Behavior" refers to organism activity consequences of reaction together with arousal as physical event and sensation as psychological event or experience of mind (1969:45) in psychology.

Prapapen Suwan (1977:10) explains that behavior is either perceptible or imperceptible human activities, such as, heart operation, muscle operation, talking, walking, thinking, feeling, affection or attention etc.

With regards to Goldenson (1984:90) notes that behavior is individual's psychological performance or responsiveness, interaction of internal or external stimulus, and perceptible and accidental activities.

As regards the above behavioral concepts, in this study, human behavior could be referred to perceptible and measurable action.

2.1.2 Theories relevant to human behavior

(1) Social Learning Theory

Man is a thinking organism possessing capabilities that provide him with some power of self-direction. People can represent external influences symbolically and later use such representations to guide their actions; they can solve problems mentally without having to enact the various alternatives; and they can foresee the probable consequences of different actions and alter their behavior accordingly (Bandura, A., 1973:42).

In social learning theory, human functioning relies on three regulatory systems. They include antecedent inducements, response feedback influences, and cognitive processes that guide and regulate action. Human aggression is a learned conduct that, like other forms of social behavior, is under stimulus, reinforcement, and cognitive control (Bandura, A, 1973:44). The three major systems by which behavior is regulated do not operate independently; most actions are simultaneously controlled by two or more of the component influences (Bandura, A., 1973:52).

(2) Theories in Environment Psychology

Earth Day in 1970 represented a dramatic expression of the social consciousness around environmental issues that typified this period. Proshansky and Altman add that the social concern with people's effects on the environment grew to encompass a similar concern with the long-term effects of physical environment on human beings (Holahan, C.J., 1982:13).

Environmental psychologists initiated their efforts at theory construction by drawing on existing theory in other branches of psychology that might be extended to help us understand the complex relationship between environment and behavior (Wohlwill, 1970; Proshansky, 1973 as cited in Holahan, C.J., 1982:15) as shown below in Figure 1.

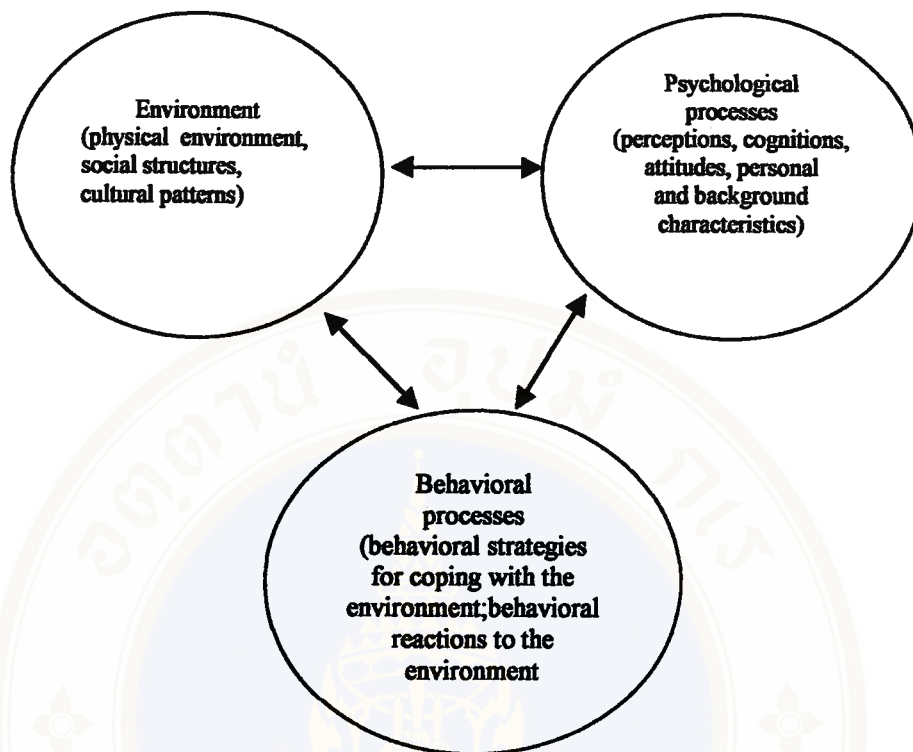


Figure 1 A transactional model of the relationships among the environment, psychological processes and behavioral processes. (Adapted from Bandura, A., 1978)

As above mentioned, a brief description of each of these theories are provided :

1) Arousal Theories

Arousal Theories have typically been concerned with the influence of arousal on performance (Veitch & Arkkelin, 1995:19). Arousal also has important consequences for performance. According to the Yerkes-Dodson Law, performance is maximal at intermediate levels of arousal and gets progressively worse as arousal either falls below or rises above this optimal point (Bell, et al., 1990:96).

One reaction we have when we become aroused is to seek the opinion of others. We in part compare our reactions to those of others to see if we are acting appropriately and to see if we are better off or worse off than others (Festinger,

1954; Wills, 1981 as cited in Bell, et al., 1990:96). This process is known as social comparison. Nevertheless, the arousal notion is a useful one and will probably continue to be incorporated into those environment-behavior relationships to which it is applicable (Bell, et al., 1990:97).

2). Stimulus Load Theories

Cohen points out that humans have a limited capacity to process information. When inputs exceed that capacity, people tend to ignore some inputs and devote more attention to others (Veitch & Arkkelin, 1995:20). Generally, Stimuli most important to the task at hand are allocated as much attention as needed and less important stimuli are ignored. Milgram (Bell, et al., 1990:98-100) also suggested that the deterioration of social life in large urban areas is caused by the ignoring of peripheral social cues and a reduced capacity to attend to them because of the increased demands of everyday functioning. Thus, urban ills may be due in part to an environmental overload in which the hustle and bustle of everyday life in the city requires so much attention that there is very little left over for "peripheral" social concerns.

This stimulus load approach applies to mental and motor performance and to at least some social behaviors and assesses the extent to which attentional depletion contributes to social and environmental problems.

3). Behavior Constraint Theories

According to these theories, the environment can prevent, interfere with, or limit the behaviors of its inhabitants (Rodin & Baum, 1978; Stokols, 1978 as

cited in Veitch & Arkkelin, 1995:22). In a sense, these theories deal with situations where persons either actually lose some degree of control over their environment, or they perceive that they have (Veitch & Arkkelin, 1995:22).

Brehm and Brehm assert that when we feel that we have lost control over the environment, we first experience discomfort and then attempt to reassert our control. They label this phenomenon "psychological reactance". If repeated attempts to regain control are unsuccessful, learned helplessness may develop (Seligman, 1975 as cited in Veitch & Arkkelin, 1995:22). People begin to feel as though their behavior has no effect on the environment. They begin to believe they no longer control their own destiny, and that what happens to them is out of their personal control. These feelings can eventually lead to clinical depression, and in the most extreme form can lead people to give up on life, and to die. On the opposite side of coin, perceived control over one's environment can alleviate the negative outcomes that the environment might otherwise bring about (Veitch & Arkkelin, 1995:22).

4). Adaptation-Level Theories

Excessive stimulation as well as too little stimulation is hypothesized to have deleterious effects on emotions and behaviors. Adaptation-level theorists speak specifically of two processes that make up the interrelationship of humans to their environment: the processes of adaptation and adjustment. Either process brings the organism back to an equilibrium with its environment.

Another value of this approach is that it recognizes individual differences in adaptation level. Thus, this approach is capable of explaining the different responses of two individuals to the same environment. These individual

differences in adaptation level lead to quite different behaviors (Veitch & Arkkelin, 1995:23).

5). Environmental-Stress Theories

Stress theories emphasize the mediating role of physiology, emotion, and cognition in the organism-environment interaction. The organism then responds in such a way as to alleviate the stress (Veitch & Arkkelin, 1995:24).

Daniel Stokols (1979, as cited in Holahan, C.J. ,1982:357) suggests that the level of environmental demand associated with a particular stressor can be assessed in terms of the degree of controllability and the degree of environmental salience in the situation. Environmental demand (and the associated psychological distress) will be greatest when controllability is low and salience high. This model of stress views environmental stressor not as isolated stimuli, but as events embedded in a particular situation reflecting both personal needs and environmental conditions.

Part of the stress response is automatic. Initially there is an alarm reaction to the stressor, where in various physiological processes are altered. Resistance then follows as the organism actively attempts to cope with the stressor. Finally, as coping resources are depleted, a state of exhaustion sets in (Selys, 1956 as cited in Veitch & Arkkelin, 1995:24).

Concerning the above theories in environmental psychology, they can be considered as an indispensable social technology because only scientific technology is not enough for the solutions to environmental problems.

2.1.3 The types of behavior

Regarding Sucha and Surang Chan-am (1964:1), human behavior was divided into unlearned behavior and learned behavior.

According to Preeyaporn Wongbutrot (1978:7), human behavior is classified as overt behavior (talking, crying, walking etc.) and as covert behavior (thinking, feeling etc.).

2.1.4 The components of behavior.

Prapapen Suwan (1977:10-21) explains that behavior contains 3 domains as follows:

1. Cognitive domain consisting of knowledge, comprehension, application, analysis, synthesis and evaluation.
2. Affective domain concerning receiving, responding, valuing, organization and characterization by a value or value complex.
3. Psychomotor domain regarding either prompt performance or later performance. This evaluative domain is the aim of behavioral study. However, the 2 remaining domains are supplementary.

2.1.5 Behavior Determinants

Bandura (1973:40-43) points out the 2 following behavior determinants:

1. Antecedent determinants. Human behavior was extensively analyzed in term of environmental forces, such as events or experience, with which

people can predict how they would behave in given different situations, toward different persons, at different times, and in different social roles.

2. **Consequent determinants.** The more rudimentary form of learning, rooted in direct experience, is largely governed by the rewarding and punishing consequences that follow any given action. People are repeatedly confronted with situations with which they must deal in one way or another. Some of the responses they try to prove unsuccessful, while others produce more favorable effects. Through this process of differential reinforcement, successful modes of behavior are eventually selected from exploratory activities, while ineffectual ones are discarded.

2.1.6 Measurement of behavior

Grant and Evans (1994:2-3) found that behavior could be measured by frequency or rate, duration, latency and percentage correct.

Somchitt Supantas (1982:131-136) quoted that there are 2 modes to study on behavior.

1. **Direct behavioral study** consists of direct observation and naturalistic observation. The observer must be careful in this systematical study with taking notes.

2. **Indirect behavioral study** is conducted by interview, questionnaires, experiment in which the respondents notes their own behavior.

2.1.7 Behavior change techniques

By assuming the perspective of the environmental professional responsible for changing conservation behavior, it is useful to think of three categories of interventions: information techniques, positive motivational techniques, and coercive techniques. All of these play important, often complimentary, roles in changing conservation behavior (De Young, R.,1993:487). (Figure 2)

Techniques differ on the source of initiation and the degree to which people are involved as active participation in their own behavior change. The behavior change is initiated either by some outside entity or by some aspect of the behavior setting. Furthermore, these interventions are generally experienced as being tangible and concrete in nature. In contrast, personal insight, self-monitored feedback, commitment, and intrinsic satisfaction, all involve information or motivation gained by direct experience and are generally noted for their less quantifiable more intangible nature (De Young, R.,1993:490-492).

Source of change	Behavior change techniques		
	Information	Positive Motivation	Coercion
Environment/Others (Tangible)	<ul style="list-style-type: none"> • Declarative knowledge • Procedural knowledge • Feedback • Modeling • Prompting 	<ul style="list-style-type: none"> • Material incentives • Social support 	<ul style="list-style-type: none"> • Material disincentives • Social pressure • Legal mandates
Internal (Intangible)	<ul style="list-style-type: none"> • Direct experience • Personal insight • Self-monitored feedback 	<ul style="list-style-type: none"> • Commitment • Intrinsic satisfactions • Sense of competence • Sense of confidence 	<ul style="list-style-type: none"> • Sense of duty • Feeling of remorse

Figure 2 Typology of Selected Behavior Change Techniques (De Young, R.,1993:492)

In this study on waste reduction behavior of residents in townhouse villages in Chatuchak District, Bangkok, the researcher conducted indirect behavioral study by means of questionnaires including in-depth interviews in data collection.

2.2 Knowledge on waste aspects

According to Public Health Act B.E. 2535, waste refers to pieces of paper, pieces of cloths, leftovers, pieces of goods, plastic bags, food containers, ashes, dung, or carcass including any wasted materials along the street, the market, habitat or anywhere else.

With regards to waste reduction and separation promotion campaign project in Bangkok of BMA, waste was divided into 3 types;

1. usable waste : glass bottles, plastic products, newspapers, magazines, aluminum cans, metal materials etc.
2. fresh garbage : leftovers, vegetables, fruit peels including leaves.
3. hazardous waste : lightbulbs, battery, expired drugs, spray containers etc.

To solve waste problems causing air pollution, water pollution, infectious areas and disgusting environment, the U.S. Environmental Protection Agency (1989) (Verdugo, C.,V., 1996:665-666) has suggested this hierarchy lists management alternatives in the following order of preference: (a) source reduction and waste minimization, (b) recycling, (c) incineration with energy recovery, (d) incineration without energy recovery and (e) landfill.

Incinerators and landfills are at the lower end of the hierarchy of solid waste strategies because the solution they offer (elimination of wastes) is not enough to counteract their negative side-effects (more pollution). Therefore, source reduction and waste minimization are preferred alternatives. They include conscious consuming, reuse and recycling.

Conscious consuming implies the adoption of a more frugal lifestyle (De young, 1986a, 1991 as cited in Verdugo, C.,V., 1996: 666) or increased consumer awareness in the form of avoiding purchases of nonenvironmentally friendly products (Linn et al., 1994 as cited in Verdugo, C.,V., 1996: 666)

Reuse is the use of an object in a different, additional way from that originally intended when the object was purchased. In reuse, objects are neither discarded nor

reprocessed, but keep their original form. The only thing that changes is their use or the person using them, as in the case of reusing clothing, for example.

Recycling refers to treating or processing discarded objects so as to make them available for use in the original or some other form. In recycling, a special treatment is required to reconvert the recycled object. Thus, energy is required, and though recycling saves resources, the reconversion process may produce pollution.

According to De Young (as cited in Verdugo, C.,V., 1996 : 667), reuse and recycling refer to waste reduction and source reduction, respectively. Waste reduction refers to any technique that reduces the quantity of discards reaching landfills, including recycling and composting, whereas source reduction attempts to prevent pollution by avoiding generation of waste at its source; thus, reuse practices are source reduction procedures.

The principles of waste minimization

Waste minimization is one sustainable development strategy of Environmental Management System (BMA, 1997:68-71) in the following order as shown in Figure 3 :

1. Waste Disposal : sanitary landfill, secure landfill, ocean dumping etc.
2. Pollution Control : water treatment system, chemical treatment system, incineration, solidification etc.
3. Recycling or resource recovery : recycling, reuse, repair, energy recovery, composition, reclamation, distillation, filtration etc.
4. Waste minimization (by industry) or waste reduction / rejection (by Community)

5. Pollution prevention includes risk prevention for workers in production.
6. Cleaner production is integrated with recycling, waste minimization and pollution prevention for example, to change in raw materials, to improve operating and housekeeping practices, to perform on-site reuse, to change technology and to assess product's life cycle.
7. Industrial ecology emphasizes on the equilibrium of resource energy and costs.

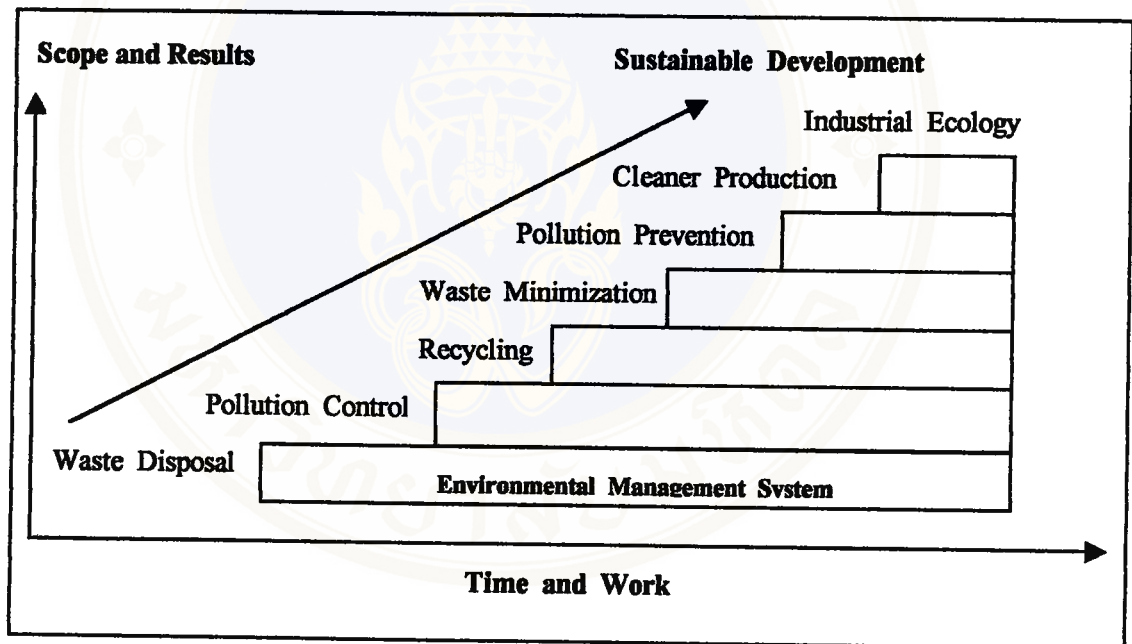


Figure 3 The hierarchy of strategy for sustainable development

(W. Burton Hamner, 1996)

2.3 Policy on municipal waste management of Thailand

To reach the goal of the continued waste management set in the 8th National Economic and Social Development Plan and to become guidelines for the 9th National Economic and Social Development Plan, policy on municipal waste management of

Thailand was set up as follows (Ministry of Science, Technology and Environment, 1999:6-9) :

Policy

1. Control waste generation of people.
2. Provide budget, technical assistance and human resources to local organizations.
3. Promote local organizations participation in waste disposal by establishing the common center of municipal waste disposal.
4. Set up appropriate regulations on waste management.
5. Encourage private involvement and people participation in solving waste problems.

Goals

1. Control waste generation rate of individual not more than 1 kilogram a day within 2001.
2. Encourage the reusables not less than 10% and 15% within 2001 and 2006 respectively.
3. Control the waste remainder in municipality not more than 10% and 15% within 2001 and 2006 respectively.
4. Initiate all provinces' waste managing plan by establishing the local center of waste disposal not less than 50% of all provinces in 2006 (or 38 provinces).

Approaches to promote the translation of policy into practice

1. Support the establishment of waste disposal centers in several communities.
2. Encourage joint investment with private sector for waste disposal and reuse.
3. Promote private investment on waste management and monitoring businesses.
4. Apply “Polluter Pays Principle” equally to all waste generators.
5. Review related regulations on appropriate fee for waste collection and disposal services.
6. Promote correct attitude, public education program and public participation to youth and citizens.
7. Initiate education and training to concerned government and private personnel.
8. Encourage research and appropriate technology development in solving waste management problems.

2.4 Waste Reduction Project of BMA

Waste disposal and collection systems, such as sanitary landfill, composting for organic fertilizer and incineration of contaminated waste from hospitals etc., are at the end of pipe, the waste reduction and separation practices have been campaigned as solutions to the waste problems at source by BMA to enhance the efficiency of waste disposal, to decrease operation costs, including to preserve natural resources and environment (Srinorn Leemaharunguang and Anuchit Charoensrisomchit, 1998:75-78).

The ways to reduce waste

The effective way to reduction waste is the source reduction alternatives based on capability of user, costs, duration, obstacles and relevant factors. Currently, this acceptable way includes the 3 following alternatives:

*** Waste prevention:**

1), Buy only the bulky amount you need and only those products with little package.

2), Avoid disposable products like paper or plastic cups etc. Also, use only those products that have long life or that can be repaired or reused.

3), Do double-sided photocopies, use a notice board or circulation system rather than individual photocopies, reuse office supplies and also communicate with intercom and e-mail etc.

*** Waste recycling:**

Waste recycling with or without any processing includes collecting, separating, applying and reusing.

*** Waste separation:**

Separate waste by categories in order to reintroduce recyclable wastes in production cycle or to be disposed of by reuse, composting, incineration, landfill or feeding animals etc.

2.5 The solutions to waste problems in Thailand

BMA goes all out for privatisation

Watcharapon Thongrung (<http://202.44.251.4/nationnews/1998/199811/19981104/34204.html>)

reported that BMA is seeking to privatize services with plans to hand over to the private sector most of its operations from street cleaning, museums and road construction to flood control and waste management projects.

The privatization stems from a BMA policy to lessen its role in the provision of public services through increasing private participation which will help boost efficiency and service quality to international standards.

Solid waste management projects including solid waste collection from commercial buildings, construction and demolition waste management, and street cleaning, TOR for the construction and demolition waste management scheme would be distributed by the year-end. All projects are scheduled for implementation by 2001.

Garbage-treatment plantbags award from ICSC

The management system of the garbage-treatment plant for Phuket province has won an international award from the International Centre for Sustainable Cities (ICSC : the Canadian-based non-governmental organisation working on promoting sustainable development of urban communities worldwide).

The Phuket garbage system won an award because of its ability to operate on its own without depending on financial support from outside organisations.

Phuket's garbage plant started up in 1994, with help from ICSC, and developed its management system step by step especially in efficiency and project safety. The project urges local people to form groups to administer the system. The group called

White Pearl is composed of Phuket municipality, hotel-owners, restaurateurs and tour companies quoting an ICSC article entitled "Garbage War Breaks Out in Southeast Asia".

"The garbage is not only treated properly. The latest development in the treatment system also educates local people to cooperate in recycling, reusing and educating the waste.

It added that owing to the success of Phuket's garbage system, ICSC had received funding from the Canadian International Development Agency in 1997 to implement the model in other cities as part of the "Southeast Asia Local Solid Waste Improvement Project", which will be implemented in Hat Yai and Udon Thani (<http://202.44.251.1/nationnews/1999/199902/19990227/41291.html>).

2.6 The solutions to waste problems in the other countries

Turning Garbage into Gold in Egypt (UNDP, 1995:103)

The 20,000 people of Mokattam, a poor community in Cairo, live mostly from the reuse of one of the world's largest cities. They collect 600 tons a day and turn 80 percent of it into recyclable material which is sold to support the community. Clothing is shredded and turned into mattress filling, paper is recycled, aluminum is melted down. To facilitate the collection process, the organization was able to get the people of Cairo to separate their garbage into organic and inorganic waste.

Though some people would consider such an occupation unworthy of attention, the people of Mokattam are proud. Everything they do is done with the dignity of the people who know they possess a trade that is increasingly valuable in the world that is running out of room for its garbage.

The Association for the Protection of the Environment is an Egyptian NGO based in Cairo that has worked with the Mokattam community for ten years. There are more than 200 women and girls who work for the organization, producing everything from greeting cards and handbags to quilts and pillows from refuse. The products are exported around the world. The workers earn a regular wage and all profits are divided. Besides working, all women are given training in various skills including family planning, literacy and health. More than 400 women have been trained since 1984.

Aside from reducing the amount of waste that enters the landfills of Cairo, the activity has numerous other environmental benefits. Project organizer Laila Iskandar, who attended the 1994 U.N. International Conference on Population and Development, says this form of community development is directly linked to reducing population. "Through the availability of education, health, employment and economic independence, families naturally have fewer children," she said. Iskandar was given the prestigious Goldman Environmental Award for her efforts.

The Global Action Plan for the Earth (UNDP, 1995:74)

The Global Action Plan (GAP) for the Earth is an international NGO initiative to substantially contribute to the reversal of high resource consumption and pollution, especially in the developed world. GAP's primary goal is to empower a critical mass of global citizens to permanently redesign their lifestyles so that they are ecologically more sustainable.

Realizing that the highest rates of consumption exist in the developed world, GAP set to work first in this region of the world, establishing 15 local councils in

countries from Poland and Finland to Canada and the United States. In each country, the organization's manual, *The Household EcoTeam Workbook*, was adopted to the cultural, societal and political realities of the particular society. Its coordination, publishing and regional distribution is carried out by a local chapter of GAP in partnership with local NGOs.

Since the culture of consumption has been exported to nearly every corner of the world, GAP is now working with communities in less developed societies to establish similar programmes. Working with the Information and Public Affairs Branch of the United Nations Environment Programme, the first Southern programme was set up in Kenya.

The programme fills the gap between positive attitude and positive action. It provides people with a simple blueprint for how to take practical action to reduce consumption in their daily lives, together with the support and feedback system to help them sustain their good intentions.

So far, more than 8,000 households have participated in the EcoTeam Programme, with reported consumption reductions of 40 percent in rubbish, 12 percent in water, 15 percent in energy and 18 percent in carbon emissions.



2.7 Relevant researches and variables related to this study

2.7.1 Relevant researches.

There are a good number of studies on waste aspects. Among them, following are some relevant studies and researches:

Suwimol Pakpiboon (1992: abstract) had conducted a study on factors affecting waste disposal behavior of housewives in Bangkok Metropolis, and found that

1. Waste disposal behavior of housewives in Bangkok Metropolis was at moderate level.
2. Factors affecting waste disposal behavior were occupation, education, access to waste information, believes, value, knowledge on waste aspects, age, household members, length of residence, and hometown.

Wipapen Jiasakul (1993: abstract) had conducted a study on waste disposal behavior of people in core areas in Bangkok Metropolis, and found that

1. Waste disposal behavior of people in core areas in Bangkok Metropolis was at moderate level.
2. Factors affecting waste disposal behavior were education, income, occupation, the types of accommodation, and perception of waste problem situations.

√ Wirush Chomcheun (1993: abstract) had conducted a study on waste disposal behavior of people in Nakornpathom Municipality, and found that

1. Waste disposal behavior of people in Nakornpathom Municipality was at moderate level.

2. Factors affecting waste disposal behavior were gender, marital status, occupation, education, household members, average monthly income, accessible information, and knowledge on waste disposal.

MIHIR Kanti Majumber (1996 : abstract) had conducted a study on waste disposal in core and extended villages in Mueng District of Rajburi Province, Thailand, and found that

1. The in-bound villagers' knowledge, attitude, and practices on waste disposal are at higher level than its out-bound villagers.

2. Factors affecting knowledge, attitude, and practices were occupation, income, education, knowledge, attitude and accessible information.

De Young, R., et al. (1993:70-71) had studied "Promoting source reduction behavior: The Role of Motivational Information." It was shown that both environmental and economic rationales for practicing source reduction led to significant increases in reported source reduction behavior. Additionally, the type of conservation behavior promoted (e.g., toxics use reduction) and the location in which it is practiced (i.e., at home, at a store) were found to have an impact on the success of the interventions. Participants were more likely to adopt home-based source reduction of nontoxics over either store-based activities or activities involving toxics use reduction.

Gamba, J. R., & Oskamp, S. (1994:587) had studied "Factors influencing community residents' participation in commingled curbside recycling programs." Based on the observations, the level of self-reported participation was slightly overstated. Relevant recycling knowledge was the most significant predictor of observed recycling behavior, and content-specific motivations for or against recycling discriminated between frequent and infrequent recyclers. Relevant recycling knowledge and a few specific attitudinal measures were significant predictors of self-reported recycling behavior.

Verdugo, Victor Corral (1996 : 665) had studied "A structural model of reuse and recycling in Mexico". Direct observation are used to analyze reuse and recycling patterns of 100 families in a middle-sized northwestern Mexico City and revealed that reuse was practiced more than recycling. Moreover, these analyses showed that storage facilities, presence of collectors of recyclables, use of radio, TV, newspapers and books, age, income, and education exerted significant indirect influence on conservation behavior through reuse/recycling motives and competencies.

Florence.Lansana Margai (1997:769) had studied "Analyzing changes in waste reduction behavior in a low-income urban community following a public outreach program." The results showed improvements in the total daily recyclables collected, from 8.7 tons in April 1993 to 11.4 tons in April 1994. There were widespread variations in environmental behavior among residents in the private and public housing units. Specifically, waste recovery rates observed in the public housing units were restricted by structural constraints in the buildings, lack of resources, and

relatively poor access to the drop-off sites. The age of the residents, apartment ownership, and household size were also among the important predictors of behavior.

2.7.2 Variables related to this study

Gender

Orawan Yenjai (1992:185-186) had studied “People’s knowledge and practices on domestic night soil and waste disposal, a case study of Klong Ong Ang area and found that male had significantly more knowledge on domestic night soil and waste disposal than female did but female practiced significantly more domestic night soil and waste disposal than men did.

Surasak Soonthonlap (1994: 164) had conducted study on people’s behavior on domestic waste and night soil disposal in Nakornpathom Municipality, and found that female performed behavior of domestic waste and night soil disposal more correctly than men did.

Therefore, gender is hypothesized to make difference to waste reduction behavior.

Age

Chalida Thanomwong (1994: 119) had studied “ Behavior on waste and night soil disposal in floating houses in Muang District, Kanchanaburi Province and found that people with ages 31 years old and higher performed their behavior of waste and night soil disposal more correctly than the ones with ages between 21 – 30 years old and with ages 20 years old and lower did (at $p < 0.01$).

Wirush Chomcheun (1993: 140) had conducted a study on waste disposal behavior of people in Nakornpathom Municipality, and found that age exerted a significant difference on waste disposal behavior (at $p < 0.05$).

Therefore, age is hypothesized to make difference to waste reduction behavior.

Occupation

Suwimol Pakpiboon (1992: 189) had conducted a study on factors affecting waste disposal behavior of housewives in Bangkok Metropolis, and found that housewives who were state officers performed actual practices of waste disposal more correctly than the other housewives (at $p < 0.05$).

Wipapen Jiasakul (1993: 126) had conducted a study on waste disposal behavior of people in core areas in Bangkok Metropolitan, and found that the state officers performed practices of waste disposal more correctly than the other careerists (at $p < 0.01$).

Therefore, occupation is hypothesized to make difference to waste reduction behavior.

Education

Cholthicha Tungun (1991: 124) had studied “ Housewives’ knowledge, believes and practices of waste and night soil disposal, a case study of households along Klong San Sab, Bangkok Metropolis and found that the housewives with graduate degree and higher significantly had knowledge, believes and practices of waste and night soil disposal more than the other education degree holders did.

Wipapen Jiasakul (1993: 126) had conducted a study on waste disposal behavior of people in core areas in Bangkok Metropolis, and found that people holding higher education degree performed waste disposal behavior more than the lower education degree holders did (at $p < 0.001$).

Therefore, education is hypothesized to make difference to waste reduction behavior.

Length of residence

Cholthicha Tungun (1991:124) had studied “ Housewives’ knowledge, believes and practices of waste and night soil disposal, study case : households along Klong San Sab, Bangkok Metropolis and found that the different length of residence of housewives made significant difference to practices of waste and night soil disposal (at $p < 0.001$).

Kringkaew Loaboonsathien (1994 : 84-85) had studied “People’s attitude and behavior of used beverage packages disposal in Klongtoey Slum and found that length of residence of housewives exerted positive correlation on practices of beverage packages reuse (at $p < 0.001$).

Therefore, length of residence is hypothesized to make difference to waste reduction behavior.

Income

Wipapen Jiasakul (1993: 126) had conducted a study on waste disposal behavior of people in core areas in Bangkok Metropolis, and found that people with

higher income performed waste disposal behavior more than the lower income receivers did (at $p < 0.001$).

Chalida Thanomwong (1994: 120) had studied “ Behavior of waste and night soil disposal in floating houses in Muang District, Kanchanaburi Province and found that the tourists with higher income performed waste disposal behavior more than the lower income receivers did (at $p < 0.01$).

Therefore, income is hypothesized to make difference to waste reduction behavior.

Social status

Phisan Thanasarnsomboon (1999:183) had studied “ People’s participation in conserving arts objects, a case study of Sichang Island, Cholburi Province, and found that the different social status of people exerted significant difference on arts objects conservation (at $p < 0.001$).

Anupong Pianpaingam (2000:132) had studied “Factors affecting people’s participation in relieving environmental sanitation problems, a case study of Chiangkum District, Payao Province, and found that the different social status of people exerted significant difference on relieving environmental sanitation problems (at $p < 0.001$).

Therefore, social status is hypothesized to make difference to waste reduction behavior.

Access to waste information

Research on Society Participation in Donor Funded Projects in India (as cited in <http://www.undp.org/csopp/paquide> 1.htm.) indicated that frequency of contact and information dissemination were the most important elements in determining the level of participation which a community feels in any project.

Surasak Soonthonlap (1994: 132) had conducted study on people's behavior of domestic waste and night soil disposal in Nakornpathom Municipality, and found that the different access to waste information exerted significant difference on behavior of domestic waste and night soil disposal (at $p < 0.001$).

Therefore, access to waste information is hypothesized to make difference to waste reduction behavior.

Knowledge on waste aspects

Suwimol Pakpiboon (1992: 189) had conducted a study on factors affecting waste disposal behavior of housewives in Bangkok Metropolis, and found that the housewives with high level of knowledge on waste aspects performed significantly actual practices of waste disposal more than the housewives with the other levels of knowledge did (at $p < 0.001$).

Kringkaew Loaboonsathien (1994 : 84-85) had studied "People's attitude and behavior of used beverage packages disposal in Klongtoey Slum and found that knowledge on used beverage packages exerted significantly positive correlation on practices of beverage packages reuse (at $p < 0.001$).

Therefore, knowledge on waste aspects is hypothesized to make difference to waste reduction behavior.

Experience of waste matters

Wipapen Jiasakul (1993: 127) had conducted a study on waste disposal behavior of people in core areas in Bangkok Metropolis, and found that people's perception of waste problem situations exerted significant correlation on waste disposal behavior (at $p < 0.001$).

Prin Klaerbthong (1996:176) had studied " People's opinions on green labeled products in Bangkok Metropolis, and found that experience of environmentally friendly products exerted significantly positive correlation on people's opinions on green labeled products (at $p < 0.001$).

Therefore, experience of waste matters is hypothesized to make difference to waste reduction behavior.

Awareness of waste problems

Chitti Rodbangyang (1996: 144) had studied " Acceptance in waste separation way of police housewives in Bangkok Metropolis, a case study of central police flats, and found that the different level of environmental awareness made significant difference to acceptance in waste separation way (at $p < 0.001$).

Prin Klaerbthong (1996:176) had studied " People's opinions on green labeled products in Bangkok Metropolis, and found that environmental awareness exerted significantly positive correlation on people's opinions on green labeled products (at $p < 0.001$).

Therefore, awareness of waste problems is hypothesized to make difference to waste reduction behavior.

CHAPTER III

MATERIALS AND METHODS

In this study, survey research with questionnaire investigations and in-depth interviews were used to analyze waste reduction behavior of residents in townhouse villages in Chatuchak District, Bangkok.

3.1 Population

3.1.1 In quantitative research, residents in townhouses in Chatuchak District, Bangkok were assigned to fill out the questionnaires.

3.1.2 In qualitative research, the executives in Chatuchak District and the village chairmen or committee members were interviewed.

3.2 Sample Size and Sampling

3.2.1 In quantitative research, the sample size of the total 69,926 households in Chatuchak District (http://www.bma.go.th/html/body_page72.html) was computed by Taro

Yamane Formula:

$$n = N / (1 + Ne^2)$$

$$N = \text{population}$$

$$n = \text{sample size}$$

$$e = \text{sampling error}$$

$$n = 69,926 / (1 + 69,926 * 0.05^2) = 397.72$$

According to Simple Random Sampling, the 400 cases of sample size were selected from all 16 townhouse villages, in Chatuchak District, consisting of ;

1. Sue Trong Village, Soi Senanikom, Paholyothin Rd.
2. Cement Thai Village, Soi Senanikom, Paholyothin Rd.
3. Sri Amporn Village, Soi Senanikom, Paholyothin Rd.
4. P. Thananives Village, Soi Senanikom, Paholyothin Rd.
5. Sutthirak Village, Soi Senanikom, Paholyothin Rd.
6. Yu Charoen 40 Village, Paholyothin Rd.
7. Prachanives Village, Prachacheun Rd.
8. Chalearm Suk 7 Village, Vibhavadee Rungsit Rd.
9. Cholnives Village, Prachacheun Rd.
10. Townhome, Paholyothin Rd.
11. Yu Charoen 16 Village, Vibhavadee Rungsit Rd.
12. Amornpan Nives Village, Vibhavadee Rungsit Rd.
13. Chalearm Suk Nives Village, Ratchadapisek Rd.
14. Cement Village, Prachacheun Rd.
15. Boonsung Village, Vibhavadee Rungsit Rd.
16. Victory Village, Vibhavadee Rungsit Rd.

3.2.2 In qualitative research, the sample size includes the 2 Deputy Directors of Chatuchak District Office, a Chief of Department of Public Park and Cleansing, a Chief of Public Cleansing Control including 4 village chairmen or village committee members from 16 villages.

3.3 Instruments

3.3.1 The questionnaire used in quantitative research consisted of 7 parts as follows:

Part I : Residents' socio-demographic characteristics

Part II : Access to waste information

The rating scores for frequency of access to waste information are;

Everyday	=	5 scores
3-4 times a week	=	4 scores
once-twice a week	=	3 scores
once-twice a month	=	2 scores
3-4 times a year	=	1 score
never	=	0 score

Part III : Closed-ended questions concerning knowledge on waste aspects

correct answer	=	1 score
wrong answer	=	0 score

Part IV : Closed-ended questions concerning experience of waste matters

experienced	=	1 score
inexperienced	=	0 score

Part V : Closed-ended questions concerning awareness of waste problems

	positive	negative
"strongly agree"	5 scores	1 score

“agree”	4 scores	2 scores
“uncertain”	3 scores	3 scores
“disagree”	2 scores	4 scores
“strongly disagree”	1 score	5 scores

Part VI : Closed-ended questions concerning waste reduction behavior

	positive	negative
“always”	4 scores	0 score
“very often”	3 scores	1 scores
“often”	2 scores	2 scores
“sometimes”	1 scores	3 scores
“never”	0 score	4 scores

Part VII : Open-ended questions concerning problems, obstacles and suggestions of waste reduction practices and waste disposal in Chatuchak District.

According to measurement criteria of Ministry of education (as cited in Nipa Manunpichu, 1985:80) it was applied to classify levels of access to waste information, knowledge on waste aspects, experience of waste matters, awareness of waste problems and waste reduction behavior as follows:

59 % and lower = low level

60-69 % = moderate level

70 % and higher = high level

3.3.2 In qualitative research, the questions for in-depth interviews were classified into 2 groups:

3.3.2.1 For the executives of Chatuchak District Office, items were related to policy on waste management, waste managing operation, waste disposal behavior of residents, including problems, obstacles and suggestions.

3.3.2.2 For village chairmen or village committee members, items were covered with waste disposal situations in each village, waste disposal behavior of residents, including opinion on, and the problems, obstacles and suggestions of waste disposal practices in each village.

3.3.3 Questionnaires developing process

3.3.3.1 After the composition of questionnaires and approval of the content validity by thesis supervising committee, the pre-test was done with a total 40 townhouse residents in Laksi District, Bangkok.

3.3.3.2 Reliability test for the part of knowledge on waste aspects was evaluated by Split Half Method of Spearman Brown's Correction Factor Formula:

$$r_{tt} = \frac{2 r_{hh}}{1 + r_{hh}}$$

r_{tt} = Reliability of the whole questionnaire

r_{hh} = Reliability of half of questionnaire

The result was equal to 0.76.

3. For the parts of awareness of waste problems and waste reduction behavior, coefficient alpha computed by Cronbach's formula was used to evaluate their reliability:

$$\alpha = n / (n - 1) * (1 - \sum Si^2 / St^2)$$

α = coefficient alpha

n = number of items

Si^2 = variance of a single item

St^2 = variance of all items

The results were : 1. equal to 0.76 for awareness of waste problems, and
2. equal to 0.78 for waste reduction behavior.

3.4 Data Collection

3.4.1 For qualitative data collection, a letter from Faculty of Social Sciences and Humanities, Mahidol University, was sent to Director of Chatuchak District Office asking for his favor to interview the 2 Deputy Directors, a Chief of Department of Public Park and Cleansing, a Chief of Public Cleansing Control, including 4 village chairmen or committee members.

3.4.2 For quantitative study, the researcher together with 5 trained assistants went collecting data within June 1-30, 2000.

3.5 Data Analysis

After the completed questionnaires were collected, each one was coded and then recorded the coded data on computer. Finally, these data were analyzed by SPSS (Statistical Package for the Social Sciences) for Windows.

3.7 Statistics used

1. The percentage, mean and standard deviation.
2. One Way Analysis of Variance by Breakdown Dependent Variable.

CHAPTER IV

RESULTS

Data in this study on waste reduction behavior were from questionnaires filled in by 400 residents in townhouse villages in Chatuchak District, Bangkok and interviews with those who take charge of waste management in Chatuchak District Office and with a village chairman and village committee members. The presentation sequences of the findings are as follows:

- 4.1 Residents' socio-demographic characteristics
- 4.2 Motive findings
- 4.3 Waste reduction behavior of residents in townhouse villages in Chatuchak District, Bangkok
- 4.4 The analyses of correlation of the socio-demographic and motive factors with waste reduction behavior of residents.
- 4.5 Problems, obstacles and suggestions
- 4.6 The presentation of in-depth interviews

4.1 Residents' socio-demographic characteristics

As shown in Table 1, more than half of residents (58.5%) were female and the remaining 41.5% were male.

Age had three response categories, that was, 76.8 % between ages 26 – 59 years old, 16.0% between ages 18 – 25 years old and 7.2% between ages 60 – 67 years old respectively. The average age was 37 years old.

There were 5 occupation categories consisting of employees (36.5%), state/state enterprise officers (32.2%), self-employed (12.5%), housewives (8.2%), and students (8.0%). Besides, There were also 2.5 % of unemployed.

Education had seven response categories: graduate degree (52.0%), postgraduate degree (18.2%), high school diploma (10.8%), college graduate degree (7.4%), primary school diploma (5.8%), junior high school diploma (4.8%), and uneducated (1.0%).

Most of residents at 64.2% have lived for 11- 40 years in Bangkok, 21.0 % for 2 – 10 years and 14.8% for 41 – 67 years respectively. The average length of residence was 24.95 years.

Income had three response categories: 46.2% earned 5,000 – 12,000 Baht, 38.8% earned 19,001 – 50,000 Baht and 15.0% earned 12,001 – 19,000 Baht respectively. The average income was 16,376.25 Baht.

Most 98.8% were residents without social status while the rest at 1.2% were a village chairman and village committee members.

Table 1 Number and percentage of residents' socio-demographic characteristics

Socio-demographic characteristics	N = 400 cases	
	Number	Percentage
Gender		
Male	166	41.5
Female	234	58.5
Age		
18 - 25 years old	64	16.0
26 - 59 years old	307	76.8
60 - 67 years old	29	7.2
$\bar{X} = 36.58$ S.D. = 11.97 Max = 67 Min = 18		
Occupation		
Self-employed	50	12.5
Housewives	33	8.2
State/state enterprise officers	129	32.3
Employees	146	36.5
Students	32	8.0
Unemployed	10	2.5
Education		
Uneducated	4	1.0
Primary School diploma	23	5.8
Junior high school diploma	19	4.8
High school diploma	43	10.8
Collage graduate degree	30	7.4
Graduate Degree	208	52.0
Postgraduate Degree	73	18.2
Length of residence		
2 - 10 years	84	21.0
11 - 40 years	257	64.2
41 - 67 years	59	14.8
$\bar{X} = 24.95$ S.D. = 14.79 Max = 67 Min = 2		
Income		
5,000 - 12,000 Baht	185	46.2
12,001 - 19,000 Baht	60	15.0
19,001 - 50,000 Baht	155	38.8
$\bar{X} = 16,376.25$ S.D. = 9,614.46 Max = 50,000 Min = 5,000		
Social Status		
Without social status	395	98.8
With social status (a village chairman and village committee members)	5	1.2

4.2 Motive findings

4.2.1 access to waste information

Most residents at 83.2% got waste information while the rest at 16.8% never did (Table 2).

Table 2 Number and percentage of residents as classified by access to waste information

Access to waste information	Number	N = 400 cases
		Percentage
Never	67	16.8
Ever	333	83.2

4.2.1.1 The types of media and frequency

Table 3 shows the media through which the 333 residents got waste information including frequency.

Through radio, 24.0% of 333 residents never got waste information, while the 21.6.0% got 3-4 times a week, 19.8% got once-twice a week , 13.5% got once-twice a month, 12.1% got 3-4 times a year and 9.0% got everyday respectively.

Watching television, most 23.7% residents got waste information once-twice a week, 20.7% got everyday, 20.4% got once-twice a month, 18.1% got 3-4 times a week, 9.6% got 3-4 times a year and 7.5% never got respectively.

Reading newspapers, most 28.2% residents got waste information once-twice a week, 21.1% got 3-4 times a week, 15.3% never got, 14.7% got once-twice a month, 10.8% got 3-4 times a year and 9.9% got everyday respectively.

Reading magazines, 36.3% residents never got waste information, 30.0% got once-twice a month, 13.8% got once-twice a week, 12.1% got 3-4 times a year, 6.3% got 3-4 times a week and 1.5% got everyday respectively.

With verbal communications, 30.6% residents never got , 28.5% got once-twice a month, 15.1% got once-twice a week, 12.9% got 3-4 times a year, 9.0% got 3-4 times a week and 3.9% got everyday respectively.

Through formal publication, 48.1% residents never got, 19.5% got once-twice a month, 18.9% got 3-4 times a year, 7.5% got once-twice a week, 4.5% got 3-4 times a week and 1.5% got everyday respectively.

From libraries/academic institutions, 63.7% residents never got, 17.7% got 3-4 times a year, 9.0% got once-twice a month, 6.6% got once-twice a week, and 3.0% got 3-4 times a week respectively.

Through pamphlets/brochures, 50.8% residents never got, 23.4% got 3-4 times a year, 12.9% got once-twice a month, 7.8% got once-twice a week, and 5.1% got 3-4 times a week respectively.

Table 3 Number and percentage of residents who gained access to waste information as classified by the types of media and frequency

N = 333 cases

Media	Frequency					
	Everyday	3-4 times a week	Once-twice a week	Once-twice a month	3-4 times a year	Never
Radio	30 (9.0)	72 (21.6)	66 (19.8)	45 (13.5)	40 (12.1)	80 (24.0)
Television	69 (20.7)	60 (18.1)	79 (23.7)	68 (20.4)	32 (9.6)	25 (7.5)
Newspapers	33 (9.9)	70 (21.1)	94 (28.2)	49 (14.7)	36 (10.8)	51 (15.3)
Magazines	5 (1.5)	21 (6.3)	46 (13.8)	100 (30.0)	40 (12.1)	121 (36.3)
Verbal Communications	13 (3.9)	30 (9.0)	50 (15.1)	95 (28.5)	43 (12.9)	102 (30.6)
Formal publication	5 (1.5)	15 (4.5)	25 (7.5)	65 (19.5)	63 (18.9)	160 (48.1)
Libraries/academic Institutions	—	10 (3.0)	22 (6.6)	30 (9.0)	59 (17.7)	212 (63.7)
Pamphlets/ Brochures	—	17 (5.1)	26 (7.8)	43 (12.9)	78 (23.4)	169 (50.8)

By categorizing the levels of access to waste information (as shown in Table 4), it is important to note that 92.8% of residents got waste information at low level, 4.4% at moderate level and 2.8% at high level respectively. The average score was 11.

Table 4 Number and percentage of residents as classified by the levels of access to waste information

N = 400 cases

Levels of access to waste information	Number	Percentage
Low level (23 scores and lower)	371	92.8
Moderate level (24 – 27 scores)	18	4.4
High level (28 scores and higher)	11	2.8

$\bar{X} = 11.4$ S.D. = 8.554 Max. 35.0 Min. 0

4.2.1.2 Requirements of additional waste information and publications.

Table 5 shows the additional waste information waste and publications which 79.8% residents needed while 20.2% did not need.

Table 5 Number and percentage of residents as classified by the requirements of additional waste information

Requirements of additional waste information	Number	N = 400 cases
		Percentage
Accept	81	20.2
Refuse	319	79.8

In Table 6, topics of waste information required respectively by the majority of residents were waste disposal (22.6%), the impacts of waste problems on human and environment (21.9%), the publications of waste separation and reuse campaign (20.1%), other countries' examples of waste separation and reuse techniques (18.5%), the methods of hazardous waste disposal (8.8%) and the ways to separate waste in one trash (8.1%).

For publications, television was the most popular media(72.7%), the others were respectively required: newspaper (12.9%), radio (8.8%), pamphlet/brochures (3.8%) and internet (1.8%).

Table 6 Number and percentage of residents' requirements of additional waste information as classified by topics and media.

Requirements of additional waste information	N = 319 cases	
	Number	Percentage
Topics:		
Waste disposal	72	22.6
The impacts of waste problems on human and environment	70	21.9
The publications of waste separation and reuse campaign	64	20.1
Other countries' examples of waste separation and reuse techniques	59	18.5
Hazardous waste disposal	28	8.8
The ways to separate waste in one trash	26	8.1
Media:		
Television	232	72.7
Newspapers	41	12.9
Radio	28	8.8
Pamphlet/brochures	12	3.8
Internet	6	1.8

4.2.2 Knowledge on waste aspects

The 12 questions on general knowledge on waste aspects answered by 400 residents includes a variety of topics as follows (Table 7):

1. "Consumption beyond necessity is the major cause to increase the volume of waste." 65.8% of residents got wrong answers while 34.2% got correct ones.
2. "Waste prevention is the solution at source of increasing volume of waste." 57.5% got correct answers whereas 42.5% got wrong ones.
3. "To purchase dish detergent in refillable bottles is conscious consuming behavior to relieve waste problems." 80.0% got correct answers while 20.0% got wrong ones.
4. "To mix fruit peels with vegetables and fresh garbage is a correct way to separate waste." 57.0% got correct answers while 43.0% got wrong ones.
5. "Air pollution, water pollution and infectious areas are the impacts of waste problems." 96.0% got correct answers and only 4.0% got wrong ones.

6. "Yellow containers accept recycled waste." 62.3% got wrong answers whereas 37.7% got correct ones.

7. "Waste reduction contributes to beautify our living environment, to minimize the burdens of waste collection and disposal and to save energy and natural resources." 95.3% got correct answers and only 4.7% got wrong ones.

8. "Lightbulbs and insecticides containers must not be burnt". 97.5% got correct answers while 2.5% got wrong ones.

9. "To discard the used-content bottles is not a way to reduce waste." 86.3% got correct answers while 13.7% got wrong ones.

10. "Department of Government and Bangkok Metropolitan Administration are the state agencies taking direct charges of waste management." 68.0% got correct answers while 32.0% got wrong ones.

11. "The main aim of waste reduction and the solutions to waste problems is to mitigate the impacts on environment, economic and people's life quality." 93.3% got correct answers while 6.7% got wrong ones.

12. "To build awareness on "Polluter Pays Principle" is to encourage people's participation in solving waste problems." 86.0% got correct answers while 14.0% got wrong ones.

Table 7 Number and Percentage of residents as classified by knowledge on waste aspects.

Questions	N = 400 cases	
	correct	wrong
	No. (%)	No. (%)
1. Consumption beyond necessity is the major cause to increase the volume of waste.	137 (34.2%)	263 (65.8%)
2. Waste prevention is the solution at source of increasing volume of waste.	230 (57.5%)	170 (42.5%)
3. To purchase dish detergent in refillable bottles is conscious consuming behavior to relieve waste problems.	320 (80.0%)	80 (20.0%)
4. To mix fruit peels with vegetables and fresh garbage is a correct way to separate waste.	228 (57.0%)	172 (43.0%)
5. Air pollution, water pollution and infectious areas are the impacts of waste problems.	384 (96.0%)	16 (4.0%)
6. Yellow containers accept recycled waste.	151 (37.7%)	249 (62.3%)
7. Waste reduction contributes to beautify our living environment, to minimize the burdens of waste collection and disposal and to save energy and natural resources.	381 (95.3%)	19 (4.7%)
8. Lightbulbs and insecticides containers must not be burnt.	390 (97.5%)	10 (2.5%)
9. To discard the used-content bottles is not a way to reduce waste.	345 (86.3%)	55 (13.7%)
10. Department of Government and Bangkok Metropolitan Administration are the state agencies taking direct charges of waste management.	272 (68.0%)	128 (32.0%)
11. The main aim of waste reduction and the solutions to waste problems is to mitigate the impacts on environment, economic and people's life quality.	373 (93.3%)	27 (6.7%)
12. To build awareness on "Polluter Pays Principle" is to encourage people's participation in solving waste problems.	344 (86.0%)	56 (14.0%)

By categorizing the levels of knowledge on waste aspects, Table 4.8 reports that 48.3% of residents had the knowledge on waste aspects at high level, 28.2% had the knowledge on waste aspects at moderate level and 23.5% had the knowledge on waste aspects at low level respectively. The average score of knowledge on waste aspects was 8.888.

Table 8 Number and percentage of residents as classified by the levels of knowledge on waste aspects.

N = 400 cases		
Levels of knowledge on waste aspects	Number	Percentage
Low level (7 scores and lower)	94	23.5
Moderate level (8 – 9 scores)	113	28.2
High level (10 scores and higher)	193	48.3
$\bar{X} = 8.888$ S.D. = 1.866 Min. = 4.0 Max. = 12.0		

4.2.3 Experience of waste matters

As detailed in Table 9, the experiences of waste matters which the residents gained show in the following lists:

1. 85.8 % of residents wanted to discard the wastes upon their categories, but there was only one trash while 14.2% did not do.
2. None of them has never been fined for waste discarding in public place.
3. 69.2% discarded waste by categories into containers while 30.8% did not do.
4. 81.5% faced the problem of the remainder odour while 18.5% did not do.

5. 84.2% faced the impact of rodents, flies and cockroaches while 15.8% did not do.
6. 72.8% faced the problem of drainage overflows while 27.2% did not do.
7. 50.8% did not know how to reuse the recovered materials while 49.2% knew.
8. 68.8% faced the problem of waste separation while 31.2% did not do.
9. 76.8% avoided disposable products while 23.2% did not do.
10. 46.8% used to reuse the separated materials while 53.2% did not do.

Table 9 Number and percentage of residents as classified by experience of waste matters

Experience of waste matters	N = 400 cases	
	Yes	No
Have you ever	343 (85.5%)	57 (14.2%)
1. wanted to discard the wastes upon their categories, but there was only one trash ?	—	400 (0.0%)
2. been fined for waste discarding in public place ?	—	400 (0.0%)
3. discarded waste by categories into containers ?	277 (69.2%)	123 (30.8%)
4. faced the problem of the remainder odour ?	326 (81.5%)	74 (18.5%)
5. faced the impacts of rodents, flies and cockroaches ?	337 (84.2%)	63 (15.8%)
6. faced the problem of drainage overflows ?	291 (72.8%)	109 (27.2%)
7. unknown how to reuse the recovered materials ?	203 (50.8%)	197 (49.2%)
8. faced the problem of waste separation?	275 (68.8%)	125 (31.2%)
9. avoided disposable products ?	307 (76.8%)	93 (23.2%)
10. reused the separated materials ?	187 (46.8%)	213 (53.2%)

By categorizing the levels of experience of waste matters, 52.0% residents gained the experiences of waste matters at moderate level, 25.0% gained at high level and 23.0% gained at low level. The average score was 6.365 (in Table 10).

Table 10 Number and percentage of residents as classified by the levels of experience of waste matters.

Levels of experience of waste matters		N = 400 cases	
		Number	Percentage
Low level	(5 scores and lower)	92	23.0
Moderate level	(6 – 7 scores)	208	52.0
High level	(8 scores and higher)	100	25.0
$\bar{X} = 6.365$ S.D. = 1.526 Min. = 2.0 Max. = 9.0			

4.2.4 Awareness of waste problems

It can also be seen from Table 11 how residents were aware of waste problem issues as described below:

1. “Domestic waste without separation does not make the impacts on the living environment of the communities.” 40.2% residents disagreed, 19.8% strongly disagreed, 17.2% were uncertain, 16.8% strongly agreed, and 6.0% agreed respectively.

2. “The waste problems do not cause water pollution and air pollution.” 65.8% strongly disagreed, 24.5% disagreed, 4.0% were uncertain, 3.2% agreed, and 2.5% strongly agreed respectively.

3. “To solve the waste problems is the mission of government, but not of citizens.” 56.2% strongly disagreed, 36.0% disagreed, 3.3% agreed, 2.5% strongly agreed and 2.0% were uncertain respectively.

4. “Waste separation contributes to increase the reusable materials.” 63.2% agreed, 25.0% strongly agreed, 6.0% were uncertain, 3.3% disagreed and 2.5% strongly disagreed respectively.

5. "Waste prevention starts at the step of the purchasing decisions." 54.5% agreed, 33.8% strongly agreed, 9.0% were uncertain, 2.2% disagreed and 0.5% strongly disagreed respectively.
6. "People's consumption behavior does not affect the waste problems." 54.5% disagreed, 33.0% strongly disagreed, 6.5% agreed, 5.5% were uncertain and 0.5% strongly agreed respectively.
7. "To give away sweets in a used bottle to your friend is less impressive than to buy them in a new one." 45.8% disagreed, 22.7% were uncertain, 16.0% strongly disagreed, 12.0% agreed, and 3.5% strongly agreed respectively.
8. "To clean the surface of table with tissues is more comfortable than with a rag." 33.5% disagreed, 25.2% agreed, 19.8% were uncertain, 19.3% strongly disagreed and 2.2% strongly agreed respectively.
9. "Wasted materials may be still valuable to reuse." 58.0% agreed, 32.2% strongly agreed, 6.5% were uncertain, 2.3% disagreed and 1.0% strongly disagreed respectively.
10. "To practice the patterns of waste prevention-oriented consumption is difficult." 35.5% disagreed, 23.5% were uncertain, 18.5% agreed, 13.7% strongly disagreed and 8.8% strongly agreed respectively.
11. "The procedures of using products in returnable containers waste enough time." 36.0% disagreed, 23.0% agreed, 17.5% were uncertain, 16.2% strongly disagreed and 7.3% strongly agreed respectively.
12. "Several waste solving campaign projects are useless." 43.5% disagreed, 25.0% strongly disagreed, 23.8% were uncertain, 7.7% agreed and 0.0% strongly agreed respectively.

13. “To offer the reused plastic bags to some neighboring merchants is better than to discard them.” 34.2% agreed, 29.5% strongly agreed, 17.5% were uncertain, 13.5% disagreed and 5.3% strongly disagreed.

14. “Waste separation brings about a waste of time and difficulties.” 50.2% disagreed, 29.2% strongly disagreed, 14.8% were uncertain, 5.8% agreed and 0.0% strongly agreed respectively.

15. “To cooperate in conscious consuming helps to reduce natural resources and energy in production.” 48.0% agreed, 41.8% strongly agreed, 6.0% were uncertain, 4.2% disagreed and 0.0% strongly disagreed respectively.



Table 11 Number and percentage of residents as classified by awareness of waste problems

Awareness of waste problems	N = 400 cases				
	strongly agree	agree	uncertain	disagree	strongly disagree
1. *Domestic waste without separation does not make the impacts on the living environment of the communities.	67 (16.8%)	24 (6.0%)	69 (17.2%)	161 (40.2%)	79 (19.8%)
2. *The waste problems do not cause water pollution and air pollution.	10 (2.5%)	13 (3.2%)	16 (4.0%)	98 (24.5%)	263 (65.8%)
3. *To solve the waste problems is the mission of government, but not of citizens.	10 (2.5%)	13 (3.3%)	8 (2.0%)	144 (36.0%)	225 (56.2%)
4. Waste separation contributes to increase the reusable materials.	100 (25.0%)	253 (63.2%)	24 (6.0%)	13 (3.3%)	10 (2.5%)
5. Waste prevention starts at the step of the purchasing decisions.	135 (33.8%)	218 (54.5%)	36 (9.0%)	9 (2.2%)	2 (0.5%)
6. *People's consumption behavior does not affect the waste problems.	2 (0.5%)	26 (6.5%)	22 (5.5%)	218 (54.5%)	132 (33.0%)
7. *To give away sweets in a used bottle to your friend is less impressive than to buy them in a new one.	14 (3.5%)	48 (12.0%)	91 (22.7%)	183 (45.8%)	64 (16.0%)
8. *To clean the surface of table with tissues is more comfortable than with a rag.	9 (2.2%)	101 (25.2%)	79 (19.8%)	134 (33.5%)	77 (19.3%)

Table 11 (cont.) Number and percentage of residents as classified by awareness of waste problems.

N = 400 cases

Awareness of waste problems	strongly agree	agree	uncertain	disagree	Strongly disagree
9. Wasted materials may be still valuable to reuse.	129 (32.2%)	232 (58.0%)	26 (6.5%)	9 (2.3%)	4 (1.0%)
10. *To practice the patterns of waste prevention-oriented consumption is difficult.	35 (8.8%)	74 (18.5%)	94 (23.5%)	142 (35.5%)	55 (13.7%)
11. *The procedures of using products in returnable containers waste enough time.	29 (7.3%)	92 (23.0%)	70 (17.5%)	144 (36.0%)	65 (16.2%)
12. *Several waste solving campaign projects are useless.	0 (0.0%)	31 (7.7%)	95 (23.8%)	174 (43.5%)	100 (25.0%)
13. To offer the reused plastic bags to some neighboring merchants is better than to discard them.	118 (29.5%)	137 (34.2%)	70 (17.5%)	54 (13.5%)	21 (5.3%)
14. *Waste separation brings about a waste of time and difficulties.	0 (0.0%)	23 (5.8%)	59 (14.8%)	201 (50.2%)	117 (29.2%)
15. To cooperate in conscious Consuming helps to reduce natural resources and energy in production.	167 (41.8%)	192 (48.0%)	24 (6.0%)	17 (4.2%)	0 (0.0%)

notes: * negative items

By categorizing the levels of awareness of waste problems in Table 12, 84.0% residents were aware of waste problems at high level, 13.8% were at moderate level and 2.2% were at low level. The average score was 58.275.

Table 12 Number and percentage of residents as classified by the levels of awareness of waste problems.

Levels of awareness of waste problems		N = 400 cases	
		Number	Percentage
Low level	(44 scores and lower)	9	2.2
Moderate level	(45 – 51 scores)	55	13.8
High level	(52 scores and higher)	336	84.0
$\bar{X} = 58.275$ S.D. = 6.785 Min. = 40.0 Max. = 75.0			

4.3 Waste reduction behavior of residents

Table 13 shows the 400 residents were asked to check a list to indicate their practices of waste prevention, waste reuse and waste separation as follows:

1. "Use durable products." The majority of residents (40.8%) indicated "always", 25.5% indicated "often", 18.2% indicated "very often", 15.5% indicated "sometimes" and 0.0% indicated "never" respectively.
2. "Use tissues instead of handkerchief." 28.3% indicated "very often", 25.5% indicated "always", 20.5% indicated "often", 15.2% indicated "sometimes" and 10.5% indicated "never" respectively.
3. "Use disposable products like paper or plastic cups." 37.2% indicated "never", 34.0% indicated "sometimes", 11.2% indicated "very often", 9.8% indicated "often" and 7.8% indicated "always" respectively.
4. "Use refillable products." 33.5% indicated "always", 28.5% indicated "very often", 27.3% "often", 9.5% indicated "sometimes" and 1.2% indicated "never" respectively.

5. "Prefer food packaged in foam containers for convenience." 50.2% indicated "sometimes", 22.2% indicated "often", 17.8% indicated "never", 5.8% indicated "very often" and 4.0% indicated "always" respectively.

6. "Use cloth bags instead of plastic ones." 33.4% indicated "sometimes", 28.8% indicated "never", 23.0% indicated "often", 7.8% indicated "very often" and 7.0% indicated "always" respectively.

7. "Bring your containers to buy food at any neighboring shops." 30.2% indicated "sometimes", 29.0% indicated "never", 20.3% indicated "often", 10.5% indicated "very often" and 10.0% indicated "always" respectively.

8. "Throw away the reusable bottles." 37.8% indicated "sometimes", 32.0% indicated "often", 12.2% indicated "very often", 9.8% indicated "always" and 8.2% indicated "never" respectively.

9. "Apply some materials or aluminum cans as saving boxes or chair etc." 45.8% indicated "never", 39.8% indicated "sometimes", 10.4% indicated "often", 3.0% indicated "very often" and 1.0% indicated "always" respectively.

10. "Do double-sided photocopies." 28.0% indicated "very often", 23.5% indicated "always", 20.2% indicated "often", 16.5% indicated "never" and 11.8% indicated "sometimes" respectively.

11. "Throw away a lot of unwanted grocery bags." 36.0% indicated "sometimes", 28.8% indicated "never", 17.8% indicated "often", 12.0% indicated "very often" and 5.4% indicated "always" respectively.

12. "Pack a gift in a used wrapper." 28.0% indicated "sometimes", 22.0% indicated "very often" along with "often", 15.2% indicated "never" and 12.8% indicated "always" respectively.

13. "Buy only products packaged in reusable containers." 29.1% indicated "often", 19.5% indicated "very often", 18.8% indicated "sometimes", 16.8% indicated "always" and 15.8% indicated "never" respectively.

14. "Separate waste by categories at home." 29.0% indicated "often" along with "never", 26.0% indicated "sometimes", 8.5% indicated "always" and 7.5% indicated "very often" respectively.

15. "Throw away waste in public trashes without separating by categories." 40.8% indicated "never", 36.1% indicated "sometimes", 10.8% indicated "often", 6.5% indicated "always" and 5.8% indicated "very often" respectively.

16. "Persuade your friends and family members to separate waste by categories before disposal." 30.0% indicated "never", 29.0% indicated "often", 28.7% indicated "sometimes", 7.5% indicated "very often" and 4.8% indicated "always" respectively.

17. "Separate hazardous wastes out of others before disposal." 25.7% indicated "never", 25.5% indicated "often", 17.8% indicated "always", 16.0% indicated "very often" and 15.0% indicated "sometimes" respectively.

18. "Separate the disposable packages to reuse." 29.0% indicated "sometimes", 27.8% indicated "often", 16.8% indicated "very often", 13.7% indicated "always" and 12.7% indicated "never" respectively.

19. "Separate used one-sided paper to suitably reuse." 39.3% indicated "always", 23.0% indicated "often", 21.5% indicated "very often", 10.0% indicated "sometimes" and 6.2% indicated "never" respectively.

20. "Avoid strewing wastes over the ground if trashes are unavailable in public." 31.3% indicated "sometimes", 23.5% indicated "often" along with "never", 14.5% indicated "always" and 7.2% indicated "very often" respectively.

Table 13 Number and percentage of residents as classified by waste reduction behavior.

Waste reduction behavior	N = 400 cases				
	always	very often	often	Sometimes	Never
1. Use durable products.	163 (40.8%)	73 (18.2%)	102 (25.5%)	62 (15.5%)	0 (0.0%)
2. Use tissues instead of handkerchief.	102 (25.5%)	113 (28.3%)	82 (20.5%)	61 (15.2%)	42 (10.5%)
3. Use disposable products like paper or plastic cups.	31 (7.8%)	45 (11.2%)	39 (9.8%)	136 (34%)	149 (37.2%)
4. Use refillable products.	134 (33.5%)	114 (28.5%)	109 (27.3%)	38 (9.5%)	5 (1.2%)
5. Prefer food packaged in foam containers for convenience.	16 (4%)	23 (5.8%)	89 (22.2%)	201 (50.2%)	71 (17.8%)
6. Use cloth bags instead of plastic ones.	28 (7%)	31 (7.8%)	92 (23%)	134 (33.4%)	115 (28.8%)
7. Bring your containers to buy food at any neighboring shops.	40 (10%)	42 (10.5%)	81 (20.3%)	121 (30.2%)	116 (29%)
8. Throw away the reusable bottles.	39 (9.8%)	49 (12.2%)	128 (32%)	151 (37.8%)	33 (8.2%)
9. Apply some beverage cans or materials as saving boxes or chair etc.	4 (1%)	12 (3%)	42 (10.4%)	159 (39.8%)	183 (45.8%)
10. Do double-sided photocopies.	94 (23.5%)	112 (28%)	81 (20.2%)	47 (11.8%)	66 (16.5%)
11. Throw away a lot of unwanted grocery bags.	22 (5.4%)	48 (12%)	71 (17.8%)	144 (36%)	115 (28.8%)
12. Pack a gift in a used wrapper.	51 (12.8%)	88 (22%)	88 (22%)	112 (28%)	61 (15.2%)

Table 13 (cont.) Number and percentage of residents as classified by waste reduction behavior.

Waste reduction behavior	N = 400 cases				
	always	very often	often	sometimes	Never
13. Buy only products packaged in reusable containers.	67 (16.8%)	78 (19.5%)	117 (29.1%)	75 (18.8%)	63 (15.8%)
14. Separate waste by categories at home.	34 (8.5%)	30 (7.5%)	116 (29%)	104 (26%)	116 (29%)
15. Throw away waste in public trashes without separating by categories	26 (6.5%)	23 (5.8%)	43 (10.8%)	145 (36.1%)	163 (40.8%)
16. Persuade your friends and family members to separate waste by categories before disposal.	19 (4.8%)	30 (7.5%)	116 (29%)	115 (28.7%)	120 (30%)
17. Separate hazardous wastes out of others before disposing.	71 (17.8%)	64 (16%)	102 (25.5%)	60 (15%)	103 (25.7%)
18. Separate the disposable packages to reuse.	55 (13.7%)	67 (16.8%)	111 (27.8%)	116 (29%)	51 (12.7%)
19. Separate used one-sided paper to suitably reuse.	157 (39.3%)	86 (21.5%)	92 (23%)	40 (10%)	25 (6.2%)
20. Avoid strewing waste over the ground if trashes are unavailable in public.	58 (14.5%)	29 (7.2%)	94 (23.5%)	125 (31.3%)	94 (23.5%)

notes:

* negative items

Items no. 1 - 7 are related to waste prevention behavior.

Items no. 8 - 13 are related to waste reuse behavior.

Items no. 14 - 20 are related to waste separation behavior.

By categorizing waste reduction behavior into three aspects in Table 14, the majority of residents practiced waste reduction at low level, namely, 70.8% practiced waste reuse, 69.8% practiced waste separation and 63.8% practiced waste prevention respectively.

Table 14 Number and percentage of residents as classified by behavior of waste prevention, waste reuse and waste separation.

Waste reduction behavior		N = 400 cases	
		Number	Percentage
Levels of waste prevention behavior			
Low	(16 scores and lower)	255	63.8
Moderate	(17 – 19 scores)	84	21.0
High	(20 scores and higher)	61	15.2
$\bar{X} = 15.515$ S.D. = 3.707 Min. = 5.0 Max. = 24.0			
Levels of waste reuse behavior			
Low	(14 scores and lower)	283	70.8
Moderate	(15 – 16 scores)	43	10.8
High	(17 scores and higher)	74	18.4
$\bar{X} = 11.888$ S.D. = 4.370 Min. = 2.0 Max. = 22.0			
Levels of on waste prevention behavior			
Low	(16 scores and lower)	279	69.8
Moderate	(17 – 19 scores)	62	15.4
High	(20 scores and higher)	59	14.8
$\bar{X} = 13.780$ S.D. = 5.422 Min. = 0.0 Max. = 27.0			

In summing all scores of three aspects of behavior in Table 15, the behavior level of the majority of the residents (70.8%) was at low, 16.0% were at moderate level and 13.2% were at high level respectively. The mean score was 41.183.

Table 15 Number and percentage of residents as classified by the levels of waste reduction behavior.

Levels of waste reduction behavior		N = 400 cases	
		Number	Percentage
Low	(47 scores and lower)	283	70.8
Moderate	(48 – 55 scores)	64	16.0
High	(56 scores and higher)	53	13.2
$\bar{X} = 41.183$ S.D. = 11.422 Min. = 10.0 Max. = 65.0			

4.4 The analyses of the correlation of socio-demographic variables and motive variables with the waste reduction behavior of residents in townhouse villages in Chatuchak District, Bangkok.

4.4.1 Socio-demographic variables

Table 16 shows the correlations of socio-demographic variables with waste reduction behavior analyzed by One-Way ANOVA as below:

Gender : Female ($\bar{X} = 42.85$) practiced waste reduction more than male ($\bar{X} = 38.85$) did. Based on statistical test, there was a significant difference between gender with waste reduction behavior. (at $p < 0.001$)

Age : The residents with ages ranging from 60 – 67 years old ($\bar{X} = 43.23$) practiced waste reduction more than those who aged 26 – 59 ($\bar{X} = 41.08$) and aged 18 – 25 years old ($\bar{X} = 40.54$) did respectively. Based on statistical test, age made a insignificant difference to waste reduction behavior.

Occupation : The residents who were self-employed ($\bar{X} = 47.84$) practiced waste reduction more than students ($\bar{X} = 41.91$), state/state enterprise officers ($\bar{X} = 41.23$), employees ($\bar{X} = 39.88$), housewives ($\bar{X} = 37.88$) and unemployed ($\bar{X} = 34.80$)

did respectively. Based on statistical test, occupation made a significant difference to waste reduction behavior. (at $p < 0.001$)

Education : The residents with primary school diploma ($\bar{X} = 45.17$) practiced waste reduction more than those who held college graduate degree ($\bar{X} = 42.37$), postgraduate degree ($\bar{X} = 41.29$), graduate degree ($\bar{X} = 40.95$), junior high school diploma ($\bar{X} = 40.37$), high school diploma ($\bar{X} = 39.84$), and were uneducated ($\bar{X} = 38.0$) did respectively. Based on statistical test, education exerted an insignificant difference on waste reduction behavior.

Length of residence : The residents having lived in Bangkok between 2 – 10 years ($\bar{X} = 41.87$) practiced waste reduction more than those who have lived for 11 – 40 years ($\bar{X} = 40.95$) and for 41 – 67 years ($\bar{X} = 33.05$) did respectively. Based on statistical test, length of residence made a significant difference to waste reduction behavior. (at $p < 0.01$)

Income : The residents earning 5,000 – 12,000 Baht ($\bar{X} = 42.32$) practiced waste reduction more than those who earned 19,001 – 50,000 Baht ($\bar{X} = 41.77$) and 12,001 – 19,000 Baht ($\bar{X} = 36.15$) did respectively. Based on statistical test, income exerted a significant difference on waste reduction behavior. (at $p < 0.001$)

Social status : The residents being a village chairman and village committee members ($\bar{X} = 47.20$) practiced waste reduction more than the residents without social status ($\bar{X} = 41.11$) did respectively. Based on statistical test, social status exerted an insignificant difference on waste reduction behavior.

Table 16 The correlational analyses of socio-demographic variables with waste reduction behavior. (One -Way ANOVA)

Socio-demographic variables	\bar{X}	S.D.	N	N = 400 cases Sig of F
Gender				0.0005**
Male	38.85	11.59	166	
Female	42.85	11.02	234	
Age				0.3199
18 - 25 years old	40.54	10.71	149	
26 - 59 years old	41.08	11.92	195	
60 - 67 years old	43.23	11.46	56	
Occupation				0.0001**
Self-employed	47.84	10.84	50	
Housewives	37.88	10.13	33	
State/state enterprise officers	41.23	11.98	129	
Employees	39.88	11.22	146	
Students	34.80	0.63	10	
Unemployed	41.94	9.99	32	
Education				0.6484
Uneducated	38.00	0.00	4	
Primary school diploma	45.17	16.34	23	
Junior high school diploma	40.37	7.51	19	
High school diploma	39.84	8.25	43	
College graduate degree	42.37	9.70	30	
Graduate degree	40.95	12.68	208	
Postgraduate degree	41.29	8.91	73	
Length of residence				0.0027*
2 - 10 years	41.87	11.39	280	
11 - 40 years	40.95	11.86	99	
41 - 67 years	33.05	5.26	21	
Income				0.0009**
5,000 - 12,000 Baht	42.32	10.00	185	
12,001 - 19,000 Baht	36.15	12.59	60	
19,001 - 50,000 Baht	41.77	12.07	155	
Social Status				0.2363
Without social status	47.20	10.82	395	
With social status (a village chairman and village committee members)	41.11	11.42	5	

notes : *P < 0.01
 **P < 0.001

4.4.2 Motive factors

Table 17 shows the correlations of motive variables with waste reduction behavior analyzed by One -Way ANOVA as follows:

Access to waste information : The residents gaining access to waste information at high level ($\bar{X} = 54.27$) practiced waste reduction more than those who gained at low level ($\bar{X} = 40.91$) and at moderate level ($\bar{X} = 38.78$) did respectively. Based on statistical test, there was a significant difference between access to waste information with waste reduction behavior.(at $p < 0.001$)

Knowledge on waste aspects: The residents having knowledge on waste aspects at moderate level ($\bar{X} = 44.98$) practiced waste reduction more than those who had knowledge at low level ($\bar{X} = 40.62$) and at high level ($\bar{X} = 39.23$) did respectively. Based on statistical test, there was a significant difference between knowledge on waste aspects with waste reduction behavior.(at $p < 0.001$)

Experience of waste matters : The residents experiencing on waste matters at high level ($\bar{X} = 45.85$) practiced waste reduction more than those at moderate level ($\bar{X} = 40.43$) and at low level ($\bar{X} = 37.80$) did respectively. Based on statistical test, there was a significant difference between experience of waste matters with waste reduction behavior.(at $p < 0.001$)

Awareness of waste problems : The residents being aware of waste problems at high level ($\bar{X} = 41.44$) practiced waste reduction more than those at moderate level ($\bar{X} = 40.91$) and at low level ($\bar{X} = 33.33$) did respectively. Based on statistical test, there was an insignificant difference between awareness of waste problems with waste reduction behavior.

Table 17 The correlational analyses of motive variables with waste reduction behavior (One -Way ANOVA).

Motive variables	\bar{X}	S.D.	N	N = 400 cases
				Sig of F
Access to waste information				0.0004*
At low level	40.91	10.90	371	
At moderate level	38.78	18.80	18	
At high level	54.27	2.61	11	
Knowledge on waste aspects				0.0001*
At low level	40.62	11.53	94	
At moderate level	44.98	11.04	113	
At high level	39.23	11.09	193	
Experience of waste matters				0.0000*
At low level	37.80	10.56	92	
At moderate level	40.43	9.94	208	
At high level	45.85	13.51	100	
Awareness of waste problems				0.1080
At low level	33.33	11.07	9	
At moderate level	40.91	13.08	55	
At high level	41.44	11.10	336	

note : *P < 0.001

4.5 The problems, obstacles and suggestions of waste reduction practices

4.5.1 problems/obstacles

The findings drawn from the part of open-ended questionnaires highlight the following problems/obstacles:

1. problems/obstacles of waste prevention practices

A majority of the residents encountered the difficulties in waste prevention practices because the current consumption patterns did not permit much waste reduction, namely, there were too many disposable packages to avoid in routine consumption. Additionally, since the way of life were attached to rapidity and modernity, the patterns of convenience-oriented consumption were given preference over conscious consuming despite the impacts on massive amounts of waste.

2. problems/obstacles of waste reuse practices

Responses show that the residents had no time to prepare reusable materials, were unsure to determine what materials were reusable with safety and complained about some unqualified materials to reuse. More challenging was that some attitude-consistent behavior was dependent on good appearance, convenience of purchasing some new materials rather than inassurance of the quality of the reusable ones. However, among them, there were some environmental practitioners often reusing but sometimes unknowing how to reuse some existing materials.

3. problems/obstacles of waste separation practices

The majority of the residents lacked knowledge about the disposal of some types of waste, such as, lightbulbs, insecticide containers, spray cans, batteries, lubricant, and infectious waste. It also seemed that inconvenience and lack of knowledge of waste separation were the factors limiting waste separation practices . The residents reported that they had no enough space for in-home trash separation and that only one bin attracted pests. In addition, though their in-home separated wastes, they were mixed with other kinds of waste into waste collecting truck. For waste separation in public, the inadequate containers were provided on the roadside throughout Bangkok.

4. problems/obstacles of the waste management of Chatuchak District Office.

Most residents complained about insufficient collecting trucks, frequency of collection services, the lack of sufficient containers, in particular containers for all categories of separated waste, a long distance to go to drop off the waste in public trashes including the homeless opening the bins in search of redeemable materials.

4.5.2 Suggestions

Following are some suggestions of the residents:

1. The suggestions of waste prevention practices

1.1 The relevant organizations should provide information about the impacts of waste and the ways to dispose of each type of waste.

1.2 Government should call for manufacturers' cooperation along with promotion in responsibilities for the disposal of products that became waste, for example, avoiding manufacturing overpackaged and disposable goods.

1.3 People should much more take into account the environmentally responsible behavior.

2. The suggestions of waste reuse practices

2.1 The relevant organizations should disseminate the information of the practical ways to reuse items, such as, "how to" books.

2.2 Government should call for manufacturers' cooperation along with promotion in manufacturing durable, returnable, refillable and reusable items.

3. The suggestions of waste separation practices

3.1 BMA should provide the adequate containers to accept all types of waste.

3.2 BMA should campaign for domestic waste separated by categories into color bags in order to decrease the officials' waste separation process.

4. The suggestions of waste management of Chatuchak District Office.

The effective system of waste collection services was required by most residents.

4.6 The presentation of in-depth interviews

In-depth interviews were made with the 2 Deputy Directors of Chatuchak District Office, a Chief of Department of Public Park and Cleansing, a Chief of Public Cleansing Control including a village chairman and village committee members, this study aims to examine some of the following issues:

4.6.1 For the executives of Chatuchak District Office

4.6.1.1 Policy on waste management

Chatuchak District Office has carried out waste management based on BMA's policy on waste administration and management (as stated in Appendix) emphasizing on the efficient waste collection, transportation, separation and disposal.

4.6.1.2 Waste managing operation

Chatuchak District Office sends trucks to collect waste from household everyday on schedule. Before working hours, waste collection service must be finished for avoiding traffic jam. Because of inadequate collection equipment and crew, the circular services on each day must make and keep firstly main roads clean before collecting waste from households.

4.6.1.3 Waste disposal behavior of people

Most people cooperated with Chatuchak District Office in putting out their bins on each pickup morning. However, there were a few actual waste separation practices because they thought collection crew would add all domestic waste together. In fact, they misunderstood.

4.6.1.4 Problems/obstacles of waste management

Households generated far more waste than the authorities can handle with inadequate collection equipment and vehicles which often broken down

and remained unrepaired. Moreover, serving domestic waste, it was always a risk to the collection crew's health.

Collection fee were willingly paid by most people. However, there were some avoiding paying fee. Dissimilar to electricity or water supply fee which were unpaid with no service, but waste collection fee could be avoided with other ways to dispose of waste.

4.6.1.5 Suggestion

People should be aware of the causes of waste problems and the application of environmentally consuming behavior to solutions. If people did not play their role in change. An obligation might help the change succeed.

4.6.2 For a village chairman and village committee members

In most of townhouse villages, the containers at collection points were provided by village committee members or residents. Each household put out their bins at appointed waste collection time with the contribution of a monthly to authority. Waste was an unimportant problem of each townhouse village. In general, Most townhouse village had no plan to manage waste because waste disposal was expected to be government responsibility anyway. However, village committee members have kept supervising cleanness of their place.

The volume of waste in townhouse village has been dramatically increased. People participated in waste prevention at disappointing level. Their attentions were drawn to make their living rather than to practice waste prevention. Furthermore, no waste prevention project was launched by any villages. Waste prevention behavior was dependent on personal satisfaction beyond their change force.

Similarly, the actual practices of waste separation were a less visible part of everyday life. Reasons against waste separating included not enough both in-home and public separation trashes, no space for separating bins including comfort preference.

As shown earlier, Chatuchak District Office's waste management has been at unsatisfactory level. People always complained about insufficient collection equipment, old and damaged trucks including infrequent collection services. Therefore, the improvement of waste collection service's systems was firstly required by all of them.

CHAPTER V

DISCUSSION

Based on the objectives and hypotheses of this study in Chapter I, the findings could be discussed as identified below:

5.1 Objectives

1. To study the level of waste reduction behavior of residents in townhouse villages in Chatuchak District, Bangkok.

The results confirmed that the waste reduction behavior of residents was at low level (70.8%).

2. To study the factors affecting waste reduction behavior of residents in townhouse villages in Chatuchak District, Bangkok.

The findings reported that these factors included experience of waste matters, knowledge on waste aspects, occupation, access to waste information, gender, income, and length of residence.

5.2 Hypotheses

Assessed by One-way ANOVA, hypotheses for the level of and factors affecting residents' behavior were discussed as follows:

The first hypothesis : the waste reduction behavior of residents is at moderate level.

Counter to hypothesis, the 92.8% residents' behavior on waste reduction was at low level.

The second hypothesis: the socio-demographic factors (gender, age, occupation, education, length of residence, income and social status) make difference to waste reduction behavior, namely,

Gender: The results shows that there was a significant difference between gender with waste reduction behavior(at $p < 0.001$) as hypothesized.

Age: Based on statistical test, age made an insignificant difference to waste reduction behavior. This hypothesis was rejected.

Occupation : It exerted a significant difference on waste reduction behavior (at $p < 0.001$) as hypothesized.

Education : Counter to hypothesis, education made an insignificant difference to waste reduction behavior.

Length of residence : It contributed a significant difference to waste reduction behavior (at $p < 0.001$) as hypothesized.

Income : Based on statistical test, there was a significant difference between income with waste reduction behavior (at $p < 0.001$) as hypothesized.

Social status : There was an insignificant difference between income with waste reduction behavior. This hypothesis was rejected.

The third hypothesis: the motive factors (access to waste information, knowledge on waste aspects, experience of waste matters, awareness of waste problems) made difference to waste reduction behavior, namely,

Access to waste information : The findings reported that there was a significant difference between access to waste information with waste reduction behavior (at $p < 0.001$) as hypothesized.

Knowledge on waste aspects: Based on statistical test, there was a significant difference between knowledge on waste aspects with waste reduction behavior (at $p < 0.001$) as hypothesized.

Experience of waste matters : It made a significant difference to waste reduction behavior (at $p < 0.001$) as hypothesized.

Awareness of waste problems : Counter to hypothesis, awareness of waste problems made an insignificant difference to waste reduction behavior.

5.3 Discussion on the findings

Following are identified issues contributed to recommendations in chapter 6 for important considerations in promoting individual waste reduction practices.

1. The survey study indicated that most residents (70.8%) performed waste reduction behavior at low level. As partly analyzed, waste reuse, waste separation, and waste prevention were also practiced at low level respectively by 70.8%, 69.8% and 63.8%. Similarly, qualitative study shows that waste separation was practiced at disappointing level, despite the high level of knowledge on waste aspects of most residents found in quantitative study. Therefore, the responsible organizations should

disseminate the relevant knowledge, in particular knowledge about waste separation ways, emphasizing on the translation of its principle into practice.

2. It seems likely that inadequate information on waste should be an important factor limiting waste reducing practices. Because 92.8% got information at low level, waste reduction was also practiced at low level. However, 76.8% residents intended to receive additional information, in particular, waste disposal methods, impacts of waste problem on human health and environment, examples of other countries' waste separation and reuse techniques etc. These required topics quite contributed to waste reducing practices. With sufficient and effective processing and accessing of information, people are better able to apply this knowledge to any situations.

3. Although nearly half of residents (48.3%) had knowledge on waste aspects at high level, by investigating each question on knowledge about waste, there are two issues identified lack of procedural knowledge First, according to incomprehensive waste reduction, 65.8% did not know the main cause of increasing the amount of waste. Second, for incomprehension of waste disposal techniques, 42.5% did not know how to solve the increased waste problem at its source, 43.0% did not know how to separate waste correctly, and 62.3% did not know that yellow containers accept recyclable waste. As shown, it can be assumed that the relevant knowledge on waste aspects produced a significant positive effect on competencies in waste reduction practices.

CHAPTER VI

CONCLUSION

The study was conducted to examine waste reduction behavior of residents in townhouse villages in Chatuchak District, Bangkok, factors affecting the behavior for contribution to promote waste reduction including problems, obstacles and suggestions.

Data in this study were derived from the responses of questionnaires of 400 residents in townhouse villages in Chatuchak District and from the interviews with the executives of Chatuchak District Office including a village chairman and village committee members.

Analyzed by Statistical Package for the Social Sciences, data were presented by percentage, mean, standard deviation, and One-Way Analysis of Variance (ANOVA).

6.1 Conclusion

More than half of residents were female. Most aged 26 – 59 years old, were employers, with graduate degree, have lived in Bangkok for 11 –40 years, and earned 5,000- 12,000 Baht.

Most residents gained access to waste information at low level, had knowledge on waste aspects at high level, gained experience of waste matters at moderate level, and were aware of waste problems at high level.

Most residents (70.8%) performed waste reduction behavior at low level, 16.0% at moderate level and 13.25 at high level. As partly examined, waste reuse, waste prevention and waste separation were performed at low level by 70.8%, 69.8% and 63.8% respectively.

Based on the analyses of One-Way ANOVA, occupation, gender, and income made significant differences to waste reduction behavior (at $p < 0.001$) while length of residence did at $p < 0.01$. For motive factors, experience of waste matters, access to waste information and knowledge on waste aspects affected significantly waste reduction behavior (at $p < 0.001$).

Reasons against waste reduction practices given by residents were personal inconvenience, personal preference and unavailability of facilities. For problems/obstacles of waste management of Chatuchak District Office, system limitations, such as system of collection services and public trashes availabilities were frequently complained. Therefore, these barriers were recommended to be eliminated as detailed in Table 6.1.

By managing waste in Chatuchak District, those who concerned tried their best. Any failures did not require only their developing waste managing plans, but also people's cooperation in managing environmentally or socially responsible behavior.

Similarly, a village chairman and village committee members faced the same problems and required the same solutions as residents did. According to waste reduction behavior of residents, they perceived that residents practiced at disappointing level. However, it was hard for them to force change because it seemed to note that waste reduction behavior was dependent on personal satisfaction.

Table 18 Residents' opinions on problems, obstacles, suggestions of waste reduction practices and waste management of Chatuchak District Office.

Waste reduction	Problems/obstacles	Suggestions
Waste prevention	<ol style="list-style-type: none"> 1. Most products did not contribute to waste prevention, such as, foam and plastic products. 2. Comfort preference-oriented consumption support the usage of disposable products. 3. The way of life depended on rapidity and modernity brought about many beautiful packaging and much instant food in disposable containers. 	<p><u>To people</u></p> <ol style="list-style-type: none"> 1. The manufacturers should avoid manufacturing overpackaged and disposable goods. 2. The consumers should much more take into account the environmentally responsible behavior. <p><u>To government</u></p> <ol style="list-style-type: none"> 1. They should subsidize, offer tax breaks and technology and sciences to the manufacturers for solving waste problems and improving environment quality. 2. They should publicize the relevant knowledge on waste reduction.
Waste reuse	<ol style="list-style-type: none"> 1. Residents had no time to prepare reusable materials. 2. Residents were unsure to determine what materials were reusable with safety. 	<p><u>To people</u></p> <ol style="list-style-type: none"> 1. The manufacturers should manufacture durable, returnable, and reusable goods and avoid toxic substances in good production.

Table 18 (cont.) Residents' opinions on problems, obstacles, suggestions of waste reduction practices and waste management of Chatuchak District Office.

Waste reduction	Problems/obstacles	Suggestions
	<p>3. Some materials were unqualified to reuse.</p> <p>4. Some residents' attitude-consistent behavior was dependent on good appearance, convenience of purchasing some new materials rather than inassurance of the quality of the reusables.</p> <p>5. Residents did not know how to reuse some existing materials.</p>	<p>3. The consumers should cooperate in waste separation in order to get more the reusables.</p> <p><u>To government</u></p> <p>1. They should support the above manufacturers' production.</p> <p>2. They should promote domestic-waste reuse practice.</p>
Waste separation	<p>1. Residents lacked relevant knowledge on waste separation.</p> <p>2. Residents preferred convenience to domestic-waste separation because of the need of several home trashes.</p> <p>3. Inadequate public trashes were provided.</p>	<p><u>To people</u></p> <p>They should learn about waste separation by categories and into the accurate receptacles in order to eliminate boredom stemming from confusion.</p> <p><u>To government</u></p> <p>BMA should provide the adequate public containers including promote separating waste by categories in color bags.</p>

Table 18 (cont.) Residents' opinions on problems, obstacles, suggestions of waste reduction practices and waste management of Chatuchak District Office.

Waste reduction	Problems/obstacles	Suggestions
Waste Management of Chatuchak District Office	<ol style="list-style-type: none"> 1. The duration and frequency of waste collection services were ineffective. 2. The equipment was inadequate such as, containers and trucks. 	<p><u>To Chatuchak District Office</u></p> <ol style="list-style-type: none"> 1. They should improve the system of waste collection services. 2. They should provide the adequate containers at appropriate points throughout Bangkok. 3. They should frequently maintain the collecting trucks.

6.2 Recommendations

6.2.1 Recommendations of findings

The findings of this study have many implications for understanding and promoting waste reducing practices.

1. The results of this study suggest the need for additional information including a definition of source reduction, practical suggestions on how to reduce waste by preventing, reusing and separating with effective methods of information gathering. The relevant organizations such as, Department of Environmental Quality Promotion, Pollution Control Department and Bangkok Metropolitan Administration should publicize the required additional information through television broadcast. The effective processing of information provided by the relevant organizations enable the residents to apply the appropriate knowledge to any situations or solutions to waste problems.

2. Attention should be paid to promote plans of waste reduction that include the relevant knowledge about waste prevention, waste reuse, and waste separation. Any dissemination of knowledge should be based on direct experiences. For example, environmental education should be encouraged by the relevant organizations, policy makers or educators through field exercises and action projects so that residents can learn not only to be environmental practitioners but also to be environmentally conscious consumers.

3. An important implication provided by these findings was the necessity of improving existing waste managing systems. Chatuchak District Office and BMA should inform the availability of containers and waste collection services to encourage the residents to practice waste reduction.

4. In the current event, the government organizations have limitation on budget provision. If possible, people should cooperate in providing public containers and try to establish reuse or recycle center in their own community.

6.2.2 Recommendations of further research

1. The study on people expectation of the roles of waste management organizations should be conducted.

2. The future study should focus on designing programs for domestic-waste reduction behavior performed with preference.

3. With regard to evoke attitude-consistent behavior and build on residents' desire to practice waste reduction, the study on extrinsic and intrinsic motivations should be conducted for making waste reduction behavior more appealing for practitioners.

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QUESTIONNAIRE

“WASTE REDUCTION BEHAVIOR OF RESIDENTS IN TOWNHOUSE VILLAGES IN CHATUCHAK DISTRICT, BANGKOK METROPOLIS”

Part I Residents’ socio-demographic characteristics

Please fill in the blanks and mark / in ().

1. Sex () male () female

2. Ageyears

3. Occupation

() 1. Self-employed

() 2. housewife

() 3. State/state enterprise officer

() 4. Employed

() 5. Unemployed

() 6. Other

4. Education

() 1. Uneducated

() 2. Primary school diploma

() 3. Junior high school diploma

() 4. high school diploma

() 5. College graduate degree

() 6. Graduate degree

() 7. Postgraduate degree

5. Length of living in Bangkok..... years

6. Net income you earn per monthBaht

7. Are you in any social status?

() 1. No.

() 2. Yes. Which one?.....

Part III Knowledge on waste aspects

1. Which one is the major cause to increase the volume of waste?
 - a. lack of waste disposing site
 - b. consumption beyond necessity
 - c. ineffective waste managing organizations
 - d. inadequate budget and personnel for waste disposal

2. Which way is the solution at source of increasing volume of waste?
 - a. waste reduction
 - b. burning
 - c. waste separation
 - d. composition

3. Which one is conscious consuming behavior to relieve waste problems?
 - a. use one-sided photocopies
 - b. purchase dish detergent in refillable bottles
 - c. purchased food packaged in foam containers
 - d. often purchase a little goods

4. Which one is a correct way to separate waste?
 - a. food leftovers, paper, pieces of cloth
 - b. materials, glasses, ashes
 - c. fruit peels, vegetables and fresh waste
 - d. fresh waste, wood, food containers

5. Which one is the impact of waste problems?
 - a. air pollution
 - b. water pollution
 - c. infectious areas
 - d. all are correct.

- () c. To save budget of waste managing organizations
- () d. To mitigate the impacts on environment, economic and people's life quality.

12. Which one is to encourage people's participation in solving waste problems?

- () a. To build awareness on "Polluter Pays Principle".
- () b. To support private sectors to run waste disposal businesses.
- () c. To educate state and private officers
- () d. To improve any waste disposal regulations

Part IV Experience of waste matters

Have you ever.....

Experience of waste matters	Yes	No
1. wanted to discard the wastes upon their categories, but there was only one trash ?		
2. been fined for waste discarding in public place?		
3. discarded waste by categories into containers ?		
4. faced the problem of the remainder odour ?		
5. faced the impacts of rodents, flies and cockroaches ?		
6. faced the problem of drainage overflows ?		
7. unknown how to reuse the recovered materials ?		
8. faced the problem of waste separation ?		
9. avoided disposable products ?		
10. reused the separated materials ?		

Part V Awareness of waste problems

Awareness of waste problems	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree
1. *Domestic waste without separation does not make the impacts on the living environment of the communities.					
2. *The waste problems do not cause water pollution and air pollution					
3. *To solve the waste problems is the mission of government, but not of citizens.					
4. Waste separation contributes to increase the reusable materials.					
5. Waste prevention starts at the step of the purchasing decisions.					
6. *People's consumption behavior does not affect the waste problems.					
7. *To give away sweets in a used bottle to your friend is less impressive than to buy them in a new one.					
8. *To clean the surface of table with tissues is more comfortable than with a rag.					
9. Wasted materials may be still valuable to reuse.					
10. *To practice the patterns of waste prevention-oriented consumption is difficult.					
11. *The procedures of using products in returnable containers waste enough time.					
12. *Several waste solving campaign projects are useless.					
13. To offer the reused plastic bags to some neighboring merchants is better than to discard them.					
14. *Waste separation brings about a waste of time and difficulties.					
15. To cooperate in conscious Consuming helps to reduce natural resources and energy in production.					

Part VI : Waste reduction behavior

Waste reduction behavior	always	very often	often	sometimes	never
1. Use durable products.					
2. Use tissues instead of handkerchief.					
3. Use disposable products like paper or plastic cups.					
4. Use refillable products.					
5. Prefer food packaged in foam containers for convenience.					
6. Use cloth bags instead of plastic ones.					
7. Bring your containers to buy food at any neighboring shops.					
8. Throw away the reusable bottles.					
9. Apply some beverage cans or materials as saving boxes or chair etc.					
10. Do double-sided photocopies.					
11. Throw away a lot of unwanted grocery bags.					
12. Pack a gift in a used wrapper.					
13. Buy only products packaged in reusable containers.					
14. Separate wastes at home.					
15. Throw away wastes in public trashes without separating by categories					
16. Persuade your friends and family members to separate wastes before disposing.					
17. Separate hazardous wastes out of others before disposing.					
18. Separate the disposable packages to reuse.					
19. Separate used one-sided paper to suitably reuse.					
20. Avoid strewing waste over the ground if trashes are unavailable in public.					

Part VII Problems ,obstacles and suggestions of waste reduction practices

1. Problems/obstacles in the following practices that you have encountered are:

1.1 Waste prevention practices:.....

.....

1.2 Waste reuse practices :.....

.....

1.3 Waste separation practices :.....

.....

2. Opinions and suggestions to solve problems in waste reduction :

2.1 Waste prevention :.....

.....

2.2 Waste reuse :.....

.....

2.3 Waste separation :.....

.....

3. Your opinions or suggestions for promoting waste reduction practices:

.....

.....

.....

4. Which types of waste are difficult to be disposed ?

.....

Your suggestions:

.....

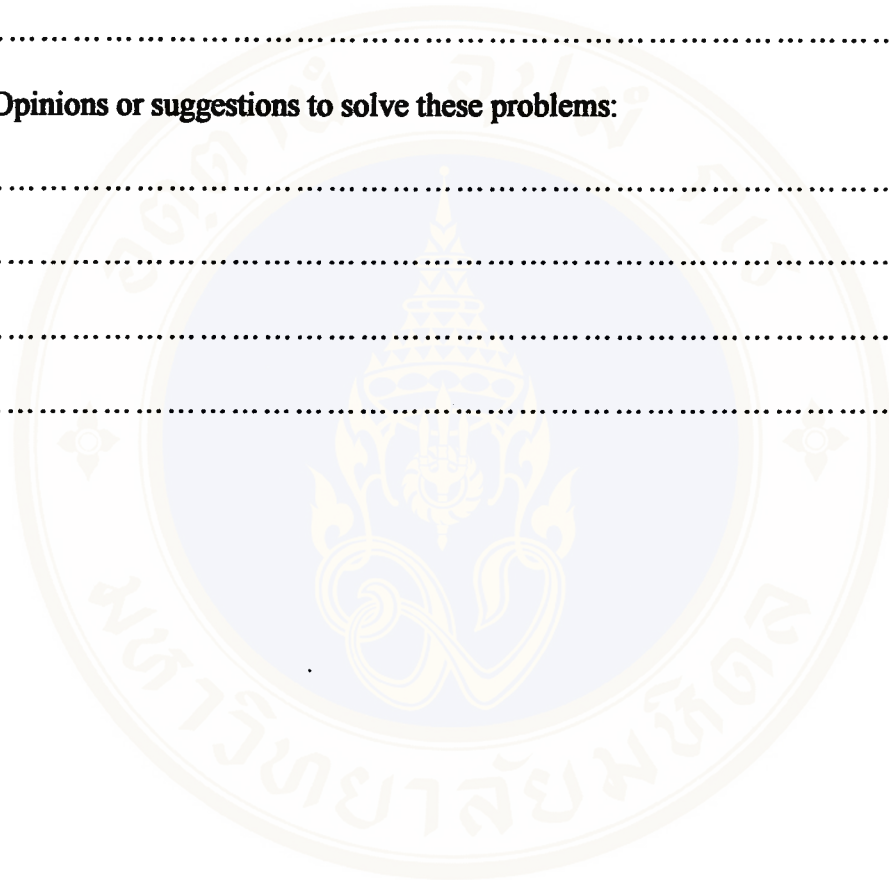
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5. **Problems/obstacles of Chatuchak District Office's waste management that you have faced are:**

.....
.....
.....

Opinions or suggestions to solve these problems:

.....
.....
.....
.....



Number of areas, population and households in Bangkok Metropolis
(Data on January 2000)

District	Area (k.m²)	Population	Households
Klongtoey	13	141,926	52,204
Klongsan	6	113,824	27,917
Klongsamwa	111	89,521	36,537
Kannayaow	26	76,740	25,380
Chatuchak	33	170,585	69,926
Jomtong	26	174,646	53,038
Donmuang	37	144,333	50,999
Dindeang	8	166,128	46,397
Dusit	11	157,475	27,817
Taringchan	29	99,823	29,446
Thaweewattana	50	52,315	21,824
Thungkru	31	87,857	34,398
Thonburi	29	188,187	41,230
Bangkapi	6	142,649	65,016
Bangkoknoi	12	162,272	42,536
Bangkokyai	9	89,646	26,466
Bangkhuntien	121	106,086	39,434
Bangkhen	42	168,419	68,105
Bangkorlaem	11	120,257	33,253
Bangkae	44	172,284	62,345
Bangsue	12	161,264	44,810
Bangna	19	100,266	39,579
Bangna	35	73,094	34,353
Bangplad	11	122,793	36,108
Bangrak	6	63,028	24,146
Bungkum	24	136,806	45,066
Pathumwan	8	104,011	24,661
Prawet	52	118,731	40,417
Pomprabsatturpai	2	76,493	18,085

Number of area population and households in Bangkok Metropolis
(continued)

District	Area (k.m²)	Population	Households
Phyathai	6	91,615	26,561
Pranakorn	14	82,960	18,115
Prakhanong	10	100,144	32,650
Paseecharoan	18	142,176	41,346
Minburi	64	98,697	34,005
Yannawa	17	93,753	38,999
Rachathewi	7	106,484	26,268
Rachburana	16	94,561	29,214
Radkrabung	124	113,416	38,972
Ladproaw	21	107,467	37,806
Wangthonghleng	20	106,816	43,457
Wattana	1	80,959	40,973
Sapansung	44	71,845	22,329
Sathorn	9	110,397	31,813
Saimai	236	142,278	59,222
Sampanthawong	28	37,497	13,550
Suanluang	13	111,340	42,886
Nongjork	36	88,554	25,253
Nongkham	24	109,726	39,963
Laksi	23	117,807	41,270
Huaykwang	23	78,610	30,798

Policy on waste administration and management

Bangkok Metropolitan Administration

The BMA's policies on waste are reduce, separate, recycle, clean up and create community participation, as stated in the Fifth Bangkok's Development Plan (1997-2001). (Siam-Tech Group, 2000:56). Some parts could be summarized as follows:

1. Guideline and measures of waste management

1.1 Waste Reduction Campaign Aspect

1.1.1 Control waste generation rate by encouraging waste reduction before discarding and waste reuse.

1.1.2 Disseminate knowledge through accessible media on municipal hazardous waste problem and impacts on human health and environment for more practices of hazardous waste separation.

1.1.3 Promote private sector and people roles in waste recycling program.

1.2 Waste Collection Improvement Aspect

1.2.1 Improve the efficiency of cleaning the roads by mechanic systems instead of labors.

1.2.2 Efficiency in maintaining old and damaged collection vehicles including in collecting construction waste should be increased.

1.2.3 Waste collection services along the canals should be expanded.

1.2.4 Improve the efficiency of collecting infectious waste .

1.2.5 Improve the municipal hazardous waste collecting systems.

1.2.6 Encourage the private sector to provide services for collecting

waste, hazardous waste and construction waste.

1.2.7 Increase efficiency in collection crews' work performance and provide health checking services, compensation and welfare to the ones who work with risk to their health.

1.2.8 Set up hospital waste collection system, separating it from general waste collection system as protection of contaminations including collection fee.

1.3 Waste Disposal Improvement Aspect

1.3.1 Increase efficiency in disposing waste including in waste water treatment.

1.3.2 Encourage the private sector to manage waste disposal.

2. Waste Managing Plans

2.1 Sub-plan on waste reduction

2.1.1 BMA' efficient waste separation promote project aiming to calling for people's participation in separating at least 20% of all municipal hazardous waste in 2001.

2.1.2 Waste recycling center establishment project with 1,000 tons a day capacity size.

2.2 Sub-plan on waste collection improvement

2.2.1 Collection equipment and vehicles provision project for district offices.

2.2.2 Collection vehicles maintaining improvement project

2.2.3 Municipal hazardous waste collection project

2.2.4 Officers' cleansing work performance promotion project

BIOGRAPHY

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