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Research Article

Habits and Benefits of Recycling Among Household in Kota Kinabalu, Sabah, Malaysia

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ABSTRACT

This work points to examine psychosocial characteristics of recyclers and non-recyclers. Specifically, the study examined recycling habits and the perceptions of recycling benefits among household in Kota Kinabalu, Sabah. The respondents consist of 484 households. Results showed that most of the households are non-recyclers (59.9%). Recycling status was influenced by accommodation types - apartment, bungalow, semi-detached, terraced house and village house. Non-recyclers tend to discard the material when they did not know whether the waste material is recyclable or not and those who did not recycle tend to take in higher general environmental concern compared to those who recycle. Thematic analysis reveals the three components of recycling habit which has (i) disposed, (ii) Segregate, and (iii) Seek Information. Meanwhile, four components of perceptions towards recycling benefits are constructed, which are (i) Environmental Preservation, (ii) Resources and Cost Conservation, (iii) Monetary Reward and (iv) Environmental Awareness.

Keywords: Recycling Habits, Recycling Benefits, Waste Management, Recycling Attitude, Recycling Behavior

INTRODUCTION

According to Bernama [6], a sum of 30,000 metric tons of waste was produced by the households in Malaysia daily and around 10,950,000 metric tons of waste created in just a twelvemonth. This total of waste produced is increasing every year due to the increased population of households in Malaysia. Referable to the increasing number of immigrants in the country, will create problems of waste created. According to Bernama [7], a sum of 2.1 million migrant workers is registered and possess a working pass under the Department of Immigration and still many of them are illegal and did not show.

Syed [30] reported that landfills in Malaysia are currently facing a critical condition in managing the

domestic solid waste. In the year 2009, there are 289 landfills in Malaysia. Most of the landfills in the country are operating by open-dumping. For a long period of time, open-dumping landfills could pollute the environment especially the water and air. To overcome the problem of current open-dumping landfills, it must be replaced by sanitary landfills which are more environmentally friendly. For now, only seven are considered as sanitary landfills in Malaysia.

Statistics showed that 113 landfills in Malaysia are no longer operating and waiting to be closed [30]. Therefore, in order to extend the life of the landfills in Malaysia, the government has launched a recycling program and campaigns. The government has set a target in the year 2020, 22 per cent of

Malaysian is committed as recyclers. The waste production of Malaysians would increase by a drastic 65% from 10,000 tonnes per day in 2010 to 17,000 tonnes per day by 2020 [3].

A survey conducted by Solid Waste Management and Public Cleaning Corporation (PPSPPA) on 17,000 respondents in Malaysia has reported that 99 per cent of respondents were aware of the importance of waste recycling, but only 68.8 percent are committed recyclers. This showed that the number of people practicing recycling is unparalleled with recycling awareness. In order to achieve the target of 22 per cent recycling citizens by the year 2020, more works need to be done in order to enhance the awareness and attitude of households in Malaysia as well as encouraging citizens towards recycling. According to Syed [30], a complex problem involves several factors regarding shortage of funds and expertise, low level of public awareness and unclear legal framework. One way to address such problem is to compare people who recycle with those who do not [33]. Therefore, it is important to determine socio-demographic and psychological characteristics of recyclers and non-recyclers.

Recycling status can be differing in many ways. In this study, two psychological characteristics were examined. Firstly, the household's knowledge towards waste materials was identified. In doing so, researchers could examine the habits they put in recycling activities by comparing habitual behavior of recyclers and non-recyclers. Habits are typically construed as learned, goal-directed acts that become automatic responses in specific situations [1]. Automatic responses are viewed as an act performed with unconscious reasoning in a particular time. For this study, Habit is viewable as what act the recyclers and non-recyclers performed when they encountered uncertainty whether the waste materials are recyclable or not. Secondly, the perceptions of recyclers and non-recyclers towards recycling benefits were examined. According to Wright [34], research findings have been clearer concerning the relationship of attitudes to recycling behavior, focusing on both how individuals feel about the environment and recycling. In general, individuals who possess a positive perception towards recycling benefits would engage in recycling activity. It is important to understand attitudes about recycling, because if people see no benefit to an action they will not participate in it [19].

To date, numerous works has been done to define the characteristics of recyclers and non-recyclers. It is important to examine the social-demographic and psychological characteristics of recyclers to enable researchers to identify the common grounds of recycling behavior. Studies on recycling behaviors have been investigated across different disciplines such as economics, sociology, law, psychology and engineering. In environmental psychology, past researchers were interested in

identifying factors influencing household recycling behavior in term of correlation, motivations, determinants and barriers [20]. Current research is lacking information regarding household habits, therefore this study was aimed to examine household habits when encounter uncertainty of recyclable materials.

Aarts, Verplanken, and Van Knippenberg in their study of the role of habit in attitude-behavior models have presented three characteristics. Firstly, habits comprising a goal-directed type of automaticity. Secondly, repeated actions are caused by satisfactory experiences and lastly, mental processes act as a mediator of habitual responses. Habits are associated with repeated behavior, when a housewife whom is uncertain whether a particular waste material can be recycled may choose to throw it into the dustbin; her decision is based on intentions and attitudes. If the behavior is repeatedly performed, it will become a habit. When the housewife encounters the same experience again, her habit of "throw into the dustbin" will be automatically activated in her memory. It is vital to study recycling habits among households in order to improve the prediction of future behaviors. Therefore, if the behavior is repeated over and over again, future decisions are no longer guided by attitudes or perceived control but rather primarily influenced by habits. The relationship between reason-based concept such as attitudes and subsequent goal-directed behavior may be moderated by habit strength [26].

Study by Vicente and Reis in examining the factor influencing recycling behaviors among households has reported the influence of attitudes on household's recycling behavior. One of the components of attitude towards recycling is "Awareness of Recycling Benefits". Five sub-components were constructed for benefits of recycling, which are "conserve energy", "reduce litter", "reduce pollution", "preserve natural resources" and "reduce the land for dumps". Similarly, study by Bolaane [9] in examining perceptions of municipal officials' perceptions towards recycling benefits showed that most had high awareness. From the interviews, three potential benefits of recycling emerged which are "reduce quantity of waste disposal", "reduce quantity of waste collected" and "create jobs for the low-income groups". They concluded that even though municipal officials are aware of the benefits of recycling, their attitudes could not be generalized in practicing recycling and merely to maintain the status quo of the conventional waste collection and disposal.

2. Objectives:

The aim of the study is to examine recycling habits among households and their perceptions towards recycling benefits.

In examining the issues the following questions

are addressed:

1. What is the recycling status of households in Kota Kinabalu?
2. What are the habits of the households when they encounter uncertainty whether the waste material could be recycled or not?
3. What are the perceptions of recycling benefits among households in Kota Kinabalu?
4. What are the socio-demographic and psychological characteristics of recyclers and non-recyclers?

Materials and Methods

3.1. Respondents:

The respondents of this study consist of 484 households around the Kota Kinabalu district. The majority of the respondents are females (62.2 per cent). The mean age of the respondents was 30.67 years. The majority of the sample belongs to 18-37 age group (78.6 per cent), followed by 38-57 age group (20.0 per cent) and lastly 58-75 (1.4 per cent). The average household size was 5 people. Most households lived in village houses at (31.8 per cent), the rest was staying in terraced houses (29.1 per cent), apartments (29.1 per cent), bungalows (5.4 per cent) and semi-detached (4.5 per cent). The demographic characteristics are summarized in Table 1.

3.2. Measures:

An open-ended questionnaire was developed by the researchers by combining a self-constructing questionnaires and sources from past studies such as Larsen [18], Milfont and Duckitt's [21], Vining, Linn and Burdge [32], Katzev, Blake and Messer [16], Stern, Dietz, and Kalof [29] and NEPCNew Environmental Paradigm [12]. The full questionnaire which consists of five parts is aimed to examine several variables towards recycling such as attitudes, behaviors, barriers, motivation and psychosocial and demographic characteristics.

3.3. Statistical analysis:

The data were analyzed in two steps. Firstly, thematic analysis was conducted by following the steps listed by Braun and Clarke [10]. The data were simplified and patterns were constructed through responses written by the respondents. The data were analyzed through a series of procedure starting with data transcription, familiarization with the data from multiple readings and an initial noting of ideas. Then, potential themes were derived after coding was conducted across the data. The last process was to review the themes in order to construct an appropriate theme across individual and data set extractions.

4. Results:

4.1. Recyclers and Non-Recyclers Demographic

Characteristics:

In order to examine recycling status, the households were asked "Have you done the separation of garbage for recycling purposes?" Respondents that answered yes were perceived as recyclers whereby respondents that answered no were perceived as non-recyclers. Table 2 shows the different percentage of recyclers and non-recyclers among households in Kota Kinabalu.

A Chi-Square for test for goodness-of-fits was performed to analyze the relationship between genders, age groups, types of accommodation and recycling status. The findings of crosstab analysis showed no significant correlations for age [Pearson X² (df=2, N=484) = 1.235, p=0. 539] and gender [Pearson X² (df=1, N=484) = 0.411, p=0. 522] towards recycling status. Meanwhile, there is a significant correlation for types of accommodation [Pearson X² (df=4, N=484) = 9.805, p=0. 044] and recycling status. Table 3 shows the relationship between social-demographic characteristics and recycling status.

4.2. Habits towards Waste Materials:

Raw data from the respondents were analyzed by transferring it into the database, then the statements were organized into different components and sub-components according to the similarity of its contents. Through this procedure, themes were constructed for habits towards waste materials. When the respondents were asked regarding their habits towards the uncertainty of recyclable items, the most common answers were "Dispose" at 249 times as compared to "Seek Information" at 141 times and "Segregate" at 82 times. Table 4 shows the summary of the main components and sub-components of household habits towards waste materials.

Dispose:

The most frequent component listed by the respondents is "Dispose". Three sub-components were derived from it which are (i) Throw into Dustbin (n=220), (ii) burn (n=17) and (iii) Bury (n=12). Some of the responses were: "I will throw it directly into the dustbin", another said "the material will be burned immediately" and "If could not identify whether the material can be recycled or not, I would gather the materials and bury it".

Segregate:

Second component that was listed by the respondents is "Segregate". There are only two sub-components in this category which are (i) Collect and Stored (n=29) and (ii) Separate Wastes in Categories (n=43). Some of the examples of the statements were "store in a safe place and arrange neatly", "I will gather all the materials in the plastic and will not throw it anywhere" and "Separate it from other waste".

Seek Information:

The last component is "Seek Information". Six sub-components were constructed, the first sub-component is Ask People where it was divided into four categories which are (i) General (n=32), (ii) Family (n=5), (iii) Friends and (iv) Experts are respectively 15 times listed. Meanwhile the fifth sub-component was (v) Refer to internet (n=67) and lastly (vi) Refer to Label (n=7).

A Chi-Square Test was performed to compare between recyclers and non-recyclers habits towards waste materials when they encountered uncertainty of recyclable materials. There is only one significant difference between recyclers and non-recyclers among the components which is "Dispose" [Pearson X² (df=1, N=471) = 27.086, p=. 00], where non-recyclers are most likely to throw the material when they did not know whether the waste material is recyclable or not. Meanwhile, "Segregate" [Pearson X² (df=1, N=471) = .058, p=. 810] and "Seeking Information" [Pearson X² (df=1, N=471) = 0.473, p=. 491] showed no significant differences between recyclers and non-recyclers. Table 5 shows the summary of the relationship between recyclers and non-recyclers habits towards waste materials.

4.2. Perceptions of Benefits of Recycling:

Four components were derived from the database for perception towards the benefits of recycling. When the respondents were asked about their perception towards the benefits of recycling, most frequent answer listed was "Environmental Preservation" at 375 times. Other components listed were "Resources and Cost Conservation" at 168 times, Monetary Reward at 45 times and lastly Environmental Awareness at 38 times. Table 6 shows the summary of the main components and sub-components of household perceptions towards the benefits of recycling.

Environmental Preservation:

There are four sub-components under the "Environmental Preservation" which are (i) Environmental Protection (n=141), (ii) Cleanliness (n=46), (iii) Pollution (n=111) and (iv) Waste Disposal Reduction (n=77). Some of the responses were: "Conserve the earth"; "To ensure the cleanliness of the environment"; "Can reduce landfills and pollution" and "Reduces the amount of waste sent to landfills and incinerators and prevents pollution by reducing the need to collect new raw materials".

Resources and Cost Conservation:

For Resources and Conservation component, six sub-components were constructed. Cost Saving consists of four elements which are (i) General (n=45), (ii) Management (n=32), (iii) Processing (n=16) and (iv) Living (n=11). Other sub-

components are (v) Securing Sustainable Resources (n=34) and (vi) Material Wastage Reduction. Examples of the statement are "Prevents wastage"; "Conserve natural resources"; "Spend less on expenses to produce new products"; "Can save in terms of Living Cost"; "Extend live of limited earth's resource" and "Transformed it into crafts out of old newspapers, plastic bottles, and aluminium cans"

Monetary Reward:

The third component of the benefits of recycling was Monetary Reward which listed for 45 times. Examples of the statements were "Can be made as a side income (collecting cans and selling)" and "Provide income to those who does this". Past and present literatures still reported monetary incentives as the major motivation to recycle [24] especially among lower income household. Low income households sell relatively more of their post-consumption household materials than affluent households [4].

Environmental Awareness:

There are two sub-components under the Environmental Awareness which are (i) Ease of Waste Disposal (n=12) and (ii) Nurturing Values and Awareness (n=26). Some of the statements of the respondents were "allow an efficient implementation of disposal system" and "Can help to educate people to respect the environments". A Chi-Square Test was performed to compare between recyclers and non-recyclers perceptions towards recycling benefits. Two components showed significant differences between recyclers and non-recyclers, which are "Environmental Preservation" [Pearson X² (df=1, N=471) = 13.232, p=. 000] and "Resources and Cost Conservation" [Pearson X² (df=1, N=471) = 12.647, p=. 000]. Non-recyclers are more likely to perceive environmental preservation and resources and cost conservation as a form of recycling benefits compared to recyclers. Table 7 shows the summary of the relationship between recyclers and non-recyclers perception towards recycling benefits.

Discussions:

From Table 2, the majority of the households was non-recyclers (59.9 per cent) compared to recyclers (40.1 per cent). This is parallel to amount of recyclers in Malaysia which, according to Bernama, only five per cent of Malaysians are practicing recycling. Further argument could be made for recycling status, households that ever carried out separation of garbage for recycling purposes could not be judged based on their effort and commitment. Most are rarely engaged in recycling activities. Nonetheless, a comparison between recyclers and non-recyclers by self-report data could provide an opportunity to compare the responses known recyclers to known non-recyclers. ³²



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Table 1: Demographic Characteristics of the Respondents.

Variables	Frequency (n)	Percentage (%)
Gender		
Male	183	37.8
Female	301	62.2
Age		
18-37	380	78.6
38-57	97	20.0
58-76	7	1.4
Household Size		
1-17 people	5.34	2.36
Types of Accommodation		
Bungalow	26	5.4
Terraced	142	29.3
Semi-detached	22	4.5
Apartment	140	28.9
Others	154	31.8

Table 2. Summary of Recyclers and Non-recyclers.

Have you done the Separation of Garbage for Recycling Purposes?	N	%
Yes	194	40.1
No	290	59.9
Total	484	100.0

Table 3: Summary of Relationship between Recycling Status and Socio-Demographic Characteristic.

Variables	Recyclers		Non-recyclers		X ² Value
	n	%	n	%	
Gender					
Male	70	14.5	113	23.3	0.411
Female	124	25.6	177	36.6	
Age					
18-37	149	30.8	78.6	47.7	1.235
38-57	43	8.9	20.0	11.2	
58-76	2	0.4	1.4	1.0	
Household Size					
1-17 people	5.34		2.36		
Types of Accommodation					
Bungalow	17	3.5	9	1.9	9.805*
Terraced	57	11.8	85	17.6	
Semi-detached	7	1.4	15	3.1	
Apartment	48	9.9	92	19.0	
Others	65	13.4	89	18.4	

*significant at $\alpha = .05$

Previous studies had shown that accommodation types for living could influence recycling behavior.

According to a survey made by the National Union of Students, accommodation types have significant

impact towards recycling attitudes, awareness and behaviors. Their findings showed that students staying in their own home are more likely to recycle even if it requires additional effort. Besides that, they perceived recycling as important and are more aware of recycling facilities around their living places as compared to other types of accommodation. The current study also in parallel with the findings from Jasmine Adela Mutang and Sharifah Azizah Haron, whereby the recycling status did not have significant differences between genders. Interestingly, current research findings showed no significant differences between age and recycling status, even though many studies reported that older people tend to recycle more. Past studies showed a variety of findings between socio-demographic characteristics and recycling status. According to Ebreo and Vining [13], some studies indicate positive associations between factors such as age, social class and income, whereas others show negative or negligible

associations.

By identifying household's habits of recycling, their cognitive process could be examined by looking at the cognitive structure of how they learned, stored and retrieved the memory when they encounter uncertainty of recyclable waste materials. In order to design effective interventions to modify habitual environmental behavior, it is important to consider how habits are formed, reinforced and sustained [28]. When it comes to recycling habits, it is not the frequency of engaging in the activity, but it is referring to the way behavioral choice is made. The current study showed that non-recyclers tend to throw the waste material when they encounter uncertainty. According to Ebreo and Vining [13], the greatest difference between a recycler and a non-recycler is their knowledge of which items are recyclable. Knowledge plays a big role in determining individual habits in recycling.

Table 4: Summary of Main Components and Sub-Components of Household Habits towards Waste Materials.

Main Components	Sub-components	n	%
1. Dispose	Throw into dustbin	220	88.4
	Burn	17	6.8
	Bury	12	4.8
	Total	249	100.0
2. Segregate	Collect and stored	39	47.6
	Separate wastes into categories	43	52.4
	Total	82	100
3. Seek Information	Ask people (general)	32	22.8
	Ask people (family)	5	3.5
	Ask people (friends)	15	10.6
	Ask people (experts)	15	10.6
	Refer to the internet	67	47.5
	Refer to the label	7	5.0
	Total	141	100.0

Table 5: Summary of Relationship between Recycling Status and Habits towards Waste Materials.

Variables	Recyclers		Non-recyclers		X ² Value
	n	%	n	%	
Dispose	61	27.5	161	72.5	27.086*
Segregate	29	38.7	46	61.3	0.058
Seek Information	47	42.7	63	57.3	0.473

**significant at $\alpha = .01$

Table 6: Summary Of Main Components and Sub-Components of Household Perceptions Towards Benefits of Recycling.

Main Components	Sub-components	n	%
1. Environmental Preservation	Environmental Protection	141	37.7
	Cleanliness	46	12.3
	Reduce Pollution	110	29.4
	Waste Disposal Reduction	77	20.6
	Total	374	100.0
2. Resources and Cost Conservation	Cost Saving (general)	45	26.8
	Cost Saving (management)	32	19.1
	Cost Saving (processing)	16	9.5
	Cost Saving (Living)	11	6.5
	Securing Sustainable Resources	34	20.2
	Material Wastage Reduction	30	17.9
	Total	168	100
3. Monetary Reward		45	100.0
4. Environmental Awareness	Ease of Waste Disposal	12	31.6
	Nurturing Values and Awareness	26	68.4
	Total	38	100.0

Table 7: Summary of Relationship between Recycling Status and Perceptions towards Recycling Benefits.

Variables	Recyclers		Non-recyclers		X ² Value
	n	%	n	%	
Environmental Preservation	102	33.8	200	66.2	13.232**
Resources ad Cost Conservation	43	28.3	109	71.7	12.647**
Monetary Reward	18	40.	27	60.	0.000
Environmental Awareness	13	36.1	23	63.9	0.235

**significant at $\alpha = .01$

The findings of this study showed that majority households would dispose the waste material if they could not identify whether it is a recyclable item or not. This feedback is very important in the intervention of various behavioral change programs. One way of dealing with this problem is through informational strategy implementation. By increasing the knowledge of behavioral alternatives among households, eventually attitudes will change. Households could evaluate pros and cons of the new knowledge they acquired and in turn will affect future behavior.

Household perceptions towards recycling benefits could be seen as a pro - environmental attitude due to the high number of answers related to listed environmental issues; over 50 percent responded that recycling could benefit in term of environmental preservation. According to Banga, in many countries, recycling activities have gained increasing attention as a means of protecting the environment. In some studies, the authors used general environmental concern to refer pro-environmental attitudes. Even though the majority of the past studies showed a significant correlation between environmental concern and recycling behavior [5,2,25], as the former group of researchers argues that those individuals with more positive general environmental values and attitudes are more likely to express a higher level of recycling behavior [20], but the current findings showed otherwise. This study supports the notions by Bolaane [9] which mentioned that even though households were generally aware of recycling, this awareness appears not to necessarily translate into practicing recycling.

This study on perceptions on recycling benefits on components "Environmental Preservation" aligns with the findings showed by Vicente and Reis. They reported that by showing people their awareness of recycling benefits could lead to greater involvement in recycling. Ensuring the success of future recycling programs or campaigns, government need to inform consumers about recycling benefits as a strategy designed to promote involvement in recycling [23].

Among the components of recycling benefits, only two of it showed significant differences among recyclers and non-recyclers. Interestingly, non-recyclers tend to perceive recycling could help to preserve the environment and conserve the resources and cost compared to recyclers. This finding supports the argument by Kaiser, Florian, Wölfing

and Fuhrer on the strong link between environmental concern and recycling behavior that often reflect failure to measure attitude at a suitably high level of specificity. Thus, in reality, moral norms rather than environmental concern predict recycling behavior. Positive attitudes do not guarantee participation in waste management programs [17]. Social desirability is also one of the factors which could influence the respondent's answers. The respondents appeared to be better in the survey than in real lives. According to Alfroz *et. al.* [2], recent studies have noted that given the great amount of media devoted to environmental problems, it may be the case that many people have learned the language of environmentalism without developing a simultaneous behavioral action.

Conclusions:

This study aimed to examine recycling habits and perception of recycling benefits among households in Kota Kinabalu. Three components were derived from recycling habits which are (i) Dispose, (ii) Segregate and (iii) Seek Information. Meanwhile, for perceptions towards recycling benefits, four components were derived which are (i) Environmental Preservation (ii) Resources and Cost Conservation, (iii) Monetary Reward and (iv) Environmental Awareness. The findings showed that types of accommodation could influence recycling status among households. Non-recyclers are most likely to throw the waste materials into the dustbin if they were uncertain whether it could be recycled or not as compared to recyclers. In addition, non-recyclers generally have a high general environmental concern compared to recyclers. This study could provide feedbacks for an effective intervention in relation to habitual environmental behavior. More research explicitly investigating the interaction between habit and intention in the prediction of future behavior is urgently needed [1]. The reason of why research on habitual behavior in recycling is lacking due to the difficulty of nature of studying the habits and operationalizing it in terms of cognitive process. Future research could venture into this gap in depth to examine the relationship between habits related to the environment and recycling attitudes. Surprisingly, non-recyclers showed a higher pro-environmental attitude as compared to recyclers. Therefore, an environmental concern household cannot be assumed to engage in recycling

activities.

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Authors' Contribution

Generally, Ms. Jasmine, Dr. Chua, Ms. Lailawati, Prof. Rosnah, Mr. Alfred and Dr Ferlis were responsible for the construction of the themes. Mr. Rickless helped in the data analysis part. Prof. Rosnah and Mr. Alfred were also responsible for the language editing.

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