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**Contextual Factors Influencing Household Recycling
Behaviours: A Case of Waste Bank Project in Mahasarakham
Municipality**

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Abstract

This study investigates factors influencing household recycling behaviour and the possibility of household participation in a community-based recycling bank project. The research examines two communities in Mahasarakham municipality, where there are differences in conditions and waste recycling management. The study demonstrates that demographic attributes and socio-economic factors play a little role in waste separation and recycling behaviour at household level. Meanwhile, environmental knowledge and attitudes contribute to the perceptions of people, their awareness, and participation to the community-based recycling project. Participation process was usually lacking in the project planning procedure and did not contribute enough time and resource to educate participants.

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1. Introduction

In the past, waste was reused or recycled for agricultural and farming purposes. The modern lifestyles and mass consuming patterns tended to shorten the material life cycle and made daily separation a necessary routine. The practices of recycling have been transformed together with the waste recovery industry to catch up with the consumption process. At the same time, it developed an exchange value in the market economy realm despite of its repulsive nature. In cities within most Third World countries, solid waste management approach in developing countries should be shifted toward “waste as resource or income generator” approach (Singhirunnusorn and Sahachaisaeree, 2008). To encourage household recycling behaviour, campaigning activities should be integrated into a project at community-based level. In return, waste separation and recycling could also provide economic opportunities for poor families to generate supplementary income to meet their basic needs.

In 1997, the first “garbage for egg” project was initiated in Klong Toey Slum, Bangkok and proclaimed among the first community-based recycling projects (Kladnuenklum, 2003). Following this community participation approach, the solid waste recycling bank projects were introduced to a number of communities and schools within Bangkok and nationwide. Instead of eggs, recyclers received cash in exchanging for recyclable materials. In recent years, solid waste recycling bank projects have been recognized among local authorities in provincial Thailand. Taking the cooperation of community into account, the waste recycling bank is assumed to stimulate the solid waste management in the aspects of source segregation, recovery of recyclable materials, and storage material prior to the collection (Visvanathan, 2006). By neglecting differences in local context, the similar scheme that has been applied to communities nationwide could only provide a small number of successful and sustainable recycling projects.

This study thus aims to investigate contextual factors influencing household recycling behaviour and the possibility of household participation in the community-based recycling bank. The research examines the cases of two communities in Mahasarakham municipality, where there are differences in communities’ attributes (i.e. social, economic) and solid waste recycling management. The study initially hypothesized that the household waste recycling behaviour, the level of household participation and support in the recycling project could be influenced by socio-economic factors, settlement conditions, and people’s knowledge, experience and perception on waste and recycling issues.

2. Literature Review

A body of literature regarding recycling behaviour and solid waste management approach within the context of developing countries has been reviewed prior to the research design. Setting within the context of developing countries, the following section presents four major components of the research approach—recycling behaviour; urban solid waste recycling system in developing countries; community based waste management; and solid waste bank approach, derived from a literature review.

2.1. Recycling behaviour

Environmental knowledge and attitudes of households should be examined in order to understand their behaviour and how to encourage the waste separation and recycle activities. Knowledge of people on environment in general and waste management in particular has long been recognized among the most crucial factors influencing household recycling (Nixon and Saphores, 2009 referred to De Yong, 1989; Burn and Osakamp 1986). Most recyclers are more likely to get one or more sources of information for example friends, newspaper, television, etc. An important source of recycling knowledge that come from

public education and information through public campaigns are expectedly showing a positive correlation with recycling rate (Nixon and Saphores, 2009).

In terms of *environmental psychology*, it was found that there is the link between pro-environmental attitudes and recycling behaviour. A number of theories attempted to explain the recycling activities as pro-environmental behaviours (PEB) for instance, Schwartz's Norm Activation model (1970, 1977); the theory of Reason Action (Fishbein and Ajzen 1975, Ajzen and Fishbein 1980); and the theory of Planned Behaviour (Ajzen 1991) (see more in Mannetti et al, 2004). The theory of Planned Behaviour assumes that attitudes have a causal impact on behaviours through the mediation of behavioural intention (Ajzen, 1988, 1991, 1996; Ajzen & Madden, 1986; Godin & Kok, 1996). This intention is determined by attitudes towards the behaviour, subjective norms, and perceived behavioural control (Mannetti et al, 2004). People might also get motivated to recycle and their behaviour can be regulated by an adequate manipulation of rewards and punishments (Mannetti et al, 2004 referred to Porter, Leeming, & Dwyer, 1995). Some studies found that the psychological variables related to social norm and peer pressure influences are useful for predicting recycling behaviour (Nixon and Saphores, 2009). The proposed model basing on the Theory of Reason Action highlights that the demographic, situational and psychological factors could be also responsible for recycling behaviour.

From the environmental psychology perspective, many researches have focused on the gap between *environmental values* and *environmental action*, also known as "value-action gap" which is dependent on both individual's attitudes and external factors (Nixon and Saphores, 2009 referred to Blake 1999, p. 257). Three set of barriers were identified to explain this gap including individuality, responsibility, and practicality. The individual barriers, such as laziness or lack of interest, can sometimes outweigh environmental concerns. The people's perceptions regarding the role of institutions could influence susceptibility of responsible institution addressing environmental problems. Finally, practicality barriers including the lack of time or storage space for recyclable materials, could limit information or personal physical limitations to recycle (Nixon and Saphores, 2009).

In addition to the influences of attitude and knowledge on recycling behaviour, *convenience* also plays a significant role in determining the recycling behaviour and likelihood to participate in recycling programmes. People are more likely to recycle if they have convenient to access, even a group of people with low concern for environment (Nixon and Saphores, 2009 referred to Derksen and Gartrell, 1993).

Socio-economic and demographic factors: a number of researches on recycling behaviour have showed mixed results on the influences of socio-economic and demographic characteristics (Nixon and Saphores, 2009). Many studies demonstrated relationships among these factors and the engagement in recycling practices. It was found that in general females are more likely to recycle than males. Larger households with higher number of family member and square footage tend to have higher recycling rates. In terms of economic status, it also found that higher-income households showed the higher numbers of recycling rates. The level of formal education and knowledge about recycling were found to be positively associated with recycling behaviour (see more in Nixon and Saphores, 2009).

2.2. Urban Solid Waste Recycling System in Developing Countries

Waste has been reused or recycled for agricultural and farming purposes for centuries. The modern lifestyles and mass consuming patterns have shorten the material life cycle and made daily collection a necessary routine. The practices of recycling have been transformed together with the waste recovery industry to catch up with the consumption process. At the same time, it developed an exchange value in the market economy realm despite of its repulsive nature.

In cities within most Third World countries, policies for urban solid waste management are mainly focused on increasing the waste disposal efficiency by either utilizing advanced technologies or by other

expensive means. Policies as such could by no mean reduce the cost of waste disposal/management nor protect the healthy urban environment. Instead, waste management should be gearing towards the “waste as resource” and “waste as income generator” approach, and incorporated recycling activities at household units as the major function of the urban waste management system and policy. Besides serving the purpose of decreasing the amount of tremendous daily waste disposal, utilizing waste as resources for local production in particular, could generate income and benefit the urban poor who collect recoverable materials from dumpsites, along city streets and other public places in exchange for income.

2.3. Community-Based Waste Management

The community-based waste management approach is based upon the cooperative concept with the common goal of making the changes in the communal solid waste management, in terms of source segregation, recovery of recyclable materials, and storage prior to collection (Visvanathan, 2006). Based on this approach, a community project can create the sense of belonging together with the citizen roles of members to solve the common environmental problems in a community. The successful projects were reported such as the community-based composting projects from slums in Bangladesh; the community composting and recycling schemes in Borommatrilokanat 21 community in Phisanulok province Thailand; and the “garbage for eggs” project in Klong Toey slum in Bangkok (Visvanathan, 2006).

In many community projects, the community organization has been established in a form of Co-operative (co-op). The small group of members is selected to do the management and administration tasks. Locally initiated projects can create sense of ownership and engage all community members to participate.

Those projects proved to reduce significant littering of waste and to improve community solid waste management, health problems of the slums, and cleaner living environment. In terms of economic benefits, the project could create job and supplementary income within the community, while the municipal could reduce cost of solid waste handling and disposal.

2.4. Solid Waste Recycling Bank Approach

Recycling activities in Thailand are mainly undertaken by different groups of informal sector including foragers, dump scavengers, itinerant junk buyers, and municipal refuse workers. Waste recycling from other sector besides local authority is crucial to the Third World’s urban environment in which it enhances the efficiency of recovering process, reduces the burden of disposal cost, and helps avoid the unnecessary and unhealthy disposal technologies. Household waste separation and recycling activities can be considered as another form of informal practices that could generate supplementary income for urban poor or economically underprivileged groups.

To encourage waste separation and recycling at sources such as at home, school, and business, the solid waste recycling bank projects have become recognizable among local authorities in Thailand. Starting from the waste exchange project in Klong Toey slum, Bangkok, the recycling bank approach has been developed on the basis of public participation. Instead of exchanging recyclable materials with eggs or other consumer products, the recycling bank pay the recyclers in cash or credit depending on the administration procedure.

Resembling the bank system, a group of bank committee is set up to take care of administrative and operational tasks. At the beginning of establishment, the participants who sell materials will get credit on their account. Materials will be sold to recycling network whether formal or informal. With sufficient cash flow, the participants could consequently received money in exchange for their materials. For some projects in provincial areas, the bank would be set up as a saving co-operative. Every participant is the

share holder and will get a year-end divided from the bank profit. The operational methods and incentive strategies are different from place to place.

Finally, a study framework could be established by means of the variable found in the review. Fig. 1 demonstrates the relevant variables and their interrelation linkages, upon which the study framework is based.

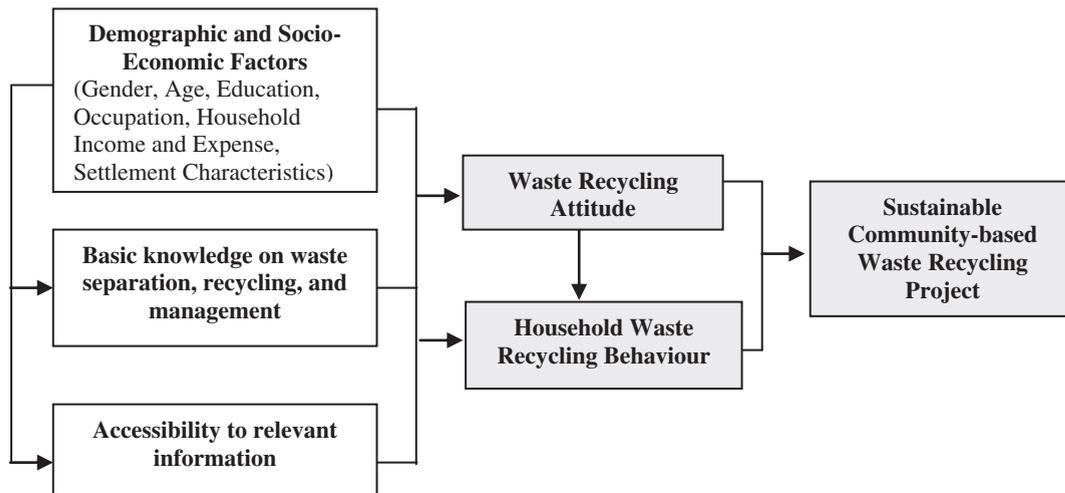


Fig. 1. Study Framework

3. Methodology

The study applies the practice of conceptualization and operationalization to create research tools, as a part of the empirical research method. Conceptualization is the process by which a term of concept in the research is clarified (conceptual definition). The study employs both objective and subjective approaches to create questions or specific measures. The study extends the aforementioned conceptual variables in Fig.1 by converting them into operational variables and indicators for data collection, after which, research tools, such as questionnaire, interview and observation checklist, are created and tested before the collection of data

The study applied an integrated quantitative-qualitative approach to investigate both the depth and breadth of case situations. The study primarily focused on a fieldwork approach in order to examine the empirical data from the selected communities and observe the happening waste management in the case communities. To explore the present waste recycling situations and local social-economic situation in the study area, the research conducted a questionnaire survey with 151 sample respondents, who were residing in two communities—namely, Song-Nue and Ban-Maad. The selected householders were individually interviewed by the research team. Data tabulation and statistical analysis are accomplished to established based line ramifications.

These two communities possessed differences in socio-economic characteristics and waste management. The study aimed to compare the recycling attitude and behaviour of people living in the Somg-Nue, where the community-based recycling bank project has been operated since 2003, and the Ban-Maad community with no recycling bank project. In addition, to understand the temporal dimension

of the situations with regard to recycling activities, in-depth interview and field observation were conducted to collect qualitative information from community leaders and residents.

4. Results and Discussion

4.1. Participation in Community-Based Solid Waste Recycling Bank

The Mahasarakham municipality initiated Song-Nue community-based recycling bank projects in 2003. To start the project, the municipality financially supported the initial fund for the bank operation. The municipality did also buy materials separated by the participants and later sell them to private agents. The project started with the money seed of 10,000 baht for buying materials from members. The recyclers could select to either receive cash for exchange or deposit credits into their accounts. Members could get divided from the bank profit by the end of each year and may also request for a small amount of loan for the daily use and in a case of emergency.

At present, the community organization independently operates the recycling bank with minimal support from the municipality. The project is now selling their materials directly to the buyers, who pick up the materials at the premise. The bank is operated by community members and opens to buy material everyday.

Data from the field survey showed that most of respondents living in Song-Nue community, approximately 96 percent, were aware of the community waste recycling bank. The data, however, showed that about 63 percent were participating in the project (Table 1). Most people stated that time availability was the main reason for non-participation in the program. The results showed that people were not selling material everyday. They typically collected recyclable materials at home and sold them to the bank twice a month. The participating households would get an amount of 100 to 200 Baht per visit. Plastics, glasses, and papers were among the most recycled materials found in the community.

Table 1. Community Participation in Recycling Bank Project

Aware of the existence of community recycling bank project	Participation in the community recycling bank project	
	Yes	No
Yes	51 (68.0%)	24 (32.0%)
No	0 (.0%)	6 (100.0%)
Overall	51 (63.0%)	30 (37.0%)

Source: Filed survey (2011)

4.2. Recycling Knowledge, Attitude, and Behaviour

The study examined the *knowledge* of target groups based on three categories including the basic knowledge about (1) household solid waste; (2) solid waste collection and recycling; and (3) solid waste disposal. Fourteen questions had been asked to examine the basic knowledge of respondents in the two communities. Fig. 2 shows that respondents in these two communities had somewhat high basic

knowledge about solid waste and its collection, recycling, and disposal in general. People in Ban-Maad community, however, show a higher percent of correct answers in the last two categories.

In terms of *attitude* towards solid waste management and recycling in the communities, the study examined the level of respondents' attitudes by using the self-evaluation form containing 15 questions within two categories— solid waste management (A1) and recycling (A2). Fig. 3 shows results from the survey. It was found that people living in these two communities have some comparable attitude levels. However, respondents from Ban-Maad shows slightly better attitude on solid waste management issues. They agreed that the solid waste management duty should involved people living in the community and waste separation and recycling practices are necessary and could create more income.

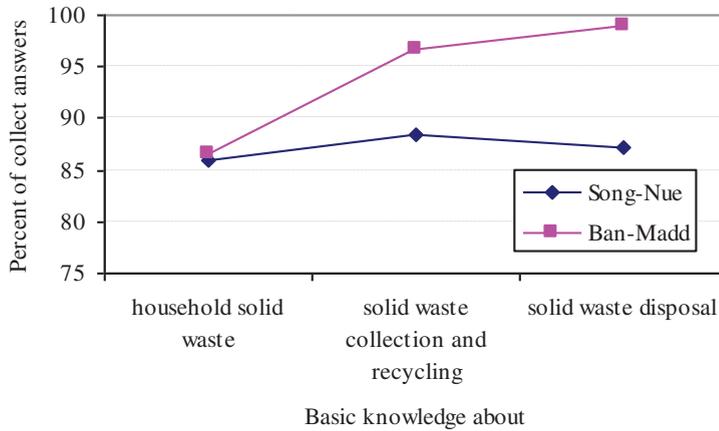


Fig. 2. Basic knowledge about solid waste and its collection, recycling & disposal

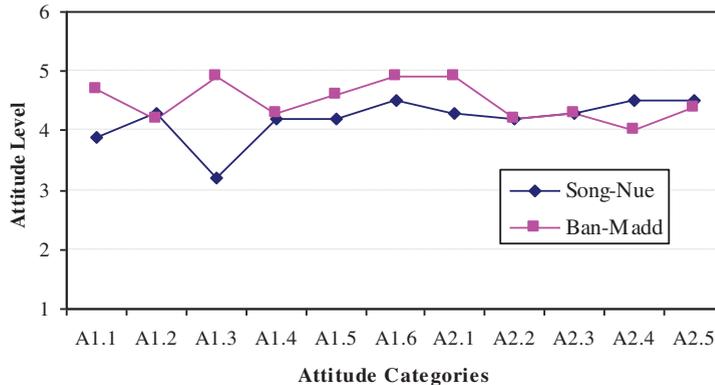


Fig. 3. Attitude towards solid waste management & recycling

In terms of *recycling behaviour*, the respondents were asked to evaluate their recycling practices. Seven conditions were set for this self-evaluation process. The frequencies in behaving on each condition were recorded and presented in Fig. 4. The results shows that respondents living in Ban-Maad (without recycling bank project) show an overall higher frequencies of behaving on solid waste separation and recycling, compared to those who lived in Song-Nue community, particularly in terms of bringing

reusable bag and basket for groceries shopping (B.5), reducing the use of plastic and Styrofoam packages (B.6), and reusing separated materials (B.7).

From the aforementioned results, it can be analyzed that people having the community recycling project tended to take it for granted on their recycling practices. Continuing on disseminating the information and raising awareness on environment issues are very important and become a key to the sustainable recycling bank project. The lower level of basic knowledge in Song-Nue community showed that people can be ignorance to the on-going recycling project where there is the absence of succeeding education after the initiation of recycling project.

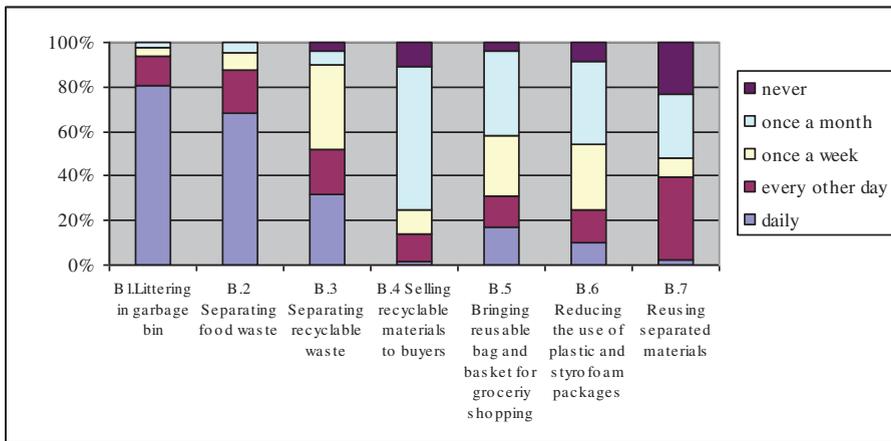


Fig. 4. Recycling behaviour in Song-Nue communities

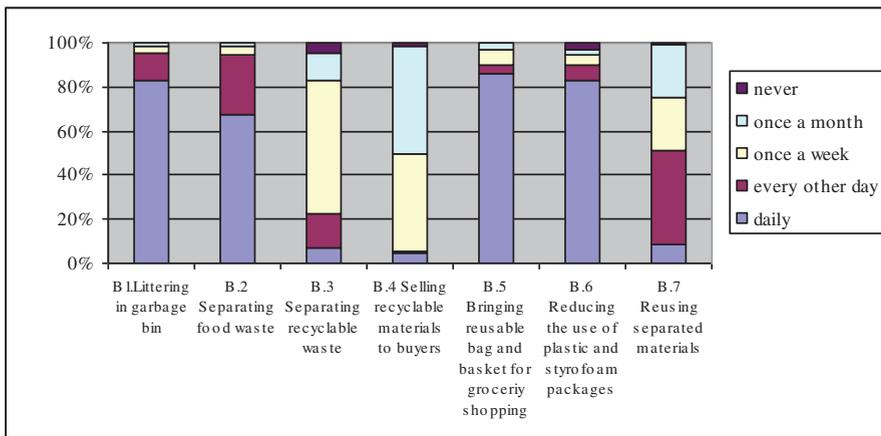


Fig. 5. Recycling behaviour in Ban-Madd communities

4.3. Demographic and Socio-Economic Attributes

Table 2 summarizes the effects of demographic factors on knowledge, attitude, and behaviour. The survey shows that the gender and educational level did not demonstrate the significant differences in the level of environmental knowledge, attitude, and recycling behaviour. However, the social status between

the group of community leaders/committee and residents show the significant differences in behaviour. The leader group shows somewhat higher points on recycling behaviour.

Table 2. Demographic factors influencing knowledge, attitude, and behaviour

Factors		Dependent variables (Mean)		
		Knowledge ^a	Attitude ^b	Behaviour ^b
Gender	Male	10.36 (1.00)	3.53 (0.29)	2.80 (0.59)
	Female	9.99 (1.19)	3.42 (0.34)	2.63 (0.54)
Social status	Community leader	9.44 (0.73)	3.38 (0.35)	3.13 (0.39) *
	Residents	10.14 (1.16)	3.46 (0.33)	2.65 (0.56) *
Educational Level	Primary education (6 years)	9.93 (1.26)	3.45 (0.28)	2.76 (0.60)
	Secondary education (12 years)	10.29 (1.18)	3.49 (0.49)	2.53 (0.54)
	2-year-College (14 years)	10.60 (0.70)	3.42 (0.17)	2.64 (0.44)
	Bachelor	10.24 (0.44)	3.42 (0.25)	2.65 (0.45)
	Higher than bachelor	10.50 (0.71)	3.27 (0.16)	2.43 (0.40)
Overall		10.10 (1.15)	3.45 (0.33)	2.68 (0.40)

Note: () Standard derivation

^a Average values of know

^b Average values of scale 1 (strongly disagree/never done) to 5 (strongly agree/very often)

* ANOVA test, the difference between groups is significant at the 0.05 level (2-tailed)

The study also examines the influences of factors: age, family size, household income, and household expense on the knowledge, attitude, and behaviour by using correlation (r). The results found that age, attitude, and behaviour are significantly correlated to the level of knowledge with the low correlation coefficients -0.164, 0.268, and -0.226 respectively. It was unexpected to found the negative correlations between knowledge and behaviour. In terms of attitude, except for the knowledge factor, the data shows that household income has a negative relation with attitude (r=-0.242). It also found that the recycling behaviours of residents are slightly improved with the increasing number of age. Elders showed more recycling practices than the younger ones. It was also demonstrated in the majority of studies that older residents are more likely to recycle (see detail in Nixon and Saphores, 2009).

Table 3. Correlation among relevant variables

Factors	Pearson Correlation (r)						
	Age	Family size	Household income	Household expense	Knowledge	Attitude	Behaviour
Age	1.000	-0.279**	-0.028	-0.072	-0.164*	-0.153	0.182*
Family size	-0.279**	1.000	0.100	0.136	-0.011	0.019	-0.122
Household income	-0.028	0.100	1.000	0.344**	-0.060	-0.242**	0.101
Household expense	-0.072	0.136	0.344**	1.000	-0.008	-0.108	0.128

Knowledge	-0.164*	-0.011	-0.060	-0.008	1.000	0.268**	-0.226**
Attitude	-0.153	0.019	-0.242**	-0.108	0.268**	1.000	-0.150
Behaviour	0.182*	-0.122	0.101	0.128	-0.226**	-0.150	1.000

Note: ** Correlation is significant at the 0.01 level (2-tailed); *Correlation is significant at the 0.05 level (2-tailed).

5. Conclusions

Solid waste management approach in developing countries should be shifted toward “waste as resource or income generator” approach. To encourage household behaviour to reduce waste at source through their participation, recycling activities should be integrated into a project at community-based level. Community-based solid waste management requires close consultation with community organization and full involvement from community members. As found from the study, environmental knowledge and attitudes can influence perceptions of people, their awareness and susceptibility to the community-based project. The continuous informing process and raising awareness on environmental issues and proper solid waste management are crucial keys to the success of community recycling bank project.

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