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ANALYSIS ON WASTE MANAGEMENT BEHAVIOUR OF YANGON CITIZENS

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EMDEVS 40 (14th BATCH)

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ANALYSIS ON WASTE MANAGEMENT BEHAVIOUR OF YANGON CITIZENS

A thesis submitted as a partial fulfillment towards the requirement of the degree of Master of Development Studies (MDEVS)

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ABSTRACT

This study intends to explore the awareness, behavior and willingness to pay on waste management in Yangon. Survey is conducted at a total 400 respondents by using questionnaires. In the interview questionnaires, it is measured the profile of respondents, daily behavior on waste discharging at home and on the street, waste related awareness level and willingness to pay, it was found that, the awareness level of waste segregation, waste reduction is very low and only under 30% have awareness. Although the service delivered by YCDC is improving there are problem which suffered to people due to the poor waste management. It was found that the percentage of willingness to pay is raised up to 89% at the price level of 1000 MMK per month, 83% at the price level of 1500 MMK per month and 70% at the price level of 2000 MMK per month. But it decreased to 49% at the price level of 2500 MMK per month and 44% at the price level of 3000 MMK per month. To improve the waste management situation of Yangon City, effective awareness raising should be strengthen.

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LIST OF ABBREVIATIONS

CBD	Center of Business District
CVM	Contingent Valuation Method
CS	Collection Station
FDS	Final Disposable Site
HHW	Household Hazardous Waste
JICA	Japan International Coorperation Agency
MMK	Myanmar Kyat
NGO	Non Governmental Organization
OHS	Occupational Health and Safety
PCCD	Pollution Control and Cleansing Department
RF	Recycle Factory
RS	Recycle Shop
SWM	Solid Waste Management
WTA	Willingness to Accept
WTP	Willingness to Pay
YCDC	Yangon City Development Committee

CHAPTER I

INTRODUCTION

1.1 Rationale of Study

Waste can be defined as the thing which is not necessary or useful anymore and discharged by human being mostly. Municipal solid waste is defined as the "non-gaseous and non-liquid waste" that results from the daily activities of community's residential and commercial sector within a given administrative urban area (Quick Study on Waste Management in Myanmar, 2016). Human being have been producing waste since long time ago. In ancient time, up to the end of 19th century, most of the waste discharged by human being are bio-degradable waste. Industrialization, improve in communication and logistics, developing technology and globalization changed to the human lives and life style. According to the changing of lift style and consumption pattern, type of waste discharged by human being contains a lot of varieties which cause the requirement of higher and complicated technology to treat waste, effective waste management related institution, system and society.

As the world becomes more urbanized and developed consumption rates are on the rise. An inevitable consequence of more consumption is the rapid increase in the amount of solid waste that is produced. Today, solid-waste management (SWM) conditions in the developing world are often quite dire and reminiscent of those found in the developed world several generations ago. The impact of inadequate SWM practices on natural and human environments is now being acknowledged (Jessica McAllister, Factors influencing SWM in Developing World, 2015).

In this 21st century, waste management is part of the important service which is sustaining our society especially in urban area. It has now become basic human right which is part of basic human needs. This basic human right involves ensuring proper sanitation, solid waste management, provision of potable water, shelter, food, energy, transport and communications which are all beneficial to society and the economy as a whole. (UNEP, 2015)

Myanmar has been facing considerable challenges with the management of waste as a result of increasing income and consumption levels, urban population growth, and lack of effective waste treatment and disposal options. In this regard, the country's Environmental Conservation Law was established with the objective of enabling the implementation of the Myanmar National Environmental policy, which was enacted in 2012. Environmental Conservation Rules have also been developed for the implementation of the Law. Accordingly, Myanmar's environmental conservation law and rules emphasize that the development of national and local waste management strategies are urgently needed (Quick Study on Waste Management in Myanmar, 2016).

Yangon is a biggest city of Myanmar with the estimated population of 6 million. It is also economic city of Yangon and one of the development pole of Myanmar. Yangon citizens are generating household and normal waste about 1500 tons to 2000 tons per day, in which clinical waste, industrial waste, business waste are not included. Therefore, waste management is critical issue for Yangon Region and its urban area and potential huge impact for environment. Currently, Waste Management is carried out by Yangon City Development Committee, Pollution Control and Cleansing Department (YCDC-PCCD). Having good waste management system in Yangon is not rely sole on YCDC-PCCD, Community involvement is also crucial. In order to have an appropriate Integrated Solid Waste Management System, Infrastructures, rate of return (cost of Solid Waste Management in the city Vs Collection Fees or other income could be generated), Public Awareness and Behavior on Waste are playing important factors. Therefore, research on community willingness to pay on waste management and awareness level and behavior of citizens are important. Without having appropriate awareness, people may reluctant to follow the good practices of waste management and less in willingness to pay which cause obstacles on implementing good waste management system. Yangon Citizens are still weak in following waste management good practices, therefore this study is focus on waste management behavior of Yangon Citizens.

1.2 Objectives of the Study

The objectives of the study are as follows:

(1) to analyze awareness of the Yangon Citizens about waste management and

(2) to identify the willingness to pay of people for solid waste management in Yangon Region.

1.3 Method of Study

The thesis used descriptive method by using primary data and secondary data from relevant articles, papers, website and data collected by YCDC. Survey Questionnaire are used to collect primary data to access the citizens' behavior on waste related behavior, attitude, knowledge, awareness and willingness to pay. Individual interview and observation are conducted. The Questionnaire are Primary data are analysis by using excel.

1.4 Scope and Limitation of the Study

The Primary data was collected from 400 respondents from Thingangyun and South-Okkalapa townships in 2019. Thingangyun and South-Okkalapa townships are suburban township in Yangon City. The two townships were selected because the distant from the final disposal site is almost same, the revenue for the waste collected by YCDC is similar level and there are not much influence of external factor on waste discharging such as there are not a lot of people come and work in day-time or pass by like central business area, downtown of Yangon. According to the time and financial constraints, the sample size is limited to the 400.

1.5 Organization of the Study

The Thesis includes five chapters. Chapter (I) is introduction including rationale of study. Chapter (II) deals with components of solid waste management, health and safety, hazards and risks in solid waste management and human behavior related on dealing with waste. Chapter (III) reveals on current waste management situation in Yangon City. Chapter (IV) deals on the findings of the study mainly focus on willingness to pay on SWM and community behavior on Solid Waste Management. Chapter (V) is conclusion which is included findings and suggestions.

CHAPTER II

LITERATURE REVIEW ON SOLID WASTE MANAGEMENT

2.1 Solid Waste and Solid Waste Management Definition

Municipal solid waste (MSW), is a waste type consisting of everyday items that are discarded by the public. "Garbage" can also refer specifically to food waste. Municipal solid waste management generally refers to the management of solid waste from residential societies, streets, public places, commercial buildings, hospitals, and other institutions. The management of these types of waste is mainly the responsibility of municipal and other governmental authorities. EU Waste Directive 2008, defines waste management to" mean the collection, transport, recovery and disposal of waste, including the supervision of such operations and the after-care of disposal sites, and including actions taken as a dealer or broker". According to Augustino et al (2015), solid waste is made up of organic and inorganic waste materials that comes about as a result of human and animal activities and is no longer needed which needs to be discarded due to its value loss to the user. Disposing solid waste improperly causes diseases like cholera, diarrhea, among others.

Waste is mostly contaminated with night soil regardless the climatic differences. Countries located in humid, tropical, and semitropical areas, wastes generated are characterized by a high concentration of plant litter whereas waste generated in countries with seasonal change may contain an abundance of ash due to coal or wood used for cooking and heating especially during winter (UNEP, 2005).

Solid waste generated are different from country to country or region to region which means the management system also varies. Solid waste is generated due to a lot of factors which includes the abundance and type of natural resource available, the lifestyle of citizens as well as their living standards. Solid waste is embarrassing and difficult to discuss with reason that policy-making and political discussions must deal with taboos in various locality which affects the process of arriving at achievable goals (UN-HABITAT, 2010).

In General, a house hold generate 4 types of wastes which are:

1. Organic Waste
2. Household Waste
3. Household Hazardous Waste and
4. Electronic Waste

Organic waste, or biodegradable waste, is a natural refuse type that comes from plants or animals. It comes in manifold forms of biodegradable plastics, food waste, green waste, paper waste, manure, human waste, sewage, and slaughterhouse waste. Most organic products sound innocuous enough and they are natural. But there's actually serious harm associated with its disposal in landfills. Due to the lack of oxygen, organic waste under goes the process of anaerobic decomposition when it's buried in a landfill. This generates methane, which is then released into our atmosphere. It almost defies logic to imagine that the pairing of organic waste and a flawed disposal solution could generate a greenhouse gas 20 times more potent than carbon dioxide.

Household wastes are non-organic waste that generate from household which is not contaminate with chemicals or other substances or solvents. Among them there are a lot of waste that can be re-useable or recyclable. It includes, plastic bottle, broken kitchen utensil, broken toys, codes, plastic water bottle, juice bottle, glassware, earthen ware, plastic materials, tins, cans, old cloth, leather and plastic shopping bags. Some of those material can be recyclable or reuse them without harm. However, to recycle, waste producer, household need to follow rules of waste disposal defined by waste collector or collaborate the facts to help in recycling. Lack of collaboration from community can cause more cost or lost opportunity to recycle. In order to gain collaboration, waste collection service provider should deliver the clear and perfect information of recycling and raise the awareness of community.

Household hazardous waste (HHW) is post-consumer waste which qualifies as hazardous waste when discarded. It includes household chemicals and other substances for which the owner no longer has a use, such as consumer products sold for home care, personal care, automotive care, pest control and other purposes, oil, batteries etc. some leftover household products that can catch fire, react, or explode

under certain circumstances, or that are corrosive or toxic as household hazardous waste.

Electronic waste or e-waste is one of the rapidly growing problems of the world. E-waste comprises of a multitude of components, some containing toxic substances that can have an adverse impact on human health and the environment if not handled properly. Electronic waste or e-waste may be defined as discarded computers, office electronic equipment, entertainment device electronics, mobile phones, television sets, and refrigerators. The processes of dismantling and disposing of electronic waste in developing countries led to a number of environmental impacts. Liquid and atmospheric releases end up in bodies of water, groundwater, soil, and air and therefore in land and sea animals – both domesticated and wild, in crops eaten by both animals and human, and in drinking water.

2.2 Components of Solid Waste Management

Solid waste management can be divided into six key components:

1. Generation
2. Storage
3. Collection
4. Transportation
5. Disposal
6. Information and Communication

Generation of solid waste is the stage at which materials become valueless to the owner and since they have no use for them and require them no longer, they wish to get rid of them. Items which may be valueless to one individual may not necessarily be valueless to another. For example, waste items such as tins and cans may be highly sought after by young children.

Storage is a system for keeping materials after they have been discarded and prior to collection and final disposal. Where on-site disposal systems are implemented, such as where people discard items directly into family pits, storage may not be necessary.

The storage facilities include:

1. Small containers: household containers, plastic bins, etc.
2. Large containers: communal bins, oil drums, etc.
3. Shallow pits
4. Communal depots: walled or fenced-in areas

In determining the size, quantity and distribution of storage facilities the number of users, type of waste and maximum walking distance must be considered. The frequency of emptying must also be determined, and it should be ensured that all facilities are reasonably safe from theft or vandalism.

Collection simply refers to how waste is collected for transportation to the final disposal site. Any collection system should be carefully planned to ensure that storage facilities do not become overloaded. Collection intervals and volumes of collected waste must be estimated carefully.

Transportation, this is the stage when solid waste is transported to the final disposal site. There are various modes of transport which may be adopted and the chosen method depends upon local availability and the volume of waste to be transported. Types of transportation can be divided into three categories:

1. Human-powered: open hand-cart, hand-cart with bins, wheelbarrow, tricycle
2. Animal-powered: donkey-drawn cart or cow or horse-drawn cart
3. Motorized: tractor and trailer, standard truck, tipper-truck

The disposable stage of solid waste management is safe disposal where associated risks are minimized. There are four main methods for the disposal of solid waste:

1. Land application: burial or landfilling
2. Composting
3. Burning or incineration
4. Recycling (resource recovery)

The most common of these is undoubtedly land application, although all four are commonly applied in emergency situations

In those day, information and communication play important role in Solid Waste Management. Most of the service provider of SWM establish the Department of Information and Communication to spread the information on the Solid Waste Management and communicate to the users. The department perform the spreading the message or information on the service currently provided and up to date information on the environmentally friendly behavior, waste reduction and conduct awareness campaign focused on the waste. The department communicate to the users about the changes of service providing, discuss on the most efficient ways to provide service and changes of service fee.

2.3 Health and Safety, Hazards and Risks in Solid Waste Management

Much of the research done on Occupational Health and Safety (OHS) in SWM in developing countries focuses on the work of so-called 'scavengers', or waste pickers, in particular at the level of dumpsites. It is very important for SWM workers at all levels, concerning both formal and informal workers. The followings presents the main hazards and risks that SWM workers or persons who dealing with waste potentially face in Yangon. A hazard is anything with the potential to do harm, and a risk is the likelihood of potential harm from that hazard actually occurring. It also includes the potential risks faced by other SWM actors. It maps out some easily observable and identifiable hazards. As waste can harm when those are generated, it causes suffer not only to workers who are working in SWM sector but also to community. There are different hazards and risk according to the types of activities.

The types of activities are:

1. Contact with waste
2. Transforming the waste manually or with machines
3. Processing the waste and spending vast amounts of time at dumpsites and
4. Combination of all those activities

Through above mentioned activities, Waste disposer, waste collectors or the people who deal with the waste can suffer one of the following hazards or all together.

The types of hazards according to the OHS categories are:

1. Physical
2. Biological
3. Chemical
4. Ergonomic
5. Psychological
6. Working conditions
7. Social hazards

Both waste throwers and collectors, and also collectors from Collection Station (CS) during the transporting the wastes to final dumping site or plants, Recycle Shop (RS) and dumpsite can face Physical, Biological and Chemical hazards by having contact with waste.

The physical hazards of having contact with waste are sharp objects, in particular metal and glass, including needles and broken or sharp pieces. Another hazard is lack of treatment in case of accidents induced by these hazards. As Risks, the persons suffer cuts, puncture wounds, infections and tetanus.

The biological hazards of having contact with waste are physical contact with bacteria, parasites and viruses present in fecal matter and decomposing household waste, including animal flesh and medical waste such as syringes, containers and bloodied cloths and other bodily fluids. The risks are parasitic and enteric infections, Tetanus, Hepatitis infection, contact dermatitis, scabies, sores, itching, psoriasis and severe rash.

The chemical hazards of having contact with waste are physical contact with toxic gases, liquids (such as solvents, cleaner), metals (asbestos, mercury, silica, lead etc.) fumes (vehicle exhaust, glues), agro- chemicals (pesticides, herbicides and insecticides) and explosives. The risks are - chemical burns, lead/mercury poisoning, headaches, nausea, respiratory diseases, skin conditions.

Transforming the waste with manually or with small machine occur particularly in Recycle Shop (RS) and Recycle Factory (RF), where wastes are transformed to recycle. There are Physical and Chemical Hazards. Physical Hazards in Transforming stage are harm by dangerous machines and instruments, cuts with

metal and untreated cuts. Chemical Hazards in Transforming stage are contact with toxic liquids and paint. The risk at transforming activities contains cuts, burns, tetanus, infections, risk of being caught in a machine, struck by an object, respiratory diseases and skin conditions.

Processing the waste happen at the final disposal sites and waste treatment plants. At this stage it can have Physical, Chemical and Biological hazards all together. The hazards at Processing the waste and spending vast amounts of time at dumpsites can be cause of organic gases, pressurized gas containers at dumpsites, and burning hazardous wastes. The risks are explosions and fires at dumpsites, landslides, additional dangers of an unsafe environment at dumpsites, airborne contamination (such as biodegradation gases, particulates and bioaerosols- carbon monoxide poisoning), lead poisoning from burning of materials with lead-containing batteries, paint, and solders, headaches and nausea from anoxic conditions where disposal sites have high methane, carbon dioxide and carbon monoxide concentrations, respiratory illness from ingesting particulates, bio-aerosols, and volatile organics during waste collection and from working in smoky an dusty conditions at open dumps.

Hazards and Risks of combination of all activities in Solid Waste Management impact mainly who work in Solid Waste Management. However, the citizens also suffer these hazards and risks often. All activities of SWM have Physical hazards, Ergonomic hazards, Psychological hazards, Working Conditions hazards, and Social Hazards. Physical Hazards are hot temperatures, noise, vibrations, working from a high or dangerous position, disordered workplace and car traffic. Ergonomic hazards are lifting, carrying or moving heavy loads, repetitive or forceful movements, work postures that are uncomfortable or which must be held for a long period of time. Psychological hazards are stress, intimidation, harassment and abuse. Working Condition hazards composed with long working hours, work in isolation and night work. Social Hazard is isolation from family. The risks are headaches, fractures, sprains, wounds from falling, injury or death from moving vehicles, back and joint injuries from lifting heavy waste-filled containers and from sitting in awkward positions. Death and permanent disability are risks potentially induced by all of the above stated hazards.

There are simple steps that can partly remove the above stated hazards, thereby diminishing health and safety risks. For example, one simple and crucial way in which bacterial and chemical hazards can be diminished is by limiting direct contact between dangerous substances and the workers' skin and body with the use of gloves, masks, closed shoes and covering clothes. Workers employed by SWM service providers are perhaps more likely to wear gloves and masks, while private and informal workers are potentially more readily exposed to substances. Another step to take is to give workers the means to hand-wash, clean themselves and protect and disinfect any cuts. It is also crucial to prevent any direct contact with hazardous waste, including medical and chemical wastes. While the hazards can be managed by protecting solid waste workers, eliminating hazardous waste altogether entails more than behavioral modification. Hazardous wastes need to be separated at the source for separate collection and disposal.

Eliminating other hazards includes adequate physical protection for chopping knife and sharp object handlers and safer machines for machine users. Ensuring limited working hours, allowing for outside contact, breaks and connection with the family, are also necessary steps towards ensuring solid waste workers health and safety. The first step towards such solutions is a general observation of the current state of occupational health and safety, which is the focus of this research. Overall, priority should be given to removing the hazards that children are facing since they are generally more vulnerable to them than healthy adults.

2.4 Community Behavior and Awareness on Solid Waste Management

One of the major issues on Solid Waste Management in developing countries is lack of awareness and using best practices of Waste Management. According to McAllister (2015), a study in Gaborone, Botswana, found that even though citizens were aware of recycling and other sustainable waste-management techniques, this does not necessarily translate into participation in pro-environmental activities such as recycling initiatives. When people lack interest in environmental issues, it means that they are not well informed which affect their actions and also makes them feel not included in waste management decision making.

Oftentimes when systems are breaking down and problems are escalating, people look to societal factors to fix the issue. This has often been the case when

dealing with the mismanagement of solid waste in the developing world. Many researchers have argued that the waste problem is caused by human behavior and therefore the solution lies in changing that behavior (Milea, 2009). Public awareness and attitudes about waste can affect the whole SWMS (Zhu et al., 2008). Recognizing trash as a problem does not prevent littering or other negative behaviors concerning waste management (Moore, 2012). This attitude-behavior gap often emerges and can be further affected by a variety of reasons including convenience, social norms, lack of public participation, and lack of education and awareness of effective waste management techniques (Milea, 2009; O'Connell, 2011). Within this attitude/behavior gap exists an inconsistency between one's values and actions. This specifically refers to the discrepancy between people's concern over the environmental harm posed by household waste and the limited action by those same people to reduce their waste or engage in other pro-environmental behaviors (O'Connell, 2011). Many researchers observed this gap first hand when conducting observations in communities of the developing world (Factors Influencing Solid-Waste Management in the Developing World by Jessica McAllister, Master of Science Utah State University, 2015). A negative behavior often associated with the mismanagement of solid waste in developing countries is the occurrence of littering. There are a multitude of causes that can contribute to an increase in public littering rates, such as a lack of social pressure to prevent littering, absence of realistic penalties or consistent enforcement, and lack of knowledge of the environmental effects of littering (Al-Khatib et al., 2009). Another major constraint seen throughout the developing world is the lack of education and awareness of effective waste-management practices. Systematic and holistic approaches and efforts should be undertaken by various government and non-governmental agencies to educate the public by focusing on the adverse effects of mounting garbage on the environment (Factors Influencing Solid-Waste Management in the Developing World by Jessica McAllister, Master of Science Utah State University, 2015).

2.5 Reviews on Previous Studies

Jessica McAllister (2015) studied on Factors Influencing Solid-Waste Management in the Developing World by using descriptive methods through secondary data. In the finding, it described that the collection of municipal solid waste is a public service that has important impacts on public health and the appearance of

towns and cities. However, increasing population has caused severe pressure on basic infrastructure and amenities, creating large areas underserved by public services. Many urban administrations seem to be losing the battle of coping with the ever-increasing quantities of waste. Public awareness and attitudes towards waste can impact the entire SWM system, from household storage to separation, interest in waste reduction, recycling, the amount of waste in the streets, and ultimately the success or failure of a SWM system. Being aware of problems does not necessarily mean that people find it their responsibility to solve them. It is up to all stakeholders involved to work together towards the common goal of sustainable waste management. Governments should take steps to educate the citizenry on waste reduction and separation as a matter of national policy and they should enact waste-minimization legislation as a first step. Emphasis on the need for information about environmentally responsible behaviors, such as recycling and waste minimization, needs to be presented in a culturally and emotionally appropriate context. Behavior change and waste prevention policy needs to be designed with convenience in mind, based on the needs of today's households for time and space. This has been proven to encourage householders to engage in waste management practices, provided that such a scheme is well publicized. Adequate municipal SWM is much more than a technological or infrastructural issue. It is a multi-dimensional issue that includes political/institutional, social, environmental, and financial aspects and involves coordinating and managing a large workforce and collaborating with all stakeholders. Waste production is increasing and is compounded by a cycle of poverty, rapid population growth, decreasing standards of living, poor governance, and the low level of environmental awareness in developing countries around the world. To enhance the sustainability of SWM in developing countries, public awareness, funding, expertise, equipment and facilities, as well as other necessities that are currently lacking or inappropriate, must be provided. Furthermore, since the envisioned SWM practices call for some behavioral changes, there is a need for community participation and education and awareness programs on related issues. The waste management regime in developing countries is seldom integrated, and there is often no clear assignment of responsibilities for tasks and schedules among the organizations involved.

Mya Lwin Lwin Aung (2016) studied on public willingness pay for solid waste management in Yangon City by using descript, regression and contingent

valuation method. The thesis find that Yangon Solid Waste Management has several short coming and as a result, household have general discontent. Although Service Provider of Yangon City, YCDC-PCCD is trying to improve their service with the help of several organizations, still there are gaps to improve all aspect of waste management. Majority of people are used to discharge their waste to designated nearby municipal secondary garbage station. Almost half of the survey respondent said that the service provided by YCDC become better. The study finds out that the cost of SWM in Yangon is three of four time of the waste service fee collected amount which still be shouldered by government. The dominant factor of public willingness to pay is trust. Although some household are not willingness to pay more, they spent more money to other service provider who are not legally recognized because they satisfy the service provided by those. Therefore, YCDC should improve their service. In overall, to develop the solid waste management of Yangon City, all related sector should improve.

Marietha Ndele Mlozi (2006) studied on community participation in solid waste management (SWM) in Mbeya City, Tanzania by using descriptive method and primary data collected through structured and non-structured interviews. The thesis find out that Solid waste management is largely perceived to be a responsibility of local government authorities. Most of community members are not aware of their role in SWM and their attitude towards participating in SWM is quite unfavorable. Efforts should be directed towards educating and awareness raising to community members about their role in SWM activities. Active and empowered environmental committees should be created for purposes of enhancing participation at lower levels. A strong link /liaison between the community and local government authorities should be encouraged for purposes of enhancing community participation in SWM. Emphasis should be targeted to promote sustainable alternative approaches of managing solid waste such as composting and recycling through use of site-specific groups.

Adriana Milea (2009) studied on issues of social and environmental justice and the role of residents in municipal solid waste management in Delhi, India using descript method. garbage is perceived as a big problem in Delhi by the majority of respondents, there is little awareness on the ways one could contribute to solving it. The sense of responsibility for one's waste was found to be the major factor determining littering and waste separation but waste minimization is mainly

associated with income and not perceived as part of the waste problem. As for ways out of the problem, it is suggested that public campaigns should emphasize residents' responsibility for their waste and the importance of each and every citizen's cooperation, thus creating a sense of a shared social goal around solving the waste problem. The information and motivation campaign should be supplemented with measures that would facilitate citizen participation.

Andrea Gojani (2014) studied on citizens attitude on participation on Solid Waste Management by using descriptive method. Solid waste management has been one of the most problematic and demanding issues addressed in both local, national and international efforts in last decade. With a growth in population and income waste production is predicted to continually increase. Due to improper solid waste management practices, there have been negative effects on the health of citizens through outbreaks of diseases and visible changes in the surroundings. Evident show the need for formal disposal facilities empowered by law and supported by local governments. Overall solid waste management plans at both the national and local levels are essential for utilizing limited resources most effectively, and providing a frame of reference for potential external support. As a part of a formal facility, it must be coupled with regulatory punishment for violations. Fines decrease the likeliness of violations. There is thus an eminent need for Gjakova to invest in the enforcement of their existing legislation and to enact enforcement measures.

CHAPTER III

SOLID WASTE MANAGEMENT IN YANGON CITY

3.1 Background of Yangon City Solid Waste Management

Yangon City is situated in Yangon Region, the southern part of Myanmar and the largest city of Myanmar. Yangon was capital till 2003 but still important business hub of Myanmar. Yangon city was composed with 33 townships out of 46 townships According to the 2014 Census, the population of Yangon City is 4.2 million.

The first Yangon Municipal Act was established on 1874 May 24. According to that municipal Act, the Municipal Board was founded and delivered the Municipal Services. According to the rapid Growth of population the new Yangon Municipal Act is defined and established on 1922. In 1974, the name is changed to Yangon City Development Board. The primary duties of the city Committee, such as street lighting, water supply, garbage disposal, maintenance of parks and gardens, markets, slaughter houses remain unchanged. Additional powers vested in the Committee by virtue of Yangon City Development Law, among the other things, to demarcate and re-demarcate the territorial limits of the authorize the Committee city, to operate city development works independently with its own funds, to assess and levy its own taxes, to utilize the foreign currency derived from the lease of its own lands and premises for development works and to take loans and grants from the Government or from foreign organizations on its own responsibility.

Traditionally, waste collection and disposal in Myanmar have been the responsibility of local municipal authorities. In Yangon as an autonomous City Development Committees and its Pollution Control and Cleansing Departments (PCCDs) with its network of administrative branches and sub-units are tasked with solid waste management in municipal areas. In other parts of the country the respective Township Development Committees under the Local Government, which manage municipal waste collection and disposal. After 1988, State Law and Order

Council Government, reformed the institutional matter and transformed to Yangon City Development Committee (YCDC).

Municipal solid waste collection systems in Yangon City can largely be characterized as labour intensive, relying on the use of both manual workers, non-specialized vehicles and few specialized vehicles. In general, the current waste collection system includes primary and secondary collection. Primary collection takes place in different forms such as door-to-door (bell collection), block, and container collection methods. The primary waste collection system is carried out either or in combination of push carts and tri-bicycles while secondary collection system is performed mainly with tipper trucks (dumpers).

According to the 2018, Yangon City Development Committee Acts, YCDC-PCCD is sole public institution which has authorization to do the Solid Waste Management of Yangon City area, including waste collection, waste storage, waste transportation, discharge, managing of final Disposal sites and treatment waste or call the tender to private or public companies to perform the SWM activities of Yangon City through transparency process. YCDC – PCCD has authorization to define the waste management policy of Yangon City and authorized to instruct to residents, factories, shops, schools and other public places to be stay according to the best practices of waste management. According to this law, YCDC-PCCD is authorized to instruct the citizen to follow the best practices, which is related to waste, take the legal action who violate the acts of waste management and cause the environmental damage. According to the YCDC-PCCD, waste generation is 2387.12 tons per day and so it can be discovered that a person disposes 0.41 kg of the waste daily.

According to the Japan International Cooperation Agency (JICA) Master Plan, JICA has identified the following 7 items as major issues and challenges.

1. Lack in plans for waste management
2. Inefficient waste collection/transportation system
3. Aging of vehicles used for collection and transportation of waste
4. Inappropriate final disposal of waste
5. Unclear waste management administration
6. Unorganized legal system for waste management
7. Inappropriate fee collection

It is necessary to establish a plan based on the quantitative prediction regarding waste management which includes collection and transportation, final disposal and intermediate treatment. The waste collection/transportation system activities are highly dependent on human resources and manual works. They therefore require significant amount of time in processing and waste is not removed from living environment sufficiently. There are many old cars among the fleet used for waste collection and transportation, needing frequent repair and maintenance.

All final waste disposal sites are in the open dumping state and have chronic problems such as water and air contamination, generation of greenhouse gas and insanity. Responsibility for hazardous waste management has not been regulated by law and YCDC rules have not prescribed this as well. Although YCDC has rules for environmental conservation and cleaning, a legal system for waste management is fragile at all level.

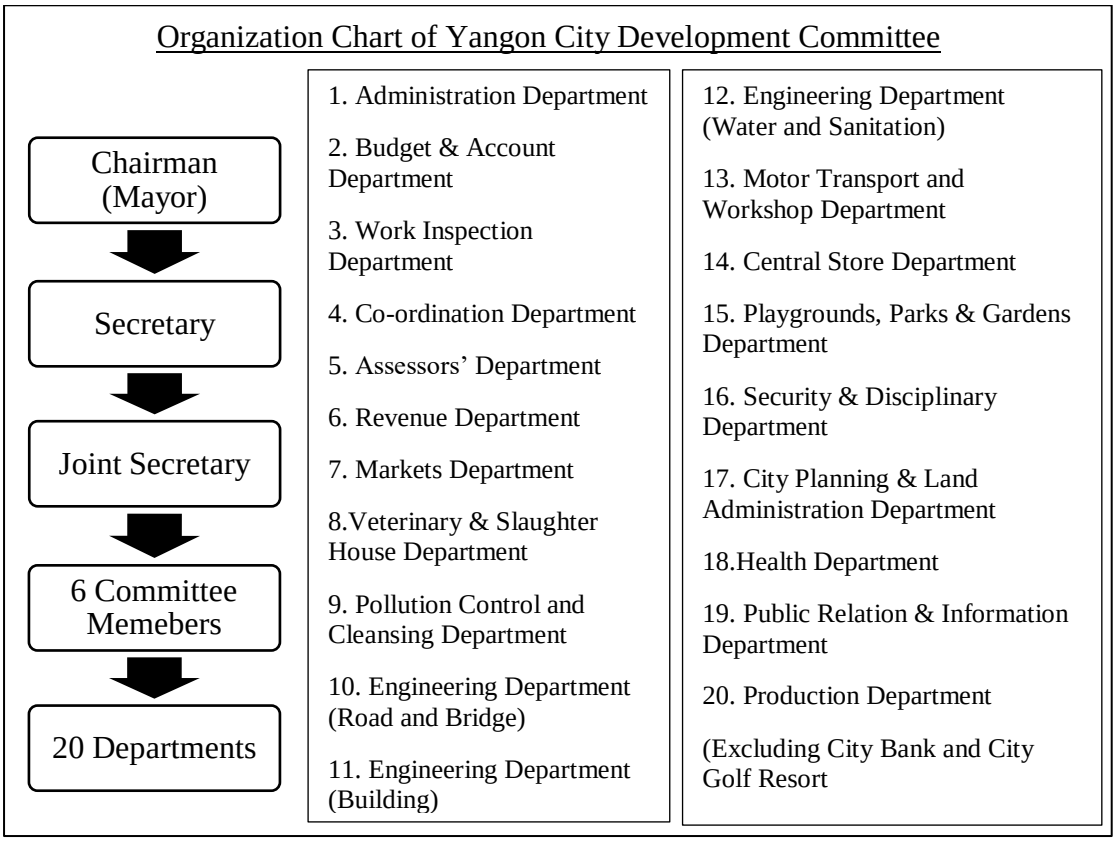
The collection ratio of tipping fee (for waste management services) from households is very low and the service providers' expenditure exceeds revenue significantly. As suggested by the above issues and challenges, JICA thinks there is much room for improvement in the efforts made in terms of waste in the city of Yangon.

3.2 Activities of Yangon City Development Committee, Pollution Control and Cleansing Department

The annexation of lower Myanmar in 1853 by the British led to massive influx of British ideas and institutions and construction of modern buildings after the British style. The first municipal organization established in 1789 underwent various transformations and reorganizations before and after the country regained its independence on 4 January 1948. The present city authority, Yangon City Development Committee which was formed under the provisions of Yangon City Development Law of 14 May 1990, is an independent body, bestowed with wide powers and authority. The Chairman of Yangon City Development Committee, concurrently the Mayor of Yangon is responsible directly to the Yangon Region Prime Minister: Under the Chairman, Vice-Chairman (Vice-Mayor), Secretary, Joint-Secretary, and Committee members currently 6 function virtually as a Cabinet, performing all relevant duties and functions. Yangon City Development Committee is

composed with 20 departments. Respective Departments server the designated municipal service for the city residents. For the waste collection, transportation, disposing, treating and raising awareness on waste management, Pollution Control and Cleansing Department is focal department. The Pollution Control and Cleansing Department is the most responsible department to draft the law and by-law related to waste management. With the agreement of Mayor, drafted law and by law are submitted to Yangon Regional Parliament to approve.

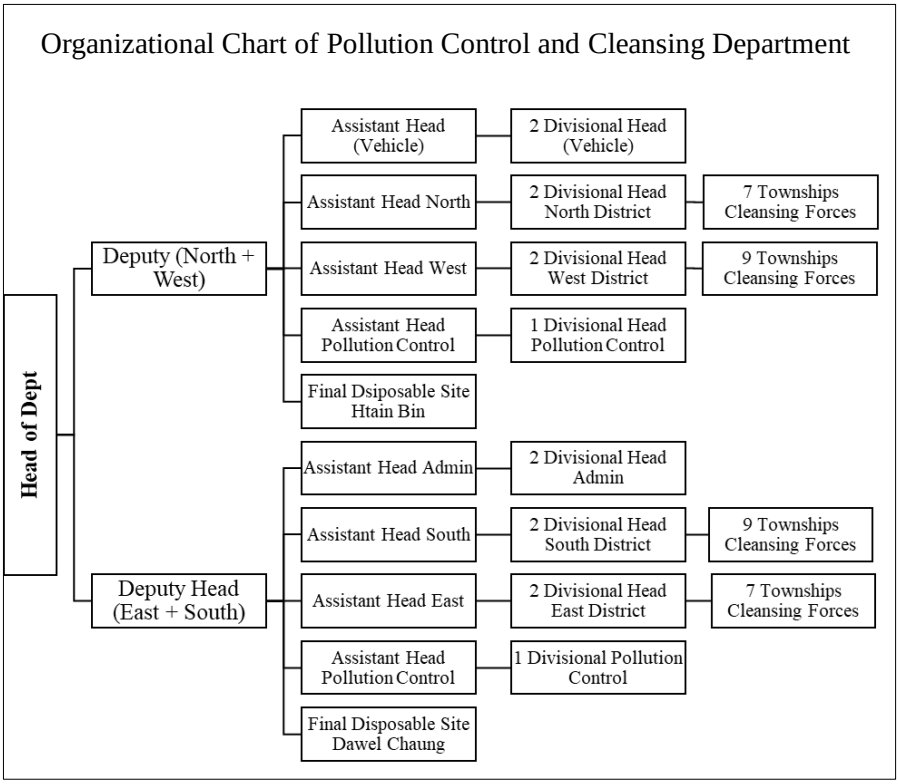
Figure: 3.1 Organization Chart of Yangon City Development Committee



(source: YCDC website).

At PCCD, there are 4879 persons who are dealing with the solid waste: 39 are officers, 1040 are in other rank, and 3800 are labourers. Regarding the capacity at the workers level, their responsibilities are normally sweeping the street; collecting the waste from households, commercial establishments, institutions, industries, and gardens; and transporting them to the Final Disposal Site (FDS). Even at the FDS, there is no proper and systematic facility and infrastructure for disposing, as waste is disposed where ever there is space. Therefore, for the labour workers' level, there is not much capacity needed to build up to handle the tasks so far.

Figure: 3.2 Organization Chart of Yangon City Development Committee, Pollution Control and Cleansing Department



Source: YCDC-PCCD

The service delivered by Yangon City Development Committee, Pollution Control and Cleansing Department, (YCDC-PCCD) on solid waste management are Sweeping, collection and transport the waste from roads and streets in the townships that have to pay tax accuracy of waste within the boundary area of Yangon City Development Committee, Plan and manage suitable waste collection systems for disposing waste in taxed townships and wards. YCDC-PCCD designate disposal places, construct brick tanks and keep waste bins in order to carry out the designated collection systems regularly. The department can guide to clean the waste in non-tax accuracy of government buildings, compounds and campus tax and to discard the waste in designated places and manage to dispose the collected waste at final disposal site. YCDC-PCCD also supervise necessary preventive ways for water pollution, air pollution and soil pollution and noise pollution in order to prevent environmental pollution and take action for irresponsible dumping according to laws, by-laws and directive.

There are 3 collection systems delivered by YCDC-PCCD to discard waste. They are Brick Tank System, Dumping Site System and Bell Ringing System. In the brick tank system, between evening (6 - 11) pm and morning (6 - l0)am waste can be discard and collect. Dumping Site System is discarding at Euro Standard Size dust bins and also at brick tanks which are kept in townships at set time. Bell Ringing System is collecting the waste with bell ringing truck and cart on the designated date and time after negotiation with ward supervisors

Disposed waste have to put in green and blue bags designated by Committee and tie safely waste bags and can be discarded waste bags with the above 3 systems. Wet waste such as organic waste can be discard with green color bag and recyclable waste can be delivered with blue color bag.

For Waste Collection fee is collected in 32 townships in the boundary of Yangon City Development Committee Quarter by years Fee. The townships are divided into three groups: Central Business District (CBD), Sub-Urban and Satellite. Currently, waste collection fee is collected by on-line receipt since October 2014. Collection fee is 20 kyat per day in CBD (15) townships and collect (1800) Kyat per quarter by month. Collection fee is 15 kyat per day in Sub-Urban (10) township and collect (1350) Kyat per quarter by month. Collection fee is 10 kyat per day in Satellite (7) townships and collect (900) Kyat per quarter by month. This collection of tax is not door-to-door system and it only collects for household kitchen waste which is disposed at the designated collection systems. According to YCDC, the composition of waste generated in Yangon City are Hospital Waste 0.12 %, Commercial and Market Waste 5.84%, Household Waste 82 %, Industrial Waste 6%, Market Waste 3.14%, On Call Collection Waste 0.90% and Other waste 2%.

The collected waste are transported by Garbage Truck and disposed at Htein Bin FDS in Hlaing Thar Yar Township, Htwei Chaung FDS in East Dagon Township and Dala FDS in Dala Township and SeikkyiKhaungto FDS in Seikkyi Khaungto Township. Currently, most of the Final Disposal Site are open dump site and have no control. Solid wastes are dumped with Open Dumping System and impact to water, air and land and environment, and cause natural disaster like fire incidents. In order to control such incidents and to extend final disposal site lifespan apart from incineration plant, YCDC is implementing Fukuoka Method Semi-aerobic Landfill Pilot Project in

Hlaing Thar Yar Township. From that project, staffs from department can transfer Fukuoka Method and implement extension landfill site projects. Advantages of applying Semi-aerobic sanitary Landfill Technology are Reduction Air Pollution of Methane Gas Releasing from Final Disposal Sites, Protection Soil and surface/underground water damaging from dumping waste on the ground illegally, Reduction Land Scare Problem of dumping waste and by using Landfill Technology, surface ground could reuse after conducting treatment process and Protection surface and underground water damaging from releasing leachate from waste dumping illegally. By collaborating YCDC and JFE Future Engineering (60) tons per day Yangon Waste to Energy Plant located in Hlawgar Road, ShwePyiThar Township near Taw KhaungK halay Cemetery was constructed. The plant operation was started on 7th April 2017.

Table: 3.1 Final Disposal Sites in Yangon City

Final Dumping Sites (FDS)	Constructed Year	Total Area/ Used in Acre	Ton of Waste/Day	Remark
1. Htein Bin	2002	150/70	847 tons per day	Open dumping
2. Htawe Chaung	2001	55.77/47.4	612 tons per day	Open dumping
3. Shwe Pyi Thar	2005	1	50 tons per day	Low landfill temporary site
4. Mingalardon:	2003	0.91	25 tons per day	Low landfill temporary site
5. Dala	2003	1.3	10 tons per day	Low landfill temporary site
6.Seikkyi Khanaungto	2003	0.25	5 tons per day	Low landfill temporary site

Source: YCDC website

According to the YCDC-PCCD, Department deliver two types of awareness programme to spread the information of waste related matter to citizens and to elevate the awareness level of citizens. The two types are;

1. School Awareness Programs
2. Public Awareness Programs.

Based on students' capacity and absorbing skills, school awareness programs are divided into (3) levels such as primary, middle and high level categories and conduct awareness programs in relevant townships (2) or (3) times a week. In 2017-2018, department could conducted solid waste school awareness program at (185) schools with the total number of students (140272) within YCDC boundary. In school awareness program, it is included solid waste explanation, waste sorting, waste discharging systematically, 3Rs (Reduce, Reuse, Recycle), distribution flyers and pamphlets, discussion between students and staffs, solid waste songs demonstration and department has been conducting schools awareness programs sustainably.

For Public Awareness Programs, the department has been conducting solid waste pick up campaign as committee wide instructed by Yangon Regional Government (YRG) and promoted public awareness programs in (33) YCDC administrative townships once per month. As public awareness program, the "Yangon Regional Waste Pick up Campaign" conducts in every month with the collaboration of YRG, YCDC, Non-Governmental Organization (NGOs) and volunteers instructed by Yangon Regional Government (YRG). In addition to this, YCDC performed Awareness posters in public place such as bus-stop and junction as Public Awareness Programs.

3.3 Informal Waste Collector

According to the 2018, Yangon City Development Committee Acts, YCDC-PCCD is sole public institution, which has authorization to do the Solid Waste Management of Yangon City area. However, for different reasons, informal waste collector who provide the service of collect the waste from household to dispose. Two are three adults with a push cart go around the residential area by ringing the bell and provide the service. According to the informal interview with the users of those informal waste collector, the main reasons are door to door service providing, waste bin are far and dirty, waste collection truck of YCDC cannot come regularly. Informal

waste collectors collect the waste at the door of service user which is very convenience for users, especially who live high level apartment. Although YCDC bin are in place in the residential area and having enough quantity of waste, they all are located in one place, such as only one point for waste disposal in one administration ward. In addition to this, YCDC waste collection truck cannot come on time and household need to hold the waste very long time. In the hot season, long time waste storing at home make odor and it is needed to discharge frequently. Those reasons push the people to use informal waste collector. However, according to YCDC, informal waste collectors are often throwing collected waste to open plot or nearest creek or water bodies. As a result, YCDC have more extra duties for cleansing those illegal dumping.

CHAPTER IV

ASSESSMENT ON THE COMMUNITY'S WASTE MANAGEMENT AWARENESS AND SURVEY ANALYSIS

4.2 Characteristics of Respondents

This section consists of characteristics of respondents by age, occupation, type of resident and income. Table 4.1 summarizes the profile of the respondents in the sub-urban townships selected for this study. The survey respondents were categorized into four age group: between 20 to 30 years old, between 30-40 years old, between 40 to 50 years old and 50 years old and older. The largest number of respondents from both townships came from the between 20 to 30 years old. The second largest number of age group is between 30 to 40 years old.

In terms of occupation, around 43% of the respondents in Thingangyun township were salaried employees, after that Dependent, Shop Owner, Self- employed and others (Craftsman, daily wager, trader) follows respectively. The opposite was the case in South Okkalapa, as the percentage of respondents who are dependents was slightly higher than that of self-employed. As both townships are located in Sub-urban of Yangon; the largest group was salaried employees.

As for educational attainment, the largest group in Thingangyun was composed of university graduates, while the second largest group was the high school graduates. This educational attainment profile of the respondents in South Okkalapa was somewhat similar. Only a few people completed masters or PhD degrees.

Most of the respondents live in apartment, which is about 56 % and followed by wooden house 28 % and RC brick house 17% respectively. The average household size was four people with two income-earning adults. The household which has 1 to 3 household members represent 42%, and 52%, 6% and 1% represent for having 4 to 6 household members, having 7 to 9 household members and having 10 to 12 household members respectively.

The average monthly income was about 360,000 Myanmar Kyat (MMK). The households spend an average of about 11,000 MMK for electricity. To validate their responses about the household income, the respondents were asked for the amount of their family monthly expenditure. According to the answers of respondents, 8% of households spend less than 100,000 MMK per month, 35% spend between 100,000 MMK to 250,000 per month, 37% spend between 250,000 MMK to 400,000 per month, 15% spend between 400,000 MMK to 600,000 per month and 6% more than 600,000 MMK.

Table 4.1 Socio Economics Profile of Respondents

Profile	Thingangyun		South Okkalapa		Pooled	
	Frequency	%	Frequency	%	Frequency	%
Age						
20-30 years	97	49%	97	49%	194	49%
30-40 years	53	27%	62	31%	115	29%
40-50 years	34	17%	27	14%	61	15%
50 years above	16	8%	14	7%	30	8%
Occupation of the respondent						
Self -employed	20	10%	42	21%	62	16%
Salaried employee	85	43%	93	47%	178	45%
dependent	51	26%	32	16%	83	21%
shop owner	35	18%	28	14%	63	16%
other (Craftsman, daily wager, trader)	9	5%	5	3%	14	4%
Educational Qualification of the respondent						
Primary	1	1%	1	1%	2	1%
Middle	19	10%	14	7%	33	8%
High	66	33%	64	32%	130	33%
Graduate	107	54%	111	56%	218	55%
Post Graduate	7	4%	10	5%	17	4%
Resident Type of Respondents						
Wood	58	29%	52	26%	110	28%
Brick	30	15%	37	19%	67	17%
Apartment	112	56%	111	56%	223	56%
No. of Family Member						
1 to 3					166	42%
4 to 6					208	52%
7 to 9					23	6%
10 to 12					3	1%
Family monthly expenditure						
less than 100,000					32	8%
100000-less than 250000					138	35%
250000-less than 400000					147	37%
400000-less than 600000					59	15%
above 600000					24	6%

Source: Survey Data

4.2 Survey Design

Household are primary source of waste generation of Municipal solid waste. Within the rage of the resources allowed, a survey was carried out mainly in two sub-urban townships, namely Thingangyun and South-Okkalapa and total 400 participants are participated. The reasons of selection of two townships are having common majority characteristics of living style of Yangon population, similar distant to waste disposal site, same level of waste collection revenue according to YCDC data. The participants are selected by simple random sampling.There were 400 respondents from suburban township, Thingangyun and South Okkalapa. Each township has 200 respondents which is 50% of total sample population. Most of the interviewed respondents were between 20 to 30 years old, salaried employee and graduates.

4.3 Survey Result

In this section, the survey analysis is mainly focus on waste generation rate, method or ways to discharge the household waste and reasons of choose method or way, method or ways to discharge waste at outdoor and reasons of choose method or way, their opinions on waste management in their surroundings.

4.3.1 Waste Discharge Habit and Waste Related Situation

In general, the respondents use 3 size of bag used to deliver the waste. Those are small size (10 x 16 inches), medium size (14 x 21 inches) and big size (16 x 28 inches). Most of them use big size bag or medium size bags which represent 46 % and 43 % respectively. 182 respondents (46%) reported that they discharge the waste bag 3 or 4 time per week and 126 respondents (32%) reported that they discharge the waste 1 or 2 times per week. Only 13% of respondents (52 household) and 10% of respondents (40 households) discharge their waste 5 or 6 times per week or more than 6 times per week. Therefore, most of the people do not discharge their waste daily. In stead of this, they discharge their waste once in 2 or 3 days.

Table 4.2 Size of waste bag used to discharge by respondents

Particulars	Frequency	%
Size of waste bag used to discharge waste		
Small	45	11%
Medium	172	43%
Big	183	46%

Source: Survey Data

Table 4.3: Frequency of Waste Discharging per week by respondents

Particulars	Frequency	%
Frequency of waste discharging per week		
1 to 2 time	126	32%
3 to 4 time	182	46%
5 to 6 time	52	13%
more than 6 times	40	10%

Source: Survey Data

Although YCDC is encouraging to waste segregation and recycling, 54% of total respondents (214 respondents) responded that they discard without segregate the waste. 25% of total respondents (101 respondents) responded that they dispose household organic wet waste and sell recyclable materials and the remaining 21% of respondents (85 respondents) apply wet waste (organic waste) and dry waste (non-organic waste) segregation system.

Table 4.4: Type of waste bag used in waste discharge

Particulars	Frequency	%
Type of waste bag used in waste discharging		
Random bag	101	25%
Shopping Bag	87	22%
YCDC Color Code Waste Bag	114	29%
Black Plastic Bag	98	25%

Source: Survey Data

The Table 4.4 shows that the bag used for waste discharge is share almost same proportion. It is indicating that people are discharging the waste with the bags they can find easily near to them.

Table 4.5. The most usual method of waste discharging

Particulars	Frequency	%
The most usual method of waste discharge		
Throw all the waste together without applying waste segregation	32	8%
Discharge the household waste (wet waste/organic waste) and sell recyclable	138	35%
Use the waste segregation method in waste discharge	147	37%

Source: Survey Data

Regarding the waste discharging place, almost half of the respondent, 49% of total respondents reported that they bring their waste to nearest garbage station for the disposal. Waste discharge to push cart of private collector and YCDC truck collation follow the second largest place of waste discharge which share 24 % each of total respondents. The remaining 3% of total respondents reported that they discharge their waste at their back yard. The respondents have to choose only one discharge method which they mostly use to deliver the waste.

Table 4.6: The most common waste discharged place by respondents

Particulars	Frequency	%
Places of Household Waste Discharging		
Backyard	12	3%
Push Cart	96	24%
YCDC Bin	196	49%
YCDC Truck Collection	96	24%

Source: Survey Data

Currently, the YCDC is the sole responsible of Solid Waste Management of Yangon City, from the waste collection to the final disposal and treatment. Therefore, YCDC is the only service provider of waste management. However, there are some people making money by offering waste collection service. They provide door to door

collection service. Therefore, a number of households who stay on the top floors of high-rise buildings and either who live far away from the disposal site or not present anyone at home while YCDC waste truck in street collection time.

Concerning the reasons of backyard disposing, the majority of respondents (92%) reported that it is easy to dispose because of their habitual practice. The second most reason is everyone is disposing which is 42%. After that, the reason, 'nothing will be change by not discharging alone' and 'there are no other method to discharge the waste' follows third and fourth respectively and which represent 33% and 17%. Therefore, peer pressure is dominant role to improve waste related situation. For the studying of the reasons of backyard disposing, the respondents can give more than one reasons.

Table 4.7. Reasons of disposing in back yard and using of Private Waste Collection Service

Particulars	Frequency	%
Reasons of Disposing in Back Yard of 22 respondents (5.5% of total respondents)		
Easy to dispose	11	92%
Everyone does	5	42%
Nothing will be change by not discharging alone	4	33%
No other method to discharge	2	17%
Reasons of Using Private Waste Collection Service of 98 users (24.5% of total respondents)		
It can provide Door to Door collection Service	75	78%
YCDC bin is far	17	18%
No one at home when YCDC truck come for waste collection	2	2%
It is cheap	4	4%

Source: Survey Data

Regarding the reasons of using private push cart waste collection service, the respondents can give more than one reason why they use private waste collection service. The most dominant reason to use the private waste collector is 'providing door to door collection service' which represent the 75%. After that, the reasons 'YCDC bin is far', 'No one at home which YCDC truck come' and 'per time

collection fee is cheap' follows and represent 17%, 2% and 4% respectively. This is because according to the observation, although there are waste bins of YCDC, all bins are located in only one in the ward.

As shown as Table 4.8, the amount of tip paid to private waste collector per time collection is from 100 MMK to 500 MMK rage. The majority of respondents responded that they have to paid 200 MMK as a tip for per time waste discharging.

Table 4.8: Collection fee per time of private waste collector

Particulars	Frequency	%
Per time service fee for waste discharging to Private Waste Collector		
100 MMK	18	19%
200 MMK	54	56%
300 MMK	13	14%
500 MMK	11	11%

Source: Survey Data

This study also studied also asked to the users of public waste collection service provided by YCDC. The 92% of respondents who discharge their waste mostly at YCDC bin reported that the situation is acceptable to discharge the waste at YCDC bin. However, it is informally reported during interview that YCDC bin are still need to clean more because it is often dirty to open and have odor. Moreover, YCDC Bin location should distribute because there are the cases that number of bins are enough but it is designated at one place in a ward. The 97% of respondents who discharge their waste mostly to the YCDC truck in street collection reported that the situation is acceptable to discharge the waste while YCDC truck is collecting. However, it is reported informally during the interview that YCDC truck does not appear on time for collection. As a result, there are problem of odor. The summary of opinion of public waste collection service users are shown in Table 4.9 and Table 4.10.

Table 4.9: Situation on waste discharging at YCDC provided service place

Particulars	Frequency	%
Opinion on waste discharging at YCDC Bin of 196 users (49% of total respondents)		
It is ok to discharge	180	92%
It is not ok to discharge	16	8%
Opinion on waste discharging at YCDC Truck in street collection of 96 users (24% of total respondents)		
It is ok to discharge	93	97%
It is not ok to discharge	3	3%

Source: Survey Data

The Table 4.10 shows that the methods of carrying food during take away service of respondents. 69% of respondents use plastic bag, 5% use foam box, 7% use both plastic bag and foam box and 19% use their own food container to carry food during take-away food buying.

Figure 4.10: Take-away food carrying methods

Particulars	Frequency	%
Take Away Food Carrying Methods		
Plastic Bag	101	25%
Disposable item such as Foam Box	87	22%
both plastic and disposable item	114	29%
Personal Food Container	98	25%

Source: Survey Data

The table 4.11 shown that the reasons of using each method during the take-away food buying. The respondents of plastic bag main user for take-away food reported that 58% of respondents reported that there is no choice because the shops use plastic bags and have to use plastic bag for take away food. The remaining 42% reported that it is convenience for them to carry food. The 17% of the respondents of disposable material such as foam boxes main user for take-away food reported that there is no choice and have to use these disposable materials, as the shop uses only disposable materials for take away food. The remaining 83%, it is reported that it is

convenience for them to carry food by using the disposable food carrier. The respondents of both plastic bag and disposable materials main user for take-away food reported that 72% of respondent said there is have no choice as the shop use these items and the food buyers have to use these items for take away food. The remaining 8% reported that those materials are used because it is convenience for them to carry food. The respondent who bring their own food container to carry take-away food who represent the 19% of total sample population. It is said that 59% of own food carrier users bring their food carrier as for health concern, 32% of them reported that they simply do not want to use plastic bag for carrying food and the remaining 9% of respondents said that bringing own food carrier is for the purpose to reduce the waste. From the majority respondent of plastic bag main users and the majority respondent of both plastic bag and disposable bag main users, which represent 58% and 72% from each category respectively, are indicating that the main reason of disposable material and plastic bag is food seller are using and there is no option for buyer. Those plastic bag and disposable materials are less opportunity to recycle and not easily bio-degradable and threat of Solid Waste Management of Yangon City.

Table 4.11: Reasons of choosing take-away food carrying methods

Particulars	Frequency	%
Reason of using plastic bag during food take-away		
The shop uses the plastic bag and no other option	160	58%
I use because it is convenience for respondent	117	42%
Reason of using disposable box during food take-away		
The shop uses the plastic bag and no other option	3	17%
I use because it is convenience for respondents	15	83%
Reason of using plastic bag and disposable box during food take-away		
The shop uses the plastic bag and no other option	21	72%
I use because it is convenience for respondents	8	28%
Reason of using own food container during food take-away		
Health	45	59%
Do not want to use plastic bag	24	32%
To reduce the waste	7	9%

Source: Survey Data

In addition to that, this study studied the waste disposing behavior of respondents while travelling. 40% of respondents report that they discharge road side, 55% discharge their waste to waste bin and 6% of total respondents discharge their waste in drainage. According to the survey it is obvious that approximately, half of total road users discharge their waste in waste bin and another half of total road users discharge their waste to road-side. There was small amount of people who discharge their waste into drainage. However, road sided discharged waste have potential to reach to the drainage and which will cause huge problem during monsoon season in Myanmar.

Table 4.12: Road Users' waste discharge place

Particulars	Frequency	%
Waste Discharge Place of Road Users		
Road Side	158	40%
Into the Bin	220	55%
Into the Drainage	22	6%

Source: Survey Data

The table 4.13 summarize the reasons of discharge at roadside, in the waste bin and in the drainage. The most majority respondent who discharge the waste road side reported that they could not find the waste bin easily. After that reason, the second majority season which discharge the waste to road side was habit. From the survey it is shown that YCDC need to fulfill the need of road user and change the habit of road users. The two prominent reasons for disposing waste in bins are "to clean the surrounding" and "to be a good citizen". Therefore, YCDC should keep this status and promote the situation. The two most prominent reasons for drainage are "it is easy to throw" and "there is no bin" to throw. Therefore, YCDC should respond the needs of road users by increasing the number of roadside waste bin in everywhere.

Table 4.13: Reasons of choosing waste discharging place by road users

Particulars	Frequency	%
Reasons of littering on the road side		
everyone does	22	14%
Habit	55	35%
YCDC will clean	7	4%
I cannot find bin easily to discharge	68	43%
Bins are dirty to open	17	11%
Reason of dispose in Bin		
to clean	158	72%
want to follow rule	18	8%
be a good citizen	35	16%
habit	3	1%
helping YCDC	4	2%
Shame to litter	2	1%
Reason of Dispose in Drainage		
easy	9	41%
Habit	2	9%
no bin	9	41%
water will wash	2	9%

Source: Survey Data

As YCDC is trying to improve their service, the citizens opinions on the waste management situation is improve. As shown in the following table, 63% of total respondents said the SWM situation is improved than previous year and 35% said no changing and only 3% said, it become worse.

Figure 4.14: Opinion on Comparison of Waste Management Situation between Current year and Previous year

Particulars	Frequency	%
Respondents' opinion on comparison of waste management situation between current year and previous year		
improved	252	63%
worse	10	3%
un change	138	35%

Source: Survey Data

The following table shows the experience and opinion of poor waste management. There were mainly concerned about the health problems that the foul odor and the insects may bring and about the destruction of scenic beauty caused by improper waste management. About 78% (311 respondents) said odor was the worst problem for them, while 70% (279 respondents) believed that it was the presence of harmful insects and rats. Meanwhile, 72% of the respondents considered the deterioration of scenic beauty as the biggest problem. From this information, one could gather that most people have to deal with the serious health problems caused by the foul smell as well as the pests because of poor waste management.

To have better SWM and to reduce current problems, there was a general agreement over the things that should be improved: upgrade equipment and machinery, increase human resources, implement rules and regulations, and provide secondary disposal sites in more convenient locations. Around 74% (296 respondents) suggested that increase awareness campaign for increasing of following rules and regulations is important to improve solid waste management. Although the YCDC has been telling people to use green and blue bags when disposing of their solid waste and to tie these bags, nobody follows the procedure. People use any bags to dispose of their trash, and they just throw them without any care. Around 61% of the respondents also thought that the YCDC should place secondary disposal sites closer to residential areas to make waste disposal more convenient and to help ensure that waste bags reach the bins properly.

Table 4.15: Problems experienced due to poor solid waste management.

Particulars	Frequency	%
Problems faced due to poor waste disposal and management		
Poor health	257	64%
Foul odor	311	78%
Deterioration of scenic beauty	287	72%
Breeding places for harmful insects and rats	279	70%
Others	7	2%

Source: Survey Data

Table 4.16: Options to improve the solid waste management.

Particulars	Frequency	%
Options in order to improve solid waste management		
Upgrade the use of machinery	271	68%
Increase human resources	277	69%
awareness campaigns	296	74%
more waste bin in everywhere	246	62%
current system is ok	50	13%
others	0	0%

Source: Survey Data

Approximately 68% of the respondents recommended increasing human resources and upgrading the use of machinery. Although most of the collectors seem busy collecting waste all day, most of the waste still ends up left on the streets. They also wished to upgrade the machinery and tools since using suitable vehicles and tools can speed up waste collection and disposal.

4.3.2 Awareness of Respondents about Waste Management Behaviour

This study studied on the field that how the respondents received the information related to waste, and level of awareness. Awareness level was measured by 3 indicators which are:

1. Waste Types Segregation Awareness
2. Waste Reducing Awareness
3. Waste Disposal Rules

The following chart show the resource of information where the respondents received waste related information. The respondents received the information more than single source.

Table 4.17: Waste related information source of respondents

Particulars	Frequency	%
Information Sources of acquiring waste related information		
Newspaper	158	40%
Awareness Campaign	45	11%
TV	231	58%
Radio	96	24%
Peer to Peer	84	21%
Facebook/internet	202	51%

Source: Survey Data

Most of the respondents received information about waste related matter through TV and Internet or social media which represent 58% and 51%. After that the resource of information follows newspaper, radio, peer to peer and community awareness campaign in serial.

This study studied on the waste segregation knowledge of respondents. The respondents were given 9 items of waste and they have to segregate wet waste (organic waste) and dry waste (inorganic waste).

The given waste items are:

a. Newspaper
b. Vegetable
c. Biscuit
d. Water bottle
e. Flower
f. Food Waste
g. Tin
h. Broken household applicants
i. Foam box.

For the wet waste segregation test, the respondents must choose the correct wet waste types which are vegetable, biscuits, flower and food waste. There are 358 respondents (90% of total respondents) choose vegetable, 124 respondents (31 % of total respondents) choose biscuit, 124 respondents (55% of total respondents) choose flower and 338 respondents (85 % of total respondents) choose food waste. As shown as in Figure the percentage of respondent are high for each wet waste. However, it is studied that the number of respondents who can choose all given wet waste items are very low. As shown as Figure only 22% of respondent can segregate all wet waste items correctly. It is also indicating that in real situation, Awareness level of community on waste type and waste segregation is still low.

Table 4.18: Wet Waste (Organic Waste) Segregation Awareness Level by each waste item

Particulars	Frequency	%
Wet Waste (Organic Waste) Segregation Awareness Level by each waste item		
newspaper	53	13%
vegetable	358	90%
biscuit	124	31%
water bottle	126	32%
flower	219	55%
food waste	338	85%
tin	112	28%
broken household applicants	11	3%
foam box	11	3%

Source: Survey Data

Table 4.19: Perfect wet waste segregation awareness level

Particulars	Frequency	%
Awareness level of Wet Waste (Organic Waste) Segregation		
Respondents who can segregate all wet waste item completely	87	22%
Respondents who cannot segregate all wet waste item completely	312	78%

Source: Survey Data

For the dry waste segregation test, the respondents must choose the correct dry waste types which are newspaper, water bottle, tin, broken household items and foam box. There are 285 respondents (71% of total respondents) choose newspaper, 238 respondents (60 % of total respondents) choose water bottle, 245 respondents (61% of total respondents) choose tin, 335 respondents (84% of total respondents) choose broken household applicants, and 292 respondents (73 % of total respondents) choose foam box. As shown as in Figure the percentage of respondent are high for each dry waste. However, it is studied that the number of respondents who can choose all given dry waste items are very low. As shown as Figure only 29% of respondent can segregate all dry waste items correctly. It is also indicating that in real situation, Awareness level of community on waste type and waste segregation is still low.

Table 4.20: Awareness level on Dry Waste Segregation by each waste item

Particulars	Frequency	%
Dry Waste (Non-Organic Waste) Segregation Awareness Level by each waste item		
newspaper	285	71%
vegetable	7	2%
biscuit	174	44%
water bottle	238	60%
flower	103	26%
food waste	14	4%
tin	245	61%
broken household applicants	335	84%
Foam box	292	73%

Source: Survey Data

Table 4.21: Perfect dry waste segregation awareness level

Particulars	Frequency	%
Awareness level of Dry Waste (non-Organic Waste) Segregation		
Respondents who can segregate all dry waste item completely	114	29%
Respondents who cannot segregate all dry waste item completely	286	71%

Source: Survey Data

Similar to the waste segregation practices, respondents are tested to choose the waste reduce method to measure how they aware the waste hierarchy namely, Reduce, Reuse and Recycle. The respondents are given 6 methods of waste disposal. They are:

1. Not buying unnecessary things
2. Use plastic bags
3. Using good quality and long-lasting items
4. Keep waste
5. Bring your own shopping bag and,
6. Donate the items which are not using anymore

Among them, they have to choose the 4 methods which helps in waste reduction in namely, not buying unnecessary things, using good quality and long-lasting items, bring your own shopping bag and donate the items which are not using

anymore. The 43% of total respondents selected not buying unnecessary things. The 34% of total respondents selected using good quality and long-lasting items. The 48% of total respondents selected bring your own shopping bag. The 33% of total respondents selected donate the items which are not using anymore. Although, the percentage of choosing each correct answer is high, but it does not exceed 50%. Moreover, for this test, only 12% (48 respondents) can select perfectly the methods to reduce the waste. Therefore, it is indicate that waste reducing methods awareness level in community is very low.

Table 4.22: Awareness level on Waste Reducing Methods by each method

Particulars	Frequency	%
Waste Reducing Awareness Level by each method		
Not Buying un necessary	170	43%
use plastic bag	61	15%
using good quality and long lasting items	137	34%
keeping waste	25	6%
bring own shpping bag	191	48%
donate the items	131	33%

Source: Survey Questionnaires

Table 4.23: Perfect waste reducing methods awareness level

Particulars	Frequency	%
Awareness level of Waste Reducing Methods		
Respondents who can identify waste reducing method completely	48	12%
Respondents who cannot identify waste reducing method completely	352	88%

Source: Survey Questionnaires

This study also studies on the awareness level on the correct waste bag color code which is defined by YCDC-PCCD. YCDC defined that Wet waste type which are organic waste such as vegetable waste, food waste, flower waste and other kitchen waste (meat, fish) must be thrown with Green Color Bag. The Dry waste type, which are tin, bottle, wood, old wire, plastic, metals, broken household applicants, cloth,

glassware, porcelain and any other recyclable materials must be thrown in Blue color waste bag. However, it is not designated separate waste bin for both waste type.

For wet waste bag code, the correct wet waste bag code, green color waste bag was selected by 19% of total respondent. 39% of total respondent choose the black color waste bag. 8% of total respondent choose the transparent waste bag. 18% of total respondent choose the blue color waste bag. 17% of total respondent choose the random (not color define) waste bag.

For dry waste bag code, the correct dry waste bag code, blue color waste bag was selected by 39% of total respondent. 16% of total respondent choose the black color waste bag. 14% of total respondent choose the transparent waste bag. 13% of total respondent choose the blue color waste bag. 20% of total respondent choose the random (not color define) waste bag.

Table 4.24: Awareness level on waste bag color code

Particulars	Frequency	%
Wet Waste Bag Awareness Level		
Green Bag	74	19%
Black Bag	155	39%
Transperant	32	8%
Blue	73	18%
Random	66	17%
Dry Waste Bag Awareness Level		
Green Bag	65	16%
Black Bag	56	14%
Transperant	53	13%
Blue	148	37%
Random	78	20%

Source: Survey Questionnaires

Regarding opinion on the quantity or situation of awareness raising organized by YCDC was studied. The majority 69% of respondents answered that the quantity of awareness raising to community is still few, while 29% of respondents answered very few and only 2% respond it is enough. No one answer the quantity of awareness

raising is too much. The following chart show the opinions of respondents on quantity of awareness raising.

Table 4.25: Quantity of Awareness Raising

Particulars	Frequency	%
Opinions on Awareness Raising Activities Quantity		
very few	115	29%
still few	277	69%
enough	8	2%
too much	0	0%

Source: Survey Data

In summary, the awareness levels of respondents were measured by using organic waste segregation and non-organic waste collection for Awareness on Waste Types Segregation, by choosing of correct waste reduction methods for Awareness on Waste Reducing and by choosing of basic rule which is correct waste bag color code for Awareness on Waste related rules. The summary results are following:

(a) Awareness on Waste Types Segregation: The awareness level of Waste Segregation is low. Only 22% of respondents have wet waste (organic waste) segregation awareness and only 29% of respondents have dry waste (non-organic waste) segregation awareness. In means, only 25.5% of respondents have waste segregation awareness.

(b) Awareness on Waste Reducing: The awareness level of Waste Reduction is the lowest among the other awareness. Only 12% of respondents have waste reduction awareness.

(c) Awareness on Waste Disposal Rule: The awareness level of waste disposal rule is also low, although it is measured by using one of basic waste disposal rule, choosing correct waste bag color code. Only 19% and 37% can select correct waste color code. In means only 28% of respondents have awareness level on waste delivery rule.

Having low awareness level is indicating that more awareness activities are needed to deliver. It is said that in table 4.25, the most majority of respondents have the quantity of awareness activities are still few.

4.3.2 Willingness to Pay for Improved Solid Waste Management

The respondents' willingness to spend money on SWM was examined using five different bid prices: MMK 1000; MMK 1,500; MMK 2,000; MMK 2,500; and MMK 3,000. The table 4.30 shows the urban households' WTP for SWM at different amounts.

Among the 400 respondents interviewed 292 use only public solid waste management services, whereas the remaining 96 use private waste collectors. The 292 respondents who use the YCDC's services exclusively pay MMK 450 per month. This is much lower than the mean price of MMK 2500 that households using the services of private collectors pay monthly.

Table 4.26: Willingness to pay to improve Solid Waste Management

Particulars	%
Willingness to pay improved Solid Waste Management	
1000 MMK per month	89%
1500 MMK per month	83%
2000 MMK per month	70%
2500 MMK per month	49%
3000 MMK per month	44%

Source: Survey Data

As can be seen from the above figure, the respondents' willingness to spend money on SWM gradually decreases as the bid price (in MMK) increases. About 89% of the respondents were willing to pay the lowest bid price of MMK 1000. About 83% of the respondents were willing to pay MMK 1,500. About 70% of the respondents were also willing to pay MMK 2,000. However, about 49% of the respondents started to become concerned when the bid price went up to MMK 2,500. Although some respondents had already spent a similar amount for private services, they still did not want to take that much responsibility for themselves.

Only 44% of the respondents were willing to pay for the bid price MMK 3,000 to get better facilities and environment. However, when asked follow-up questions to confirm their willingness, they gave different answers and did not seem as certain.

The respondents' WTP depended on their expectations about improved services. The following table also shows that the amount that people are willing to spend for SWM depends on whether the waste collection system would be conveniently located relative to where they live, and on how much cleaner and more beautiful their communities would become. A total of 267 respondents said that a bigger budget would help to ensure that all waste would be duly collected. Among those 267 respondents, 66% of respondents reported that due to the increased revenue, it will be more convenient to implement proper waste management system, 68% of respondent reported that all the waste would be collected.

Table 4.27: Reasons why people are willing to pay more.

Particulars	Frequency	%
Reasons why people are willing to pay more		
It will be more convenient	177	66%
All the waste would be collected	181	68%
others	7	3%

Source: Survey Questionnaires

There were also some other reasons why the respondents were not willing to pay for the new bid prices. Total 133 respondents, 34% of respondents reported that they are not willingness to pay more. About 32% of the respondents who are not willingness to pay more said that there was no need to pay more since they were already paying taxes. The second most common reason (about 29% of the total number of respondents who are not willingly to pay more) was that the current system was already acceptable. About 27% of the not willingly to pay more respondents believed it was not their responsibility to take action. About 23 % of respondents answered that they could not afford to spend more money, or they wanted to first get more information about what will be done with the additional money to be collected. Lastly 18% and 3% of respondents answered that there will not be improvement even with extra charge or do not believe that the extra charge will use for better SWM.

Table 4.28: Reasons of people are not willing to pay more.

Particulars	Frequency	%
Reasons of people are not willing to pay more		
Have no responsibility	36	27%
Have already paid taxes	43	32%
Cannot afford to pay more	30	23%
Current system is acceptable	38	29%
Need more information	32	24%
No improvement even with extra charge	4	3%
Do not believe that the extra charge will use for better SWM	24	18%

Source: Survey Data

According to the survey, the respondents are mainly use the YCDC waste bin to discharge waste. However, some use the informal waste collector due to their satisfactory service and YCDC waste bins are not put everywhere. Regarding the outdoor waste dispose, due to their habit and difficult to find the road side waste bin, they tend to throw their waste road side or in drainage. Based on this study waste segregation, waste reduction and color code of awareness level of respondents' level is low and the respondents think they got few information and message related to the awareness. As a result, they are not eager to think to change their improper habit and have no trust and less willingness to pay more to improve solid waste management. This study says that number of respondents who are willing to pay are (267) among 400 participants for the improvement of solid waste management.

CHAPTER V
CONCLUSION AND RECOMMENDATION

5.1 Findings

Based on the findings from previous surveys and research studies, Solid Waste Management have many shortcomings and to improve the Solid Waste Management, it is crucial to do holist approach and one stakeholder rely on another stakeholders. Service Provider and Service Users need to contribute appropriately, such as, Awareness level of service user will help in waste segregation and fulfilling the user needed facilities for waste segregation will help in behavior change of solid waste management and help in waste treatment process of service providers. In this decade, with the support from some organizations, YCDC-PCCD had been tried hard to improve the service. However, there are some gaps to improve.

In this study, household surveys were conducted in two sub-urban townships namely, Thingangyun and South Okkalapa Township. The selected population were interviewed to obtain the information as to how the residents assess the Solid Waste Management, the behaviors of the residents on waste related behavior both in the street and the house, Awareness level of their waste management, their attitude on the waste management and willingness to pay. Altogether 400 people are interviewed, consist of 200 from Thingangyun Township and 200 from South Okkalapa township.

The results presented were based upon interview of respondents from two suburban townships, namely, Thingangyun and South Okkalapa township. As for educational background majority of respondents are university graduates or completed high school education and many of them are salaried employee.

The majority of the respondents said that they dispose their waste by bringing to YCDC waste bin. The remaining majority groups dispose their waste by using private waste collector or YCDC truck in street collection. The main reason of using private collector is door to door collection. However, majority of respondents reported

that the situation of Waste Management is improved compared to last year. Therefore, YCDC should keep improving their service on waste bin collection as primary and should improve the issue on cleanness of bin and its odor and YCDC should put the waste bin in more location. It is also indicating that the respondents faced the problem of odor, scenic beauty and breeding of harmful rat and insect.

For Take Away food carrying, the majority, 69% of respondents used plastic bag to carry take away food. Among of them, 58% of plastic bag users reported that they have to use because seller use the plastic bag and there has no option. It is indicate that the majority of plastic using is cause by seller.

For road side waste discharging manner, over half of respondents, 55% of total respondent reported that they mainly discharge their waste in the bin while going around, while 40% of total respondents reported that they dispose their waste on road side. The main reasons to dispose to road side are they cannot find bin easily and it is their habit, representing 43% and 35% respectively. Therefore, YCDC should distribute designated road side dust bin in more place and implement behavior change process such as more effective awareness, impose fine, appreciate the manner of community who dispose their waste in bin and more street cleaning.

Regarding the awareness level of respondents, awareness level was measured in three main field which are waste type segregation, waste reducing and waste disposal rule. In waste segregation and waste reducing methods, only 22% of respondents can segregate wet waste perfectly. As well as for dry waste segregation and waste reducing methods, only 29% and 12% of respondents can done perfectly. Therefore, it can conclude that awareness level of community is low and it needed to enforce more awareness to get effectively. It also proved that 98% of respondent said that the awareness raising quantity is still low. According to the study, the majority of information source of respondent on waste related matter is TV.

For awareness level of color code of waste bag, only 19% and 37% of respondent can select the correct color code of wet and dry waste respectively. In reality, only 29% of respondents use the color waste bag and the remaining used random bag, black color bag and random bag.

When asked about their preferences on willingness to pay, the willingness to spend money on Solid Waste Management was measured using five different price:

1000 MMK, 1500 MMK, 2500 MMK and 3000 MMK. Willingness to pay gradually decreased as the bid price in MMK increased. The most influencing reasons for un-willingness to pay are: taxes are paid and no extra charge, having feeling of no responsibility, more information for the future plan. The main factors influencing for this decision was the issue of mutual understanding and trust.

5.2 Suggestions

According to the finding of study, it can conclude that awareness level of community is low and it needed to enforce more awareness to get effectively. It also proved that 98% of respondent said that the awareness raising quantity is still low although YCDC-PCCD is implementing School Awareness and Public Awareness. According to the study, the majority of information source of respondent on waste related matter is TV. Therefore, YCDC also should consider TV as a tool of awareness raising media while regular implementing of School and Public Awareness Programs.

For the waste related behavior changing of citizens, YCDC should distribute designated road side dust bin in more place to be eased to throw the waste for road user which enforce the behavior changing and implement other behavior change process such as more effective awareness, impose fine, appreciate the manner of community who dispose their waste in bin and more street cleaning.

For the Waste segregation, YCDC should place waste bin for different waste type by differentiating color of bin according to waste type and should stick the sticker of waste item of respective waste type on the bin. This will be easier for community to collaborate in waste segregation, as well as can promote the waste segregation awareness. As YCDC is an organization, changing the organization's activities will be more efficient and faster than the whole community changing process.

Regarding the plastic bag usage, YCDC should improve the rule and regulation on seller who use the plastic bag and persuade them not to use plastic bag. On the other hand, it is needed to find the alternation solution to carry take away food and for shopping easily.

YCDC should keep improving their service on waste bin collection as primary and should improve the issue on cleanness of bin and its odor and YCDC should put the waste bin in more location. It is also indicating that the respondents faced the problem of odor, scenic beauty and breeding of harmful rat and insect.

The main factors influencing for willingness to pay decision was the issue of mutual understanding and trust. YCDC should increase more information flow on current activities, plan for future, awareness raising and nature of waste collection service.

Overall, it can be concluded that to improve the solid waste management, YCDC should effort more on information sharing, awareness raising, fulfilling the needs of community related on waste discharging, improving facilities to deliver better service and legal action to change the behavior of community. Community should also collaboration by following the rules and regulation of waste management related matters and changing their own behavior.

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Questionnaire

- This questionnaire is sole purpose to collect to data for studying the waste related activities of a Yangon citizen by a student with the purpose of writing a thesis to fulfill the Master of Development Studies Degree of Yangon University of Economics. There will not be any legal action.
- This questionnaire has only the purpose to write a thesis and will not be used for business affairs.

Profile

1. Age

(a) between 20 to 30 (b) between 30 to 40 (c) between 40 to 50

2. Occupation

(a) own business (b) salaried employee (c) dependent (d) seller buyer (e) others

3. Education

(a) Primary (b) Middle (c) High (d) Graduate (e) post graduated

4. No of Family Memeber

…….

5. Monthly Family expenditure

(a) under 100,000 (b) from 100,000 to under 250,000 (c) from 250,000 to under 400,000 (d) from 400,000 to under 600,000 (e) above 600,000

6. Type of Housing

(a) wooden (b) brick (c) apartment

7. No of adult family member

……

8. No of under 15 years old children

……

9. No of car in family

……..

10. monthly electricity bill

---------- MMK

11. Family members income

……

No of family who has income

First family member income

…… MMK

Second family income

…… MMK

Third family member income

…… MMK

Fourth family member income

…… MMK

12. Total family member income

…… MMK

Waste Discharge Habit and Situation

1. Size of waste bag to discharge

(a) small (b) medium (c) big

2. waste discharge frequency per week

(a) 1 to 2 time (b) 3 to 4 times (c) 5 to 6 times (d) 6 time and above

3. Method of Waste Discharge (Please put the most common method)

(a) all waste are disposed without segregation
(b) household waste are discharged and sell the recyclable materials such as bottle and paper
(c) Use the waste segregation method in waste discharge

4. The most common waste discharged place

(a) Backyard (Please answer question no. 4. a)
(b) Push Cart (Please answer question no. 4. b.1 and 4. b.2)

(c) YCDC Bin (Please answer question no. 4. c)

(d) YCDC Truck Collection (Please answer question no. 4. d)

4.a. Reasons of disposing in back yard

(a) Easy to dispose (b) Everyone does (c) Nothing will be change by not discharging alone (d) No other method to discharge

4.b.1 Reason of using private waste collection service

(a) It can provide Door to Door collection Service

(b) YCDC bin is far

(c) No one at home when YCDC truck come for waste collection

(d) It is cheap

4.b.2 Per time service fee for waste discharging to Private Waste Collector

.....

4.c Reason of using private waste collection service

(a) It is ok to discharge (b) It is not ok to discharge

4.d Reason of using private waste collection service

(a) It is ok to discharge (b) It is not ok to discharge

5. Type of waste bag used in waste discharging

(a) Random bag (b) Shopping Bag (c) YCDC Color Code Waste Bag (d) Black Plastic Bag

6. How do you carry Take Away Food and why do you choose that method?

……

……

7. Waste Discharge Place of Road Users

(a) Road Side (Please answer question no. 7. a)

(b) Into the Bin (Please answer question no. 7. b)

(c) Into the Drainage (Please answer question no. 7. c)

7.a. Reasons of littering on the road side

(a) everyone does (b) Habit (c) YCDC will clean (d) I cannot find bin easily to discharge

7.b Reason of dispose in Bin

……

7.c Reason of Dispose in Drainage

……

8. Opinion on comparison of waste management situation between current year and previous year

(a) improved (b) worse (c) un change

9. Problems faced due to poor waste disposal and management. P

	Poor health	( )
	Foul odor	( )
	Deterioration of scenic beauty	( )
	Breeding places for harmful insects and rats	( )
	Others	( )

10. Following Options are options to improve the solid waste management. Please select the most prioritized options

	Upgrade the use of machinery	( )
	Increase human resources	( )
	awareness campaigns	( )
	more waste bin in everywhere	( )
	current system is ok	( )
	others	( )

Analysis on Awareness on Waste Management

1. Main Information Sources of acquiring waste related information

(a) Newspaper (b) Awareness Campaign (c) TV (d) Radio (e) Peer to Peer
(f) Facebook/internet

2. Please select the wet waste (organic waste)

(a) newspaper (b) vegetable (c) biscuit (d) water bottle (e) flower (f) food waste
(g) tin (h) broken household applicants foam box

3. Please select the dry waste (non-organic waste)

(a) newspaper (b) vegetable (c) biscuit (d) water bottle (e) flower (f) food waste
(g) tin (h) broken household applicants foam box

4. Choose color code of wet waste bag

(a) Green Bag (b) Black Bag (c) Transparent (d) Blue (e) Random

5. Choose color code of dry waste bag

(a) Green Bag (b) Black Bag (c) Transparent (d) Blue (e) Random

6. Please select the waste reduction methods

(a) Waste Reducing Awareness Level by each method (b) Not Buying un necessary
(c) use plastic bag (d) using good quality and long lasting items
(e) keeping waste (f) bring own shopping bag (g) donate the items

7. Opinions on Awareness Raising Activities Quantity

(a) very few (b) still few (c) enough (d) too much

Analysis on Willingness to Pay

1. **If the Waste Management Service will improve, do you have willingness to pay more for waste collection fee?**

<table>
<tr><td colspan="2">If YCDC will collect 1000/1500/2000/2500/3000 Kyat per month for waste collection fee, do you want to pay more?</td></tr>
<tr><td>☐ Yes</td><td>☐ No</td></tr>
<tr><td>Why?</td><td>Why?</td></tr>
<tr><td>☐ It will be more convenient</td><td>☐ Have no responsibility</td></tr>
<tr><td>☐ All the waste would be collected</td><td>☐ Cannot afford to pay more</td></tr>
<tr><td rowspan="5">☐ Others
----------</td><td>☐ Have already paid taxes</td></tr>
<tr><td>☐ Can accept cureent system</td></tr>
<tr><td>☐ Need more information</td></tr>
<tr><td>☐ No improvement even with extra charge</td></tr>
<tr><td>☐ Do not believe that the extra charge will use for better SWM</td></tr>
</table>

Name:

Phone No: