FACTORS INFLUENCING ON HOUSEHOLD'S RECYCLING BEHAVIORS: A CASE STUDY OF SELLING RECYCLABLES IN PYAY CITY, PYAY DISTRICT, BAGO REGION, MYANMAR

KHINE LWIN AYE

MASTER OF SCIENCE

IN

NATURAL RESOURCES AND ENVIRONMENTAL MANAGEMENT

SCHOOL OF SCIENCE

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Thesis Title	Factors Influencing on Household's Recycling Behaviors: A Case Study of Selling Recyclables in Pyay City, Pyay District, Bago Region, Myanmar
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ABSTRACT

The purpose of this study is to explore the extent of household's participation in the separation of key saleable materials and the factors that influence on their recycling behaviors in Pyay City, Myanmar. Data were collected through a questionnaire survey with the 348 completed responses to test the components of the Theory of Planned Behavior, namely, attitudes, social norms, and perceived behavioral controls. Overall, this study finds that the extent of source separation in Pyay City, Myanmar was very limited. Households rarely sorted recyclables to sell even if materials like metal cans, plastic bottles, paper boxes, glass bottles and writing paper had a market. Findings from the research study provide an insight that only a few specific components of TPB were influential to household's recycling behavior. The linear combination of attitude (ATT), social norms(SNs), perceived behavioral control(PBC) and revenue per year explained 36.3% of the variance in household's recycling behavior. The revenue per year and perceived behavioral control (the perception about time and space to separate and store the recyclables) are "the most influencing" factors in the model. Based on the findings, recommendations for future

campaigns to promote source separation of recyclables are given including the scope and the requirements of such campaigns that should be introduced at a neighborhood level not require too much time and space from targeted households to practice.

Keywords: Solid Waste Management/Theory of Planned Behavior/Source Separation/Recycling

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ABBREVIATIONS

ATT	Attitude
DN	Descriptive Norm
IN	Injunctive Norm
INT	Intention
MSW	Municipal Solid Waste
OECD	Organization for Economic Co-operation and Development
PBC	Perceived Behavioral Control
PCA	Principal Component Analysis
SD	Standard Deviation
SN	Social Norms
SWM	Solid Waste Management
TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Action
T&D	Township Development Committee
USA	United States of America

CHAPTER 1

INTRODUCTION

1.1 Background

Material separation is an integral part of sustainable waste management. It provides clean and homogeneous fractions of waste materials and facilitates subsequent recycling or reuses processes. Effective separation of municipal solid waste requires participation of households at source which can be lacking in developing countries where most cities are still struggling to provide basic waste removal and disposal services. However, there is a “low-hanging fruit” even in underdeveloped municipal solid waste management system. Some materials such as plastic bottle, papers, and tin can could be separated and sold to junk shops or other informal businesses. The recycling of these saleable recyclables is not only an effective way in reducing the amount of waste that needs to be removed and disposed but also a mechanism to promote resource efficiency that has significant economic and environmental benefits. In this research, the household's participation in separation of saleable recyclable materials and the factors that influence on their recycling behaviors are explored. Pyay, a city of Myanmar is selected as a case study due to not only there has a operating market for saleable recyclables but also facing insufficient space of dumping site. Because this study follows a general framework of environmental behavior, its findings might be applicable to the situation of other cities in developing countries with similar context.

Pyay (formerly known as Prome) is situated in West Bago Region, Myanmar. It is located on the eastern bank of the Ayeyarwady River. It is situated at 18º- 44’and 19º- 06’ of North Latitude and 95º - 13’ and 95º - 29’ of East Longitude and its

altitude is 61 m above sea level. The district of Pyay encompasses the valley of the Ayeyarwady, located between Thayetmyo, Hinthada and Tharyarwaddy districts. Along the western side of Pyay District are the Rakhine (Arakan) Yoma mountain ranges, and along the eastern side are the Bago (Pegu) Yoma mountain ranges .The north and northeast of the district is forest-covered, and contains numerous valleys and ravines, which unite in one large stream called the Naweng River. Pyay lies 260km (160 miles) northwest of Yangon in Myanmar, shown in Figure 1.1 Pyay, the administrative and the largest city of the Western Bago Region. Pyay District is subdivided into 6 Townships include Pyay Township, Paukkhaung Township, Padaung Township, Paungde Township, Thegon Township, and Shwedaung Township.

Figure 1.1 Location of Pyay

As a transportation hub that can be reached by various means, it is crowded by traders, tourists and travelers throughout the year. The main tourist attraction is the 7th century ancient city 'Sri Ksetra', it's palace which is located 8km (5 miles) to the southeast of modern Pyay, Hmawza Historical Museum and thousand year old pagodas and temples. It is also economically important city in region due to the three industrial zones, regional trading center, five high schools, one general hospital (500 beds), private hospitals, high-way bus station, rail-way station, two universities and three collages. Pyay is composed of ten wards in urban area and has total area of 2,293 acres. The population is about 135,325 in 2012. There are 28,177 households and five urban markets. The number of well known hotels and restaurants in Pyay are 9 and 8 respectively. Map of study area (Pyay city) is shown in Figure 1.2.

Solid waste management in Pyay was a public serviced provided by Township Development Committee (T&D). At present, collection system in Pyay is bell-ringing system. Pyay has been using this system for a long time. In this system, a solid waste collection truck with one or two workers for handling waste moves along a predetermined route, from 12 am, in making its daily rounds of collection and disposal. As the trucks moves slowly along its route, the residents are alerted by the ringing of the bell rang by one of the workers riding on the truck. At the signal of the bell, the residents bring their waste containers to the vehicle. The handling workers load the waste onto the vehicle. When the truck is full, it takes off the open dumping site. For cleaning of streets and roads, sweepers work early morning. The existing disposal system in Pyay is dumping on land system and threatens to the public health and environment. Moreover, due to increasing rate of municipal solid waste (MSW) and insufficient space of exiting dumping site, T&D is looking for new dumping site. However, the amount of MSW and shortage of dumping site would be less if there is source separation and the loss of resources would be recoverable.

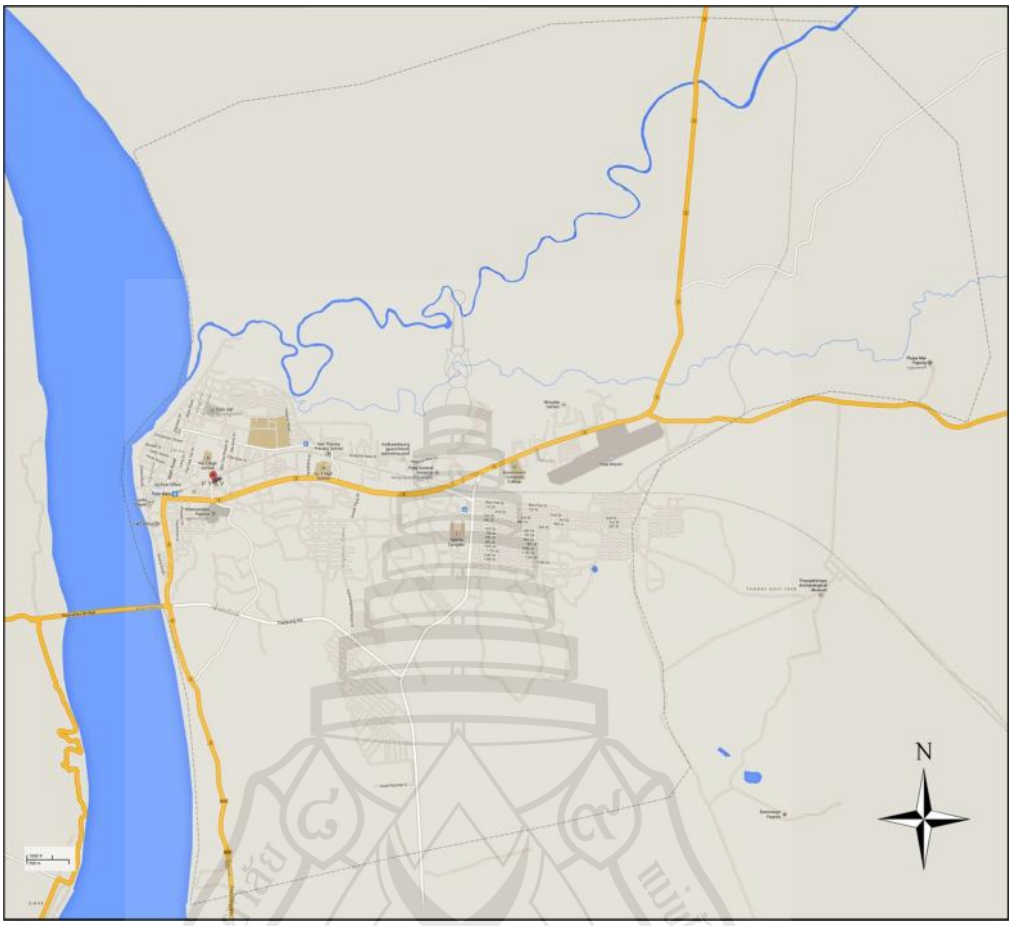


Figure 1.2 Map of study area (Pyay)

1.2 Problem Statement

Solid waste management has become an issue due to the rapid growing population and changing consumption rate. The appropriate solid waste management can be effective to prevent the environmental degradation and health risk. Nowadays, solid waste issue is directly related with human's consumption rate, their behavior, knowledge and less of awareness. Most people did not know their responsibilities and role in solid waste management. To minimize the solid waste generation and environmental impact, recycling method is one of the most environmentally friendly methods in solid waste management. If the solid waste generation is increased over

time, it can cause disposal problem and environmental issues. Reduce; reuse, recycling and source separation behavior are important to address the issues associated with solid waste management. Therefore, many research studies discuss about recycling behavior and to improve public participation in solid waste management. (Vitor & Martinho, 2009; Berglund & Matti S., 2006; Davies, Taylor, Fahy, Meade & Callaghan-Platt, 2005; Márqueza, Ojedaa & Hidalgob 2008).

Pyay, as the increasing population, rapid economic growth and rise in community living standards, the refuse of solid waste generation will accelerate in the future within the city. The amount of solid waste is increased over time and it can cause difficult to dispose. Currently, T&D is facing insufficient space of dumping site. Moreover, there is currently no source separation in municipal solid waste management system as the city is only equipped to handle a mixed stream of MSW. However, there is a “low-hanging fruit”. Some materials such as plastic bottle, papers, and newspapers can be separated and sold to junk shops and other informal businesses. However, households are not notice about recyclable materials can be used as resources. Now, most people still have been discarded as ‘waste’ and they could be sold these materials for money.

1.3 Objectives

This study aims at supporting the solid waste management (SWM) of Pyay, specifically;

1.3.1 To understand the factors that influence households’ recycling behavior

1.3.2 To identify households that should be targeted for future campaign

1.4 Research Questions

In order to meet the objectives, the research will try to answer the following questions:

1.4.1 Why do households in Pyay separate saleable recyclables?

1.4.2 How do different types of households in Pyay separate saleable recyclables?

1.4.3 How would the separation of saleable recyclables be encouraged in Pyay?

1.5 Scope and Limitations

The thematic scope of the study is to explore the existing role of households' saleable recyclable separation and to understand the factors that influence on household's recycling behavior. In other words, it is focus on the participation of households for separation of saleable recyclables, rather than the whole recycle businesses; the businesses might get recyclables from other channels such as from waste pickers who recover the materials from mixed waste but in this case there is no participation from households. The samplings of 400 households were collected through the questionnaire survey to assess the extent of household's saleable recyclables separation and to determine the factors that influence on household's recycling behaviors. To evaluate the factors on households' recycling behavior, the theory of planning behavior (TPB): attitude towards recycling, social norms about recycling and perceived behavioral control of recycling are used.

There already have saleable recyclables material market in Pyay, this study might directly applicable to other cities in developing countries that have markets for recyclable materials rather than the separation of other kinds of waste such as food waste that have yet had outlets for recycling.

1.6 Conceptual Framework

Figure 1.3 describes the conceptual framework of research study that explore the relationship of household's source separation behavior with the three predictor of TPB and socio-demographic characteristics that might influence the behavior. Recyclable materials separation is a behavior which requires considerable efforts on the part of individual as household waste must be sorted, separated, and stored. This study tests the factors that influence on household's recycling behaviors according to TPB. According to TPB, human behavior is guided by three kinds of considerations: beliefs about the likely outcomes of the behavior and the evaluations of these outcomes (attitude), beliefs about the normative expectations of others and motivation to comply with these expectations (subjective), and beliefs about the presence of factors that may facilitate or impede performance of the behavior and the perceived power of these factors (perceived behavioral control). In their respective aggregates, behavioral beliefs produce a favorable or unfavorable attitude toward the behavior; normative beliefs result in perceived social pressure or subjective norm; and control beliefs give rise to perceived behavioral control.

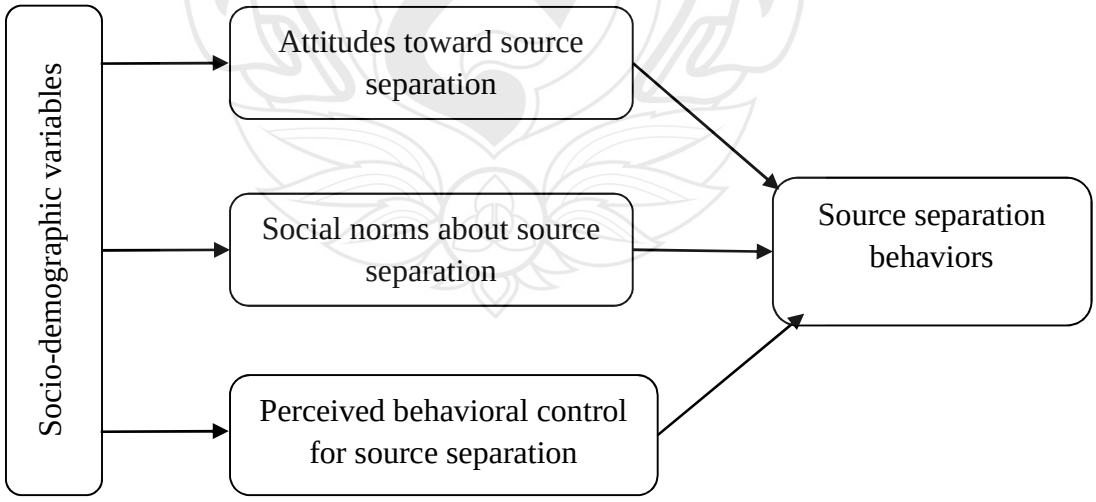


Figure 1.3 Conceptual Framework of Research Study

1.7 Thesis Outline

This study comprises five chapters. The objectives and scopes of this thesis are introduced in chapter one together with general information. Chapter two describes literature reviews. Chapter three shows methodology. Chapter four presents results and discussion. Conclusion and recommendations are given in chapter five.

CHAPTER 2

LITERATURE REVIEWS

In this chapter, the theory and previous researches have been studied as a support for current research. There are composed of four sections as follows:

1. Waste Management and Recycling in Developing Countries
2. Theory of Planned Behavior (TPB)
3. TPB and Recycling Behaviors
4. Summary

2.1 Waste Management and Recycling in Developing Countries

In the developing countries, the practice of hierarchical solid waste management system is less. The activities of the hierarchical SWM system consist waste reduction, source separation; reuse, recycling and proper disposal system. Household waste separation for recycling is an important role in sustainable solid waste management (Tadesse, 2009) Recycling is also one of the most environmental friendly behaviors and this performance is based on not only voluntary but also individual activities and cooperation. (Thørgersen, 2002 quoted in Aragonés, Francescato, and Gärling, 2002) To promote households recycling participation in solid waste management, a well informed waste collection regime, environmental education, good attitudes, and an effective enforcement scheme from social norms, proper economic incentives and promotion for local communities should be considered and focused. To approach the community based solid waste management strategy or public angle, social cohesion is important. (Tsai, 2007; Bekin, Carrigan & Szmigin, 2007; Philemon Kirunda, 2009)

To manage the waste issues, the proper economic incentives and promotion such as self-explanatory, “Garbage for Eggs” (GFE) project is used as the first program for communities in Yala (Thailand) (Kamaruddin, 2012). Although waste management has sound disposal system, the resource problems and environmental issues from wastes are increased and it becomes important to dealing with the public and political role. The important role is to transform solid waste to some form of recycling from disposal. In many developing countries, residential access source separation system for recycling program. The participation and household involving is the fundamental factor in recycling channel to avoid at least the mixing of recyclable and non-recyclable materials (Thørgersen)

Agarwal, Singhmar, Kulshrestha, and Mittal (2005) reported the important of recycling, condition of poor recyclists, steps of recycle dealers in Delhi, India. In the developing countries, the recycling of municipal solid waste is increased however, not like with developed countries. Nowadays, recycling is the most environmentally sound strategy for source reduction and reuse (United States Environmental Protection Agency, 2013) To explore the existing situations and issues in solid waste management, 43recyclists of three landfill sites, 7 big dealers and 15 small recyclable dealers were interviewed in field survey. Researchers suggested about municipal solid waste composition and disposal, each step of recyclable dealers and waste recyclists, recycle trade market and waste chain in Delhi, India. In addition, researchers showed the findings concern with waste recycling level, number of recyclist and price of recyclables .After that, researchers proposed the two models as Management model-A and Management model-B. This study has given the market mechanism of recyclables and also details about the recyclists. The suggestion about sound solid waste management system and recycling development discussed at the end of the study.

Jenkins, Martinez, Palmer and Podolsky, (2003) examined between the unit pricing ‘market-based’ environmental policy and curbside recycling programs. Data were collected national household-level and contained five specific materials (glass bottles, plastic bottles, aluminum, newspaper, and yard waste. The authors give the suggestions concern with the advantages and disadvantages of both recycling programs. A unit pricing (volume-based) program gives the indirect incentive to

recycle and also direct incentive as waste quantity reduction. If the local recycling program is not exist, a curbside recycling program would be less time to carry the recyclable materials as like glass bottles that are difficult to transport and can break. The recycling percentage of five specific different materials that include the recycling services (local drop-off facility/curbside collection/ mandatory or voluntary and so on) along with the socioeconomic characteristics of households was given as a source. The results indicated that the drop-off and curbside recycling programs increases the household's recycling opinions for specific five materials. Mainly, the recycling program is depended on the households that would be difficult to transport and storage. And also the result finding shown that the recycling program gives the strongest incentive to recycle if it is considered to create the convenience such as time and cost. The market prices of recyclable, the collection and procession costs also influenced by the specific type of recycling program. The effect of a unit pricing program, on the other hand, is less clear.

Wilson, Velis and Cheeseman (2006) reviewed the informal sector conditions and main challenges of SWM in developing countries from other study of Medina, 2000.The researcher said that many people depend on recycling materials for their livelihood in developing countries. The main challenges of solid waste management in developing countries and the appropriate solution is that finding the way to improve the informal sector conditions in recycling and workers' livelihoods were pointed out. The researcher classified the informal waste recycling according to their activities. These are: (1) "Itinerant waste buyers": These waste collectors are collected or bought recyclable materials from households by going door to door. And then these recycling materials that buy from households are transported to the recycling shop. (2) "Street waste picking": These waste collectors are collected the recyclable materials from community bins and mixed waste which thrown on the street. (3) "Municipal waste collection crew": The secondary raw materials are recovered and this practice is broadly used in most countries such as Mexico, Colombia, Thailand and the Philippines. (4) "Waste picking from dumps": Wastes are sorted from dumps before covered (pp. 798-808). In the informal recycling sector, scavengers and waste pickers are involved as actors to extract the reusable and recyclable materials from mixed waste informal recycling sector. Most of the developing countries, the informal waste

recycling is the main role to success in sustainable waste management. It can also give the benefits for the local economy. The researcher pointed out the recycling degree, its benefits and influence factors. The researcher said that recycling degree is depends on various factors such as income levels, markets, the requirement level of secondary raw materials, financial status , prices of virgin materials and etc. Most of the developing countries, informal recycling existed according to the low levels of economic development. However it can reduce the cost of the formal waste management system due to decrease the amount of waste for collection, less time and transporting. In addition, it can provide the employment and livelihoods for social groups. And then discussed about the cost and benefits of the informal sector, role of scavengers and waste pickers. The informal sector has not only health and social problems but also provision of economic benefits. The integration process of informal recycling in formal waste management sector suggested at the end of the study.

Zhang, Tan and Gersberg (2010) examined the existing challenges of solid waste management system in China. The researcher had given the information concern with the collection and transportation of municipal solid waste, population and waste generation rate in China between 2001 and 2007. And also made the comparison of the total waste generation amount and generation rate between selected OECD countries and China. The researcher pointed out the total amount of waste generation in China stands as second rank after the USA. The researcher discussed about current municipal solid waste management including waste generation, collection system and disposal processes. The researchers investigated current collection methods in major cities of China. There is a primary and secondary collection. The primary point includes one stage: storage and transportation service to local collection points. The secondary collection has two stages: first stage is storage and the second is a transportation service from a local collection point to treatment and disposal destinations. For residential urban waste collection, roadside collection and household collection are used. Roadside collection is a useful method for recycling program. In this collection, residents sorted their recyclable items and then storage at specific container that offered from local authorities. The old household

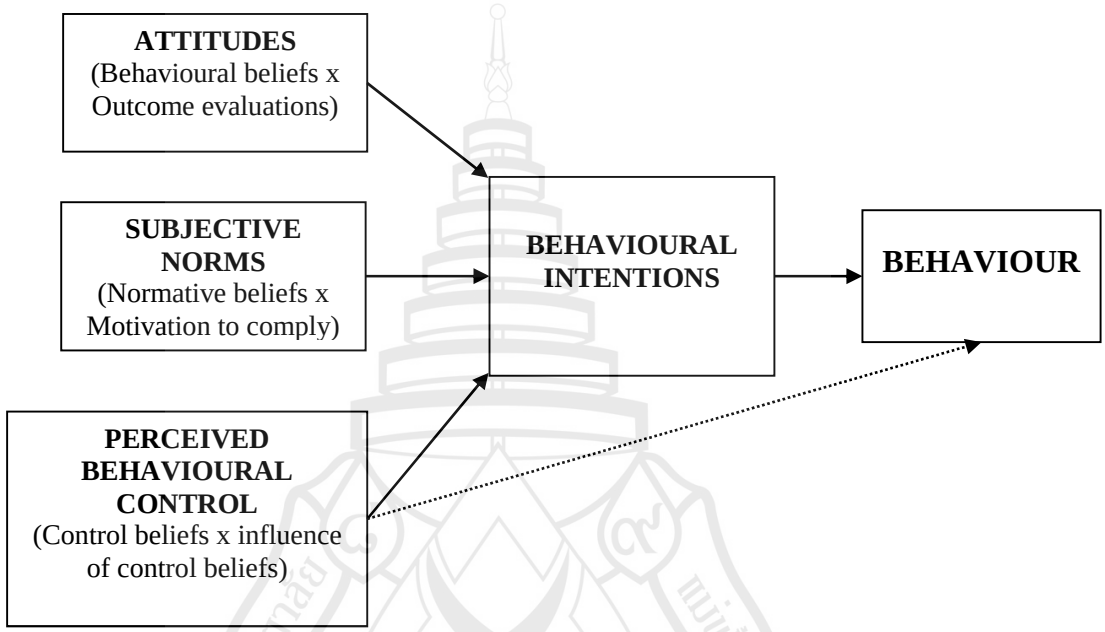
collection system is “ring bell collection” and “refuse chute”. And also researcher compared solid waste composition between China and other countries.

In addition, the researchers examined waste separation (participation of residents) and recycling system (collected by scavengers, reusable waste collectors, and door-to-door buyers) in China. The role of the informal sector, current challenges in solid waste management as littering are expressed. Furthermore, the difference between developed and developing countries in waste separation and recycling system are also discussed. The researcher pointed out the factors that affect the recycling rate in China compared with other countries. The main cause is that the environmental unawareness of resident and low price of recyclable materials. Industries bought the recyclable materials with lowest price and therefore it does not give incentive to individual for recycling. The main cause is lack of market for reuse materials and recyclable goods. Finally, the researcher gives the recommendation to organize and manage the informal sector in municipal solid waste management, to change the current collection system, to consider the recycling behaviors and facilities, to give the education programs for waste sorting and recycling. To promote policy, the disposal level and charging fees system and key findings are discussed at the end of the study.

2.2 Theory of Planned Behavior

Ajzen proposed the theory of planned behavior (TPB) as a model to predict behavior. TPB provided a framework to determine the behavior. According to TPB, human behavior is guided by three kinds of considerations: beliefs about the likely outcomes of the behavior and the evaluations of these outcomes (attitude), beliefs about the normative expectations of others and motivation to comply with these expectations (subjective), and beliefs about the presence of factors that may facilitate or impede the performance of the behavior and the perceived power of these factors (perceived behavioral control). In their respective aggregates, behavioral beliefs produce a favorable or unfavorable attitude toward the behavior; normative beliefs result in perceived social pressure or subjective norm; and control beliefs give rise to

perceived behavioral control. The theory of planned behavior has shown in Figure 2.1 as follows (Bamberg, and Schmidt, 1998; Tonglet, Phillips and Read, 2004; Ajzen, 1985)



Source Ajzen (1991)

Figure 2.1 The Theory of Planned Behavior (TPB)

TPB model includes intentions, attitudes, social norms and perceived behavioral control. To predict the intention of a person, the three predictors are used. There are attitude, social norms and perceived behavioral control. Each of them has individual special meaning in theory. The following are the brief meaning of these predictors.

Intention: Intention refers to the performance and behavior of a person. It can be used to predict human behaviors. Attitudes, social norms, and perceived behavioral control are used as three predictors (Francis et al., 2004)

Attitudes (whether the person has a favor to do it): The attitude of a person is based on the belief and consequences of the reported behaviors. The attitude is related to belief, outcomes and evaluation of the performance (Francis et al., 2004)

Social norms (how much the person feel social pressure to do it): The social or subjective norms are determined as the perception of one person on another person's performances in society. There are two types of social norms. They are injective norms (perception about others' expectation) and descriptive norms (perception about others' behavior) (Thørgersen)

Perceived Behavioral Control: It refers to the individual feeling and self confidence in ability to perform the behaviors. "It has two aspects: how much a person has control over the behavior and how confident a person feels about being able to do or not the target behavior" (Francis et al., 2004, pp.8-9)

2.3 TPB and Recycling Behaviors

There are various previous studies to understand the factors that influence on households' recycling behaviors by using the theory of planned behavior.

Recyclable materials separation is a behavior which requires considerable efforts on the part of individual as household waste must be sorted, separated, and stored. Consequently the separation decision is likely to be complex and several factors must be taken into consideration to explain it. TPB provides a theoretical framework for systematically identifying the factors which influence the separation decision. TPB also allowed individuals who have positive attitudes, and think that there is adequate normative support, and perceive that they can easily engage in the activity, should have strong intentions to perform the behavior (Fielding, McDonald and Louis, 2008).

(Tonglet et al., 2004) presented the challenges of UK local Authorities (Las) and proposed to encourage the households' participation in solid waste management and recycling programs in Brixworth town. To achieve this target, the authors tried to understand the attitudes and perception of householder on recycling. First mentioned about the previous waste strategies for UK concern with recycling, waste management

system and recent researches in recycling. In addition, researchers discussed about theory of planned behavior and theory of reasoned action (Ajzen) hypothesis. To explore the factors that influence on household's recycling behavior in Brixworth, UK, theory of planned behavior (TPB) used as a framework with additional variables. The additional variables are moral norms; past experience; situational factors and consequences of recycling. The data obtained through the questionnaires with 258 households and interview with random 20 residents. Questionnaires consist the specific components of TPB (personal recycling behavior, attitude, social norms and perceived behavioral control for recycling) and the additional variables questions. Seven-point rating scales are used to measure the components of theory of planned behavior. In these questions, scale 1 is indicated to positive view of recycling and scale 7 is indicated to the negative view of recycling. Most of the respondents are females. They had recycled their household wastes in the past and also they agree to recycle. According to the observation, it is indicated that the household lacked the understanding with recycling. The results found that the pro-recycling attitudes are the main driver to recycle. The other factors such as suitable facilities, opportunities and knowledge, perceived convenience time and space are also influence on recycling behaviors. The result reported that the specific components of TPB explained only 26.1% of the variance in recycling intentions; however, it increases 33.3% when combining with the additional measures variables. "The prediction of perceived behavioral control and situational measure were not significant correlated with intention to recycle. Knowledge toward recycling is strongly and significantly related with intention to recycle" (pp. 11-39). Development of recycling schemes, specific parts of TPB, specific issues and limitation of research discussed at the end of the study.

Achapan Ittiravivongs (2012) investigated the factors that influence on household's recycling behavior in Thailand. The researchers also examined the role of responsibility as a moderator. The theory of reasoned action (TRA) and theory of planned behavior (TPB) are used as a framework. The data are collected through the personal interviews and structured questionnaires with 381 sample households in Bangkok. The researchers used several statistical tests such as descriptive statistics, principal component analysis and logistic regression analysis, etc. The results showed

that the specific components of TPB significantly explained the recycling intention and the degree of responsibility are also affected on households recycling intention. The implication of recycling, giving disposal containers, increasing awareness and responsibility for recycling participation are suggested at the end of the study.

Knussena, Yulea, MacKenzieb and Wellsc (2004) used the theory of planned behavior to examine the household's intention to recycle that the poor recycling facilities area (Glasgow, Scotland).A cross-sectional survey design was applied and conducted through the questionnaires with 252 households. Specific types of recyclables are newspaper, glass, plastic and aluminum. Using the 7 point scale for intention to recycle. Attitude toward recycle contain 6 items, subjective norms with 3 items and perceived behavioral control with 2 items and used 7 point scale to measure. Additional variables as past recycling behavior and lack of facilities and used 5 point scale to measure. The basic descriptive statistics and bivariate (correlation) analysis used to explore the intention to recycle and the relationship within the TPB's components and intention. Hierarchical multiple regression analysis used to discover the past recycling behavior, perceived habit and perceived lack of facilities. In addition, it examined the impact of perceived habit on the past behavior-intention-relationship, the impact of perceived habit and past behavior on the attitude-intention relationship .The component of TPB and intention were related and also discovered that there has the significant relationship between intentions and past behavior. In addition, perceived habit has significantly related to past recycling behavior and also perceived behavioral control correlated with perceived lack of facilities.

The result reported that older respondents had more positive attitude, stronger subjective norm, strongly intention to recycle and also they have done more recycle in the past. However, they were less to perceive a lack of facilities to recycle. The demographic variables (gender, age, and occupation category) explained 5% of variance of intention to recycle. Female are recycler than male in past and also they had stronger perceived habit of recycling. The unemployed, retired or student had stronger intention to recycle and also in past but mid-manual occupation group found that more negative attitudes; lower subjective norms and perceived behavioral control scores for recyclables intention to recycle. Overall, demographic, TPB components

and additional variables explained 55 % of the variance (53% adjusted) of intentions to recycle. There have “two suggestions”: (a) “past behavior-intention relationship was stronger with no perceived habit of recycling” and (b) “the attitude- intention relationship was stronger if there was more recycled in the past”. “PBC-intention relationship found that weaker when it was perceived of lacking facilities” (p.244) Specific findings and comments was suggested at the end of the study.

Ioannou, Zampetakis and Lasaridi (2011) investigated the important factors that affect on recycling of packaging waste and printed paper. The researchers used the TPB as a theoretical framework to explore the behavior of recyclable municipal solid waste recycling in urban areas of Greece. It was explained the components of TPB and also presented about additional predicting variables. They are past recycling behavior, situational factors, and consequences/outcomes of recycling, along with demographic factors (age, gender and education). The data were collected through a structured questionnaire with personal interviews within one month duration. The sample size is three hundred and fifty households randomly selected in study area. Questionnaires applied a five-point, Likert scale to measure the variables. The questionnaires composed with socio-demographic characteristics of respondents, past personal recycling behaviors (6 items), ATT (6 items), SN (5 items), PBC (5 items), INT (3 items), situational factors (4 items) and consequences/outcomes of recycling (5 items). Plastic, glass, aluminum/tinplate, paper packaging and printed paper are used as recyclable. Descriptive statistics, correlation analysis and path analysis were used in this research. From the path analysis, the finding reported that components of TPB (ATT, SN and PBC) accounted 45.9 % of the intention to recycle. When adding the demographic variable, the percentage of variance explained increased to 49%. The intention for recycling has the statistically significant with respondent’s age and education. “When adding the variables of past recycling behavior, situational factors and consequences of recycling into the path model, it is accounted 79% of variance. The main predictors of intention to recycle are attitude and past recycling behavior. The limitation of the study and influential factors on recycling intention were discussed at the end of the study.

Tekkaya, Kilic and Sahin (2011) used the Ajzen's theory of planned behavior (TPB) and examined the determinants of teacher candidates' recycling behavior. Data were obtained by 232 teacher candidates in two campus universities. Multiple regression analysis is used to investigate the significant predictors of recycling behavior. The behavioral intention is explained 25% of variance in recycling behavior. However, it was not found statistically significant relationship between the perceived behavioral control and recycling behaviors. Teacher candidates' recycling intention were found to be significantly correlated with the linear combination of attitudes, subjective norms, and perceived behavioral control. The linear combination of this significant determinant could be accounted about 31% of variance in behavioral intention. Future development plan and recommendation were discussed at the end of the study.

2.4 Summary

Ajzen proposed the theory of planed behavior (TPB) as a model to predict behavior. TPB constructed by the three predictors groups: attitude (ATT), social norms (SN) and perceived behavioral control (PBC). The attitude (whether the person has a favor to do it) is based on the belief and consequences of the reported behaviors (Francis et al., 2004) Social norms (how much the person feel social pressure to do it) based on injective norms (perception about others' expectation) and descriptive norms (perception about others' behavior) (Thørgersen) The perceived behavioral control refers to the individual feeling and self confidence in ability to perform the behaviors and has two aspects: the extent a person think he/she can control the behavior and the confidence he/she feels about being able to do or not the target behavior. (Francis et al., 2004, pp.8-9). The previous research studies used TPB as a framework to explain the recycling behavior and identify the specific components of TPB on recycling behaviors (Tonglet et al., 2004; Ioannou et al, 2011; Knussena, et al., 2004; Achapan Ittiravivongs, 2012; Ölander & Thørgersen, 2006) Several studies discovered the relationship between the socio-demographic factors (age, gender, education status, and income) and recycling behaviors (Ioannou et al, 2011**;** Knussena, et al., 2004)

Many previous research studies examined the important of recycling, role of informal sectors and recyclists in solid waste management and suggested about important role of households, proper incentive, recycling program such as Garbage for Eggs" (GFE) project in sustainable solid waste management (Wilson et al.,2006; Agarwal et al., 2005; Tsai, 2007; Bekin et al., 2007; Philemon Kirunda, 2009; Thørgersen, 2002; Kamaruddin, 2012; Jenkins et al.,2003). This study explores the extent of household's participation in the separation of key saleable materials and the factors that influence on household's recycling behaviors in Pyay city, Myanmar.

CHAPTER 3

METHODOLOGY

3.1 Research Design

3.1.1 Quantitative Method

Quantitative data is basically represented by numbers. Quantitative data is the pieces of information that can be counted mathematically and large number of respondents are randomly selected for survey. This method is generalized and sample is representative. Data are very consistent, precise and reliable. After that data are analyzed by using statistical methods, percentage, frequency distribution etc. Quantitative research is applauded for the fact that "the findings are generalisable and the data are objective" (Terre Blanche, Durrheim & Painter (Eds.), 2007) Quantitative method is adopted in this study. Quantitative data and statistical analysis would also help in testing some hypotheses and increase on the validity of the findings from this study.

3.1.2 Questionnaires Survey

The data collected from personal interviews through the questionnaire survey, designed follow the previous literatures. Pre-test (pilot survey) was conducted with a few participant households to test the understanding level and to improve the questionnaire. The structured questionnaire survey is conducted with 400 households (see details below) within one month. These questions are based on the theory of planned behavior. Attitudes, social norms and perceived behavioral control are used as the three predictors to identify the most influential factor on household's recycling behavior. Survey data obtained from document (the answers from households) analysis and interviews with selected households.

3.2 Sample Size and Sampling Procedure

3.2.1 Sample Size (Creative Research System, 2012)

$$ss = \frac{z^2 * (p) * (1 - p)}{c^2}$$

where; z = value (e.g. 1.96 for 95% confidence level)

p = percentage picking a choice, expressed as decimal (0.5 used for sample size needed)

c = confidence interval, expressed as decimal

Therefore to get 5% confidence interval, c = 0.05

$$ss = \frac{1.96^2 * (0.5) * (1 - 0.5)}{0.0025}$$

$$ss = 384.16$$

Correction for finite population

New

$$ss = \frac{ss}{\frac{ss - 1}{pop} + 1}$$

ss = sample size

pop = Total Household number

$$ss = \frac{384.16}{\frac{384.16 - 1}{28177} + 1}$$

$$= 379.006 \approx 379$$

Therefore, representative sample household number=379

Total sampling household numbers= 400

3.2.2 Sampling Procedure

Pyay consists of ten wards in major urban area. These are Na Win Ward, Shwe Ku Ward, Kyaung Gyi Oe Tan Ward, San Taw Ward, Sin Su Ward, Ywar Be Ward, Khit Ta Yar Ward, Pyi Thar Yar Ward, Na Wa Day Ward, and Shwe Ta Gar Ward. The general background information of selected four wards is shown in following Table 3.1 and 3.2.

Table 3.1 General Background Information of Selected Four Wards

Ward	Total Households (Nos.)	Area (sq.km)	Total Population	Population Density per sq.km
Hsinsu	1,816	6.455	8,716	1,350.27
Kyunggyiohdane	785	0.441	3,770	8,548.75
Sandaw	2,582	0.700	12,395	17,707.00
Nawin	3,930	2.707	18,865	6,968.97
Total	**9,113**	**9.882**	**34,918**	**29,652.94**

Source Stratified Sampling Method

$$\text{Sample size for each layer} = \frac{\text{size of the whole sample}}{\text{size of the whole population}} \text{ x size of the layer}$$

where;

sample size of the whole population = 9113 households

size of the whole sample = 400 households

A stratified sample is made up of different 'layers' of the population. Therefore, each ward takes as layer for stratified sample.

Table 3.2 Sample Allocation within Selected Four Wards

Ward	Size of the layer	Sample size of each layer
Hsinsu (H)	1,816	$\frac{400}{9113}$ x $1816 = 80$
Kyunggyiohdane (K)	785	$\frac{400}{9113}$ x $785 = 34$
Sandaw(S)	2,582	$\frac{400}{9113}$ x $2582 = 113$
Nawin(N)	3,930	$\frac{400}{9113}$ x $3930 = 173$
		Total sample size = 400

3.3 Questionnaires Design

The questionnaires are based on literature and previous application of TPB as examples from Questionnaires are categorized into three sections. First section is the general socioeconomic information of respondents. Second part is to assess the household's saleable recyclables separation behavior for selling. The third section is to measure the three components of TPB (recycling attitudes, social norms and perceived behavioral control). The three predictors of TPB were measured with five point scale ranging from '1' (strongly disagree) to '5' (strongly agree). The separation frequency scale of each material is range from 0 to 4. The scales are '0' (never), '1' (rarely), '2' (sometimes), '3' (usually) and '4' (always). For second part and third, the questionnaire contained the following sections:

3.3.1 Households' source separation behavior

Asking participants directly to know their recycling behavior, how often they recycle each of the specific recyclable materials in the provided list: metal can, plastic bottle, paper box, glass bottles, and papers. The scale was indicated five points (never, rarely, sometimes, usually and always or every day.

3.3.2 Attitudes

Five-point scale used to measure the attitudes towards the saleable recyclables separation behavior. The attitude is identified as separation waste is good/bad; useful/waste of time; help to reduce solid waste generation/cannot help and etc.

3.3.3 Social Norms

These questions refer to two options: (1) People (my relatives/ friends/neighbors/City and T&D) who are important for me to separate saleable recyclables that I think, I should separate saleable recyclables' (2) People (my relatives/ friends/neighbors/City and T&D) who are important to me would approve of my recycling and separating the saleable recyclable materials from my house'.

3.3.4 Perceived Behavioral Control (PBC)

The perceived behavioral control is directly ask to the respondents how much they control to perform their behaviors and how easy or difficult performance on this behavior. Some items are described as follows:

1. I have enough space in my house to store separated recyclables.
2. I know what item of households waste can be sold as recyclables.
3. I have enough time to separate recyclable materials from my household wastes.

3.4 Data Collection

Pyay has about 28177 totally household numbers. To get 5% confidence interval, the sample household size is 379 numbers needed. Therefore, 400 households were conducted to collect data in this study. To test the content of the questionnaires, pilot survey (pre-test) had done with 20 households before going to data collection in the field. In the main survey, data were collected through questionnaire surveys with the set sampling size of 400 households. The face-to-face communications encouraged participation in the research resulting in a high response rate at 87% or 348 completed responses**.**

3.4.1 Hypothesis

In this study, the theory of planned behavior is used to assess the factors that influence on household's saleable recyclables separation (recycling behaviors). Attitude, social norms and perceived behavioral control are defined as the factors that influence on household's recycling behavior. And then determined the factors that the most significantly affect on household's recycling behavior.

3.4.2 Variables

In this study, household's separation behavior is used as a dependent variable. The specific elements of TPB and an additional variable (revenue per year in USD) are determined as independent variables. The demographic factors are also considered to explore the household's recycling behavior. Source separation behaviors were measured by the Separation Index. The respondents were asked to report the frequency they separated and sold recyclables at a material level. The separation frequency scale of each material is range from 0 to 4. The scales are '0' (never), '1' (rarely), '2' (sometimes), '3' (usually) and '4' (always). The usage of each material is offered the binary choices, '0' (doesn't use) and '1' (use). In addition to the frequency, households were also asked to estimate the revenues they earned each time they sold recyclables and the typical period they hoarded materials before selling. These two data were then used to calculate yearly revenue from selling recyclables per head (i.e.

normalized by the size of the family). The three predictors of TPB were measured with five point scales ranging from ‘1’ (strongly disagree) to ‘5’ (strongly agree**).**Separation Index was the average score of the separation frequency of the materials and revenue index. It ranged from 0 to 4. The frequency index was calculated by the following formula (Eq; 3.1):

Frequency

$$\text{Index} = \frac{\sum \text{Separation frequency of each material}}{\sum \text{Usage of each material}} \quad \text{.....Eq; (3.1)}$$

3.5 Data Analysis

The survey data are analyzed by using statistical analysis computer packages. There are a variety of statistical analytical methods. Before going to the field survey, dataset sheet will be done to put the data getting from the survey. Data are put into the datasheet at the end of the each day. By analyzing the quantitative data, we can know the difference between variables. After that it can be concluded about this study by using inferential statistics from descriptive. The selected statistical analytical methods are shown as the following:

3.5.1 Descriptive Statistics:

To summarize the finding data, the data will be analyzed by using descriptive statistics. Frequency scores, means, level of measurement, standard deviation, and cumulative percent are used. The results are presented into tables as diagramming and report etc**.**

3.5.2 Statistical Significant

The statistical significant is also important concept to explore whether or not relationship in the sample population. Many social science research, if the probability p value is $p<0.05$, $p<0.01$ and $p<0.001$ has a statistically significant. (Linneman, 2011, p. 223)

3.5.3 Bivariate Test (Correlation Analysis)

The purpose of Pearson's correlation coefficient (Pearson's r) is to test the strength of relationship between two variables. It ranges from 0 to 1, there is a positive relationship. It ranges from 0 to -1, there is a negative relationship and zero means no relationship. (Salkind, 2011, p.88)

3.5.4 Factor Analysis and Principal Component Analysis

Sakar, Keskin and Unver (2011) used 'Factor analysis and Principal Component Analysis' to reduce a large number of explanatory variables to a small number of dimensions and components. After that these reducing variables are used in regression equation. '"The central idea of principal component analysis (PCA) is to reduce the dimensionality of a data set consisting of a large number of interrelated variables, while retaining as much as possible of the variation present in the data set. This is achieved by transforming to a new set of variables, the principal components (PCs), which are uncorrelated, and which are ordered so that the first few retain most of the variation present in all of the original variables" (Jolliffee, 2002, p.1)

3.5.5 Multiple Regression Analysis

Multiple regression analysis is a statistical tool for understanding the relationship between a dependent variable and the explanatory variables. It includes a single dependent variable and several explanatory variables. Multiple regression has the three main types. They are: standard (or simultaneous), hierarchical and stepwise regression. In the standard multiple regression, all of the independent (or predictors) variables are entered into the equation simultaneously. In hierarchical regression, the independent variables are entered into the equation in the order specified based on theoretical grounds. In stepwise regression, it provide a list of independent variables and then allows the program to select which variables it will enter and in which order they go into the equation, based on a set of statistical criteria In the multiple regression, the coefficient of determination R^2 is the main coefficient . R Square gives the amount of the variance in the dependent variable (predicted stress) that is explained by the model (which includes the independent variables). To compare the contribution of each independent variable, standardized coefficient (Beta) is used. To construct a

regression equation, unstandardized coefficient (B) is used. (Pallant, 2010) The general form for a regression equation with multiple independent variables (Szafran, 2012, pp.67, 244) is described a follow:

$$Y=a+b_1X_1 + b_2X_2 + \cdots b_nX_n \quad \text{.....Eq; (3.2)}$$

Where:

Y = dependent variable

a= the constant term (Y intercept) and

$b_1 \ldots b_n$ =unstandardized coefficients of each independent variable

$X_1 \ldots X_n$ =explanatory variables (independent variables)

Regression residual = Y- Y^ (difference between the actual and fitted values of the dependent variable)

3.5.6 Assumption of Multiple Regression

Multiple regression is one of the fussier of the statistical techniques. It makes a number of assumptions about the data, and it is not all that forgiving if they are violated. The major assumption (Pallant) is taken in the following:

3.5.6.1 Multicollinearity and singularity:

This refers to the relationship among the independent variables. Multicollinearity exists when the independent variables are highly correlated (r=.9 and above). Singularity occurs when one independent variable is actually a combination of other independent variables (e.g. when both subscale scores and the total score of a scale are included.) Multiple regression doesn't like multicollinerariy or singularity and these certainly don't contribute to a good regression model.

3.5.6.2 Outliers:

Multiple regression is very sensitive to outliers and therefore it would be checked for extreme scores in the process.

3.5.6.3 Normality, linearity, homoscedasticity, and independent of residuals:

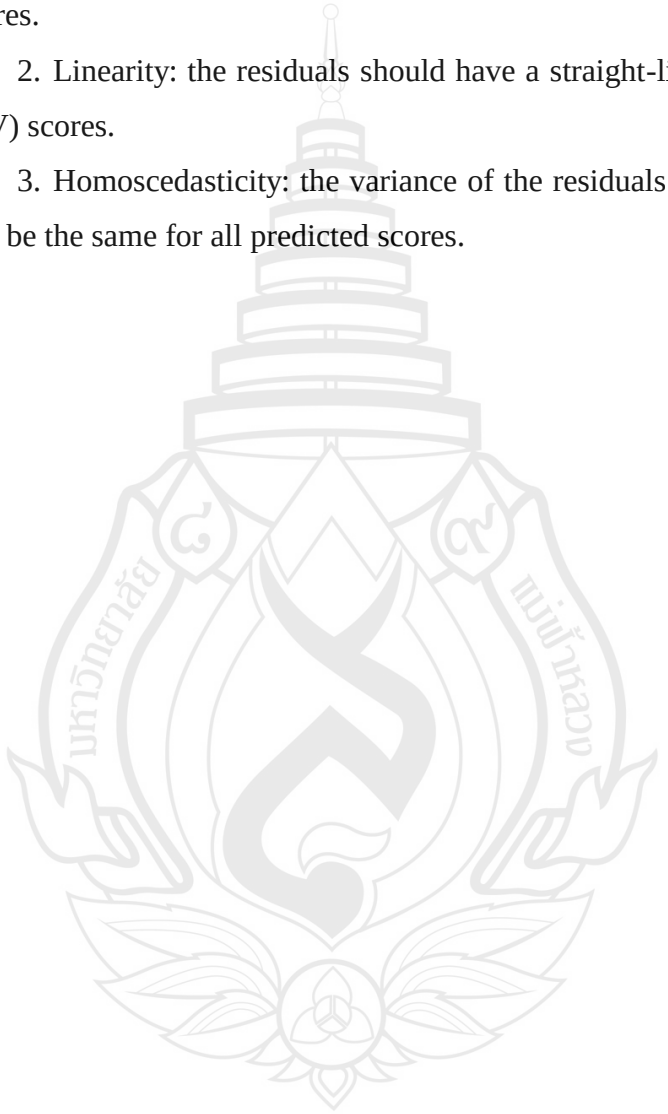
These all refer to various aspects of distribution of scores and the nature of the underlying relationship between the variables. These assumptions can be checked

from the residuals scatter plots which are generated as part of the multiple regression procedure. Residuals are the differences between the obtained and the predicted dependent variable (DV) scores. The residual scatter plot should be checked as the following:

1. Normality: the residuals should be normally distributed about the predicted scores.

2. Linearity: the residuals should have a straight-line relationship with predicted (DV) scores.

3. Homoscedasticity: the variance of the residuals about predicted DV scores should be the same for all predicted scores.



CHAPTER 4

RESULTS AND DISCUSSIONS

The data that collected through questionnaire survey was analyzed with statistical package analysis and the findings are presented in this chapter. Totally, 400 households are conducted to collect the data and 348 households were responded. The face-to-face communication encouraged participation in the research resulting in a high response rate at 87% or 348 completed responses. Previously, descriptive statistics and basic analysis such as standard deviation (percentage, mean scores), bivariate (correlation) analysis and independent sample t-test were conducted. Principal Component Analysis is used to reduce the factors and to identify the key factors that influence on household's recyclables separation behavior. Multiple-Regression analysis is applied to assess the relationship between the household's saleable recyclables separation behavior and specific elements of TPB.

4.1 Descriptive Statistics Analysis

4.1.1 Socio-demographic Characteristic of Respondents

Socio-demographic characteristic of participant households is shown in Table 4.1. The gender of the head of the households is Male (86.2%) and Female (13.8%). 145 (41.7%) out of 400 respondent households have senior citizen (age 60 and above). 56.9% respondent households have the children (age 15 and below), whereas 43.1% respondent households did not have the children. Only 3.4% respondent households have a maid. The average household total income per household is 414,195.40MMK (422.64USD). The average household member size was 4.39 people. For the status of higher education level in the family, 35.6% respondent

family did not have university education but the other 64.4% respondent family had at least one member that did.

Table 4.1 Socio-demographic Characteristics of Participating Households

Descriptions	Respondents' Attribute	Frequency (n)	Percentage (%)
Gender of head of the household	Male	300	86.2
	Female	48	13.8
Do you have any senior citizen (age 60 and above) in your household?	Yes	145	41.7
	No	203	58.3
Do you have any children (age 15 or less) in your households?	Yes	150	56.9
	No	198	43.1
Maid: Do you have a maid?	Yes	12	3.4
	No	336	96.6
Household total income per month (MMK)/USD	Average	414195.40MMK (422.64USD)	
	Std; Deviation	305417.344	
Household Member size	Average	4.39	
	Std; Deviation	1.658	
Education level: What is the highest education level in the family?	Undergraduate (Primary School, Secondary School and High School)	124	35.6
	Graduated	224	64.4

Note. MMK: Myanmar Kyat and USD: United States Dollar (1 USD= 980 MMK)

In this study, the two variables of socio-demographic factors are excluded. These two variables are gender and maid. When comparing the percentage group of gender of the head of the households, 86.2% are ‘Male’ and only 13.8% are ‘Female’. And also only 12 out of the 348 (3.4%) of the respondent households have a maid. The percentage rate of these two variables is rather uniform and so would not be used in future statistical test analysis.

4.1.2 Material Usage of Households

The following "Table 4.2" shows that the major saleable recyclables using items of respondent households. Metal can, plastic bottle, paper box, glass bottle and papers are used as key saleable recycables in this study.

Table 4.2 Major Saleable Recyclable Items of Respondent Households

Items	Do you use the following products?	N	Percentage
Metal can	Yes	269	77.3
	No	79	22.7
Plastic bottle	Yes	323	92.8
	No	25	7.2
Paper box	Yes	213	61.2
	No	135	38.8
Glass bottle	Yes	321	92.3
	No	27	7.7
Writing paper/book	Yes	330	94.8
	No	18	5.2

4.1.3 Household's Saleable Recyclables Separation for Selling

The number of 256 households are separated the saleable materials and the left households are not separated. The percentage of household's saleable materials separation is shown in the following (Table 4.3 and Figure 4.1). The result of the study showed that 74%of the respondent households are generally separated at least one of five materials and 26 %of the respondent households reported that they did not sort any of the five materials for recycling.

Table 4.3 Saleable Recyclables Separation for Selling of Participant Households

	Separation	Percentage
Separation of saleable recyclables	Yes	74
	No	26

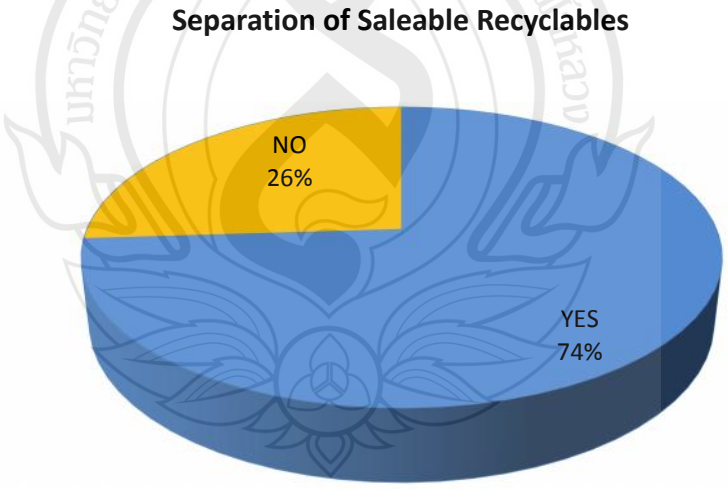


Figure 4.1 Saleable Recyclables Separation of Households

4.1.4 Household's Source Separation Practices

To understand the household's source separation behavior, the respondents were asked how often they separated the saleable recyclables for selling. The scale of separation behavior ranges from 0 to 4. They are '0' mean 'never', '1' mean 'rarely', '2' mean 'sometimes', '3' mean 'usually' and '4' mean 'always' separate the saleable recyclables. When the score get 0, it means that people who have never sort any of five materials for recycling. If the score get 4, it refer that the people always separate saleable recyclables. Table 4.4 and Figure 4.2 present the usage and recycling percentage of the five materials. This study found that, 79 households or 22.7% did not use metal can. In addition, out of the other 77.3 % (269HH) of the population use metal can. Even from 269 HH that use metal can, 123 HH (35.3%) had never separated. So, in total 58% did not separate metal cans. 7.2% of total households did not use plastic bottles. Plastic bottles are used by the other 323 HH (92.8% of the population). From 323 HH that use plastic bottles, 114 HH(32.7%) are never separate. So, in total 39.9% did not separate plastic bottles. 38.8% of total households did not use paper boxes/carton boxes. Paper box/carton boxes are used by the other 213 HH (61.2% of the population). From 213 HH that use paper boxes/carton boxes, (25%) are never separate. Therefore, in total 63.8% did not separate paper boxes/carton boxes. 7.7% of total households did not use glass bottles. Glass bottles are used by the other 321 HH(92.3% of the population). From that 321HH that use glass bottles, 152HH (43.6%) are never separate.So, in total 51.3% did not separate glass bottle. 5.2% of total households did not use writing paper/books. The other 94.8% (330 HH) use writing paper/book. From 330 HH, 192 HH (39.7%) are never separate.Therefore, in total 44.9% did not separate writing paper/book.

Table 4.4 Household's Saleable Materials Separation

	No Use	Use				
		Never	Rarely	Sometimes	Usually	Always
Metal can	22.7	35.3	31.9	5.2	1.7	3.2
Plastic bottle	7.2	32.7	33.1	16.1	6.6	4.3
Paper box	38.8	25	20.7	8.0	4.3	3.2
Glass Bottle	7.7	43.6	25.6	10.1	7.5	5.5
Writing paper/book	5.2	39.7	35.3	9.2	4	6.6

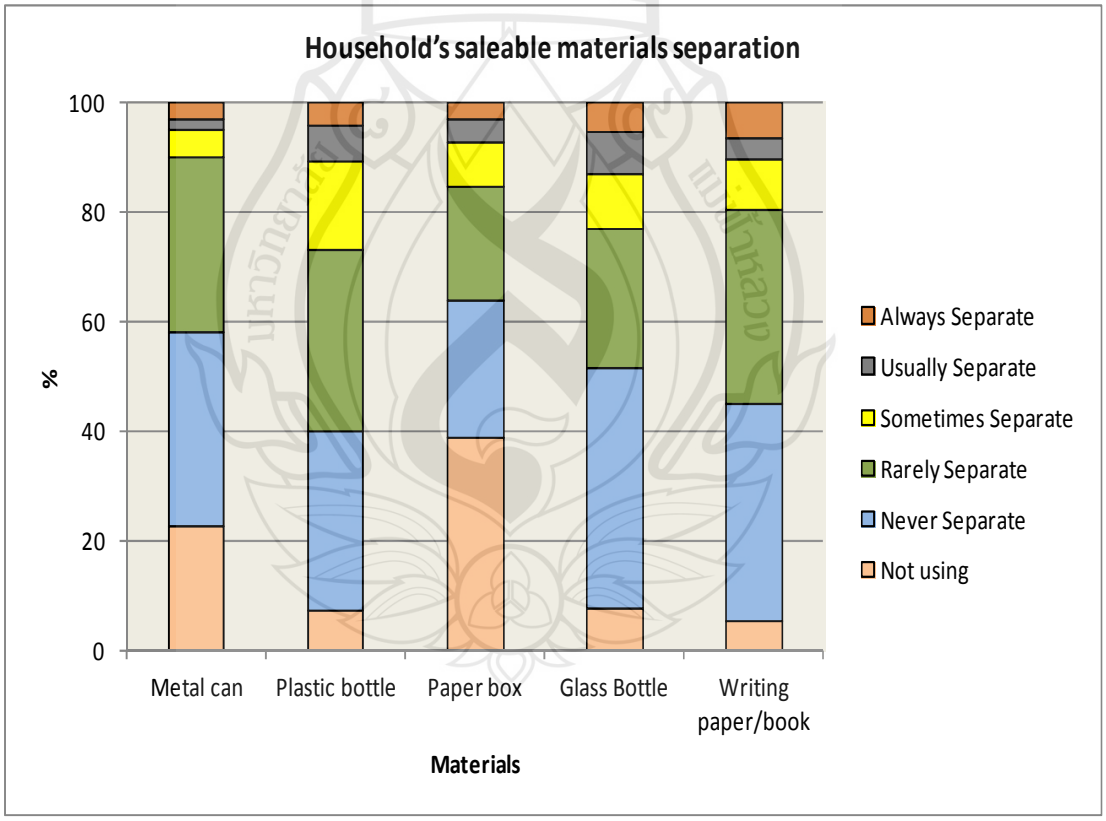


Figure 4.2 Household's Usage and Recycling Percentage of Saleable Recyclables

Table 4.5 Key Saleable Recyclables Separation (Mean and Standard Deviation**)**

How often do you separate the following recyclable items for selling?(Maximum=4, Minimum=0)	Mean	Std. Deviation(SD)
Metal Can	0.60	0.910
Plastic Bottle	1.02	1.103
Paper Box	0.62	1.018
Glass Bottle	0.90	1.183
Papers	0.92	1.137

The score of separation practices ranges from 0 to 4. The mean score and Standard Deviation (SD) of key saleable materials separation are shown in above Table 4.5. The mean score and standard deviation (SD) for separation behavior indexes presented in Table 4.6 as follows. The mean score of Separation Index is 0.6182(SD 0.58160) indicating that general households in Pyay rarely separate saleable recyclables. When estimating the separation behavior index, two cases that have more than 10000 MMK getting money from selling materials were excluded.

Table 4.6 Mean Scores of Separation Behavior Index and Revenue Index

Items	N	Mean	Std. Deviation
Separation Index (Maximum score=4, Minimum score=0)	346	0.6182	0.58160
Yearly Revenue Index (MMK)	346	439.8717	772.19715
Revenue per year (USD)	346	.4309	.73901

The theory of planned behavior is composed by three groups of predictors. They are attitude (ATT), social norms (SN) and perceived behavioral control (PBC). There are two subcomponents in social norms (SN), which are the injunctive norm (IN) and descriptive norm (DN). The range score of three components is 1 to 5. The mean scores and standard deviation are shown in following Table 4.7

Table 4.7 Three Component Variables of TPB (Mean and Standard Deviation**)**

Component Variables of TPB(Maximum= 5, Minimum=1)	**Description**	**Mean**	**Standard Deviation (SD)**
ATT1	I would feel guilty if I don't separate recyclable materials from my household waste.	2.58	1.213
ATT2	The money I get back from selling recyclables is significant.	2.66	1.300
ATT3	For me, separation of recyclable can help to keep household tidy.	3.92	1.146
ATT4	If I separate the recyclable materials from my household waste, I feel that it will help to reduce the solid waste generation.	3.75	1.000
ATT5	If I separate the recyclable materials from my household, I will feel that I am doing something positive the city and T&D.	3.62	0.960
ATT6	Junk shops are trustworthy businesses.	2.96	1.062
ATT7	People who work at junk shops look dirty.	3.26	1.049
IN1	My relatives expect me to separate and sell recyclable materials from my house.	3.22	1.196
IN2	My friends expect me to separate and sell recyclable materials from my house.	3.50	1.122
IN3	My neighbors expect me to separate and sell recyclable materials from my house.	3.61	1.119

Table 4.7 (continued)

Component Variables of TPB(Maximum= 5, Minimum=1)	Description	Mean	Standard Deviation (SD)
IN4	City and T&D expect me to separate and sell the recyclable materials from my house.	3.63	1.134
DN1	My relatives separate and sell recyclable materials.	3.34	1.202
DN2	My friends separate and sell recyclable materials	3.62	1.115
DN3	My neighbors separate and sell recyclable materials.	3.83	1.112
DN4	Most households that live in city, they separate and sell their recyclable materials from their house.	4.07	1.087
PBC1	I have enough space in my house to store separated saleable recyclables.	3.22	1.253
PBC2	I know what item of households waste can be sold as recyclables.	4.03	0.881
PBC3	I know where to sell my household recyclable materials.	3.78	1.057
PBC4	The distance from house and junkshop is close to sell recyclable materials.	2.99	1.365
PBC5	Door to door old materials buyers often come to our roads/streets.	3.98	1.117
PBC6	I have enough time to separate recyclable materials from my household wastes.	3.26	1.171

4.2 Influence of Socio-demographic Factors on Household's Recycling Behavior

To explore the different mean scores of household's recycling behavior between the two groups of senior citizen (Yes or No), children (Yes or No) and different education groups (Undergraduate and Graduated), T-test is used. Table 4.8 shown the difference mean scores of household's source separation behavior in different socio-demographic groups. The mean score of source separation behavior in order that have senior citizen household group (age 60 or above) is 0.6626 and the group that doesn't have senior citizen household is 0.6151, suggest that it has no statically significant difference mean scores. Regarding with the household group that have children (age 15 or less), the mean score of separation behavior is 0.6253 and the mean score of separation behavior that the household doesn't have children is 0.6088. With regard to the higher education, the mean score of undergraduate household group is 0.6168 and 0.6207 mean score in graduated household group. When comparing the mean scores of household's recycling behavior between the two groups of each socio-demographic variable, the result shown that socio-demographic characteristic cannot establish any statistically significant relationship to household's recycling behavior based on the differences in means.

Table 4.8 Mean Score of Separation Behavior Index of Various Socio-demographic Groups

Description	Groups	Mean	Standard Deviation(SD)
Senior Citizen (age 60 or above)	Yes	0.6226	0.59728
	No	0.6151	0.57177
Children (age 15 or less)	Yes	0.6253	0.60073
	No	0.6088	0.55717
Highest Education Level	Undergraduate	0.6168	0.59737
	Graduated	0.6207	0.55461

To determine the effect of total income per month and household member size on household's recycling behavior, Bivariate test is used. The results that shown in Table 4.9 suggest that the household member size and total monthly income are not statically significant correlated to the household's recycling behavior.

Table 4.9 Correlation between Income and Household Size with Separation Behavior Index

	Separation Index
Total income per household	.077
Household member size	-.007

4.3 Influence of Revenue Index

Pearson correlation analysis was used to measure the strength of the relationship between two variables. The result shown that separation index is positively and significantly related with yearly revenue index in MMK ($r=0.647$, $p<0.01$). Separation Index is also significantly and positively related to Revenue per year (USD) ($r=.602$, $p<0.01$). Correlation analysis between separation index and revenue index (MMK, USD) are shown in following Table 4.10.

Table 4.10 Correlation between Separation Index and Yearly Revenue Index

	Separation Index
Yearly Revenue Index (MMK)	.647**
Revenue per year (USD)	.602**

4.4 Bivariate Test of Influence of TPB's Components

The Pearson correlation (Table 4.11) shows that each variable of attitude, social norms (injunctive norm and descriptive norm) and perceived behavioral control influenced on household's recycling behaviors and discussed as follow:

4.4.1 Separation behavior:

It was positively related with attitude: ATT1 ($r=0.118$, $p<0.05$), ATT4 ($r= 0.177$, $p<0.01$), ATT5($r=0.146$, $p<0.01$). It was also positively related with injunctive norm: IN3 ($r=0.72$, $p<0.01$), IN4($r=0.188$, $p<0.01$) and descriptive norm: DN1 ($r=0.123$, $p<0.05$), DN2 ($r=0.119$, $p<0.05$) DN3($r=0.159$, $p<0.01$).Perceived behavioral control: PBC1 (0.127), PBC6($r=0.271$, $p<0.01$) was positively related with recycling behavior.

4.4.2 Metal Can:

Household's metal can separation behavior is positively and significantly related with ATT4 ($r=0.137$, $p<0.05$), IN1 ($r=0.122$, $p<0.05$), PBC1 ($r=0.124$, $p<0.05$) and PBC6 ($r=0.139$, $r<0.01$).

4.4.3 Plastic Bottles:

Household's plastic bottles separation practice is positively and significantly related with ATT1 ($r=0.162$, $p<0.01$), ATT3 ($r=0.159$, $p<0.01$), ATT4 ($r=0.227$, $p<0.01$), ATT5 ($r=0.210$, $p<0.01$). IN2 ($r=0.130$, $p<0.05$), IN3 ($r=0.159$, $p<0.01$), IN4 ($r=0.203$, $p<0.01$) and DN3 ($r=0.193$, $p<0.01$), DN4 ($r=0.146$, $p<0.01$). PBC1 ($r=0.157$, $p<0.01$) and PBC6 ($r=0.241$, $p<0.01$).

4.4.4 Paper Box:

Household's paper box separation practice is positively and significantly related with ATT1 ($r=0.162$, $p<0.01$), ATT3 ($r=0.159$, $p<0.01$), ATT4 ($r=0.227$, $p<0.01$), ATT5 ($r=0.210$, $p<0.01$). IN2 ($r=0.130$, $p<0.05$), IN3 ($r=0.159$, $p<0.01$), IN4 ($r=0.203$, $p<0.01$) and DN3 ($r=0.193$, $p<0.01$), DN4 ($r=0.146$, $p<0.01$). PBC1 ($r=0.157$, $p<0.01$) and PBC6 ($r=0.241$, $p<0.01$).

4.4.5 Glass Bottles:

Household's paper box separation practice is positively and significantly related with PBC1 (r=0.126, p<0.05) and PBC6 (r=0.177, p<0.01).

4.4.6 Papers:

Household's papers separation practice is positively and significantly related with ATT7 (r=0.126, p<0.05) and PBC6 (r=0.166, p<0.01).

Table 4.11 Influence of TPB's Components

	Separation Behavior Index	Metal Can	Plastic Bottles	Paper Box	Glass Box	Papers
ATT1	.118*	0.084	.162**	.170**	.021	.016
ATT2	0.054	.039	.070	.082	.060	-.069
ATT3	0.088	.102	.159**	.058	.049	-.007
ATT4	.177**	.137*	.227**	.131*	.096	.028
ATT5	.146**	.012	.210**	.188**	.005	.068
ATT6	.089	.043	.050	.055	.031	.038
ATT7	.102	.022	-.014	.070	.101	.126*
IN1	0.081	.122*	.046	.026	.035	-.001
IN2	0.077	.061	.130*	-.011	-.001	-.024
IN3	.172**	.016	.159**	.123*	.053	.006
IN4	.188**	.019	.203**	.177**	.096	.098
DN1	.123*	.095	.055	.009	.077	.086
DN2	.119*	.005	.098	.053	.051	.017
DN3	.159**	.011	.193**	.120*	.077	.002
DN4	.083	.026	.146**	.073	.024	-.092
PBC1	.127*	.124*	.157**	.169**	.126*	.042
PBC2	-.011	-.037	.047	-.086	-.050	-.044
PBC3	.096	.062	.082	.083	.031	-.001
PBC4	-.024	.037	.000	.054	-.006	-.045
PBC5	.104	.018	.072	.040	.090	.068
PBC6	.271**	.139**	.241**	.130*	.177**	.166**

Note. * p<0.05, ** p<0.01 significant level (2-tailed)

4.5 Principal Component Analysis

Primarily, Principal Component Analysis is applied to reduce the ten explanatory variables that influence on household's separation behavior. In this analysis, the three influence factors are getting according to the principal component analysis. The Rotated Component Matrix (Table 4.12) shows the three influence factors on household's separation behavior.

Table 4.12 Rotated Component Matrix

		Component		
		1	**2**	**3**
I would feel guilty if I don't separate recyclable materials from my household waste.	ATT1	0.520	0.193	0.266
If I separate the recyclable materials from my household waste, I feel that it will help to reduce the solid waste generation.	ATT4	0.651	0.101	0.203
If I separate the recyclable materials from my household, I will feel that I am doing something positive the city and T&D.	ATT5	0.675	0.079	-0.002
My neighbors expect me to separate and sell recyclable materials from my house.	IN3	0.698	0.349	-0.036
City and T&D expect me to separate and sell the recyclable materials from my house.	IN4	0.745	0.189	0.009

Table 4.12 (continued)

		Component		
		1	**2**	**3**
My relatives separate and sell recyclable materials.	DN1	0.039	0.836	0.153
My friends separate and sell recyclable materials.	DN2	0.338	0.811	0.076
My neighbors separate and sell recyclable materials.	DN3	0.416	0.713	0.010
I have enough space in my house to store separated saleable recyclables	PBC1	-0.010	0.254	0.793
I have enough time to separate the saleable recyclables.	PBC6	0.177	-0.066	0.820

The three components that showed in Table 4.12 are:

1. Factor 1: The first component was composed with three items from Attitude (ATT1, ATT4, and ATT5) and two items from Injunctive Norm (IN3, IN4).

2. Factor 2: The second factor was composed of Descriptive Norm as (DN1, DN2, and DN 3).

3. Factor 3: The third factors identified Perceived Behavioral Control as (PBC1, PBC6).

4.6 Data Transformation

To approach the normal distribution, data of Separation Index (SIndex) and Revenue per year in USD are transformed to logarithm of Separation Index (Ln of SIndex) and logarithm of Revenue per year in USD (ln of revenue in USD).

4.7 Multiple Regression Analysis

Multiple linear regression analysis used in order to explore the factors that influence on household's saleable separation behavior by the specific components of TPB. Separation behavior index used as a dependent variable. The three greatest influence factors from factor analysis are used as independent variables in multiple regression. The three independent variables are as follows:

Independent Variable1: Combination of Attitude (ATT1, ATT4, ATT5) and Injunctive Norm (IN3, IN4),

Independent Variable 2: Descriptive Norm (DN1, DN2, and DN 3),

Independent Variable 3: Perceived Behavioral Control (PBC1, PBC6) and

Table 4.13 Multiple Linear Regression Analysis with Three Independent Variables

Model	**R**	**R Square**	**Adjusted R Square**	**F**	**Sig.**
	.274	.075	.063	6.241***	.000

	Model	**Unstandardized Coefficients**		**Standardized Coefficient**	**Pearson Correlation**	**Sig.**
		B	**Std Error**	**Beta**	**r**	**p-value**
1	(Constant)	-.319	.040			.000
	Attitudes (1,4,5) + Injunctive Norms (3,4)	-.022	.042	-.034	-.032	.596
	Descriptive Norms (DN1+DN2+DN3)	-.057	.042	-.087	-.118	.175
	Perceived Behavioural Controls (space+time)	.159	.041	.247	.259***	.000

Note. * p<0.05, ** p<0.01, ***p<0.001 significant level

Table 4.14 presented that multiple linear regression model with an additional variable (revenue per year). The prediction model was statistically significant, F=27.869, p < .001, and explained 36.3 %(R^2 = .363, Adjusted R^2 = .350) of the variance of household's saleable recyclables separation behavior. Especially, revenue per year in USD (ln revenue) and perceived behavioral control (the perception about they had time and space) are strongly and positively related to the household's source separation behavior. Individual effect was found for attitude and injunctive norms (Beta=-.078, p=.173), descriptive norms (Beta=-.121, p=.039), perceived behavioral controls for time and space (Beta=.281, p=.000) and ln revenue in USD (Beta=.481, p=.000). Revenue per year (USD) and Perceived behavioral control mainly affected on household's source separation behavior.

Table 4.14 Multiple Linear Regression Analysis (adding an additional variable)

Model	**R**	**R Square**	**Adjusted R Square**	**F**	**Sig.**
	.602	.363	.350	27.869***	.000

Model		**Unstandardized Coefficients**		**Standardized Coefficient**	**Pearson Correlation**	**Sig.**
		B	**Std Error**	**Beta**	**r**	**p-value**
1	(Constant)	-.009	.047			.000
	Attitudes (1,4,5) + Injunctive Norms (3,4)	-.049	.036	-.078	-.072	.173
	Descriptive Norms (DN1+DN2+DN3)	-.080	.038	-.121	-.126*	.039
	Perceived Behavioural Controls (space+time)	.178	.037	.281	.352***	.000
	ln of revenue in USD	.351	.042	.481	.505***	.000

Note. * p<0.05, ** p<0.01, ***p<0.001 significant level

Dependent variable: LN of SIndex (Log of Separation Index),

Independent Variable1: Combination of Attitude (ATT1, ATT4, ATT5) and Injunctive Norm (IN3, IN4),

Independent Variable 2: Descriptive Norm (DN1, DN2, and DN 3),

Independent Variable 3: Perceived Behavioral Control (PBC1, PBC6) and

Independent Variable 4: Revenue per year in USD (ln revenue).

The prediction equation described as follows by using the unstandardized coefficients:

Y (log of SIndex) = -.009+ (-.049) (ATT&IN) + (-.080) (DN) +.178 (PBC) +.351(lnrevenue in USD)

4.8 Discussion

The purpose of this study is to explore the extent of household's participation in the separation of key saleable materials and the factors that influence on household's recycling behaviors**.** This study finds that the extent of source separation in Pyay City, Myanmar was very limited. Households rarely sorted recyclables for sell even if materials like metal cans, plastic bottles, paper boxes, glass bottles and writing paper had a market**.** 26% of the households reported that they did not sort any of the five materials for recycling. Table 4.4 presents the recycling behaviors by types of materials. Overall, the mean score of Separation Index is 0.6182 (S.D. 0.58160) indicating that in general households in Pyay rarely separate saleable recyclables as shown in Table 4.6. In this study, the recycling behavior and socio-demographic factors are not established statistically significant relationship between them. However, the previous research study found that the demographic characteristics (gender, age, and occupation groups) explained and influenced on intention to recycling behavior. The older respondents had more positive attitude, stronger subjective norms and intention to recycle (Knussena, et al., 2004) In this study, bivariate test (Table 4.11) shows that a few specific components of TPB that influence on household's recycling behaviors. The key findings are discussed as follow:

4.8.1 Influence of TPB's Components

Attitudes: the guilt that the households would feel if they do not separate recyclables; the feeling that they help reducing waste with source separation; and, the feeling that they do something positive for the city can motivate source separation. The attitudes toward personal gains such as revenues from selling materials and the tidiness of the house or the image of the recycling businesses do not show to influence the reported behaviors.

Social Norms: Regarding the injunctive norms, households tended to separate more recyclables if they felt they were expected by their neighbors and the city to do so. For descriptive norms, the beliefs that their relatives, friends, and neighbors normally practiced source separation can be influential but not the belief about the practice at the city level.

Perceived Behavioral Control: The perceptions that they had time and space to separate and store waste materials are the two factors that can determine the recycling behaviors. Distance to the junkshops is not significant possibly due to the omnipresent of door-to-door waste buyers.

4.8.2 Multiple Regression Analysis Outputs

Multiple regression analysis is used to decide the most influence factors on household's saleable recyclables separation (recycling) behavior and discussed as follows:

4.8.2.1 R Square & Adjusted R Square: Multiple regression analysis output (Table 4.12) shows that the value of R Square is .363. It means that all predictor variables explained 36.3% (Adjusted R Square=.350) of the variance in household's recyclables separation behavior. The overall predictors are the specific components of TPB and additional variable (Revenue per year in USD). The specific components of TPB explain only 7.5% (Adjusted R Square= .063) of the variance in separation behavior. However, it is increased and explained 36.3% when combining an additional variable as revenue per year in USD (lnrevenue) to the model. This finding is similar to some of the previous research studies that reported in the literature review. (Tonglet et al., 2004) similarly explored the household's participation in SWM and recycling programs in Brixworth town (UK). The result shown that specific components

of TPB explained only 26.1% of the variance in recycling intentions; however, it increases 33.3% when combining with the additional measures variables. The similar study that explored the recycling behavior and participation in West Oxfordshire, UK, TPB components only explained 2% of the intention to recycle. However, it was increased to 26.1% with the additional variables which include past behavior, moral norms, consequences of recycling and attitude to waste minimization (Davis et al., 2006; Knussena et al., 2004) conducted the poor recycling facilities area (Glasgow, Scotland) and used the theory of planned behavior to examine the household's intention to recycle. TPB components, demographic factors and additional variables explained 55 % of the variance (53% adjusted) of intention to recycle. (Ioannou et al., 2011) also investigated the important factors that affect on recycling of packaging waste and printed paper. The study found that specific components of TPB explained 45.9 % of the intention to recycle. When adding the demographic variable, the percentage of variance explained increased to 49%. When adding the variables of past recycling behavior, situational factors and consequences of recycling into the path model, it is accounted 79% of the variance.

4.8.2.2 Standardized Coefficient (Beta): It is used to compare the effect of independent variables on a dependent variable. Each of the standardized coefficients is discussed as follows:

1. Attitude and Injective Norm: In this study, the combining of attitude and injective norm (Beta=-.078, p=.173) are not significantly predicted to recycling behavior. (Tonglet et al., 2004) reported that the attitude toward recycling behavior is the most important factor to predict recycling behavior. (Ioannou et al.) also investigated household's attitude and past recycling behavior were predicted the intention for recycling. However, there has a difference in this study. In this study, the attitude could not be predicted the recycling behavior. (Ölander, & Thørgersen, 2006) reported that social norms was not an important determinant before and after intervention to recycle. In this study, injunctive norm are not to be predicted to household's recycling behavior. It seems that household's recycling behavior in Pyay directly depends on their own perceived behavioral control.

2. Descriptive Norm: The descriptive norm (Beta= -.121, p=.039) is significantly predicted to household's recycling behavior. But the descriptive norm is a weak predictor and it is related with negatively to the reported behavior. It seems that households in Pyay observed the behavior of others such as relatives, neighbors and friends. However, they are not influenced by social pressure to do reported behavior.

3. Perceived Behavioral Control: In this study, the two factors (that option of time and space to separate and store) of perceived behavioral control (Beta=.281, p<.001) are a strong predictor of household's separation behavior. It seems that the households in Pyay influenced under their perceived behavioral control (physical recycling such as time, space and inconvenience).If they have more enough time and space to separate and store the recyclables, they willing to separate recyclable for selling. (Tonglet et al., 2004) however, found that the perceived convenience time and space were also influenced on recycling behaviors but it cannot be predicted the intention to recycling behavior.

4. Revenue per year (USD): Revenue per year in USD (Beta=.481, p<.001). Revenue per year in USD is the strongest predictor of household's recyclable separation behavior. It means that the household's recyclables separation behaviors would be particularly influenced by revenue from selling materials. If they get the more revenue from selling recyclables, they are more active to separate recyclables for selling.

5. Unstandardized Coefficient (B): The regression coefficient B represents that if the independent variable changes by one unit, the dependent variable will change the amount. The unstandardized coefficient (B) of Revenue per year in USD is .351. If Revenue per year (USD) increases LN 1 unit, separation behavior index increase to LN .351. In the other words, if PBC increases 1 unit, separation behavior increase 0.351units (0.351%).Figure 4.2 shows the relationship chart between the Revenue per year (USD) and household's saleable recyclable separation behavior. The blue line represents the separation behavior of the respondent. The chart demonstrates that there is a correlation between Revenue per year (USD) and saleable recycle behaviour. The more revenue per year, the better recycle behavior. If they get 50 USD of revenue per year, the separation behaviour is 3.99 (nearly 4).

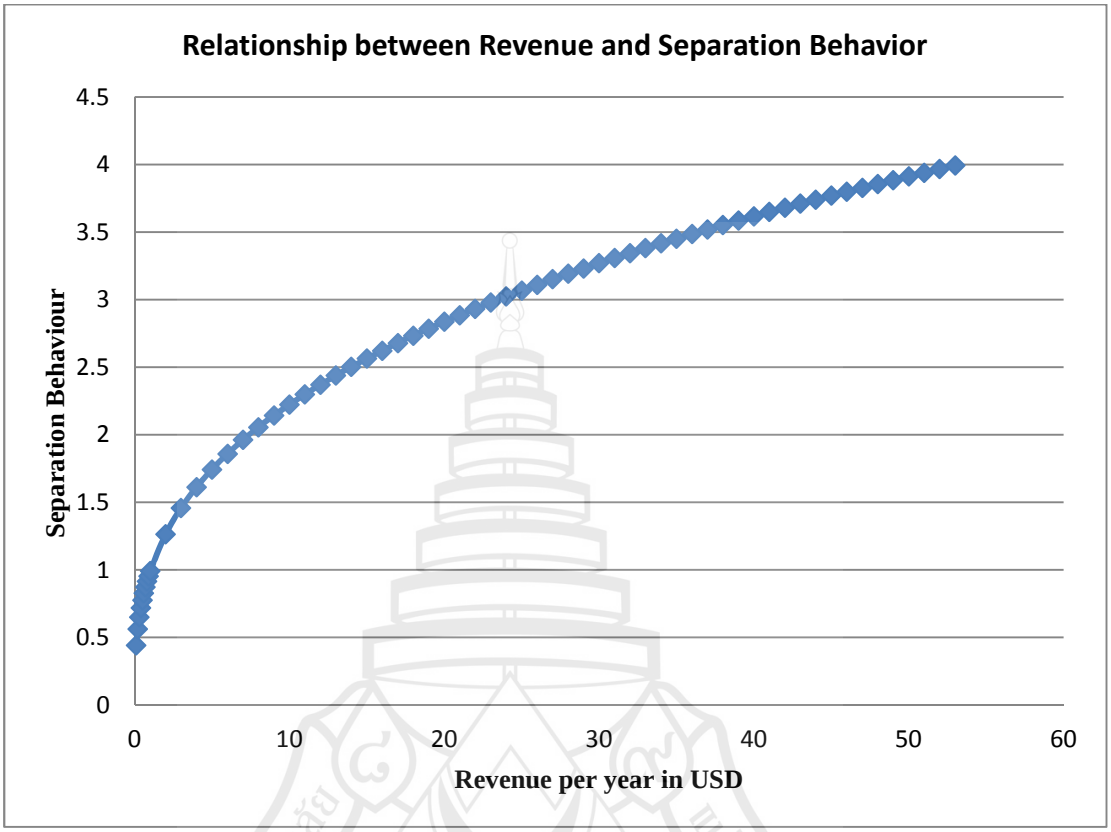


Figure 4.3 Revenue and Household's Recycling Behavior

4.8.3 Suggestions and Comments from Local People

From the 348 respondents, some of the respondents answer the suggestion open ended question. In general, the answer indicates that the respondents willing to separate more recyclables if they can get back better value of selling recyclables. As one respondent said that:

> *'I would like to separate, if I can get back better price from selling recyclables, the money get back from selling recyclables does not worth the effort. To sell the recyclables, I have to separate and store for long time.'*

Another respondent said that:

> *'The money I get back from selling is a little bit. So most of the time, I have to discharge saleable recyclables together with other wastes to collection trucks.'*

Some respondents don't bother with money get back from selling recyclables. As one resident said that:

> ***'***I separate the saleable recyclables from my home and give it to the person who helps me clean my house and compound.***'***

A few of respondents were willing to separate recycle even without money get back from saleable recyclables. Depend on the respondent's environmental education level, their thinking and behaviour is different. As one respondent said that:

> *'I think we should separate saleable recyclables, it should be benefit for environment.'*

In other side, one respondent said that

> *'I'm struggle with household work; there is no time to separate saleable recyclables. Even I separate or not, I don't think there is much difference.'*

In some community, there has been environmental educated. Two respondents answer as below:

> ***'***I separate and sell the saleable recyclables to support Green Development and Environmental Pollution program and also to get the extra income. Even the money I get back from selling recyclables isn't much, I separate it. Because, that benefit on my house, environment and city. People should disposal the waste systematically and they should separate recyclables and sell back.***'***
>
> ***'***Separation and selling saleable recyclables can help create cleaner and healthier environment. If we sell our recyclables, it can be use to make new product. And also we should share and encourage reusing the materials again and again. We should not encourage the materials to use just only one time. I have been learning about recycle and reuse in training course.

Some respondents willing to do reuse rather than selling back saleable recyclables.

> *'Even the money I get back from selling recyclables isn't significant; I use to sell the saleable recyclables. Sometime, I gave these materials to someone who would sell it. Sometime, I keep the plastic bottle and glass bottle to reuse because it can be reuse as container for refill ingredients such as salt, sugar, etc.'*

Another respondents mention as below:

> *'Although I feel that separation of saleable recyclables help to keep household tidy, I don't like to use the materials such as plastic. I rather like to use decomposable materials as like papers.'*
>
> *''My home does not have much saleable recyclable materials because there are a few family members and my kids are students, they spend most of the time at outside.'*

4.9 Summary

The result of the study showed that 74% of the households are generally separated at least one of five materials but their recycling behavior is rarely separated (mean score of separation index- 0.6182 out of 4 scales). The socio-demographic characteristic cannot establish any statistically significant relationship to household's recycling behavior based on the differences in means. The household's recycling behavior can be predicted and explained 7.5% with the three components of TPB. The prediction power of model is significantly increased as 36.3% when adding an additional variable (revenue per year) into the model. The revenue per year and perceived behavioral control are "the most influencing" factors in the model. The value get back from the selling recycle cannot attract to the local people even low income household. It seems like the market value of recyclable materials in Pyay is too low and do not connect to international market. The public awareness raising campaigns and environmental education programs present in Pyay, however, the knowledge cannot spread widely into different communities and household levels.

CHATER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This study finds out the factors that influence on household's saleable recyclables separation behavior. Overall, this study finds that the extent of source separation in Pyay City, Myanmar was very limited. Households rarely sorted recyclables to sell even if materials like metal cans, plastic bottles, paper boxes, glass bottles and writing paper had a market. Findings from the research study provide an insight that only a few specific components of TPB were influential to household's recycling behavior. The findings suggested that household's saleable recyclables separation behavior is statistically significant related with attitude (based on feeling), injective norms (based on the expectation of neighbors and city to do the reported behavior), and descriptive norm (based on the belief that their relatives, friends, and neighbors normally practiced source separation). PBC (based on the perceptions that they had time and space to separate and store waste materials. According to the multiple regression analysis, the main predictors of household's recycling behavior are the revenue from selling materials per year and PBC (time and space options). If households get more revenue from selling recyclables, more willing to separate recyclable. If they have more enough time and space to separate and store the recyclables, they would be more willing to separate recyclables.

Thus, it would be more effective to be considered and provided sufficient to encourage the households to recycle in future campaign of solid waste management. For future campaigns to promote source separation of recyclables are given including the scope and the requirements of such campaigns that should be introduced at a

neighborhood level not require too much time and space from targeted households to practice.It can be concluded that the households in Pyay separate the saleable recyclables depended on the revenue from selling materials and PBC (the perceptions that they had time and space to separate and store waste materials). Regarding with the socio-demographic factors, senior citizen (age 60 or more), children (age 15 or less) and highest education level (undergraduate and graduated) are not statically significant predicted to household's recycling behavior. The previous research studies reported that older people have the more favorable to do recycling. However, it is limited in this study and therefore the different household types cannot effect on household's saleable recyclables separation behavior.

5.2 Recommendations

5.2.1 Practical Recommendations

Targeting wastes for recovery and designating a wide range of materials for recovery, communities need to be considered other factors in developing material recovery, programs such as the curbside and/or drop-off service, economic incentives and education that play a primary role in solid waste management (Platt, Doherty, Broughton & Morris, 1991) In this study, the city should have an information campaign that clearly conveys the message that it expects the residents to separate recyclables and this can help reducing the amount waste the city needs to manage with its limited resources. In addition, based on the findings, it might be more effective to introduce and promote source separation at a neighborhood level in the form of demonstration projects than implementing it across the board at a city level. However, the separation system that will be promoted must not require too much time and space to practice.

In this study, some local people suggest concern with the value of saleable recyclable materials. They suggest that the value of saleable recyclable materials should be better and they hope to get the more revenue from selling recyclables. Base on the respondents' answers of open ended questions, the value get back from the selling recycle can't attract to the local people even low income household. It seems

like the market value of recyclable materials in Pyay is too low and don't connect to international market. The stakeholders and local government should find a way to raise the recyclable materials value; in these ways the households can be attracted to do more recycle separation. In other ways, there should be introduced economic incentive and promotion program for recyclable materials. Even there is the public awareness raising campaigns and environmental education programs in Pyay, most of the household don't have the enough environmental education. It seems like the Informative measure is existing but ineffective. There should have a kind of environmental education program that can penetrate deeply into different communities and household levels.

5.2.2 Suggestion for Future Researches

The relationship between the socio-demographic factors and household's recycling behavior are not cleared in this study. However, in some previous similar study showed that there was a relationship between the socio-demographic characteristics and the household's recycling behavior. Therefore, it should be investigated deeply in future research studies. Some of the TPB's components such as PBC (distance from the household to the junk shops) are not reported to household recycling behavior. Unreported variables that include in attitude, social norms and perceived behavioral control should be investigated in the future research studies.

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APPENDIX

APPENDIX

Sample Questionnaires

Section I. Socio-Demographic Variables (respondent who authority to separate the solid waste in household)

(1) Who is the head of the household?

(2) Household member size

(3) Do you have any senior citizen (age 60 or more) in your household?

(4) Do you have any children (age 15 or less) in your households?

(5) What is the highest education level in the family?

(6) Household total income per month

(7) Do you have a maid?

Section II. Components of TPB

Dependent Variables (Behavior) (Y)

(1) Do you use the following products? Please ticks that consume items.

Items	Mark
1. Metal cans	
2. Plastic bottles	
3. Paper boxes	

4. Glass bottles	
5. Writing book/paper	

(2) Do you sell recyclable materials from your household wastes to junk shops or waste pickers?

(i) Yes

(ii) No (Please skip to Section Part III)

(3)How often do you separate the following recyclable items for selling?

Items	Never (0)	Rarely (1)	Sometimes(2)	Usually(3)	Always(4)
1. Metal cans					
2. Plastic bottles					
3. Paper boxes					
4. Glass bottles					
5. Writing book/paper					

(4) How much do you get money by selling these saleable recyclable materials per time?

(5) How many days do you normally have to separate recyclable materials until you have enough materials to sell?

Part III. Independent Variables (X)

Attitude (ATT)

Items	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Do not know
1. I would feel guilty if I don't separate recyclable materials from my household waste.						
2. The money I get back from selling recyclables is significant.						
3. For me, separation of recyclable can help to keep household tidy.						
4. If I separate the recyclable materials from my household waste, I feel that it will help to reduce the solid waste generation.						

Items	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Do not know
5. If I separate the recyclable materials from my household, I will feel that I am doing something positive the city and T&D.						
6. Junk shops are trustworthy businesses.						
7. People who work at junk shops look dirty.						

Social Norms (injunctive norm and descriptive norm)

Injunctive norms

How much do you agree with the following statements?

Items	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Do not know
1. My relatives expect me to separate and sell recyclable materials from my house.						

Items	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Do not know
2. My friends expect me to separate and sell recyclable materials from my house.						
3. My neighbors expect me to separate and sell recyclable materials from my house.						
4. City and T&D expect me to separate and sell the recyclable materials from my house.						

Descriptive norm (DM)

How much do you agree with the following statements?

Items	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Do not know
1. My relatives separate and sell recyclable materials.						
2. My friends separate and sell recyclable materials.						
3. My neighbors separate and sell recyclable materials						
4. Most households that live in city, they separate and sell their recyclable materials from their house.						

Perceived Behavioral Control

Items	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Do not know
1. I have enough space in my house to store separated saleable recyclables.						
2. I know what item of households waste can be sold as recyclables.						
3. I know where to sell my household recyclable materials.						
4. The distance from house and junkshop is close to sell recyclable materials.						
5. Door to door old materials buyers often come to our roads/streets.						
6. I have enough time to separate recyclable materials from my household wastes.						

Discussion Question

Do you have any suggestion concern with the recycling in Pyay?

CURRICULUM VITAE

CURRICULUM VITAE

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