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**MSc Programme in Urban Management and Development**

Rotterdam, The Netherlands

September 2013

**Thesis**

Community-driven Waste Management:  
How Sustainable are Waste Banks in Yogyakarta?

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Specialization: Urban Environmental Management and Climate  
Change



## **MASTER'S PROGRAMME IN URBAN MANAGEMENT AND DEVELOPMENT**

**(October 2012 – September 2013)**

# **Community-driven Waste Management: How Sustainable are Waste Banks in Yogyakarta?**

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Indonesia

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UMD 9 Report number:  
Rotterdam, September 2013

## SUMMARY

This research focused on the sustainability of community Solid Waste Management (SWM) through a waste bank system. The first part of the research renders insights the operation of the waste banks in Yogyakarta Municipality as well as the motivation of households to involve in the activities. The second part of this research explores the sustainability of the waste banks in the context of the city level based on Integrated Sustainable Solid Waste Management (ISWM) concept. The view points of four stakeholders group are analyzed in this study; the selected waste banks in the Yogyakarta Municipality, the customers of the waste banks, the local authority and the waste buyers conducting waste transaction with the waste banks. The final part highlights the suggestion made by the stakeholders on how the sustainability of the waste banks can be improved.

The study was exploratory and explanatory single holistic case study. The selection of sample for waste banks was stratified purposive while for customers of the selected waste banks, it was convenience sampling. Meanwhile, the local authority officers and the waste buyers were purposive. Various literatures and case studies on ISWM were reviewed. Assessment variables and indicators were then formulated as analytic tools to assess the sustainability of the waste activities. The waste system is considered sustainable if most of the environment, social and economic goals are reached. The method of primary data collection involved semi open questionnaires which were conducted on the waste bank customers while in-depth interviews were administered with the waste bank directors, the selected waste bank customers, RW waste collectors, Environment Agency of Yogyakarta Municipality (EAYM) officers, the Ministry of Environment representatives and the selected waste buyers. Review secondary data as well as observation were also applied. The data from field work then were analyzed both qualitatively and quantitatively assisted by Atlas.ti and SPSS program software in the forms of narratives, tables, chats and images.

The findings reveal that the selected waste banks only receive inorganic waste material from customers. In daily operation, the waste banks incorporate an economic value of waste into a community SWM system. To cover the operational costs, the selected waste banks adopt a profit sharing mechanism. In terms of motivation, the majority of customers use an environmental awareness as a main driving force to involve in the waste bank activities.

The study also shows that the majority of the selected waste bank operations are sustainable since most of the environmental, social and economic sustainability principles were achieved. An exception is in the Asri waste bank; the Asri waste bank is not sustainable as it failed to fulfill mostly assessment indicators on environmental and social sustainability. In the context of the city level, the selected waste banks contribute to sustainable SWM system in Yogyakarta since they reduce the waste handling and collection costs of the Municipality.

In order to improve the sustainability of waste bank operations, a set of suggestion is formulated; enforcing SWM regulation, distributing sufficient facility and equipment, training on making recycled craft products as well as the market creation, raising household awareness on SWM and also providing an additional capital to expand the waste bank operation.

**Keywords:** *sustainability, waste bank, solid waste, ISWM, Yogyakarta Municipality*

## **ACKNOWLEDGEMENTS**

First and foremost, I would like to thank to Allah, the most beneficent and the most merciful, for sustaining my life during my whole study period in Rotterdam, the Netherlands. My humblest gratitude goes to the Holy Prophet Muhammad (peace be upon him) and his companions (may Allah bless them) who have provided me continuous guidance. May Allah give me an ability to apply their way of life in every given instance.

I also would like to express my profound sense of reverence to my supervisor Marijk Huysman, for the persistent and indefatigable support through extensive discussions and constructive criticisms in the process of writing this thesis. My sincere appreciation also goes to Ir. Agam Marsoyo, M.Sc., PhD for his supervision at the beginning of the thesis.

My next appreciation is to the entire staff of IHS-Erasmus University and MPKD-Gadjah Mada University for the supports, advises and encouragements in the entire studying process.

My next gratitude also goes to my fellow UMD 9 participants and Double Degree students for enriching interactions and togetherness. I highly appreciate for this great relationship.

I would like to thank all my respondents of “waste bank communities” and waste buyers in Yogyakarta for participation and assistance. My appreciation also goes to my respondents from Environment Agency of Yogyakarta Municipality and the Ministry of Environment representatives, who sacrificed their worthwhile time in providing the secondary data during the field work. Your contributions make this thesis possible.

My heartfelt admiration belongs to my parents. Thank you for your longanimity in raising your son. My individual thanks are to my dearest wife and sons. I tremendously appreciate your ceaseless support, prayers and best wishes. May Allah always devotes His blessing to our family. Last but not least, I would say thanks to all family and all people who remembered me in their prayers.

Sutomo  
September, Rotterdam

## ABBREVIATIONS

€	Euro
3R	Reduce, Reuse, Recycle
BLH	Badan Lingkungan Hidup / Environmental Agency
BPS	Badan Pusat Statistik / Central Bureau of Statistics
CBO	Community Base Organization
CDM	Clean Development Mechanism
CO <sub>2</sub>	Carbon dioxide
CSR	Corporate Social Responsibility
Dasa Wisma	Group of ten households / smallest administrative unit in RT area
DHF	Dengue Hemorrhagic Fever
EAYM	Environment Agency of Yogyakarta Municipality
EPR	Extended Producer Responsibility
GHG	Green House Gasses
IDR	Indonesian Rupiah
Idul Fitri	End of Ramadhan celebration
ISWM	Integrated Sustainable Waste Management
Kartamantul	Yogyakarta, Sleman and Bantul / One municipality and two regions located in Yogyakarta Province
LGA	Local Government Association
MLIC	Medium and Low-Income Countries
NGO	Non Government Organization
PKK	Pembinaan Kesejahteraan Keluarga / Fostering Family Welfare, citizen organization specially intended for housewives
RT	Rukun Tetangga / Neighbourhood Group, small citizen organization comprising several households, supervised by RW
RW	Rukun Warga / Community Group, citizen organization comprising several RTs, supervised by sub district
SWM	Solid Waste Management
UD	Usaha Dagang / Trading Enterprises
Waroeng 3R	Small shop in neighbourhood level providing essential food stuff that can be traded with waste
www	world wide web

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## **CHAPTER ONE INTRODUCTION**

### **1.1 Introduction**

The chapter starts with brief information of Solid Waste Management (SWM) currently applied in Indonesia. The discussion is followed by a presentation of the issues in solid waste management system in Yogyakarta municipality. Based on the elaboration of those solid waste issues, the researcher formulates research objectives as well as research questions that need to be answered through this study. At the end of this chapter, it will be presented the significance of this study as well as scope and limitations of the study.

### **1.2 Background**

Cities' authorities in Indonesia are struggling with Solid Waste Management (SWM). Growing population and the acceleration of economic development lead to high urban waste generation. It is predicted that the total generation of solid waste in cities throughout Indonesia will increase five times by 2020 (Kardono, 2007). On one hand, the increasing waste generation calls for raised demand for SWM services. On the other hand, traditional ways in SWM are still widely used by local governments in dealing the waste. The majority of the local governments still apply the end-of-pipe approach rather than optimizing waste management at a source.

It is common found that local governments in Indonesia often face SWM problems beyond their ability. There is a quite big discrepancy between a need for proper SWM services and the ability of the local governments to overcome waste issues. Inadequate financing, unqualified staff and lack of public awareness are believed as major impediments for the local government in providing effective and efficient SWM services (Marshall and Farahbakhsh, 2013; Shekdar, 2009). Moreover, instead of involving other parties, the local governments in Indonesia remain the only actor who is responsible in SWM. This results the burden of the local governments in SWM getting higher.

Due to an increase of waste volume in most cities in Indonesia, the local governments have to increasingly put an attention to health and environmental issues. Waste collection services provided by the local authorities are still insufficient. So far, the local governments in Indonesia use approximately 6 percent of the yearly budgets in waste management. With such a budget the local governments are only able to collect more or less 60 percent of the total waste generated (Deradjat and Chaerul, 2005). Households without regular solid waste collection services routinely treat the uncollected waste by illegally burning or dumping the waste into a river or on open spaces. That poor waste management can lead to a catastrophe for human health and an environment.

Illegally dumping of solid waste on river, for example, not only causes unpleasant odors but also can contaminate the source of surface and groundwater. Decomposition of the solid waste can lead to the process of eutrophication and putrefaction of rivers and lakes. The situations can potentially result the outbreaks of water and vector borne disease. The problem of putrescible waste is more serious for tropical countries like in Indonesia. The lack of urban waste management system and the lack of law enforcement in proper waste disposal can raise the exposure of diseases, particularly in peri urban areas (Un-Habitat, 2010).

Urban SWM systems also become important to an environment since its contribution to climate change phenomena. Many researchers argue that an improper SWM is one of the

main contributors of Green House Gasses (GHG's). In the whole world, disposing solid waste approximately contributes 3 per cent of GHG's emission (Stern, 2007). Tchobanoglous and Kreith (2002) also say that every ton of waste land filled will produce 2.323 tons of CO<sub>2</sub>. Therefore, in order to reduce the negative effects of solid waste, since 2008 the central government of Indonesia has enacted a regulation that oblige local governments to implement a more environmentally friendly disposal method by using a sanitary landfill rather than an open dumping system. However, due to technical and financial constraints, it is very difficult for local governments to fulfill such a regulation.

### **1.3 Problem Statement**

As one of the main cities in Indonesia, Yogyakarta is also fighting with SWM challenges. The increasing population and economic development lead to some SWM problems, such as high urban waste generation, lack of coverage areas and lack of landfills.

Currently, not less than 250 tons of solid wastes are generated by the municipality per day. The majority of the solid waste, almost 70 percent, come from households. Meanwhile, half of the total waste is composed by inorganic material. On the other hand, due to geographical circumstances and lack of abilities, the municipality is only able to collect 90 percent of the total urban waste. The rest of waste is managed by the citizens itself in either legal or illegal way. The example of the legal way of household waste management is composting organic waste to become compost. Meanwhile, the illegal way in household waste management are uncontrolled waste burning and disposing the waste into river or on open spaces (EAYM, 2012).

Besides high waste generation and a lack of its collection, the municipality is also struggling with a landfill. Due to its small area, with only 32.5 km<sup>2</sup>, it is difficult to the municipality to set up the landfill on its own space. The only way is disposing the waste to a landfill at another regency. As the consequence of this disposal collaboration, the municipality must allocate a huge budget for sharing costs, more or less € 150,000 per year. The payment actually is depended on the weight of waste disposed by the municipality on that landfill. On the other hand, so far, the SWM system in this municipality is still approached in a conventional way. The only objective is transferring the waste from the city center to the disposal area as quick as possible (EAYM, 2012).

The challenges of SWM in Yogyakarta have encouraged its communities to perform community waste management at sources. Participation of the citizens in managing the waste at the sources is done by forming many waste activities that the initiatives come from the community itself. One of the community waste activities in Yogyakarta is through waste bank systems. The system incorporates a monetary value of waste into a community waste management. Like a conventional bank, there are customers, account books, directors and tellers in this system.

In the last five years, the system of waste bank has been established by 19 communities in Yogyakarta municipality. Communities independently build waste banks, starting from searching the information, establishment and operationalization. In SWM context, the waste bank system is one kind of a creative idea from communities that may help the local government to find out an effective solution to deal with SWM problems. Indeed, the increasing number of community activities in the form of waste bank should be appreciated. However, not only focus on the quantity, the inquiry on the sustainability of such activities is also become increasingly prominent in order to contribute sustainable SWM in the

municipality. Many evidence shows that the sustainability of community waste activities is low. In addition, so far, there are no researches that have been conducted to assess the sustainability of the waste banks.

#### **1.4 Research Objective**

Based on the problem statement above, the objectives of this research are:

1. To describe the function of waste banks and the motivations of households to participate in waste bank activities.
2. To explore the sustainability of waste bank operations in the context of the city-wide SWM system in Yogyakarta.
3. To investigate the effective government mechanisms to support sustainable solid waste management through waste banks.

#### **1.5 Research Question**

The questions of this research are:

1. How do waste banks in Yogyakarta function and what are the motivations of households to participate in the waste banks activities?
2. How sustainable are waste bank operations in the context of the city-wide SWM system in Yogyakarta?
3. How can the sustainability of waste bank operations be improved in Yogyakarta?

#### **1.6 Significance of the study**

1. Theoretically, the study is expected to contribute to the development of scientific thought, particularly in sustainable community SWM at neighborhood level through a waste bank system.
2. Practically, this research is expected to provide inputs for stakeholders, particularly local governments in formulating policies and appropriate methods to promote sustainable community SWM system through a waste bank system.

#### **1.7 Scope and limitations**

The study aimed to explore the function of waste banks in Yogyakarta, the motivation of households to participate in the waste banks' activities, the sustainability of waste banks in the context of SWM system in Yogyakarta and the government mechanisms needed to support their sustainability. To explore the sustainability of the waste banks, this study focused on the three dimensions of Integrated Sustainable Waste management (ISWM) namely; stakeholders, functional elements and sustainability aspects. It was limited to four groups of stakeholders; waste banks, the local government, households as the waste banks' customers and waste buyers. While, the functional elements that need to be explored were waste separation and recovery. It focused on the environmental, social and economic aspects of sustainability. In order to investigate the government mechanisms to support sustainable waste banks, the study concentrated on the efforts that need to be provided by the local government in ensuring the environmental, social and economic aspects of sustainability.

## CHAPTER TWO LITERATURE REVIEW

### 2.1 Introduction

This section will review literature related to theories on sustainable solid waste management and the role of community participation and management in it. The chapter starts with presenting definitions of waste and an overview of waste management challenges in medium and low-income countries (MLIC), and their challenges. It then continues with formulating the ISWM framework and focuses in particular on the role of community activities within the integrated perspective. This will be followed by a review on various models of the management of community activities in waste systems. This section also presents several case studies on community waste activities in MLIC. At the end of this chapter the conceptual framework that forms the basis for this research will be presented.

### 2.2 Solid Waste Management (SWM)

The term of waste is interpreted in traditional way as something worthless and discarded by people who have used it. The term implies a negative connotation and highly subjective (Marshall and Farahbakhsh, 2013; van de Klundert et al., 2001). In different circumstances, something considered worthless by someone could have value for others (van de Klundert et al., 2001). In ISWM context, waste according to van de Klundert et al. (2001) has both positive and negative connotations. The waste has a negative connotation if the waste cannot be used as resources anymore and not well managed so that its existence will endanger the environment. On the other hand, the waste has a positive connotation when the waste can be used as resources for other purposes. An obvious example that waste has a positive meaning are many people in medium and low-income countries who use waste as a source to prop up their livelihood (van de Klundert et al., 2001).

#### 2.2.1 SWM challenges in cities of MLIC in Asia

Solid waste management remains a thorny issue for the majority of MLIC. Most of the city authorities in those countries have not been able to manage the growing amounts of solid waste generated. This situation is habit's impact on the quality of services to be provided to citizens. Many cities are unable to collect the total solid waste produced and even the wastes collected are not managed in a proper manner. Medina (2002) mentions that cities in developing countries in general only collect 50 – 80 percent of the refuse generated and that 90 percent of the municipal waste collected ends up in open dumps. Consequently, this has impacts on the health condition and the environmental status of such cities.

These typical problems of solid waste are also experienced by cities in MLIC in Asia. Zurbrugg (2002) mentions that cities in Asia are still struggling to supply the most basic services, particularly in solid waste sector. In general, the waste management challenges faced by cities in Asian countries can be categorized as follows:

#### *Increasing waste generated*

Urbanization accompanied by high economic growth in some Asian cities has made the problem of urban waste management become challenging. The problem not only relates to the increasing amount of waste but also to changes in the waste composition. The rapid economic growth raises personal incomes and consumption patterns. Therefore, much more waste will be thrown (Mongkolnchaiarunya, 2005). Mongkolnchaiarunya (2005) mention that the waste generated in Asian cities will increase to 1.8 million tons per day in 2025 from

only 0.75 million tons in 1998. “The cultural and socio-economic situation also influences the waste composition generated by a population” (Coffey and Coad (2010); Schübeler (1996) in Marshall and Farahbakhsh, 2013, p. 992). This is seen in the change from simple organic into a lot of inorganic materials which tend to be more difficult to manage. Hence, the conventional waste management approaches currently implemented must be adapted in addressing the new waste arising.

### ***Low service coverage***

Due to a very large increase in the population of cities, it become also increasingly difficult for municipalities to provide waste services on a regular for all citizens (Shekdar, 2009). The growing number of urban dwellers increases the municipal solid waste generated and also the number of space to be served. With limited resources, therefore, the responsibility of local government in supplying solid waste services becomes more difficult. Inequality in services coverage also remains a critical issue because most of the waste service are enjoyed by the middle to upper class (Marshall and Farahbakhsh, 2013).

### ***Inadequate financing***

Various authors indicate that SWM activities are in general heavily under-financed (Coffey and Coad, 2010; Marshall and Farahbakhsh, 2013). In order to deal with the limited waste service revenues, municipalities normally receive subsidies from the city’s general revenues or transfers from the central government. The majority of waste budget expenditures in MLIC are on collection and disposal activities, around 80-90% of the total budget (Memon, 2010; Mongkolnchaiarunya, 2003; Marshal and Farahbakhsh, 2013). Regionalization of landfills also increases the cost of waste transportation since the distance between cities where the waste is produced and the dumping site is increasing (Poerbo, 1991).

### ***Duplicate system***

There is a tendency that many MLIC are simply trying to adopt waste management systems that have been running well in rich countries. They ignore the differences in characteristics between the two groups of countries. The waste management systems applied in rich countries are usually technology- and capital-intensive. According to van de Klundert et al., (2001) and Shekdar (2008) if this system is to be applied in MLIC, it would threaten the sustainability of the system itself because the system require high operational costs and difficulties in the maintenance process.

### ***Public awareness***

The effectiveness and efficiency of a municipal solid waste management system highly depend on active public participation and on awareness of service users (Shekdar, 2008). Public waste attitudes affect the way of managing solid waste. People concerning to waste issues generally is easier to work and associate with governments in various waste management programs, such as reduction, separation and recycling efforts as well as a contribution in waste services payments. According to van de Klundert et al. (2001) unaware people tend to become apathetic and a ‘part of the problem, rather than an ingredient of the solution’.

## **2.2.2 History of SWM**

The initial waste management systems applied in cities were basically relying on engineering concepts, and ignoring other important aspects. This approach was widely adopted by various developed countries in the 1965-1970’s (Chang et al., 2011; Marshal and Farahbakhsh, 2013) and most developing countries in the recent era (Charnpratheap et al., 1997; (Chang and

Wang, 1996)Chang et al., 1997; Chang and Wang, 1996; Marshall and Farahbakhsh, 2013). System engineering weaknesses were considered the only major cause for various waste problems at that time, and these could only be solved by a technological approach. Waste was also seen as valueless and needed to be collected and transported as quickly as possible for health concerns.

In the 1980-1990's, the approach towards waste management in the urban areas gradually changed. From reliance on the engineering approach, also began to include aspects of economy and the environment (Marshall and Farahbakhsh, 2013; Morrissey and Browne, 2004). An ideal waste management system at that time was suppose to focus on environmental effectiveness and economic efficiency. Although there were a lot of stakeholders involved in a SWM system, such as informal sectors, unsatisfied communities, and small enterprises, there was ignorance with regard to the involvement of those stakeholders in SWM systems.

Due the continuing inability of local governments in developing countries to solve the waste problem, many scholars began to think about the importance of a more holistic waste system that integrates various aspects and that creates space for the active participation of various stakeholders (Marshall and Farahbakhsh, 2013). This new solid waste management system should be “environmental effective, economic efficient and socially acceptable” (Marshall and Farahbakhsh, 2013; van de Klundert et al., 2001). A more holistic approach is increasingly considered indispensable by developing countries for a variety of complex waste issues that are wrapped around them (Marshall and Farahbakhsh, 2013).

### **2.2.3 The drivers of SWM in medium and low-income countries**

“Many similarities exist between the past SWM development trajectories of industrialized countries and the current trajectories of developing countries” (Marshall and Farahbakhsh, 2013, p. 992). “Many cities in lower income nations are experiencing similar conditions to those of the 19th century in high income countries: “high levels of urbanization, degrading sanitary conditions and unprecedented levels of morbidity and mortality, which affected the working class society” (Konteh (2009) in Marshall and Farahbakhsh, 2013, p. 992). While the factors encouraging SWM in medium and low-medium countries are:

#### ***Public health***

Public health is the main driving factor of SWM in developing countries due to the potential health hazards posed by improper waste management system. One of the most common illness caused by poor waste management in developing countries is diarrhea. Therefore, the main focus of SWM in those countries is how to collect and dispose of waste immediately from urban areas (Marshall and Farahbakhsh, 2013; Wilson, 2007).

#### ***Environment***

Environmental protection efforts have also stimulated city authorities of MLIC to improve upon this SWM, though, in reality, this implementation is still far ((Marshall and Farahbakhsh, 2013; Wilson, 2007). In Indonesia, for example, the central government in order to prevent pollution, enacted a regulation in 2008 that requires all cities in Indonesia to change their disposal method from open dumping to sanitary land filling. Due to the budget constraint, there is until now no one city in Indonesia that was able to implement this.



### ***Economy***

Since the 1990's, economic aspects become a salient issue for waste management in developing countries. This is because of many informal actors who highly depend for their livelihoods on informal recycling activities (Marshall and Farahbakhsh, 2013; UN-HABITAT, 2010; Wilson, 2007). Although their existence is considered being a nuisance by communities and local governments, their potential contribution to municipal waste recycling programs is huge (Poerbo, 1991). If properly managed, integration of informal actors can ease the burden of governments in managing waste problems.

### ***Climate change***

Climate change has become a driving factor for SWM in developing countries through their involvement in the Clean Development Mechanism (CDM) program (Marshall and Farahbakhsh, 2013; Wilson, 2007). The impact of climate change is a cross-border, so it is not effective when the mitigation and adaptation measures of climate change without involving all countries in the world. Although it must be recognized that in this case, most developing countries are in a passive position since the various measures taken so far are due to the obligation of industrial countries to reduce their carbon emissions. Climate change has however stimulated and enforced national and local government to take SWM more serious and come up with solutions that reduce emissions to air that contribute to green house gasses (GHG). It is interesting to see how the narrow technical focus on SWM for the 1970-1980's has however broadened gradually. Many more approaches than only the engineering technical ones have become essential. The integrated SWM concept, that was developed at the end of 1990's, is in that sense providing space for a variety of waste management considerations and offer space for a large variety of stakeholders.

## **2.3 Integrated Sustainable Waste Management (ISWM)**

"ISWM refers to a waste management system that best suits the society, economy and environment in a given location, in a city in most cases" (Klundert and Anschitz, 2000). "Sustainable" in ISWM setting according to Klundert (2000) has two criteria; (1) "appropriate to the local conditions", and (2) "capable to maintain itself over time without exhausting the resources it needs". This in contrast to conventional waste management which tend to be reductionist and avoid to focus on the complexities of relationships among stakeholders and its elements (Marshall and Farahbakhsh, 2013), ISWM tries to incorporate all potential stakeholders and waste system elements in one system to address waste issues (Klundert, 2000).

### **2.3.1 Dimensions of ISWM**

Van de Klundert et al. (2001) argue that there are three main dimensions that must exist in the ISWM system, namely stakeholders, functional elements of the system and the sustainability aspects that need to be taken into consideration when a system is assessed, implemented or approved. In the following part these dimension will be explained.

### **2.3.2 Stakeholders**

According to van de Klundert et al.(2001), stakeholders in the ISWM system are individuals, institutions or organizations that have an interest in an urban waste management system. These interests and their roles differ, but they cooperate in for a common purpose. If a system is integrated and sustainable it is tailored (Marshall and Farahbakhsh, 2013). The stakeholders among cities are different. This is influenced by the specific conditions of each region. In general, the stakeholders in the context of ISWM are local authorities, "NGO's/CBO's, service users, private informal sectors and formal sectors, and donor agencies" (van de

Klundert et al., 2001). It is essential to offer opportunities to stakeholders to participate in all SWM cycles in order to raise their awareness in SWM schemes (Kassim and Ali, 2006). This research will particularly focus on community group concerning with the initiative of waste banks, households as a member of waste bank, the buyers (dealers/wholesalers) and the local government.

### **2.3.3 Functional elements**

Functional elements consist of generation and separation, collection, transfer and transport, treatment and disposal, reduction, re-use, recycling and recovery (van de Klundert et al., 2001). According to McDougall et al. (2008) and Marshal and Farahbakhsh (2013) the focus of ISWM is to incorporate various interconnected processes and functional elements which create a waste management system. The activities taken up community initiatives through a waste bank system consist of separation and recovery; therefore, this research shall focus on includes both activities as functional element should be investigated.

### **2.3.4 Sustainability aspects**

Various authors underline that the ISWM concept tries to obtain a balance between environmental effectiveness, social acceptability, and economic affordability (Marshall and Farahbakhsh, 2013; McDougall et al., 2008; Morrissey and Browne, 2004; Shekdar, 2009; Thomas and McDougall, 2005). Imran et al. (2008) in support of the above argument mentions that “sustainable waste management aims at the improvement of human life by providing healthy living conditions and economic advantages for human beings while at the same time keeping the effect of waste from damaging the ecosystems as small as possible”. Imran et al. (2008) notes that an environmentally sustainable solid waste system entails activities that can minimize the environmental destruction from any solid waste pollutions. Environmentally sustainable SWM also implies that the principles of the waste management hierarchy are taken into consideration. This implies that a system is managed in order from prevention to reduction, reuse, recycling, recovery, and disposal to a landfill (Marshall and Farahbakhsh, 2013). A socially sustainable solid waste system means that the system meets the wellbeing of all citizens and provides access to services for everyone as well as enlarges public awareness as well as participation in obtaining SWM goals. Whereas, an economically sustainable solid waste management is efficient in the long run (Imran et al., 2008). An efficient SWM implies that the system able to finance the activities without depending on donors. Van de Klundert et al. (2001) also argue that a waste system is economically sustainable when it is able to sustain itself in terms of finances. Based on the review those literatures, this research will focus on environmental sustainability, social sustainability, and economic sustainability.

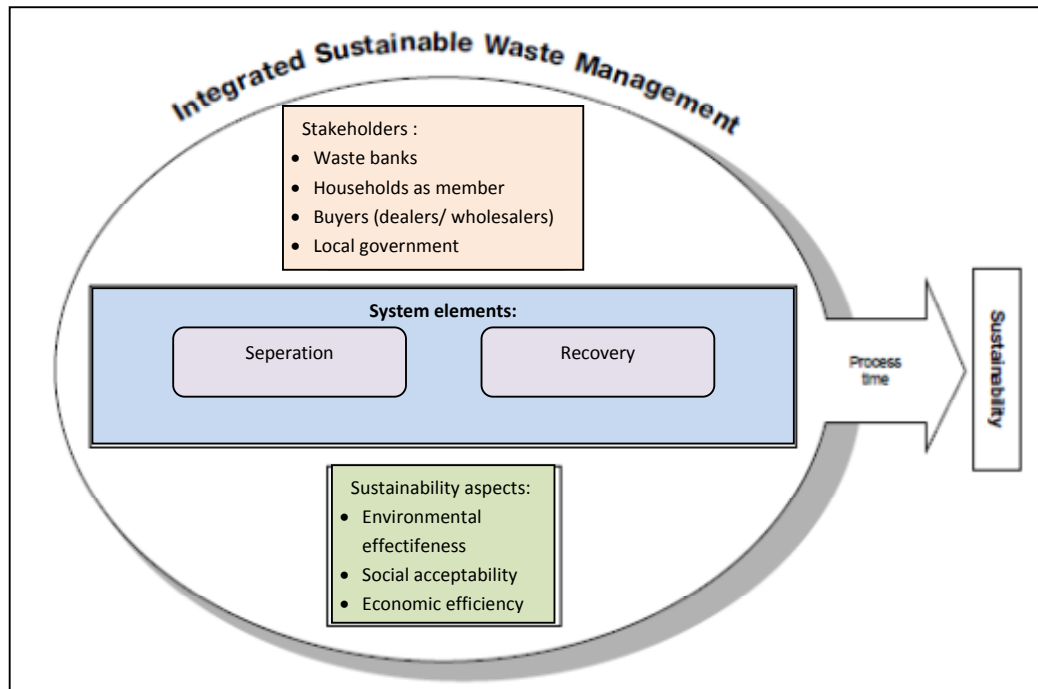


Figure 2.1: The ISWM Model to analyze the sustainability of waste banks  
**Source :** Van de Klundert et al. (2001, p.14) with modifications.

## 2.4 Sustainable community participation in SWM

There is no single definition for community participation. Many researchers interpret community participation based on their own views (Shukor et al., 2011; Huysman, 2003). Subash (2006) sees community participation as a means to enhance efficiency, effectiveness, and sustainability of projects. He argues that involving the community in projects can improve cost sharing; can lead to more effective implementation because tasks and responsibilities are shared; and can also raise local ownership. While, the WHO (2003) perceives community participation as the involvement of residents in programs to resolve issues. Community participation is important, particularly in the provision of basic service programs. On the other hand, Okello et al. (2009) in Shukor et al. (2011) describe community participation as “an interactive process that involves communication, listening, consulting, merging and collaborations with citizens and citizens groups”. This interactive process opens opportunities for citizens to give their consent and their opinion on decision making processes. The third manner of defining community participation is more suited to discuss community participation for its emphasis on autonomous and interactive approach. In this approach, public decide for their needs instead of depend on other decisions.

### 2.4.1 Degrees of community participation in SWM

To keep a SWM system running there is a certain degree of participation required. According to Moningka and Laroui (2000) and Subash (2006), community participation can be considered at two levels, namely the individual level and the collective level. Examples of community participation at an individual level are sorting waste at the household, putting out the waste at a proper place and regular time, and keeping surrounding of the home free from waste. Community participation at a collective level can include sweeping of public spaces, involvement in awareness campaigns, attending regular meeting, physical or financial contributions to waste program, participating in the formulating programs, and involvement in community waste activities management.

### **2.4.2 Advantages of community participation in SWM**

It is being recognized that community participation provides many benefits compared to traditional approaches, which tend to be top down. Some advantages highlight the benefit from the point of view of program and its continuity, while other advantages are seen as beneficial for the community itself.

#### ***Advantages of community participation for a program***

From the point of view of program, community participation in SWM can ensure the reflection of community priorities and needs; enhance the sustainability of program, reduction in the volume of waste generated and monetary saving for local governments. Involving the community in the preparation of a program can assure the reflection of community priorities and needs. This is because communities themselves know best what their needs and problems are. Therefore, Subash (2006) argues that program design should assure to reflect and integrate demand and priorities of the community that it serves.

Meanwhile, community participation in SWM can also enhance the sustainability of program since the participation will stimulate local ownership and a feeling of responsibility to retain the activities offered by the program. These aspects are beneficial both for the enduringness and continuity of the program (Moningka and Laroui, 2000). An example of this is a program where households are involved in segregating waste at household level. In addition, through community participation in SWM, the burden of the local government in managing waste can considerably decrease in term of work load and in term of costs. Decreasing the amount of waste is because the only organic waste that must be handled by the government. Hence, the trips for waste collecting are fewer than before when both organic and inorganic waste was transported by the municipality (Atienza, 2008).

#### ***Advantages of community participation for a community***

From the point of view of community, community participation in SWM can build local capacities and generate additional incomes. Through community participation, a community can enlarge the consciousness and know-how; therefore, the community will have abilities to pull off on an equal basis with the government and other stakeholders to encourage shared goals. An example of this benefit is a community composting program where households are encourage to compost organic waste in their garden (Moningka and Laroui, 2000). A typical activity of community participation in SWM is the promotion of waste selling between community groups, households and buyers. Different from previously when the selling activity was not promoted, there was no further income for households because the waste was gathered for free. Through the selling activities program, residents can sell their saleable waste for additional income (Atienza, 2008; Mongkolnchaiarunya, 2005).

### **2.4.3 Challenges of community participation in SWM**

It is required a condition where a community participation in SWM can provide optimum benefits for municipal waste management in general, and for the community itself. In general, there are five challenges of community participation in SWM, namely low participation of households, management problems, social operational problems, financial problems and failing cooperation with local governments.

#### ***Low participation of households***

Wastes services in developing countries are often only enjoyed by the rich and ignoring the poor. On the other hand, the poor usually spend a whole day to earn a living; therefore, they

do not have time to think about improving waste management even though they cannot access the waste services. Sometimes low participation of households can also be induced by households' waste behavior. Quite often households' waste behavior opposes the principle of effective waste management. This can be due to the lack of facilities, for instance if a bin or transfer point is located too far away. As a consequence, people are likely to dump their waste in the streets or in rivers or open spaces. This is of course mainly due to the lack of knowledge and the lack of incentives (Anschütz and Consultants, 1996; Subash, 2006).

### ***Management problem***

A typical community activity in SWM is on a voluntary basis. In the long run, this voluntary action is usually difficult to survive, especially when the initiators leave or die. In addition, since the community initiatives are conducted on the voluntary basis, there are no financial and performance control mechanism. In place to monitor and control the activities, usually trust is the only foundation for these activities, and that can also lead to misunderstandings and mistrusts (Anschütz and Consultants, 1996; Atienza, 2008)

### ***Social operational problems***

It was mentioned earlier that the activities operated based on a trust result in poor performance control. Almost all of the volunteers consider community activities in SWM as a half time job, so it is hard to expect them to work professionally. The absence of a place to conduct such activities can also be an obstacle since there is no public space that can be used. Usually the community activities in SWM rely on donations from members of the community. It would be difficult if the community initiative by poorer society (Anschütz and Consultants, 1996; Poerbo, 1991; Atienza, 2008).

### ***Financial problems***

Community activities in SWM are more social than profit. Therefore, in conducting activities, the community often relies on donors rather than impose a reasonable cost to service users. In addition, since the community activities are informal, they face difficulties to seek external sources of financing because banks typically lend only if a community has a legal entity. Even they are also difficult to get assistance from the government because their existence is frequently ignored (Anschütz and Consultants, 1996; Mongkolnchaiarunya, 2005).

### ***Failing cooperation with municipalities***

Frequently, local governments consider community activities that incorporate informal sector workers like scavengers in a door-to-door collection or composting program at community level as a nuisance in maintaining the cleanliness of the city. They consider such activities as untidy. Therefore, the government is reluctant to provide formal legal authority or financial assistance (Anschütz and Consultants, 1996; Poerbo, 1991; Zurbrugg, 2002).

## **2.4.4 Principles for sustainable community participation in SWM**

With the increase of community participation in SWM during the last two decades, it is also become increasingly important to consider the sustainability of such participation. In the above sub chapter we have in detail look at the various challenges that have to be faced by community group, but we also saw that community participation in SWM can bring also lots of advantages. In this section below an effort will be made to list various aspects that determine the sustainability of community waste participation. This sustainability will be considered at the levels of environmental sustainability, social sustainability, and economic sustainability.

## **1. Environmental sustainability**

In order to assure and expand the environmental sustainability of community participation in SWM, the following aspects need to be considered:

### *The participation that leads to waste reduction*

Reduction in the amount of waste that needs to be handled by the local government can be a direct result of a community participation in SWM. Within waste trading programs, communities collect and sell inorganic waste. Hence, the local government only handles the organic one (Atienza, 2008). A community participation in SWM is environmentally and economically effective if it is able to reduce the amount of waste that needs to be disposed to a transfer point.

### *Reduction in waste collection frequency*

Due to reducing waste disposed to a transfer point, thus, the frequency of transporting waste from the transfer point to the landfill is being reduced. “Since the saleable wastes are already collected by the communities, only the non-saleable wastes are now collected by the trucks from local government. Therefore, there are now fewer trips for collecting waste compared to before when both saleable and non-saleable waste was collected by the municipal waste trucks” (Atienza, 2008).

### *Activities that enable reuse and recycling*

It is important for community activities in SWM to promote waste reuse and recycle efforts. Such efforts are beneficial not only for a government but also providing benefits for the community itself. The case study of Green Exchange program in Curitiba is a good example. The program encourages households to bring their domestic waste to a recycling point to be exchanged for food or bus tickets. Almost 70 percent of households take a part on this program; even though such a program is voluntary. Since 1989, the scheme has separated 419,000 tons of saleable waste. This means less waste on street, less industries to produce new materials, less transportation to collect waste and less landfill to dispose the waste (Kruljac, 2012).

## **2. Social sustainability**

In order to ensure and enlarge the social sustainability of community waste participation, the following aspects need to be considered:

### *Inclusion of all households*

To make a harmony and better participation among households in SWM activities, inclusiveness approach must be adopted since it will reduce the disruption for racist discrimination (Shukor et al., 2011). A social sustainable community waste participation should cover towards all households in a community and does not exclude anyone.

### *Awareness on the waste behaviors among households*

Awareness on the waste behaviors are factors that affect the participation of households in community waste activities (Dustin Becker, 2003; Larson, 2002). Normally, households are reluctant to join in waste separation activities when they lack of awareness on the need for and impact such activities. Efforts to increase awareness are important, not only to keep them actively involved in collaborative activities, but also to maintain their participation. Mongkolnchaiarunya (2005) says that to obtain durability of participation, community groups have to educate the households on a continuous basis.

#### *Awareness creation and participation activation*

As mentioned earlier, in order to maintain the durability of participation in community SWM among households, it is needed an education on a continue basis. In order to conduct such an effort, it is required an awareness creation and participation activation from stakeholders. In this case, local leaders and local institutions can play an important role. According to Rogers (2003) local leaders have abilities to influence households to participate in community activities. The local leaders can also play as mediators between the households and the community groups. While, the local institutions can enhance households' participation since that institutions normally represent all local communities, therefore, they can easily mobilize households. The examples of local institutions are youth groups and religious groups (Baharum, 2010; Charuvichaipong and Sajor, 2006; Dustin Becker, 2003).

#### *Integration of waste pickers*

There are two SWM systems that exist side by side in developing countries. The first one is formal system which is conducted by local governments, and the second one is called informal system carried by waste pickers. Even though the second system is often regarded as nuisance, their contributions in reducing waste volume are quite significant. IGES (2003) reports that waste pickers in Surabaya are able to reduce urban waste by almost 30 percent of total waste generated. Normally, the local governments consider SWM activities as a way to protect health and environment, the other hand the waste pickers consider their activities as an approach to seek a livelihood. With the increase of community activities in SWM, sometimes the waste activities conducted by community groups and waste pickers are quite similar. If they are not managed well, the community activities in SWM can potentially occupy the activities of waste pickers. Therefore, the community activities in SWM is considered socially sustainable when the waste pickers are not being pushed out from their routine activities (Poerbo, 1991).

### **3. *Economic efficiency***

In order to achieve the economic sustainability of community participation in SWM, the following aspects need to be considered:

#### *Operating revenues*

Operating revenues are income which is derived from daily business operations (LGA, 2006). In the context of community activities in SWM, the operating revenue can be obtained from fees paid by users. However, in some cases, the operating revenues do not cover a whole cost (Anschütz and Consultants, 1996). Due to a social orientation, the community activities services in SWM often set a lower tariff to the users.

#### *Operating expenses*

Operating expenses are expenditures which are incurred by a business in performing normal operations (LGA, 2006). The operating expenses in the context of community activities in SWM can be in the forms of worker costs and day-to-day expenses. Since the community activities in SWM are run on a voluntary basis, the community group often neglects to calculate the actual operating costs.

#### *Operating surplus*

An essential financial indicator to assess the economic sustainability of community activities in SWM is an operating surplus. The operating surplus can be calculated by subtracting the operating expenses from the operating revenues in a certain period,



normally in one year (LGA, 2006). This remains a big challenge for community activities in SWM since the activities are not profit oriented. However, the term of not for profit does not imply that such activities should be losses.

*Not dependent on external funding*

The operating surplus as mentioned earlier is closely related to the independency of community activities in SWM from external funding. The community activities in SWM are considered economically sustainable when such activities are self sufficient in terms of finances and they are not depending on external support (Imran et al., 2008).

*Reduction in waste handling and collection costs*

As mentioned in the environmental effectiveness aspect, community initiatives in SWM have a potential to reduce the amount of waste disposed to landfill (Atienza, 2008). Thus, besides reducing the frequency of waste transportation, it can also reduce labor expenses spent by the government. Hence, it can save the waste management budget.

## **2.5 Government mechanisms for sustainable community participation in SWM**

“The concept of sustainable waste management cannot be separated from good governance” (Imran et al., 2008. p. 6). Good governance, in the context of sustainable community participation in SWM, can be illustrated as the way in which a government interacts with the community in order to support the sustainability of its participation. In a situation where a community has challenges to perform the sustainability due to a lack of resources, cooperation with local government is the most viable alternative. The local government, in this case, can play an important role by providing mechanisms to ensure the sustainability of community participation in SWM.

In the following sub chapters, the author will explain such mechanisms that can be used by a local government to ensure environmental sustainability, social sustainability and economic sustainability of community participation in SWM:

### **2.5.1 Ensuring environmental sustainability**

In order to ensure the environmental sustainability of community participation in SWM, local governments should consider the following mechanisms:

#### **a. Regulation framework**

The absence of regulations that back up community participation in SWM is a common problem. In this case, government can enforce some laws that support community activities in SWM, for example laws to oblige waste separation at households or laws to ban disposing waste into rivers. A case study in xavierville could be a good example. The authority of xavierville enforces a policy that prohibits the households to dispose unseparated waste. For any violation, the authority will impose fines and refuse to collect the unseparated waste. With this policy, the households participating in separation reach until 80 % of the total number of households (Lardinois and Furedy, 1999. p. 66).

#### **b. Facility and equipment support**

The lack of facilities and equipments remains a problem for community participation in SWM. In this case, local authorities can play an important role by providing some facilities and equipments needed by communities, such as a piece of land for composting or separated bin to collect segregated waste (Ali and Snel, 1999).

### 2.5.2 Ensuring social sustainability

In order to ensure the social sustainability of community participation in SWM, the following mechanisms need to be considered by local governments:

#### a. Capacity building

Capacity building is an important issue in SWM. The community participation in SWM can success when the community committee has capacities to conduct the system. Without those capacities, the community participation in SWM is often fail (Visvanathan and Ananth, 2010). To increase capacities, governments can provide some training, such as a leadership and community management.

#### b. Awareness campaigns

Joseph (2006) says that awareness is an important factor to success community participation in SWM. The awareness factor is also essential for a community to realize their waste issues. In her case study, Muller et al. (2002) say that the level of community participation in SWM in Nagapura ward 14, Bangalore, is rising after every awareness campaign conducted. In promoting community participation in SWM, local governments can carry on campaigns through, for example, some socialization and a number of competitions in SWM.

#### c. Empowering the roles of women

The role of women in SWM in developing countries is still considered trivial. In fact, their participation in waste systems is quite significant. Much community participation in SWM today is organized by women association. With a proper empowerment, while still carrying out the primary task as a housewife, they could potentially be a solution to tackle urban waste problems. The case study below shows that women have come to take a prominent role in solving the waste problems.

#### **Box 1. Novi Aryani: Passion for handicrafts from waste**

Novi lives in a poor and populated neighborhood in Yogyakarta. In 2007, after joining training program conducted by a NGO in making packaging waste into handicrafts, she had an idea to build handicraft processing and waste management in her community, but she got a little support from her village and neighborhood leader. In spite of the lack of support, Novi decided to initiate a group named *Salingsih* (abbreviation of *Sadar Lingkungan Bersih* or *Aware of a Clean Environment*) in her neighborhood.

Novi struggled with her own family when she was starting to put waste in her guest room. Novi spent much time in handling dirty waste. The whole family guessed she had become crazy. “Menyerupai pemulung saja” (just like a waste picker) said her husband.

Novi also started to educate neighbors and children to sort waste and make handicrafts. Without financial aid, she and her group decided to pawn their motorcycles to get funds, € 334, to support their activities. Since the *Salingsih*'s waste recycling product had attracted many people, Novi and her group started getting attention from various parties. In 2009, Novi was requested by the local authority to become a motivator in promoting SWM and handicraft-creating in villages. Novi was also invited by NGO and Gadjah Mada University to be a guest speaker.

*Source: The Jakarta Post, 2011*

**c. Inclusion of informal waste pickers in SWM activity**

As mentioned earlier at the social sustainability principle, the existence of community activities in SWM and waste pickers can assist local governments to overcome urban waste problems. Due to a similar activity, the community activities in SWM maybe potentially occupy the job of the waste pickers. To avoid such an effect, the local government can try to incorporate the two similar activities. The inclusion of waste pickers in SWM activities has been applied in Bandung recycling program. At that case, the local government has cooperated with a university and a NGO to accommodate waste pickers and facilitated them to be able to participate in the waste recycling program. In this program, the local government has gained an advantage by getting the know-how workers, on the other hand, the waste pickers did not lose their livelihoods (Poerbo, 1991).

**2.5.3 Ensuring economic sustainability**

In order to ensure the economic sustainability of community participation in SWM, local governments should consider the following mechanisms:

**a. Financial support**

Local governments can secure a financial shortage of community activities in SWM by allocating a specific budget. The case study in Metro cebu shows an example of local government's effort to promote community participation in SWM. The local authority in Metro cebu, the Philippines has provided a financial support for community participation in SWM. The annual budget of 20,000 peso was allocated in establishing recycling centres that can be used for the construction cost and buying some equipments (Premakumara, 2012).

**b. Developing recyclable waste market**

Since more recyclable wastes are recovered by communities, markets are required to absorb these materials. Sometimes the markets needed are not sufficient. This situation is potential to inhibit community participation in SWM. In this case, the role of government to fulfill the gap between demand and supply of the recyclable waste is crucial. Government must able to ensure that all waste segregated by the community can be absorbed by the markets (Mt. Auburn Associates, Inc. and Northeast-Midwest Institute, 1993)

**2.6 Conceptual framework**

The conceptual framework applied for this research is based on the ISWM model. The model has three main dimensions, namely stakeholders, functional elements and sustainability aspects. The dimensions should be integrated to create a holistic framework that determines the sustainability of SWM. The stakeholders involved in this research are waste banks, households, buyers and the local government. While, the functional elements included in this study are separation and recovery activities. Environmental sustainability, social sustainability and economic sustainability are linked to assure the sustainability of waste banks.

In order to contribute to sustainable SWM in Yogyakarta, supports from the local government are needed to ensure the environmental, social and economic sustainability of waste banks. This conceptual framework is used as a basis to conduct this research.

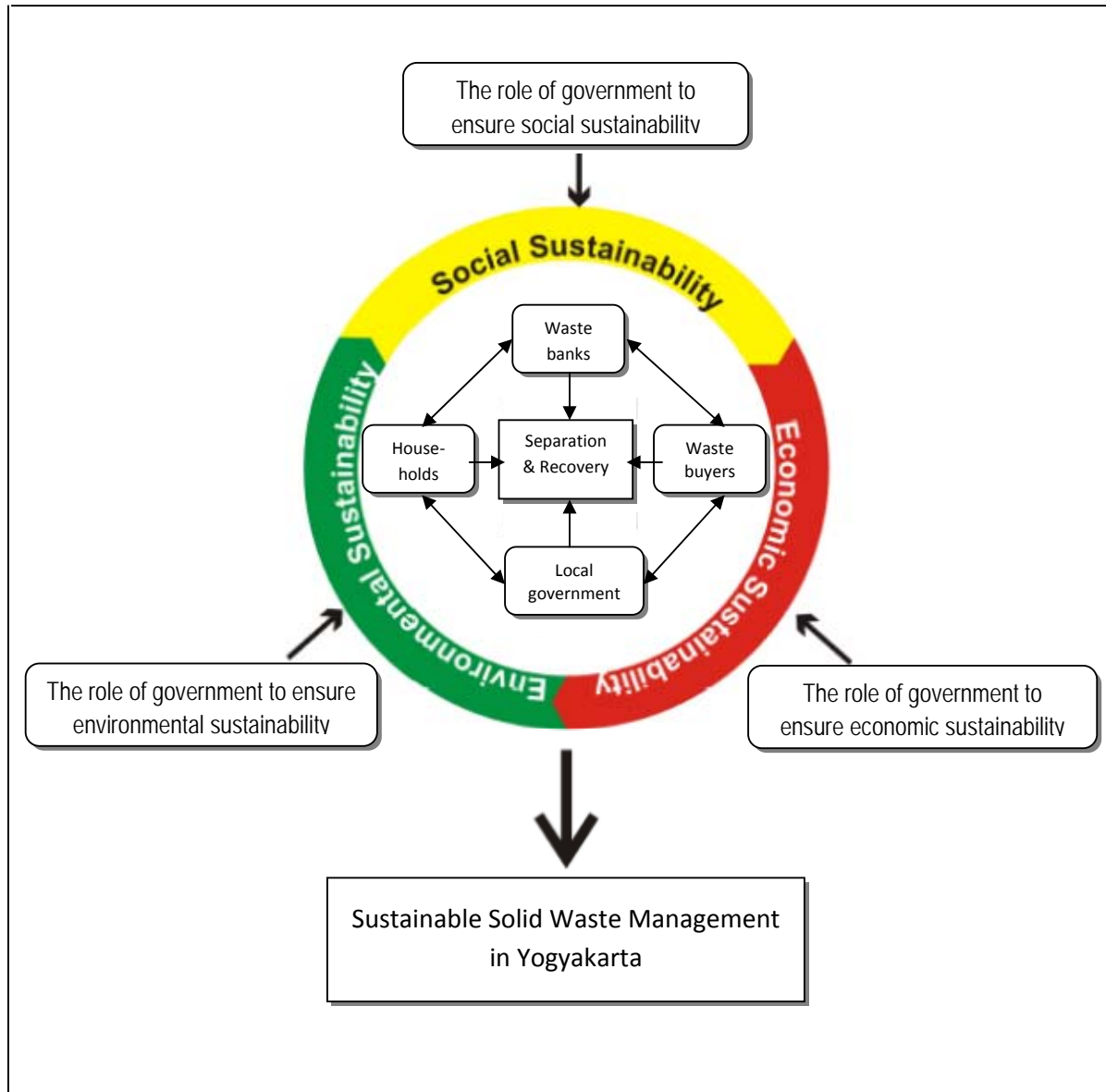


Figure 2.2: The conceptual framework  
 Source : Author’s construction based on the ISWM model (2001)

**2.7 Literature review summary**

SWM is a common concern for cities. This is because the SWM is closely related with efforts of local government to ensure public health, economic development and environment preservation. Many challenges faced by cities in MLIC make the efforts more and more complicated. There is a discrepancy between the needs of proper SWM with the ability of local government in its fulfillment. This situation encourages communities to perform various community participation in SWM. The literature reveals the essential advantages of community participation in SWM as well as its barriers. The literature also reveals the importance of sustainable community participation in SWM in order to support the sustainability of municipal SWM. One of tools to lead sustainable community participation in SWM is the ISWM model.

The ISWM model offers a holistic framework in SWM that integrates three main dimensions in it, namely stakeholders, functional elements and sustainability aspects. In its principle, the ISWM model tries to balance between environmental sustainability, social sustainability dan economic sustainability. However, in order to contribute to sustainable municipal SWM, it is required the role of the local government in ensuring the sustainability of the three principles. Based on the ISWM model, the conceptual framework as the basis for conducting this research is developed.

## **CHAPTER THREE**

### **RESEARCH DESIGN AND METHODS**

#### **3.1 Introduction**

This chapter gives an overview of the research method that will be used to conduct the study. It starts with the presentation of research approach and techniques, operationalization of variables, sample size and selection, as well as validity and reliability. At the end of this chapter, it will be presented data collections and analysis methods.

#### **3.2 Research approach and techniques**

The researcher used an exploratory and an explanatory approaches. According to Robson (2002) an exploratory approach aims to find out “what is happening; to seek new insights; to ask questions and to assess phenomena in a new light”. The approach is appropriate with this research as it will explore the function of waste banks and their contributions in reducing municipal solid waste as well as the motivation of households to participate in waste banks’ activities. The researcher also try to explore viewpoints of stakeholders on the sustainability of waste banks in Yogyakarta and the mechanisms that can be used by the local government to support the waste banks to sustainable SWM in Yogyakarta. While, the research is also an explanatory since it will explain the relationship between households’ characteristic and their participation in waste banks’ activities.

While, in order to carry out this research, the researcher used the single holistic case study strategy. A case study strategy according to Yin (2008) is used when the study tries to examine a specific phenomenon in a real-life context and the control of a researcher over such a phenomenon is very limited. The strategy is suitable with this research since the researcher intends to study a phenomenon of waste banks in Yogyakarta where the researcher does not have control over such waste banks. While, this study is categorized as single holistic because the study attempts to explore six waste banks as a single unit analysis in the context of Yogyakarta municipality.

This research used both qualitative and quantitative methods. The qualitative method was used to analyze data from in-depth interviews to explain the function of waste banks, the motivations of households to participate in waste banks’ activities, the sustainability of waste banks and the government mechanisms to support the sustainability of waste banks in Yogyakarta. While, the quantitative method was adopted to analyze data from questionnaires and secondary data, particularly on the contribution of waste banks in reducing municipal solid waste and decreasing waste handling as well as collection costs at city level.

#### **3.3 Operationalization: variables, indicators**

In the chapter two the researcher has already elaborated variables and indicators that can be used to examine the function of waste banks and the motivation of households to participate in waste banks’ activities, the sustainability of community activities in SWM as well as the government mechanisms to support such activities. In this section, the researcher operationalized those variables and indicators in order to answer the research questions.

Table 3.1: Operationalization of variables and indicators

<b>Q.1 How do waste banks in Yogyakarta function and what are the motivations of households to participate in the waste banks activities?</b>			
<b>Variables</b>	<b>Indicators</b>	<b>Data sources</b>	<b>Type of analysis</b>
Waste bank operations, management and linkages	<ul style="list-style-type: none"> <li>• Waste bank services and facilities</li> <li>• Types of waste &amp; handling methods</li> <li>• Daily operation</li> <li>• Motivation of waste bank</li> <li>• Links of waste banks with stakeholders</li> <li>• Characteristic of customers</li> </ul>	Interviews with waste bank directors, Observation, Secondary data.	Qualitative
	<ul style="list-style-type: none"> <li>• Characteristic of customers</li> </ul>	Questionnaires to be filled by customers, Interviews with selected customers, Observation, Secondary data.	Quantitative & Qualitative

<b>Q.2 How sustainable are waste bank operations in the context of the city-wide SWM system in Yogyakarta?</b>			
<b>Variables</b>	<b>Indicators</b>	<b>Data sources</b>	<b>Type of analysis</b>
Environmental sustainability	<ul style="list-style-type: none"> <li>• Inorganic waste reduction</li> <li>• Extra activities enabling reuse &amp; recycle</li> <li>• Reduction in waste collection frequency by pull cart collector</li> </ul>	Interview with waste bank directors, interview with RW waste collectors, Observation, Secondary data.	Qualitative & Quantitative
Social sustainability	<ul style="list-style-type: none"> <li>• Awareness creation &amp; participation activation</li> <li>• Inclusion of all households</li> <li>• Change in waste behaviors</li> <li>• Integration of waste pickers</li> </ul>	Interviews with waste bank directors, Observation, Secondary data.	Qualitative
Economic sustainability	<ul style="list-style-type: none"> <li>• Operating revenues</li> <li>• Operating expenses</li> <li>• Operating surplus</li> <li>• Dependency on external funding</li> </ul>	Interviews with waste bank directors, Observation, Secondary data.	Qualitative
	<ul style="list-style-type: none"> <li>• Reduction of waste handling &amp; collection costs at city level</li> </ul>	Interviews with the local government, Observation, Secondary data.	Quantitative & Qualitative

<b>Q.3 How can the sustainability of waste bank operations be improved in Yogyakarta?</b>			
<b>Variables</b>	<b>Indicators</b>	<b>Data sources</b>	<b>Type of analysis</b>
Ensuring environmental sustainability <i>(the selected waste banks' views)</i>  <i>(the local government's views)</i>	<ul style="list-style-type: none"> <li>• Regulatory framework</li> <li>• Facility and equipment support</li> </ul>	Interviews with waste bank directors, Observation, Secondary data.	Qualitative
	<ul style="list-style-type: none"> <li>• Regulatory framework</li> <li>• Facility and equipment support</li> </ul>	Interviews with the local government, Observation, Secondary data	Qualitative



Ensuring social sustainability <i>(the selected waste banks' views)</i>	<ul style="list-style-type: none"> <li>• Capacity building</li> <li>• Awareness campaigns</li> <li>• Empowering the role of women</li> <li>• Inclusion of informal waste pickers</li> </ul>	Interviews with waste bank directors, Observation, Secondary data.	Qualitative
<i>(the local government's views)</i>	<ul style="list-style-type: none"> <li>• Capacity building</li> <li>• Awareness campaigns</li> <li>• Empowering the role of women</li> <li>• Inclusion of informal waste pickers</li> </ul>	Interviews with the local government, Observation, Secondary data.	Qualitative
Ensuring economic sustainability <i>(the selected waste banks' views)</i>	<ul style="list-style-type: none"> <li>• Financial support to waste banks</li> <li>• Developing recyclable waste market</li> </ul>	Interviews with waste bank directors, Observation, Secondary data.	Qualitative
<i>(the local government's views)</i>	<ul style="list-style-type: none"> <li>• Financial support to waste banks</li> <li>• Developing recyclable waste market</li> </ul>	Interviews with the local government, Observation, Secondary data.	Qualitative
<i>(the waste buyers' views)</i>	<ul style="list-style-type: none"> <li>• Developing recyclable waste market</li> </ul>	Interviews with recyclable waste buyers, Observation, Secondary data.	Qualitative

Source: Designed by the Author (2013) based on various sources

### 3.4 Sample size and selection

The population consists of the director of Gemah Ripah waste bank, the selected waste bank directors in Yogyakarta, the selected waste bank costumers in Yogyakarta, RW waste collectors, waste buyers in Yogyakarta Environmental Agency of Yogyakarta Municipality officials and the representative of the Ministry of Environment. The selection of waste banks was through stratified proportional random sampling. According to Black (1994) the stratified random sampling is intended to select samples from various strata in population. The director of Gemah Ripah waste bank was selected purposively since he is the initiator of all waste banks in Indonesia. For waste banks in the Yogyakarta Municipality, the researcher divided the waste banks into three categories, namely waste banks in low income area, waste banks in middle income area and waste banks in high income area. In this study, 6 waste banks will be purposively selected; 2 from low income area, 2 from middle income area and 2 from high income area. The determination of those waste banks was based on the age of their establishment, namely the first and the last waste banks in every categorized area. An exception will be made on a waste bank in low income area. In this case, Tunas Mekar waste bank was selected because of its location in highly densely populated area. Directors of the selected waste banks were interviewed. 75 customers from the total costumers of the selected waste banks were selected through convenience sampling technique. The researcher visited to the selected waste bank locations on their operational days. The researcher then distributed a questionnaire for every customer who came to deposit waste to the waste bank. Afterwards, 9 customers out of the 75 customers will be interviewed. 6 respondents from RW waste collectors will be chosen through purposive sampling. They were interviewed since they daily collect and transport waste from the waste bank areas to intermediate collection points. While, the respondents from Environment Agency of Yogyakarta Municipality officials are the head and the staff of Cleanliness division, the head and the staff of Solid Waste Recycling section and the head of Capacity Building division. These officials were chosen purposively because they are directly involved in monitoring community activities in SWM in the

municipality. 2 respondents from the Ministry of Environment were also chosen by purposive sampling. They were interviewed since they are involved in managing community SWM in the Yogyakarta Municipality. In the same way, 6 waste buyers will be selected through purposive sampling. The buyers are chosen based on their direct involvement in waste trading with the waste banks.

Table 3.2: The strategy of data collection

Category of respondents	Sample size	Sampling technique	Data type	Research instrument
Gemar Ripah waste bank director	1	Purposive	Primary	Interview/ observation/ documentary review
The selected waste bank directors (Lintas Winongo, Tunas Mekar, Bumi Lestari, Surolaras, Asri and Guyub Mulyo)	6	Stratified, quota sampling, purposive	Primary/ secondary	Interview/ observation/ documentary review
Customers	75	Convenience sampling	primary	Questionnaire
The selected customers	9	Proportional, simple random	primary	Interview
RW waste collectors	6	Purposive	Primary	interview/ observation
Environment Agency of Yogyakarta municipality officials. (head & staff of Cleanliness division, head of Capacity Building division, head & staff of Solid Waste Recycling section)	5	Purposive	Primary/ secondary	Interview/ observation/ documentary review
The Ministry of Environment representatives	2	Purposive	Primary/ secondary	interview/ observation/ documentary review
Waste buyers	5	Purposive	Primary/ secondary	Interview/ observation/ documentary review
Total	109			

Source: Author (2013)

### 3.5 Validity and reliability

Validity in a research concerns to what extent the instruments measure what it is intended to measure (Forsyth and Sevens, 1999). To assure validity, questions for interviews and questionnaires was designed based on the context of the developed indicators. A triangulation technique was also used to ensure the validity. The triangulation technique applied in this research was performed by using different data sources and different data collection methods. The researcher cross checked the information among respondents. The information from interviews and questionnaires were also confirmed by direct observations of the actual conditions and reviews of related documents.

Meanwhile, reliability in a research aims to minimize errors and biases of measurements. To ensure reliable data, the rigorous design of questionnaires was carried out. The questionnaires were translated into Indonesian language and were tested before field work period.

### **3.6 Data collection methods**

Data in this research was collected from primary and secondary sources.

The primary data was gathered from questionnaires, interviews and observations.

Questionnaires: Semi open questionnaires (open and closed-ended) were used to collect data from the customers of waste banks.

Interviews: An in-depth interview technique was used to generate information from the directors of waste banks, selected customers, RW waste collectors, the officials of Environment Agency of Yogyakarta municipality, the Ministry of Environment representatives and waste buyers.

Observation: The observation was used to document the real conditions and practices of SWM in waste banks in order to cross-check the answers from questionnaires and interviews of respondents. This technique was necessary to provide a triangulated data set.

The secondary data was mainly collected from the review of the waste bank documents and the municipality reports/documents.

### **3.7 Data analysis methods**

After collecting data, the next step was organizing and classifying the data into codes and themes using Atlas.ti software. After that, the findings were presented in the form of narratives, tables and images. Thus, it was obtained tentative conclusions that need to be verified and sharpened with other data sources, namely an observation of actual conditions and a review of documents.

Meanwhile, quantitative data was analyzed using SPSS for windows software. The quantitative data was coded in the form of numeric and was tested statistically using this software. In order to measure the significance of independent variable on dependent variable, the variables were set based on ordinal and nominal measurement. After that, the results were presented in the form of tables.

In order to assess the sustainability of waste banks, the researcher adopted a sustainable recycling model developed by Schoot Uiterkamp et al., (2011). In the model, recycling activities at Tanzania and India were ranked as “2” for excellent, “1” for fair, “0” for poor, and NA for “Not Applicable. These ranks were based on how closely such activities addressed sustainability principles (Schoot Uiterkamp et al., 2011).

In this study, the researcher applied a rate of “2” for good, “1” for fair, and “0” for poor based upon how fully the activities in the selected waste banks addressed the indicators formulated. “2” was labeled when the waste banks fulfill to a large extent of the indicator. “1” was considered when the waste banks partly address the indicator. “0” was regarded when the waste banks do not address the indicator.

### **3.8 Research constraints and limitations**

In this study, two limitations were faced by the researcher. The first one was a very short frame of field work (17 June – 19 July 2013). This inhibited in reaching the number of respondents. The second one was inadequate documents. This barrier was particularly in obtaining secondary data from waste bank administrators.

### **3.9 Summary**

This chapter discussed the research approach and techniques applied in this research. In order to generate the research findings, the variables and indicators were operationalized. This chapter also discussed sampling techniques and data collection methods. Data analysis method was indicated, with the validity and reliability consideration. Constraints and limitations were also presented at the end of this chapter.

In the next chapter, it will be described an overview of the current SWM system in the study area (Yogyakarta Municipality) as well as the description of the SWM system that currently adopted by communities in the city through a waste bank model.

## CHAPTER FOUR THE LOCAL CONTEXT

### 4.1 Introduction

This chapter will explore the background of the study area. It starts with a presentation of the national policy on SWM in Indonesia. It then provides an overview of the SWM system within Yogyakarta Municipality. At the end of this chapter, it will highlight the SWM system that is currently organized by communities in the form of waste banks.

### 4.2 The National SWM Policy of Indonesia

The national policy on SWM was introduced in the year 2008 by issuing Waste Management Law No.18/2008. According to this law, solid waste management should be carried out based on the principles of sustainability, responsibility, equity, safety, awareness, profitableness, togetherness, protection, and economic value. This implied that there were several substantial policy shifts away from traditional waste management, most importantly the shift from the end-of-pipe approach to the reduction of waste at source approach. In more detail, Law 18/2008 mandates a paradigm change in the management of waste at the local level. Considering waste as a resource, that waste materials should be managed by all stakeholders.

The new waste management approach implies prevention and mitigation. The prevention part within this new approach urges for the reduction of waste by means of limiting waste generation and practicing waste reuse and waste recycling. The mitigation part on the other hand is conducted by means of sorting, collecting and transporting waste from the source via transfer points to landfills in the most sustainable manner. The new law also encourages local governments to prepare for closure of open dumping sites by the latest of one year from the enactment of the law, and establishing sanitary landfills by no later than five years after the enactment.

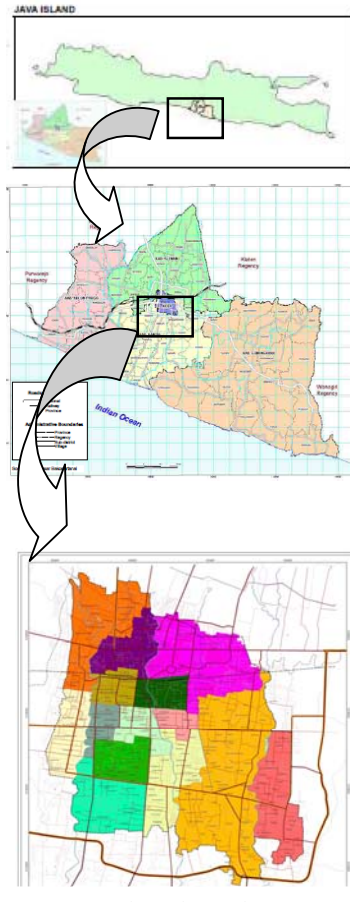
Since waste management is now considered a collective responsibility of all stakeholders, the law also arranges for the rights and liabilities all waste producers, ranging from the public and private business to the government at every level. The waste management development pattern is conducted through incentive and disincentive mechanisms. By means of this law, the government provides incentives for those who reduce waste, and uses disincentives for those who do not reduce waste. A special measure to encourage and enforce responsible waste behavior from businesses is done by means of the Extended Producer Responsibility (EPR) strategy. The law also forces compensation implementation for those who are affected by the negative impacts of waste management activities at landfills (IndII, 2011).

In order to obey and for fill the above indicated principles, Law No.18/2008 identifies a number of steps which should be carried by the national government and local governments, namely:

1. The obligation to issue derivative rules as implementing rules at the central and local level;
2. The obligation to set a waste reduction target gradually in period of time;
3. The obligation to finance waste management implementations;
4. The obligation to facilitate environmentally friendly technology applications;
5. The obligation to facilitate environmentally friendly product label applications;
6. The obligation to use 'reuse and recycle' products;
7. The obligation to facilitate recycled product marketing;

Last year, the national government embarked onto the waste bank model as well. Details of which will be provided under sub chapter 4.4.

Map 4.1: Map of Java showing the location of Yogyakarta Municipality



Source: Province of Yogyakarta, 2005

### 4.3 SWM activities in Yogyakarta Municipality

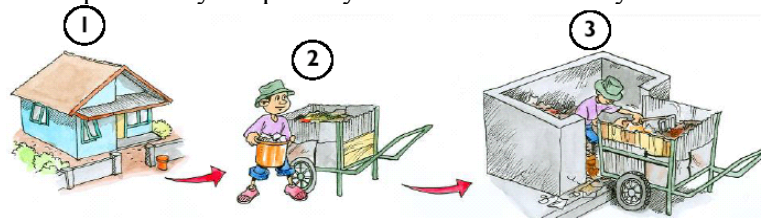
Yogyakarta Municipality operates an institution that has full authority and responsibility in addressing waste problems, namely the Environment Agency of Yogyakarta Municipality (EAYM). The Agency serves all 45 sub districts spread over 14 districts in Yogyakarta Municipality. However, the level of service provided varies per sub district, depending on the geography the areas. For the areas that are difficult to reach, the level of waste service is usually low, such as riverside areas (EAYM, 2013).

In 2012, the solid waste generated in Yogyakarta Municipality reached 185,756 tons/day. Of that amount, the EAYM can handle 167,181 tons/day or 90% of total the daily generated waste.

#### 4.3.1 Collection

The first phase of SWM is the collection of solid waste at the source level (households and commercial establishments). According to the Local Regulation No. 10/2012 on Waste Management, the solid waste collection from the source to intermediate collection point (primary collection) is the responsibility of the households. In daily practice, the households at RW level collectively hire a local worker to collect and transport their waste to the intermediate collection point by using a hand cart. In order to support this operation, the EAYM has distributed hand carts for every RW in the municipality. While the handling and transport the solid waste from the intermediate collection point to the landfill (secondary collection) is the responsibility of the EAYM. That is used by the municipality to create awareness on the system among citizens. The different responsibilities for the waste collection and transportation activities are indicated in the cartoon below:

Drawing 4.1: The responsibility for primary collection of waste by households/ communities



Drawing 4.2: The responsibility of the EAYM for secondary collection and disposal



Source: EAYM (2013)

### 4.3.2 Transportation

The success of a SWM system can be seen from the effectiveness and efficiency of transportation of solid waste from sources to landfills. According to the EAYM, secondary transportation of solid waste should not be delayed because it will increase the burden of the next carriage and cause discomfort around storage areas. The EAYM also point out that this phase is very important since it takes a lot of cost, time, effort, and coordination needed. Therefore, evaluation and planning of the type of facility, operating schedule, and route of transport is essential for the waste transportation.

### 4.3.3 Disposal

Photograph 4.1: Truck unloading waste at Piyungan landfill



Source: Author (2013)

Solid waste generated in Yogyakarta Municipality ends in a open dumping landfill. The Municipality does not have a landfill that is autonomously owned and managed directly under its administration. This is due to the very limited amount of land owned by the Municipality of Yogyakarta. The landfill is used and managed jointly by Yogyakarta Municipality, Sleman Regency, and Bantul Regency. These three local governments created a collaboration under the name of the Kartamantul Joint Secretariat (Sekber Kartamantul). The landfill is located in the village of Sitimulyo, Piyungan district, Bantul regency around  $\pm$  15 km from Yogyakarta's city center.

The landfill actually has been designed with a sanitary landfill system, but in practice it is operated as an open dumping site. Solid waste from Yogyakarta Municipality, both organic and inorganic material, as well as Hazardous Waste Materials, is disposed at this landfill. The Piyungan landfill has a total area of 12.5 hectares with a waste storage capacity of 2.5 million m<sup>3</sup> until 3 million m<sup>3</sup>. Technically, the lifespan of the landfill is about 20 years from the time of the opening in 1993. Thus, the landfill should be closed in 2013, but until now the Kartamantul Joint Secretariat has no officially decided for the new landfill (EAYM, 2013)..

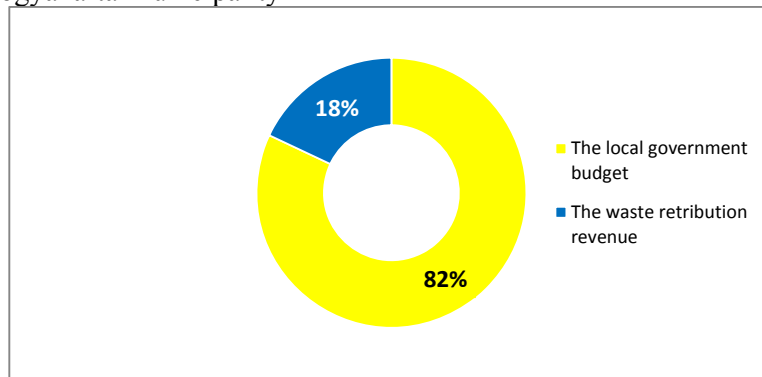
### 4.3.4 Financing and retribution system

Funding for waste management activities in Yogyakarta municipality derives partly from the state budget, the local budget, and by means of retribution. The funds from the state budget are generally used for the procurement of equipments and for goods / investments, such as procurement of a weighing bridge at the landfill. The funds derived from the local budget and retribution are generally used for operating expenses / maintenance routine. The total costs of

solid waste management in Yogyakarta Municipality during 2012 are 11 billions (EAYM, 2013).

The amount of solid waste retribution collected in Yogyakarta Municipality is based on the Act on Cleanliness Retribution No. 21 of 2002 dated July 30, 2002 about. The total amount of revenue collected under this solid waste retribution in the Municipality during 2012 was IDR 2,000,000,000 (EAYM, 2013). The contribution of the SWM retribution revenue collected to the total cost of SWM in Yogyakarta Municipality in 2012 can be illustrated in the following graph:

Chart 2.1: The contribution of SWM retribution revenue to the total costs of SWM in Yogyakarta Municipality



Source: EAYM (2013)

The chart 3.1 shows that the contribution of SWM retribution revenue to the total cost of SWM in Yogyakarta Municipality in 2012 was only 18%. Meanwhile, the remaining 82% was derived from the local government budget.

#### 4.3.5 Regulation

As a follow up to the mandate of Law 18/2008, Yogyakarta municipality in 2012 has issued the local regulation No. 10/2012 on waste management. As instruction in the Law 18/2008, this local regulation serves as the implementing instrument of the Law 18/2008. Just as Law 18/2008, the basic policy of this local regulation is how to change the SWM paradigm of end-of-pipe approaches to the reduction of waste at source by promoting 3R efforts.

Some major issues addressed in the local regulation include:

- Waste as an alternative energy source
- The division of SWM responsibilities shared between the local government, communities and businesses
- The use of environmentally friendly technology in SWM, particularly the use of controlled or sanitary landfill
- The implementation of incentive and disincentive mechanisms in SWM
- Partnership among other local governments and businesses in SWM

#### 4.4 History of the waste banks

A true form of community participation in SWM came into existence with the initiation and the development of waste banks. Unlike SWM at community level earlier where households



pay a waste fee and dispose their waste at containers, the waste banks now incorporated an economic value of waste into a community SWM system.

As a college lecturer of public health, he was always engaged in making aware on community around him to develop a healthier lifestyle. Once Dengue Hemorrhagic Fever (DHF) attacked his village, Bambang came into real action. He then initiated the establishment of the Public Health Workshop in his village and invited people to be more concerned with the cleanliness of their environment. With that concern, the dengue cases would automatically go down in number.

Photograph 4.2: The initiator of waste banks in Indonesia



Source: Author (2013)

*"I started at the simplest level, i.e. taking out the waste from my neighborhood, such as tin cans, in a place so it does not hold water. I invited the community to collect and sort waste in their immediate surroundings. Initially, the response was not too good because they thought that waste is something that one does not need to take too serious". (interview with Bambang Suwerda, July 2013).*

The poor response of the community made him think on finding an alternative that would be more appealing to people. Until one day, Bambang got the idea to apply the logistic of a conventional bank system to waste management. He imagined that it would be interesting when one could introduce economic incentives into a community SWM system.

*"I was puzzling how it would be if one would manage waste as one is managing money in a bank. I then proposed this idea to the members of my workshop and they became enthusiastic". (Interview with Bambang Suwerda, July 2013).*

Having discussed and prepared for quite some time, the two-year momentum of the major earthquake that struck Yogyakarta in 2008 was used to launch the first waste bank named Gemah Ripah Waste Bank in Badegan village, Bantul regency. During the early days of the waste bank, many people were confused about the concept. Slowly however, the public started to understand and accept the waste bank concept. The waste bank operation principle is simple and easy. Firstly, households, as customers, segregate their waste into three groups, namely paper, plastic and metal. Tellers then receive and weigh the three kinds of waste from the customers at a collection point. After that, the tellers record every transaction as a quantitative value in the customer's account book. Once the waste is resold to recyclable waste buyers, the tellers then convert the customer's quantitative value into monetary value. Which means that the customer gets paid in cash for the waste delivered.

The success of Gemah Ripah Waste Bank in Bandegan, Bantul, Yogyakarta has inspired other areas. Now, the waste bank model has been replicated in many other areas. One of the areas that widely implement the waste bank model is Yogyakarta Municipality. So far, 19 communities in Yogyakarta Municipality have adopted the waste bank model.

In 2012 the Ministry of Environment showed interest in adopting the Gemah Ripah Waste Bank model for replication nationwide. Bambang Suwerda was invited by the Ministry of Environment to act as speaker to introduce the waste bank model to several provinces in

Indonesia. He was also asked by the Ministry of Environment to jointly formulate standards for developing waste banks, such as for the collection of waste, the staffing, the structure of organization, as well as the construction of waste bank facilities.

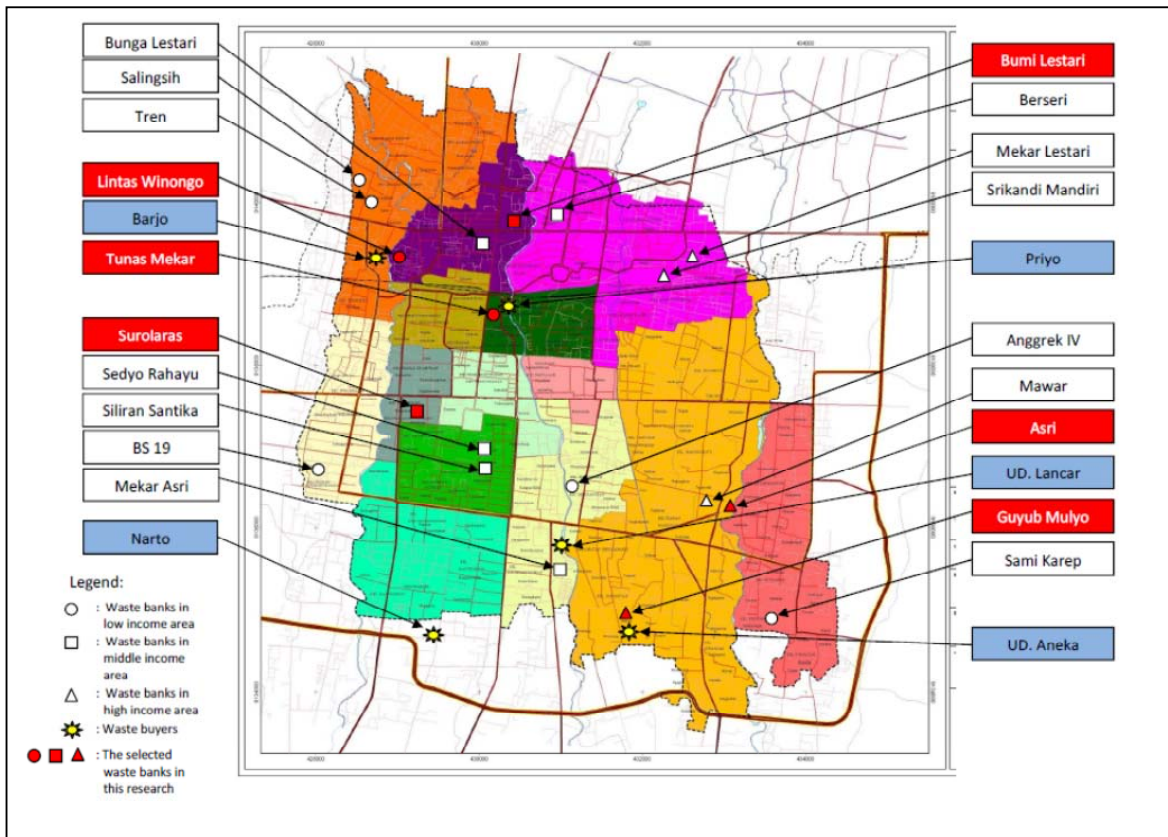
The Ministry of Environment itself adopted the waste bank model for replication nationwide because the term “waste bank” is very interesting and easy to remember by people. In addition, the aspect of economic incentive in the model is expected to attract people to start actively participating in SWM at community level. However, many parties, including local governments and NGOs criticize this policy since the ministry imposes SWM at community level into a particular model. They argue that not all regions in Indonesia can implement the waste bank model (The Ministry of Environment, 2013).

*“Actually the waste bank model at community level is very diverse. We purposely adopted the waste bank model as it is easy to remember by people. It also makes people curious. (interview with The Ministry of Environment officer, July 2013).*

#### 4.5 Waste banks in Yogyakarta

So far, there have been 19 waste banks established in Yogyakarta Municipality, which can be found on the map below.

Map 4.2: The location of 19 waste banks in Yogyakarta Municipality



Source: EAYM (2013) & Author (personal observation, 2013)

As indicated in the methodology chapter three, out of the 19 waste banks, in-depth information was collected on 6 waste banks. The selection of 6 (six) waste banks are carried on basis of income status, i.e. 2 (two) waste banks from low income area, 2 (two) waste banks from middle income areas and 2 (two) waste banks from high income areas. In the next part of this chapter, the organization of the analyzed waste banks will be further clarified.

#### **4.6 The profile of the selected waste banks**

Lintas Winongo waste bank is located in the middle of low income residents, promptly at RW 11, Bumijo sub district. This RW has relatively large area, approximately 12.34 Ha. It covers 342 households. This is the highest number of residents among other the selected waste bank areas. Out of the total households, 197 households or 58% are involved in the waste bank activities by joining as customers. The waste bank itself was established in 20 August 2008, soon after the establishment of the first waste bank in Indonesia namely Gemah Ripah waste bank in bantul. Like Lintas Winongo waste bank, Tunas Mekar waste bank also situated at low income area. The waste bank is located at RW 3, Suryatmajan sub district, close by Malioboro area. This RW is small RW with highly densely populated residents. From the whole of 52 households, 81% or 42 households are actively participated in waste bank activities. This percentage of household participation is quite high among other the selected waste banks. The waste bank was established in 27 February 2009, just a year after the establishment of Lintas Winongo waste bank and 2 years after the establishment of the Gemah Ripah waste bank.

Bumi Lestari is a waste bank located at middle income area. This waste bank lies at RW 10, Cokrodingratan sub district. The total area of this RW is approximately 5.8 Ha. The total households of this RW are 245 households. Out of 245 households, 56% or 137 households are registered as customers in this waste bank. The waste bank itself was established at 14 October 2010. Two years after the establishment of Bumi Lestari waste bank, residents at RW 08, Notoprajan sub district also established a waste bank named Surolaras waste bank. The location of the waste bank is close by the Sultanate Palace and Malioboro street. Like the Bumi lestari waste bank, the majority of citizens in the Surolaras waste bank area is categorized as middle income residents. The number of households who participate in this waste bank activity is quite high, around 81% from the total of 205 households.

Whereas, Asri waste bank and Guyub Mulyo waste bank are located in the middle of residents with high income group. The Asri waste bank situated at RW 08, Pandeyan sub district. The number of household participation in this waste bank is quite low. It has been recorded by the administrators that only 11 households or 5% from the whole of 198 households are involved in the waste bank activities as customers. This waste bank was established in 9 October 2011. While, the participation proportion of residents in Guyub Mulyo is higher than the Asri waste bank. In this waste bank, 26% out of 140 households are recorded as the waste bank customers. The Guyub Mulyo waste bank was established in 11 November 2012 and situated at RW 17, Sorosutan sub district. The following table indicates the profile information of the selected waste banks.

Table 4.1: The profile of the selected waste banks

Name of waste bank	Income status	Total households	Total customers	The percentage of customers to total households	The establishment of waste bank
Lintas winongo	low income	342	197	58%	20 August 2008
Tunas mekar	low income	52	42	81%	27 February 2009
Bumi Lestari	middle income	245	137	56%	14 October 2010
Surolaras	middle income	205	166	81%	7 January 2012
Asri	high income	198	11	5%	9 October 2011
Guyub Mulyo	high income	140	36	26%	11 November 2012
<b>Total</b>		<b>1182</b>	<b>589</b>	<b>50%</b>	

Source: The selected waste bank administrators (2013)

In terms of organizational structures, the table 4.2 below indicates that the operation of the selected waste banks is mostly organized by women. 82% out of the total administrators who are involved in the operation of the selected waste banks are women. Meanwhile, the rest of administrators (18%) are men. This is logic since housewives are primarily involved in taking care of household waste. The table below also shows that all administrators in the Asri waste bank are men. Unfortunately, so far, the waste bank is not running well. These facts indicate that the role of women in household waste management is getting significant. The municipality should realize about this. Women should be considered as a good resource by the municipality in setting SWM programs.

Table 3.2: The organizational structure of the selected waste banks

Name of waste bank	Income status	The organizational structure of the selected waste bank			
		Director	Secretary	Treasure	Teller
Lintas winongo	low income	Siti R (♀)	Sumiyati (♀)	Tutik H (♀)	Tutik (♀) Eti rohayati (♀) Sutirah (♀) Etik Suparyo(♀) Rusmiyatun (♀)
Tunas mekar	low income	CH Winarti (♀)	Mrs Sarbini (♀) Ristu S (♀)	Nanik H (♀)	Dwiatmi (♀) Novi (♀)
Bumi Lestari	middle income	Koespilah (♀)	Parjilah (♀)	Yuli Woro (♀)	Roch (♀) Sri Utari (♀) Nuk Sis (♀) Devi (♀) Ninik S (♀) Sutijah (♀) Pepi S (♀) Terry (♀) Sri (♀) Sri sumaeni (♀) Yanti (♀) Maryani (♀)
Surolaras	middle income	Achmad S (♂)	Ida Ari A (♀)	Sudaryati (♀)	Jatmikah (♀) Tuti Utami (♀) Rusmala D (♀) Arfi H (♀) M. Syafii (♂) Sunarto (♂) Danang (♂) Isbudiarto (♂)
Asri	high income	Wisnu A (♂)	Wakhid N (♂)	Muri B (♂)	M. Arif D (♂)
Guyub Mulyo	high income	Cicik A (♀)	Deasy (♀)	Rina (♀)	Mrs. Sumardi (♀)

Source: The selected waste bank administrators (2013)

Note: ♂ = male      ♀ = female

#### 4.6.1 Waste bank services and facilities

From the selected waste banks studied, it was found that in terms of services, the waste banks can be divided into 2 (two) categories. The first category is waste banks that only serve for waste savings. While, the second category is waste banks that serve waste savings and loans for their customers with a low interest rate. In the second category of waste banks, for repayment the loans, customers can pay by means of waste. From the findings, all waste banks that serve waste savings and loans are situated in low-income areas. The purpose of the loan service is to help their customers in alleviating household economic burden.

*"We also serve savings and loans specifically for our members. We provide low interest rates in order to help them rather than they borrow money outside. They can pay the debt by means of their waste ". (interview with Tunas Mekar Director, June 2013).*

In terms of facilities, almost all waste banks were established without a capital. To operate the waste bank, they typically borrow the equipment, especially scales from local residents or from their community groups. Only one waste bank, which is the Surolaras waste bank, has its own scale since its establishment. At that time, there was a Surolaras' customer who bought a digital scale that was donated for the waste bank operation.

So far, only 1 (one) waste bank out of the selected waste banks which has their own warehouse, namely Tunas Mekar waste banks. While, other waste banks just utilize their terrace house, office or office yard and mosque yard as a temporary storage area.

*"We do not have a warehouse, this is the mosque yard, we use it for free, but we are not allowed to put the waste here more than a day, so the middlemen should collect the waste as soon as possible. This mosque should be clean as before. "(Interview with Surolaras Director, June 2013).*

#### 4.6.2 Types of waste & handling methods

The selected waste banks only accept paper, plastic and metal waste. The type of waste is adjusted to the list from waste buyers. Previously the Tunas Mekar waste bank collected the glass as well. They eventually did not receive the glass waste since they changed a waste buyer and the price of the glass was very low. From author's survey, the price of glass was IDR 150/kg. In order to be taken by recyclable waste buyer, the glass should be in 1m<sup>3</sup> volume. In addition, in waste bank operation, the glass waste is more difficult to be handled rather than other waste.

In general, the methods of waste handling are the same in the selected waste banks. From the house, each customer is required to sort their solid waste into three groups: paper, plastic and metal in a clean condition. Once the customers arrive in the waste bank, tellers will weigh each of these waste types, then immediately put the waste into storage.

*"We receive paper, plastic and metal waste. We do not accept glass waste because the glass waste is very dangerous to be handled and the price is very cheap. Actually, there is a waste buyer willing to buy the glass waste, but it should in a large volume, That is difficult, because we do not have a warehouse. "(Interview with Surolaras Director, June 2013)*

### 4.6.3 Daily operation

The majority of the waste banks serve customers once a week, on Saturday or Sunday, at a time when residents are off from work. Waste bank operators also aim to provide an opportunity for customers to dispose their waste in bigger number. An exception is formed by the Bumi Lestari waste banks which operate twice a week on Tuesday and Friday. On the determined days and hours, customers come to the waste bank to deliver their waste in separated condition (usually paper, plastic and metal). Even though the schedule of waste bank services has been set, sometimes because of busy customers, the waste banks also allow the customers to deposit the waste on other days. They can do so by putting the waste in front of the house of the directors and labeling it with the customer's name. The director then will bring the waste to the waste bank on the service day. This kind of practice occurs in Bumi Lestari waste bank as well as Guyub Mulyo waste bank.

Once customers in a waste bank, tellers will directly weigh the waste and record it in customer's account book. After that the waste is put into storage. When the storage area becomes full, then the waste bank tellers contact waste buyers in order to pick up the waste. Once the waste buyers come, the waste buyers re-weigh the waste collected and do the payment based on the last weighing. After receiving a payment, the waste bank teller then record the money value into a customer's account book. Customers usually will take their savings after a period of time, could be a month, three months, or even once a year.

Photograph 4.3: Activities in the selected waste banks



Source: Author (2013)

*"Once our warehouse is full, we contact our waste buyer to pick up the waste. Having rewarded by the buyer, then we enter the value of money into customer's account book. Normally our warehouse is full in 1-2 months. Our customers can take their money at any time, but they usually pick it up if already a lot". (Interview with Tunas Mekar Director, June 2013)*

### 4.6.4 Motivation of waste bank

Awareness on environment was the most common motivations for establishing waste banks. Dirty neighborhood conditions and bad habits in managing household solid waste have encouraged waste bank initiators to work hard to find a proper solution.

*"Our RW location is on the edge of a river. We saw a lot of our neighbors who threw litters into the river. This had to be stopped, then my friends and I*

*had an idea to establish a waste bank. (Interview with Lintas Winongo Director, June 2013).*

In the case of the Bumi Lestari waste bank, besides environmental concerns, cleanliness competitions organized by a private company also stipulated the establishment of this waste bank. In this competition, the existence of a waste bank in RW area potentially increased the credit point.

In terms of initiators, most of them were usually community leaders. Lintas Winongo waste bank and Tunas Mekar waste bank, for example, the establishment of these waste banks at that moment were initiated by the head of RW. Their position made them easy to socialize the program or mobilize residents to participate in waste bank activities.

#### **4.6.5 Links of waste banks with stakeholders**

In this sub chapter, it will be presented the linkages of the selected waste banks with other stakeholders, namely the local government and their waste buyers.

##### ***Links with the local government***

The selected waste banks in Yogyakarta rarely interact with EAYM. This because all the waste banks were formed based on the initiative of the citizens themselves. Moreover, in the last three years EAYM still focused on the program of recycling organic waste. Until now, only Bumi Lestari waste bank that received assistance from the Ministry of Environment.

*"Until now EAYM has not provided assistance to our waste bank. We have just been monitored by EAYM this month. They said that EAYM will distribute the assistance for waste banks that have been running in the forms of scales, customer's account books and segregated bag at the end of this year".(Interview with director Guyub Mulyo, June 2013).*

##### ***Links with waste buyers***

The selected waste banks sell their waste collected to waste buyers that spread a lot in Yogyakarta Municipality. The waste banks normally will choose the buyers who can provide a good price. In addition, another consideration is the willingness of the waste buyers to buy all kinds of waste that has been collected by the waste banks rather than the waste buyers who only received some kind of waste.

Below is the sales network of inorganic waste, namely paper, plastic and metal waste carried by the selected waste banks:



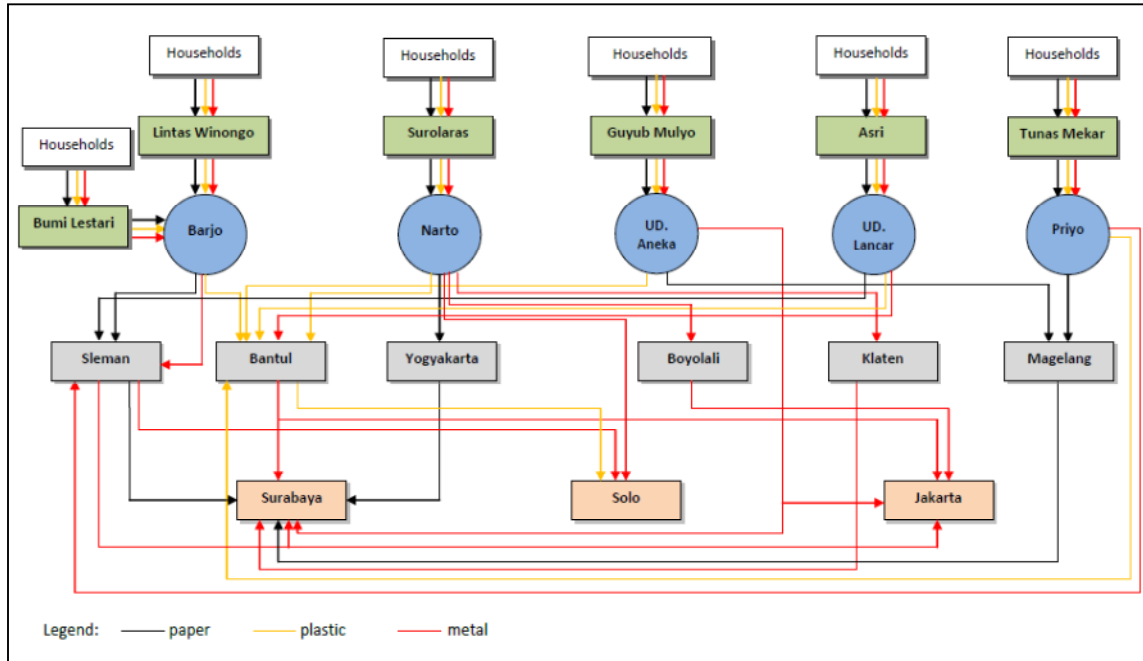


Figure 4.1: The sales network of solid waste conducted by the selected waste banks  
 Source: Designed by Author (2013)

Lintas winongo waste bank and Bumi Lestari waste bank sell all their waste collected to Barjo waste buyer. Previously, the Bumi Lestari waste bank sold the waste to another waste buyer. Since the Bumi Lestari was less satisfied with the price, based on the recommendation of Lintas Winongo waste bank, the Bumi Lestari waste bank changed its buyer to Barjo waste buyer. Lintas Winongo argued that Barjo was able to give a good price and service.

Having collected all the waste, either from Lintas Winongo waste bank or Bumi Lestari waste bank, Barjo sends the paper and metal waste to a bigger waste buyer in Sleman. The big waste buyer in Sleman then delivers the paper to the paper waste recycling industry in Surabaya. While the metal waste, by Barjo, is then sent to the metal recycling Industry in Solo.

Meanwhile, the plastic waste will normally be sent by Barjo to a bigger waste buyer in Bantul. In Bantul, the plastic waste is processed to be plastic ore, and then it will be sent to plastic recycling industry in Solo.

Surolaras waste bank sells its waste collected to Narto recyclable waste buyer. Narto then sells the paper waste to a bigger waste buyer in Yogyakarta. Afterwards, the big waste buyer in Yogyakarta delivers the paper waste to paper recycling industry in Surabaya. Like Barjo buyer, Narto also sells the plastic waste to a bigger waste buyer in Bantul. After the plastic waste is processed become plastic ore, the big waste buyer in Bantul sends it to plastic recycling industry in Solo.

Guyub Mulyo waste bank delivers its waste to UD Aneka recyclable waste buyer. Afterwards, UD Aneka sells the metal waste directly to metal recycling industry in Surabaya and Jakarta. For the paper waste, UD Aneka sends it to a bigger waste buyer in Magelang. The big buyer in Magelang then delivers it to paper recycling industry in Surabaya. Just like



Barjo Narto, UD Aneka also sells plastic waste to a bigger buyer in Bantul. After that, the big buyer in Bantul delivers the plastic waste in the forms of plastic ore to plastic recycling industry in Solo.

Asri waste bank sells all the waste collected to UD Lancar. UD Lancar then delivers the paper waste to a bigger waste buyer in Sleman. After that, the big waste buyer in Sleman delivers the paper waste to paper recycling industry in Surabaya. For plastic and metal waste, UD Aneka sells those wastes to a big waste buyer in Bantul. The big waste buyer in Bantul then processes the plastic waste into plastic ore and delivers them to plastic recycling industry in Solo. While, the metal waste, the big waste buyer in Bantul delivers them to metal recycling industry in Solo and Surabaya.

Tunas Mekar waste bank sells all the waste collected to Priyo waste buyer. Priyo then delivers the paper waste to a bigger waste buyer in Magelang. The big waste buyer in Magelang, afterwards, delivers them to paper recycling industry in Surabaya. Meanwhile, Priyo delivers the metal waste to a bigger waste buyer in Sleman. After that, the big waste buyer in Sleman delivers them to metal recycling industry in Surabaya and Jakarta. Just like other recyclable waste buyers, Priyo also delivers the plastic waste to a bigger waste buyer in Bantul. Bantul then delivers the waste in the forms of plastic ore to plastic recycling industry in Solo.

The map below shows that all types of waste from the selected waste banks in Yogyakarta end up in the recycling industry in Solo, Surabaya and Jakarta.

Map 4.3: The sales network of solid waste conducted by the selected waste banks



Source: Designed by Author (2013)

#### 4.6.6 Characteristic of customers

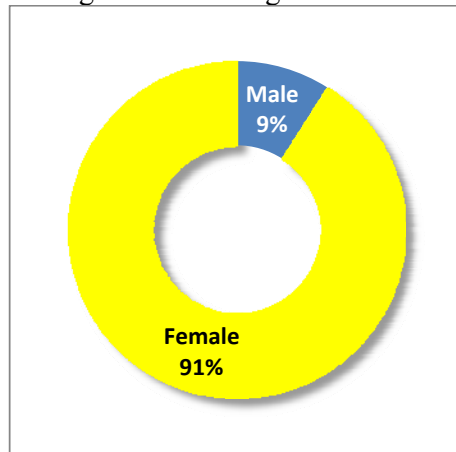
The next table and graph show that 91% of customers who participate in the activities of waste banks are women, whereas men are only 9%. This can be explained that women are the most frequent in contact with a waste in their houses. It is also because the averages of women in Yogyakarta stay at home for taking care of their households. Meanwhile, men spend mostly their time at work. In addition, it is undeniable that women are normally more patient in taking care of waste rather than men. It is as said by Surolaras Director:

*"Usually women here have a better response if they are given a socialization about household waste management. In contrast to women, men are rather apathetic on that issue. Maybe they think that taking care of household waste is women's business ".(Interview with Surolaras Director, June 2013)*

Table 4.3: The gender of waste bank customers per selected waste bank

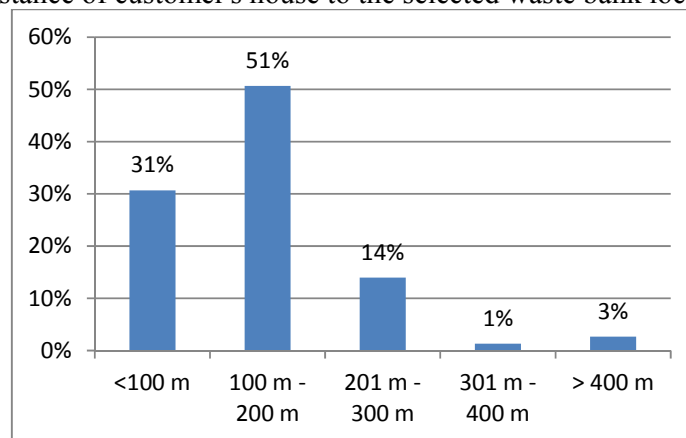
Name of waste bank	Income status	The gender of customer		Total customers (N)
		Male	female	
Lintas winongo	low income	1 (0.5%)	196 (99.5%)	197
Tunas mekar	low income	4 (6%)	38 (94%)	42
Bumi Lestari	middle income	11 (8%)	126 (92%)	137
Surolaras	middle income	19 (11%)	147 (89%)	166
Asri	high income	3 (27%)	8 (73%)	11
Guyub Mulyo	high income	15 (42%)	21 (58%)	36
<b>Total</b>		<b>53 (9%)</b>	<b>536 (91%)</b>	<b>589</b>

Chart 4.2: The percentage of customer genders at the selected waste banks



In terms of spatial proximity, the chart below indicates that the majority of customers, more than 50% reside near waste bank locations, namely at a distance of 100 meters to 200 meters. Only 3% of customers live in radius more than 400 meters.

Chart 4.3: The distance of customer's house to the selected waste bank locations



It proves that the distance is one factor determining the level of participation in a waste bank activity. So, it is understandable why all the waste banks in Yogyakarta Municipality operate at RW level, not in sub-district level. By operating the waste banks at RW level, the customers are easy to reach the waste bank locations.

From the findings, the long distance of house to waste bank location not only potentially inhibits the participation of customers but also the tellers.

*“We have one teller who is less active in serving customers since her house is too far from this waste bank”. (Interview with Bumi Lestari Director, June 2013).*

*“We implement two types of profit sharing system. 10% for our customers who bring their waste by themselves and 50% for those who ask us to pick their waste from their house. Usually, they do that since their house is too far from here. We take 50% because we need a energy to get there”. (Interview with Surolaras waste bank Teller, June 2013)*

So, to encourage active community participation in waste bank activities, the distance between the waste bank location and potential clients of the bank is an important concern for those who want to attempt for replication.

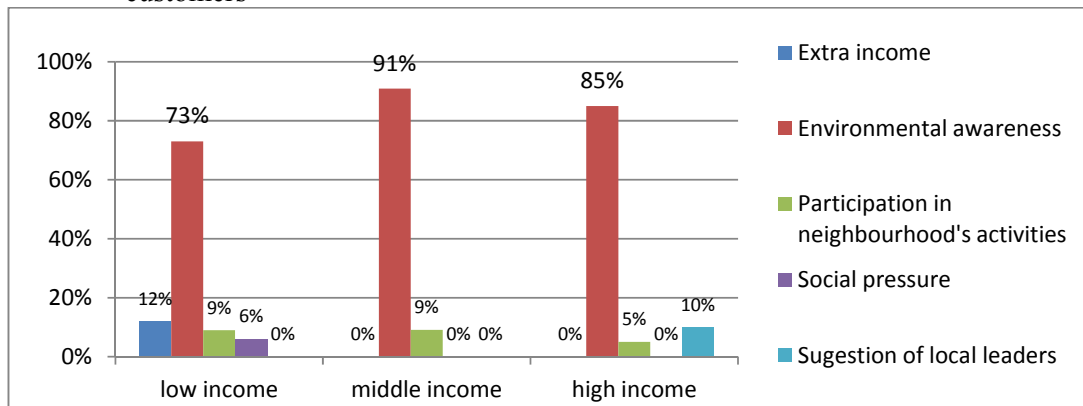
#### 4.6.7 Factors motivating participation of households in waste bank’s activities in Yogyakarta

The chart below shows that there is no significant difference on the motivation of households to participate in waste bank activities, either the motivation of low income, middle income, or high income customers. More than 70% customers from all three social status use environmental awareness as the main factor driving them to participate actively in the waste bank activities. This indicates that generally their awareness on environmental health is pretty good.

Table 4.4: The motivation of households to participate in waste bank activities as indicated by customers

Waste bank	Income status	The motivation of households to participate in waste bank activities					The number of respondents (N)
		extra income	environmental awareness	participation on neighborhood activities	social pressure	stipulated by local leaders	
Lintas winongo	low income	1 (5%)	15 (79%)	2 (11%)	1 (5%)	-	19
Tunas mekar	low income	1 (8%)	10 (84%)	1 (8%)	-	-	12
Bumi Lestari	middle income	1 (9%)	8 (73%)	1 (9%)	1 (9%)	-	11
Surolaras	middle income	-	15 (94%)	1 (6%)	-	-	16
Asri	high income	-	2 (100%)	-	-	-	2
Guyub Mulyo	high income	-	12 (80%)	1 (7%)	-	2 (13%)	15
<b>Total</b>		<b>4 (5%)</b>	<b>61 (81%)</b>	<b>6 (8%)</b>	<b>2 (3%)</b>	<b>2 (3%)</b>	<b>75</b>

Chart 4.4: The motivation of households to participate in waste bank activities as indicated by customers



*"My motivation to become a customer is to help in reducing waste, especially the waste that is not biodegradable and harmful to the environment. Our mayor has also said that our landfills will be full. Besides, in waste bank I can learn to make handicrafts plastic waste. "(Interviews with a low-income customer, July 2013).*

Only 12% of low-income customers who use extra income as a key driver to participate in waste banks. The low number of customers in using extra income as the main factor is because the profit from saving waste is not too big and it is needed a long time to accumulate a lot of money.

There are 10% customers who become customers at Guyub Mulyo waste bank due to the suggestion of local leaders. This is because the Guyub Mulyo waste bank director very actively provokes people to become customers. In less than a year, there have been almost 40 customers in her waste bank.

*"Whenever I meet housewives here, I invite them to join to the waste bank, with a slightly force. They are already familiar with my style. If they did not deliver their waste, I shouted in front of their house, until they were uncomfortable. Finally they came with their inorganic waste ". Interview with Guyub Mulyo Director, June 2013.*

#### 4.7 Summary

In Indonesia, the responsibility for SWM is on local governments. The position in Yogyakarta Municipality is not an exception. There are regulations for SWM in Yogyakarta, namely Law 18/2008 and local regulation No. 10/2012. To create awareness on SWM among citizens, the municipality adopts two different responsibilities on daily waste collection and transportation. The first responsibility is a primary collection including the waste collection and transportation from households to intermediate collection points. This responsibility lies with local households or communities. The second responsibility is a secondary collection handling the waste from the intermediate points to a landfill. The EAYM deals this second responsibility.

In response their obligation, communities set up community waste management in a form of waste bank model. In this model, the communities introduce economic incentives into a

community SWM system. In general, the routine operation of the selected waste banks can be described as follows; at household, customers sort an inorganic waste into three groups, namely paper, plastic and metal. The wastes then are delivered to a waste bank. Afterwards, the tellers then record every transaction as quantitative value in the customer's account books. Once the waste is resold to waste buyers, the tellers convert the customer's quantitative value to a monetary value. After a period of time, customers can withdraw the money from the waste bank. In order to cover their operational costs, the waste banks adopt a profit sharing mechanism. Most of customers coming from all income levels use an environmental awareness as a main driving force to participate in the waste bank activities.

The following chapter will analyze the sustainability of the selected waste banks in terms of environmental sustainability, social sustainability and economic sustainability. At the chapter, it will also be investigated the government mechanisms to improve the sustainability of the waste banks.

## CHAPTER FIVE RESEARCH FINDINGS AND ANALYSIS

### 5.1 Introduction

This chapter aims to explore the sustainability of waste banks in Yogyakarta from the view point of the waste bank organizers, the customers of waste banks, the waste buyers and the local government. At the end of this chapter, attention will be drawn to the government mechanisms that are or can be used to enhance the sustainability of the waste banks.

### 5.2 Exploring the sustainability of waste banks in Yogyakarta

For determining the sustainability of waste banks, principles of the ISWM model were used to formulate the variables, namely environmental sustainability, social sustainability, and economic sustainability.

#### 5.2.1 Environmental sustainability

There are three indicators to determine the environmental sustainability of waste banks. They include waste reduction; activities that enable reuse & recycling; and Reduction in waste collection frequency.

#### *Inorganic waste reduction/ recovery*

Table 5.1 clearly indicates that in terms of amount of waste collected, Surolaras waste bank and Lintas Winongo waste bank have the highest absorption of solid waste among other waste banks, namely 1,310 kgs / month for Surolaras and 1,059 kgs / month for Lintas Winongo waste bank. This can be explained that the both waste banks have the highest number of customers, namely 166 customers for Surolaras waste bank and 197 for Lintas Winongo waste bank. Whereas, Asri waste bank is only able to absorb 40 kg/month since the waste bank only has 11 customers. While, Tunas mekar waste bank absorbs 215 kg of waste from customers every month. Bumi Lestari waste bank receives 248 kg/month. Meanwhile, Guyub Mulyo waste bank is able to absorb 152 kg of waste in a month. Bellow it is presented the average of solid waste absorbed by those waste banks per month.

Table 5.1: The average of waste absorbed by waste banks in a month

Name of waste bank	Income status	Total number of customers	Total waste absorbed from customers per month	The average of waste deposited by a customer
Lintas winongo	low income	197	1.059 kg	5.4 kg/customer
Tunas mekar	low income	42	215 kg	5.1 kg/customer
Bumi Lestari	middle income	137	248 kg	1.8 kg/customer
Surolaras	middle income	166	1.310 kg	7.8 kg/customer
Asri	high income	11	40 kg	3.6 kg/customer
Guyub Mulyo	high income	36	152 kg	4.2 kg/customer
<b>Total</b>		<b>589</b>	<b>3,024 kg</b> <b>= 3.024 tons</b>	

The above table also shows that the selected waste banks are able to absorb 3,024 tons of inorganic waste from customers. With a total waste production of Yogyakarta Municipality in 2012 was 5,015,420 kg / month (Kartamantul Joint Secretariat, 2013). The amount of waste

reduced by the selected waste banks from the total waste production of Yogyakarta municipality is:

$$(3,024 \text{ kg}/5,015,420 \text{ kg}) \times 100\% = 0.6\%$$

In terms of percentage, the waste reduction is rather small since only 6 (six) waste banks are included in the research, and only 1% of the total number of households in Yogyakarta Municipality who joined as waste bank's customers. The number of Households in Yogyakarta Municipality in 2011 was 90.170 Households (BPS, 2013).

In terms of the average of waste deposited by each customer, customers of the Surolaras waste bank normally deposit 7.8 kg/customer/month. This is the highest amount of waste deposited among all the selected waste banks. This can be explained by the facts that most customers in this waste bank are very actively involved in waste bank activities. Out of total 166 respondents, only 15% respondents who are not deliver waste regularly. While, customers in both Lintas Winongo waste bank and Tunas Mekar waste bank are not so different in terms of delivering waste to the waste banks, on average 5.4 kg/customer/month for Lintas Winongo waste bank and 5.1 kg/customer/month for Tunas Mekar waste bank. Whereas, customers in Asri waste bank and Guyub mulyo waste bank are relatively similar on average in depositing waste to the waste banks, namely 3.6 kg per customer for the Asri waste bank and 4.2 kg for every customer in the Guyub Mulyo waste bank. What interesting is in Bumi Lestari waste bank. In this waste bank, even though the number of the customer is quite high, the waste deposited by average customers is extremely low, namely 1.8 kg per customer per month. According to the director, the customers are sometimes still throwing waste directly to containers or sometimes they just sell the waste to itinerant buyers to get cash. This can also be explained by examining customer's account books that the frequency of depositing waste is low.

Based on the above finding, one can state that due to the existence of waste banks, the amount of solid waste disposed by households at community level for collection of EAYM is reduced.

In terms of customer waste reduction as experienced by householders, the 75 respondents from the selected waste banks, 69% respondents indicate that monthly waste banks reduce between 36% - 50%. This is interesting findings because approximately 50% of household waste in Yogyakarta Municipality consists of inorganic material (EAYM, 2013). This means all the inorganic waste is being deposit in the waste bank.

*"Being a waste bank customer, I do not throw away plastic and paper waste at all. All waste can be sold to the waste bank. I rarely have metal waste. I am not sure but I guess that at this moment I bring about half of my total waste to the waste bank". (Interview with a Tunas Mekar Customer, July 2013).*

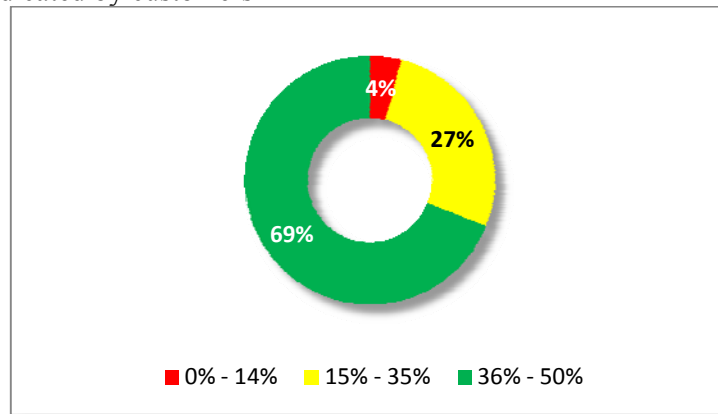
While, 27% of respondents indicate that due to the waste bank, their household waste to be disposed off came down with 15%-35%. Whereas, 4% of respondents say that the waste banks are able to decrease their waste volume about 0%-14%. These customers also indicate to not actively be involved in waste bank activities. They sometimes deliver waste into a waste bank, but sometimes they just throw away the waste to intermediate transfer point. The

percentage of waste reduction at households can be found in the table 5.2 and the chart 5.1 below.

Table 5.2: The percentage of waste volume reduction in the selected waste banks in a month as indicated by customers

Name of waste bank	N	Reduction of waste volume in % per month per selected waste bank		
		0% – 14%	15% 35%	36% - 50%
Lintas Winongo	19	-	3 (16%)	16 (84%)
Tunas mekar	12	-	2 (17%)	10 (83%)
Bumi Lestari	11	2 (18%)	6 (55%)	3 (27%)
Surolaras	16	-	1 (6%)	15 (94%)
Asri	2	1 (50%)	1 (50%)	-
Guyub Mulyo	15	-	7 (47%)	8 (53%)
<b>Total</b>	<b>75</b>	<b>3 (4%)</b>	<b>20 (27%)</b>	<b>52 (69%)</b>

Chart 5.1: The percentage of waste volume reduction in the selected waste banks in a month as indicated by customers



The data from the interview with customers also indicate that the existence of waste banks benefits the cleanliness of the neighborhood. Out of the 75 interviewees from the selected waste banks, 91% said that the waste banks have contributed to make their environment cleaner than before. This is attributed to the fact that currently almost no garbage in neighborhood is littered, especially not inorganic waste, such as plastic. Customers are now keen on collecting the waste to be deposited into the waste bank.

*"Previously households just threw waste materials out everywhere. This RW looked like a slum neighborhood. Now I am happy to see how it improved here thanks to the waste bank. We have a cleaner neighborhood, and we are actively involved in cleanliness competitions ". (Interview with a Tunas Mekar customer, July 2013).*

While only 9% of respondents said that the presence of the waste banks does not make any difference when it comes to a cleaner neighborhood. This occurs because there are waste banks that have very little number of customers, such as Asri waste bank.



Table 5.3: The increase of neighborhood cleanliness after waste bank establishment as indicated by customers

Name of waste bank	N	Increasing neighborhood cleanliness after waste bank establishment	
		yes	no
Lintas Winongo	19	17 (89%)	2 (11%)
Tunas mekar	12	12 (100%)	-
Bumi Lestari	11	10 (91%)	1 (9%)
Surolaras	16	16 (100%)	-
Asri	2	-	2 (100%)
Guyub Mulyo	15	13 (87%)	2 (13%)
<b>Total</b>	<b>75</b>	<b>68 (91%)</b>	<b>7 (9%)</b>

***Extra activities enabling reuse & recycle***

Not all inorganic waste has an economic value and can therefore not be sold to waste buyers. Examples of such materials are instant noodle wrappers or snack wrappers containing combination of plastic and aluminium foil. For that packaging waste, the tellers of waste banks still advocate their customers to deposit to waste banks. In waste banks, tellers will process those waste to be created into handicrafts, such as recycling bags, wallets and pillows. Some waste banks could operate the waste handicraft processing after joining training program conducted by NGO last year. In February 2013, in order to increase the number of artisans, EAYM also conducted a similar program to other participants. So far, some waste banks, such as Bumi Lestari and Tunas Mekar, have already sold several their products. Bumi Lestari waste bank also has participated in several local exhibitions to promote their recycling handicrafts. The inorganic waste recycling efforts are not only useful for decreasing the amount of waste to be landfills, but also providing economic value to the waste and save valuable natural resources.

*"We make handicrafts from plastic waste such as bags, wallets and flower decorations. The price of this bag is IDR 50,000. This wallet is a bit cheaper. The materials for producing these handicrafts derive from the plastic waste deposited by our customers". (Interview with Tunas Mekar Director, June 2013).*

Photograph 5.1: Recycled craft products made by Tunas Mekar waste bank



Source: Author (2013)

Although some waste banks have not been able to sell handicraft products yet, most of them are still eager to organize handicraft-making activities. So far, the handicraft-making activities are conducting by administrators of the selected waste banks on a voluntary basis.

Asri waste bank is rather small in terms of customers and has not embarked yet on handicraft work.

The selected waste banks only accept inorganic waste material from customers. Treatment of organic waste is the responsibility of each customer at home. So far, very few customers started composting of their organic waste materials. Normally, they dispose their organic waste into the waste hand carts of the collection.

***Reduction in waste collection frequency by pull cart collectors***

It was previously mentioned that the selected waste banks are able to absorb totally solid waste from customers of around 3.024 tons/month. According to information from EAYM, one waste truck of the Yogyakarta Municipality has a capacity of collection service of approximately 3 tons. In one month the selected waste bank activities reduce the volume of to be collected waste with 1 truck load. No doubt that when extrapolated for all the 19 waste banks that this is helpful for the Yogyakarta Municipality in terms of savings for the waste budget, such as petrol, labor costs and landfill space.

Photograph 4.2: RW waste collector at Tunas Mekar waste bank area



*"I used to collect the waste every day with my hand cart. Now, I pick up the waste on average every alternate day. This eases the burden of my work. (Interview with Tunas Mekar RW waste collector, July 2013)*

According to a pull cart collector in households of Tunas Mekar waste bank, the existence of the waste bank decreases waste volume approximately half of hand cart per day. This means in a week the waste bank is can reduce waste collection frequency until 3.5 hand carts. The same situation also occurs in Bumi Lestari waste bank. The waste collection frequency per week in this area is reduced about 3.5 hand carts. Meanwhile, Lintas Winongo waste bank and Surolaras waste bank are approximately able to lower their waste volume until a full hand cart a day. Thus, in a week these waste banks can reduce the waste collection frequency until 7 hand carts. Whereas, Guyub Mulyo waste bank is only able to reduce the waste collection frequency about 2.3 hand carts a week since the waste bank in a day only decreases waste volume around one third of hand cart. While, according to the Asri RW waste collector, the waste collection frequency remains similar as before. This can be explained because the waste bank only absorbs 40 kg waste from all customers. The reduction of waste volume and waste collection frequency for per selected waste banks in detail can be found in the following table.

Table 5.4: Reduction of waste volume per waste bank as estimated by RW waste collectors

Name of waste bank	Reduction in waste volume in a day	Reduction of collection frequency in a week
Lintas winongo	one hand cart	7 hand carts
Tunas mekar	half a hand cart	3.5 hand carts
Bumi Lestari	half a hand cart	3.5 hand carts
Surolaras	one hand cart	7 hand carts
Asri	unchanged	-
Guyub Mulyo	one third a hand cart	2.3 hand carts

### 5.2.2 Social sustainability

In this part, the social sustainability of the selected waste banks will be analyzed by means of the following indicators.

#### *Awareness creation & participation activation*

The selected waste banks attempt to involve all RW<sup>1</sup> households in their activities. Many things are done by waste bank organizers in conducting this effort. Normally, the selected waste banks utilize routine local meetings, as part of RW meeting, RT<sup>2</sup> meeting, PKK<sup>3</sup> meeting and religious meeting to promote and socialize the program. During the meetings, the selected waste bank organizers also provide information on the positive benefits of the waste banks.

All the head of RWs in the selected waste banks are actively involved in the waste banks as customers. By given the right example, this has attracted the interest of many other households at RW level. To create awareness and encourage participation of all households, the selected waste banks undertake various activities which are indicated in the table below.

Table 5.5: Activities in the selected waste banks to stimulate household awareness and active participation

Name of waste bank	Means of the selected waste banks to stimulate awareness and active participation
Lintas winongo	Awareness campaigns through routine meetings of RW, RT, PKK, <i>dasa wisma</i> <sup>4</sup> , tour with customers.
Tunas mekar	Awareness campaigns through routine meetings of RW, RT, PKK, distributing soft drink to all customers on Idul Fitri day <sup>5</sup> .
Bumi Lestari	Awareness campaigns through routine meetings of RW, RT, PKK, and during religious activities.
Surolaras	Awareness campaigns through utilizing the routine meeting of RW, RT, PKK, during religious activities, distribute essential food stuff on Idul Fitri day.
Asri	Awareness campaigns through utilizing the routine meetings of RW, RT, PKK.
Guyub Mulyo	Face to face campaigns on waste bank activities.

In the case of Guyub Mulyo waste bank, it should be mentioned that they started approximately one year ago. Their awareness efforts are mainly conducted by personal contact. They plan however to utilize various local meetings to promote the waste bank activities.

#### *Inclusion of all households*

The selected waste banks are open for the participation of all households. They do not exclude anyone. Moreover, they are very happy if all households are willing to become customers and actively participate in waste bank activities. Due to active promotion the waste bank concept is also spreading to other RW's.

<sup>1</sup> Rukun Warga / Community Group, citizen organization comprising several RTs, supervised by sub district

<sup>2</sup> Rukun Tetangga / Neighbourhood Group, small citizen organization comprising several households, supervised by RW

<sup>3</sup> Pembinaan Kesejahteraan Keluarga / Fostering Family Welfare, citizen organization specially intended for housewives

<sup>4</sup> Group of ten households / smallest administrative unit in RT area

<sup>5</sup> End of Ramadhan celebration

*“Most of our customers are residing in this RW area. We do however also have some customers from other RWs who do not have a waste bank yet. We are very happy. The more customers the better”.*(interview with Surolaras director, June 2013).

### ***Change in waste behavior***

It becomes obvious, while interviewing various waste bank organizers, that households' waste behavior changes after one becomes a waste bank customer. Previously, residents did not appreciate waste. They just threw their garbage without considering its value. Now, they diligently sort their solid waste at home. Frequently, even when they find waste at the road, they will grab it and take it home.

*“I saw the level of household awareness increasing tremendously. It is unbelievable but after meetings, they compete for cardboard leftovers and deposit that waste in our waste bank”.* (Interview with Lintas Winongo Director, June 2013)

An exception is formed by the Asri waste bank. Based on an interview with the waste bank's director, it was indicated that the participation level of households here is still quite low. The director explains that this is mainly due to the high income level of the residents. Those who participate are highly environment conscious. Others are not interested.

### ***Integration of waste pickers***

So far, there are still waste pickers who search for solid waste in all the selected waste bank locations. Since the communities set up the waste banks, the number of the waste pickers reduced. According to the selected waste bank directors, there is no cooperation between the waste banks and the waste pickers. They work on an individual basis and are not organized.

Their relationship is actually not good. The majority of residents object when waste pickers come into their area because they might be dirty the environment. At various RW areas, one finds notice boards with entry restrictions for waste pickers. According to respondents, there were several cases of theft in their RWs for which the waste pickers are held responsible.

*“Waste pickers try get into our RW territory. Sometimes they steal sandals of our residents. They even steal segregated waste bags that we put in front of our houses for the waste bank. Due to their dishonesty, we do not want to invite them for cooperation”.* (interview with Tunas Mekar Director, June 2013)

*“We were almost fighting with waste pickers. We already told them that the waste in the segregated waste bins cannot be taken. They however took the waste. They were stealing our garbage”.* (Interview with Asri Waste Bank administrator, July 2013).

### **5.2.3 Economic sustainability**

The social sustainability of waste bank in this research will be analyzed by means of the following indicators.

**Operating revenues**

The revenue of the selected waste banks derive from profit sharing mechanisms that apply to every customer who deposits waste materials in the waste banks. The percentage of profit sharing varies per waste bank and ranges, from 10% to 50% of the value of the waste deposited by customers. Most of the selected waste banks however apply 10% to 20% for the profit sharing. An exception is in Surolaras waste bank. In this waste bank, two types of profit sharing are adopted. The first one is 10%, for customers who bring waste to the waste bank location. The other one is 50%, for those who want the administrators to pick up waste from their homes. This service is usually used by customers that reside far away from the waste bank.

**Operating expenses**

The operating expenses of the waste banks include the purchase of administration books, account customer’s books, and other cheap equipments. What is interesting is that almost non of the selected waste banks provide a payment to their administrators (tellers and directors). All of them are volunteers, except for the administrator of the Surolaras waste bank. They receive a very small compensation.

*All administrators are paid only IDR 2,500 in every in charge. The amount of money is very small and is not comparable with their time and energy spent. Our motivation is just for cleaner neighborhood. If our intention is money, I am sure we have stopped from this activity. (interview with Surolaras Director, June 2013)*

The others are all volunteers. They are active in the waste banks since they care on an environment.

*Today we do not care about a salary. We are just happy if lots of wastes are brought in. Our motivation is to encourage as much as possible households to sort their waste. (interview with Guyub Mulyo Director, June 2013)*

**Operating surplus**

Due to hardly any monthly expenses, all waste banks so far are able to generate surpluses.

Table 5.6: Financial annual overview per waste bank (period May 2012 - June 2013)

Name of waste bank	Profit sharing	Operating revenues (in IDR)	Operating expenses (in IDR)	Operating surplus (in IDR)
Lintas winongo	10% = waste bank 90% = customers	1,305,700 (€ 93.26)	726,250 (€ 51.88)	579,450 (€ 41.39)
Tunas mekar	10% - 20% = waste bank 80% - 90% = customers	382,300 (€ 27.31)	217,000 (€ 15.50)	165300 (€ 11.81)
Bumi Lestari	10% = waste bank 90% = customers	244,200 (€ 17.44)	-	244,200 (€ 17.44)
Surolaras	•10% = waste bank 90% = customers  •50% = waste bank 50% = customers	1,557,700 (€ 111.26)	778850 (€ 55.63)	778850 (€ 55.63)

Asri	15% = waste bank 85% = customers	72,400 (€5.17)	-	72,398 (€ 5.17)
Guyub Mulyo	15% = waste bank 85% = customers	235,973 (€ 16.86)	-	235,973 (€ 16.86)

Source: The selected waste bank administrators (2013)

Note: €1 = IDR 14,000

Though small amounts, in the context of Indonesia, these amounts mean quite something for people with lower income.

***Dependency on external funding***

Financially, all the waste banks are able to operate independently. There is no dependency on external funding to support their routine activities.

***Reduction of waste handling & collection costs at city level***

Below the author shows the activities of SWM in Yogyakarta Municipality and the budget amounts for each component.

Table 5.7: Operational cost of SWM in Yogyakarta during 2012

Activities	Budget (in IDR)	The percentage of total budget
Street cleaning	2,745,721,093	25 %
Waste transportation	2,217,491,000	20 %
Cost for collecting waste retribution	921,781,900	8 %
Developing waste infrastructure	1,659,745,000	15 %
Maintenance of waste infrastructure	1,255,250,000	11 %
Meetings and SWM awareness creation campaigns at community level	580,378,250	5 %
Landfill sharing cost	1,606,920,000	15 %
<b>Total cost a year</b>	<b>10,987,387,243</b>	<b>100 %</b>
<b>Total cost a month</b>	<b>915,615,604</b>	

Source: EAYM (2013)

In 2012, total solid waste production of Yogyakarta Municipality is 5,015,420 kg/month. Hence, based on the table above, the operational cost of SWM of Yogyakarta:

$$\begin{aligned} \frac{\text{Total SWM operational costs/month}}{\text{Total solid waste production/month}} &= \frac{\text{IDR 915,615,604/month}}{5,015,420 \text{ kg/month}} \\ &= \text{IDR 183/kg of solid waste} \\ &= \text{IDR 183,000/ton of solid waste} \end{aligned}$$

Based on this calculation, each ton of solid waste collected and transported by the Yogyakarta Municipality cost around IDR 183,000 or € 13.1 (€ 1 = IDR 14,000)

We saw previously that the 6 selected waste banks are able to absorb a total of 3.024 tons of waste per month. Below is calculated how much these waste banks reduce the burden of SWM costs in Yogyakarta Municipality approximately:

$$3.024 \text{ tones} \times \text{IDR 183,000} = \text{IDR 553,392/month} = \text{IDR 6,640,704/year} = \text{€ 474.3/year}$$

The total of waste absorbed by all 19 waste banks in Yogyakarta Municipality is 5.593 tons in a month (EAYM, 2013; Author, 2013). If we then calculate the reduction of SWM costs by including the all 19 waste banks in Yogyakarta Municipality, we will have the result as following:

$$5.593 \text{ tons} \times \text{IDR } 183,000 = \text{IDR } 1,023,519/\text{month} = \text{IDR } 12,282,228/\text{year} = \text{€ } 877/\text{year}$$

The reduction of SWM costs by the waste banks can be considered as means to increase the economic efficiency of the city-wide SWM system.

### **5.3 Exploring supportive government mechanisms for waste banks**

In order to enhance the sustainability of community initiative like waste banks, different support mechanisms from various stakeholders are required. To find out what is needed and what is being done in terms in supporting waste banks, the researcher interviews both the selected waste bank directors as well as the local government.

#### **5.3.1 Ensuring environmental sustainability**

##### *The selected waste banks' views*

In terms of environmental sustainability, the director of Lintas Winongo waste bank and Bumi Lestari waste bank recommend the need for strict implementation on SWM by-laws in the field. According to them, sanctions should be enforced against violators.

*"Our regulations are enough. We have Law 18/2008 and Local Law 10/2012. In terms of enforcement of sanctions, there has been no commitment from the local government. For example, if someone is littering waste into the river, he should be fined. As long as that is not enforced, it will be difficult". (Interview with Lintas Winongo Director, June 2013).*

In addition, the director of Lintas Winongo waste bank also highlights the importance of the legal status for a waste bank. The legal status, in his view, makes it easy to collaborate with other stakeholders, such as private companies and NGO's. With the legal status, it would also make a waste bank easier to encourage all households to join waste banks. In order to support for daily operation of the waste bank, the director of Lintas Winongo. Meanwhile the administrator of Asri waste bank recommends the local government to more seriously enforce EPR (Extended Producer Responsibility) rules. According to her, the EPR mechanisms have not been applying well in Indonesia. Very few companies are aware about their responsibility. On the other hand, they are so helped by the existence of waste banks. Lots of waste from private companies are handled in waste bank operations.

In order to support for daily operation, most of waste bank directors recommend for constructing waste warehouses. So far, only Tunas Mekar waste bank that already has its own waste warehouse. Bumi Lestari waste bank is still borrowing a place from RT. While the other four waste banks actually do not have waste warehouse at all. Surolaras waste bank utilize backyard of a mosque as a place to store waste temporarily. Lintas Winongo waste bank still uses backyard of a government office.

*"Our difficulty is a place for storing waste. We are loaned by a mosque but the waste must be transported quickly. We are not allowed to keep the waste more than a day. It would be very troublesome if our recyclable waste buyer*

*cannot come up collect the waste". (Interview with Surolaras Director, June 2013).*

*"Our main obstacle is waste warehouse. We would very worry if the waste buyer cannot come to pick up the waste. This is an office; we are not allowed to store the waste here until tomorrow". (Interview with Lintas Winongo Director, June 2013).*

Whereas, Asri waste bank and Guyub Mulyo waste bank just put solid waste deposited by customers on the directors' terrace house.

*"We do not have a place to store waste. I just put the waste on my terrace house. My house looks not tidy now". (interview with Guyub Mulyo Director, June 2013)*

Photograph 5.3: Terrace house as temporary waste warehouses at Guyub Mulyo waste bank



Source: Author (2013)

In addition, the majority of waste banks recommend for distributing scales. So far, they still borrow the scales from one of their local residents. According to them, these scales are not fit to weigh solid waste since the capacity of such scales is too small. To date, only Surolaras waste bank and Bumi Lestari waste bank that already have their own scales for daily operations.

Photograph 5.4: The director of Tunas Mekar waste bank was weighing waste from a customer



Source: Author (2013)



*“We do not have a scale. This is my personal scale; It is very difficult to weigh large waste. Last year, we were told to fill out the form to scale assistance from the municipality, but until now the scale has not been dropped”. (Interview with Tunas Mekar Director waste bank, June 2013)*

In order to widen the operation of waste bank, Surolaras waste bank specifically recommends the local government for providing them with Tossa (three-wheel motorcycle) to collect glass waste from communities and deliver them to glass waste buyers. The director of Surolaras waste bank argued that much glass waste in communities, but they are difficult to collect it since the waste needs very careful handling. Moreover, the waste bank does not have its own waste warehouse.

### ***The local government's views***

In terms of law enforcement, the Yogyakarta Municipality admits that the enforcement is still very weak, even though there are rules that can be used to fine violators. So far, the municipality often uses persuasive ways rather than applying penalties. In addition, the municipality has shortages personnel to do so.

For the waste bank legal status, so far, Yogyakarta municipality has not been able to fulfill it. The municipality is still not sure exactly who is eligible in providing the licence. The municipality will conduct a discussion further with the Ministry of Environment.

While for the EPR enforcement, the authority is on the central government since mostly producers are located at big cities, such as Jakarta or Surabaya. Hence, the Yogyakarta Municipality does not have an ability to regulate them. The Ministry of Environment however has been trying to impose the EPR policy. According to them, even though the rule has been made, it is quite difficult to implement it in the field. At the central government level itself there is still a debate about such a rule.

*“We have the EPR rule already but we are very weak in the implementation. We, the Ministry of Environment have tried to impose the rule but the Ministry of Industry quickly criticizes it. They worry about the effect of the EPR implementation on investment condition. So, it is still very difficult”. (Interview with the Ministry of Environment Representative, July 2013)*

Related to the waste warehouse, the municipality actually still has a budget that can be used to build the waste warehouse. Waste banks should prepare a piece of land if they need a new waste warehouse. The problem arises when all waste banks are not able to provide such a land. As information, the Yogyakarta Municipality area is very densely populated, therefore, it is so difficult for the communities to seek a vacant land.

Whereas for scales, the municipality will distribute such items at the end of this year for the existing waste banks that do not have scales yet. The Yogyakarta Municipality will also distribute 50 pieces of customer's account books and 70 sets segregated bags for each waste bank. In addition, the municipality will also try to provide Tossa and small hand carts for few waste banks.

### **5.3.2 Ensuring social sustainability**

#### ***The selected waste banks' views***

The selected waste banks are able in mobilizing residents to actively participate in waste bank activities. An exception is in Asri waste bank. Therefore, the director recommends the need for raising SWM awareness for households.

*“Our residents are very difficult to be invited to participate in waste bank activities. We would greatly appreciate if the authorities come down to regularly socialize our households”. (Interview with Asri waste bank director, June 2013)*

In addition, the directors of all the selected waste banks recommend that the Yogyakarta Municipality organize recycled craft training for women. As information, in early 2013 the municipality actually has conducted such training with limited participants. Therefore, the waste banks wish the training can be continued to other participants. Through this training, it is also hoped can stimulate the awareness of women in household waste management.

#### ***The local government's views***

It has been planned that EAYM will carry out household awareness raising activities for each sub-district and some RWs next year. These activities aim to educate residents about the importance of waste management at households and to motivate them to join in waste banks. For this year, the agency will conduct monitoring to all waste banks in the municipality in order to see their development. On this monitoring activity, the agency will try to deal all problems found at the field. In this monitoring, the agency will be accompanied by several directors from well managed waste banks.

Next year, EAYM will also organize training in making recycled craft for women. This training is conducted based on the good feedback from the training participants previously. Some ex-training participants are already able to produce waste handicrafts now, even though the quality is not so good. With this training, it is expected that more women are willing to make handicrafts from waste. Subsequently, they will be more motivated in managing their household waste.

### **5.3.3 Ensuring economic sustainability**

#### ***The selected waste banks' views***

Lintas Winongo waste bank recommends the municipality to support additional capital. The capital, according to the director, will be used to pay waste from customers who typically want immediate cash. In addition, with the capital, the waste bank can attract other households to sell their waste to the waste bank rather than selling them to itinerant buyers. He says one of the reasons such households conducting transaction with itinerant buyers is for cash money.

Like Lintas Winongo waste bank, Guyub Mulyo waste bank also recommends for capital. The money, according to Guyub Mulyo waste bank director, will be used to make a variation in waste bank operation by purchasing daily household needs that can be traded with customers' waste. The system is called as “Waroeng 3R” in Indonesia. While, the other 4 (four) waste banks do not require a capital from the municipality in supporting their activities. They feel that they can operate the waste banks with their own capital.

The directors of the selected waste banks recommend the need for marketing recycled craft products that they have been made. After joining training on making recycled crafts, many waste banks have produced some products. Until now, most of them did not know where to sell such products are.

#### ***The waste buyers' views***

Some waste buyers have problems with the permission of location to operate their business. This as Priyo waste buyer says that he operates his business on the pavement near the Malioboro area. This is totally illegal. The municipality maybe will evict his business in future. Therefore, he recommends that the municipality is willing to give him permanent permission even though he should pay monthly retribution.

Another constraint faced by recyclable waste buyers is the stability of waste material. Frequently, the waste price is unpredictable, consequently they can potentially lose their business. They expect the government is able to intervene on the price stability, thus it can keep them from bankruptcy.

#### ***The local government's views***

Basically, the municipality cannot support assistance in the form of cash, because it will violate the government administration rules. The municipality is only allowed to provide material, such as equipments. Therefore, the municipality cannot fulfill the proposal of Lintas Winongo waste bank and Guyub Mulyo waste banks.

While for marketing recyclable craft products from waste banks, the municipality cannot do that at this moment because of product quality issues. The municipality wishes the communities willing to use the products for their daily use while they continue to increase the quality. Whenever the quality has already met the standards, the municipality promises to actively promote the product. Even, such products will be bought by the municipality itself for distribution to each participant on some training.

In terms of the permission of operating a business on illegal place, the municipality always follows the urban spatial structure rules. The municipality cannot guarantee about the eviction issues. While for waste prices instability, this is the authority of central government. As we know that the changes of price a product is normally caused by supply and demand issues by recycling industries. Meanwhile, mostly recycling industries are located in big cities, such as Jakarta and Surabaya.

### **5.4 Summary**

Environmentally, the selected waste banks are sustainable, with an exception of Asri waste bank. In this waste bank, there are no activities in reusing and recycling either inorganic or organic waste material. Moreover, the waste collection frequency remains the same as before. Socially, in general, the selected waste banks are sustainable. An exception is in the indicator of waste picker integration as they push out the position of the waste pickers from their routine jobs. Besides pushing out waste pickers, the awareness of residents on waste behaviors in the Asri waste bank area is quite low. Economically, all the selected waste banks are sustainable as they are able to generate operating surplus and independent from regular external donors. In addition, the all selected waste banks can decrease the SWM costs in Yogyakarta Municipality.

With regards to supportive government mechanisms for waste banks; in order to improve the environmental sustainability, Lintas Winongo waste bank recommends for enforcing SWM regulations. The waste bank also recommends the need for a legal status, a scale and a waste warehouse. While, Tunas Mekar waste bank only recommends for the distribution of a scale. Bumi Lestari waste bank recommends for enforcing SWM laws and constructing a waste warehouse. Whereas, Asri waste bank recommends for enforcing EPR rules and also constructing of a waste warehouse. Meanwhile, Guyub Mulyo waste bank recommends for a scale and a waste warehouse. In terms of improving the social sustainability, all waste banks recommend the need for organizing further recycled craft training. Whereas, besides the training, Asri waste bank also recommends the municipality for raising residents' awareness on SWM. Meanwhile, in order to improve the economic sustainability, all the selected waste banks recommend the need for promoting recycled craft products. Besides the promoting recycled products, Lintas Winongo and Guyub Mulyo waste bank also recommended for the distribution of additional capital. This capital, by the two waste banks will be used to widen and to make a variation in the waste bank operations.

## CHAPTER SIX CONCLUSIONS AND RECOMMENDATIONS

### 6.1 Introduction

This chapter will answer the research questions posed in chapter one. In addition, the reflections were given upon the insight of the literature in chapter two. At the final part of this chapter, it will be presented also the recommendations in order to contribute the sustainability of waste bank operations in Yogyakarta Municipality.

### 6.2 Answers to research questions

Based on the analysis of the findings, the author draws some conclusions:

#### 6.2.1 How do waste banks in Yogyakarta function and what are the motivations of households to participate in the waste banks activities?

This study reveals that all the selected waste banks only receive inorganic waste material from customers. In their operation, the selected waste banks incorporate an economic value of waste into a community SWM system. The daily activities of the waste banks are as follows; at household level, customers sort an inorganic waste into three groups, namely paper, plastic and metal. The three groups of the waste then are delivered to the waste banks. The waste bank's tellers then record every transaction as quantitative value in the customer's account books. Once the waste is resold to recyclable waste buyers, the tellers then convert the customer's quantitative value to a monetary value. Normally, after a period of time, customers will withdraw the money from the waste banks. In order to cover their operational costs, the waste banks adopt a profit sharing mechanism.

The majority of customers from three social statuses, namely low-income, middle income and high income use an environmental awareness as a main driving force to participate in the waste bank activities.

#### 6.2.2 How sustainable are waste bank operations in the context of the city-wide SWM system in Yogyakarta?

In order to assess the environmental, social and economic sustainability of the selected waste banks, the author analyzed the findings by considering the formulated variables and indicators of sustainability aspect based on the ISWM Model.

Generally, the study reveals that the majority of the selected waste bank operations are sustainable since most of the environmental, social and economic sustainability principles were achieved. An exception is in the Asri waste bank; the Asri waste bank is not sustainable as it failed to fulfill mostly assessment indicators on environmental and social sustainability.

In the context of the city level, the selected waste banks contribute to sustainable SWM system in Yogyakarta since they reduce waste volume disposed by households. This waste reduction has consequences in decreasing the waste handling and collection costs of the Municipality. This cost reductions mean increasing the economic efficiency of the city-wide SWM system.

In more detail, the sustainability of the selected waste banks in the environmental, social and economic aspects can be seen in the matrix below:

Table 6.1: Sustainability outcome matrix

Variables	Indicators	Outcomes					
		Lintas Winongo	Tunas Mekar	Bumi Lestari	Surolaras	Asri	Guyub Mulyo
Environmental sustainability	Inorganic waste reduction	2	1	1	2	1	1
	Extra activities enabling reuse & recycling	1	1	1	1	0	1
	Reduction in waste collection frequency by pull cart collectors	2	1	1	2	0	1
<b>Overall score of the variable</b>		good	fair	fair	good	poor	fair
Social sustainability	Awareness creation & participation activation	2	2	2	2	2	0
	Inclusion of all households	2	2	2	2	2	2
	Change in waste behaviors	2	2	1	2	0	1
	Integration of waste pickers	0	0	0	0	0	0
<b>Overall score of the variable</b>		good	good	fair	good	fair	fair
Economic sustainability	Operating revenues	2	1	1	2	1	1
	Operating expenses	1	1	2	1	2	2
	Operating surplus	2	1	1	2	1	1
	Dependency on external funding	2	2	2	2	2	2
	Reduction of waste handling & collection costs at city level	2	1	1	2	1	1
<b>Overall score of the variable</b>		good	fair	fair	good	fair	fair

Source: Designed by Author (2013) based on sustainable recycling model (Schoot Uiterkamp et al., 2011)

Note: 0 = poor      1 = fair      2 = good

***Environmental sustainability***

Based on the findings, the Lintas Winongo waste bank and the Surolaras waste bank are rated as good in the indicator of inorganic waste reduction since they absorb a high amount of waste from households among all other the waste banks. In a month, the Lintas Winongo and Surolaras waste banks receive 1.1 tones and 1.3 tons of inorganic waste respectively. In terms of extra activities enabling reuse & recycling, all the selected waste banks are ranked as fair since they only recycle inorganic material from householders. In this indicator, the Asri waste bank is rated as poor because it does not promote recycling activities, either inorganic or organic waste material. In the reduction of waste collection frequency indicator, the good rankings are given to the Lintas Winongo and the Surolaras as they decrease the waste collection frequency until 7 hand carts per week. While, the frequency reduction at the other

waste banks is no more than 4 hand carts in a week. Due to no frequency reduction in the waste collection frequency, the Asri waste bank is rated as poor. In general, based on this assessment, the Lintas Winongo and the Surolaras waste banks have good category in environmental sustainability. The Tunas Mekar, Bumi Lestari and Guyub Mulyo waste banks are considered fair. Whereas, the Asri waste bank is categorized poor.

### ***Social sustainability***

In the awareness creation & participation activation indicator, the Guyub Mulyo waste bank is ranked as poor since it only uses personal campaigns rather than using other creative ways. While, the other waste banks regularly utilizes local organization activities in encouraging awareness and participation. These waste banks, therefore, are given a good rate. From inclusive point of view, all the selected waste banks are graded as good category since they are open for the participation of all householders. The household's waste behavior in the Lintas Winongo, the Bumi Lestari and the Surolaras waste banks changes after one becomes a waste bank customer. They now consider waste as a worth thing. They are taking care of waste at household and their surrounding neighborhood. Therefore, the researcher ranks these waste banks good for this indicator. Meanwhile, the author categorizes the waste bank of Bumi Lestari and Guyub Mulyo fair because most of the customers only consider waste at their own household. Whereas, a poor classification is given to the Asri waste bank as the level of the customer participation on household waste management is still quite low. All the selected waste banks object to collaborate with waste pickers. They work on an individual basis. Consequently, the researcher ranks all the selected waste banks poor. Overall, the Lintas Winongo, the Tunas Mekar and Surolaras are categorized good in this variable, whereas the other the selected waste banks are considered fair.

### ***Economic sustainability***

The Lintas Winongo and the Surolaras waste bank are rated good as they generate high monthly revenue rather than the other waste banks. So far, the Lintas Winongo and the Surolaras waste bank have generated operating revenue more than IDR 1.3 million. Meanwhile, the other waste banks are less than IDR 0.4 million. The researcher hence grades fair for the other waste banks. Because of no operating expenses, we classify the Bumi Lestari, the Asri and the Guyub Mulyo waste bank good for this indicator. On the other hand, a fair rate is provided to the other waste banks. In terms of operating surplus indicator, good rankings are for the Lintas Winongo and the Surolaras waste bank since they generate high surplus, more than IDR 0.5 million, compared to the other waste banks. The researcher, therefore, gives a fair rate for the other waste banks. Since all the selected waste banks are independent on regular external funding, we provide good rate for all the waste banks. As the consequence of high waste absorbed by the Lintas Winongo and Surolaras waste bank, they are able to reduce waste handling and collection costs at the city level. Thus, the researcher rates good for these waste banks and a fair grade for the others. In general, based upon the above analysis, the researcher categorizes the Lintas Winongo and the Surolaras waste bank good in the economic sustainability variable. Meanwhile, the other waste banks are fair.

### **6.2.3 How can the sustainability of waste bank operations be improved in Yogyakarta?**

To improve the environmental sustainability, Lintas Winongo waste bank recommended the need for enforcement of the SWM regulation. The waste bank also hoped the municipality can provide a legal status, a scale and a waste warehouse for the waste banks. While, Tunas Mekar waste bank only recommended for the distribution of a scale. Bumi Lestari waste bank recommended for the enforcement of SWM regulation and the construction of waste warehouse. Meanwhile, Asri waste bank recommended the enforcement of EPR rules and the construction of waste warehouse. Whereas, Guyub Mulyo waste bank recommended for a scale and waste warehouse.

In terms of improving the social sustainability, all the selected waste banks recommended that the municipality should provide further recycled craft training. Meanwhile, besides the recycled craft training, Asri waste bank also recommended the municipality to conduct raising awareness campaigns on SWM for their households.

Meanwhile, to improve the economic sustainability, all waste banks recommended that the municipality should market waste banks' recycled craft products. Besides promoting recycled craft products, Lintas Winongo and Guyub Mulyo waste bank also recommended for the distribution of additional capital. This capital, by the two waste banks will be used to widen and to make a variation in the operation of the waste banks.

### **6.3 Reflections on the Literature**

In chapter two, the author has reviewed literatures on sustainable SWM based on ISWM model. In order to enrich the existing knowledge in the literatures, some case studies have also been analyzed. This review activity has enabled the construction of the conceptual framework as the basis for this study.

Imran et al. (2008) notes that an environmentally sustainable solid waste system entails activities that can minimize the environmental destruction from any solid waste pollution. While, a socially sustainable solid waste system means that the system provides access to services for everyone as well as enlarges public awareness and participation in obtaining SWM goals. Meanwhile, SWM is economically sustainable if the system can finance the activities without depending on external donors.

Environmentally, the research findings are in agreement with Imran's (2008) perspective. The study shows that the selected waste banks are able to reduce solid waste disposed by households. Therefore, the operation of the selected waste banks can reduce also the waste transported to the landfill. By decreasing solid waste in the landfill, this means that the operations of the selected waste banks are able to contribute in avoiding any waste pollution in the landfill. Moreover, the reduction of transportation the solid waste to the landfill can also contribute to prevent the air pollution from CO<sub>2</sub> emitted by waste trucks.

Concerning the socially sustainable SWM system, the findings reveal that in general system of the selected waste banks is also in agreement with that of Imran et al (2008) who indicate that the system should be including all households as well as raising their public awareness. The study shows that the selected waste banks are open for all household participation. This means that every resident can join as a customer in the waste bank activities. In terms of raising public awareness, Asri waste banks cannot fulfill this criterion. While, the other selected waste banks are able to increase the household awareness on SWM behaviors.



Whereas, concerning the economically aspects, the operation of the selected waste banks are appropriate with Imran's (2008) perspective. In their activities, the selected waste banks are able to finance themselves without depending on regular funds from external donors. This is because the selected waste banks are operated on a voluntary basis. This means that all the waste banks do not provide fees for the directors and tellers. The operating expenses are only for photo copy, buying customers' account books or just buying other cheap equipments. Therefore, almost no monthly expenses are paid by the selected waste banks.

Klundert (2000) says that sustainable SWM should be "appropriate to the local conditions". The study findings are in agreement with this statement. The selected waste banks have operated their activities in accordance to the local situation. This has been proved that the selected waste banks have formulated their own administration ways rather than following the complicated operation standard from the Ministry of Environment. In addition, all waste banks in Yogyakarta also operate their activities at RW level. This is not relevant to the ministry standard since the ministry argue that the waste bank should be operated at sub-district level. The customers of the waste banks in Yogyakarta can easily reach the waste bank's location if the waste banks are operated at the lower level.

Sometimes low participation of households can also be induced by households' waste behaviour. Quite often households' waste behavior opposes the principle of effective waste management (Anschütz and Consultants, 1996; Subash, 2006). This statement is in agreement with the findings. Since all the residents in Asri waste banks are rich people, they do not aware about taking care of household waste. They just throw away the waste into a waste hand cart rather than sorting them into organic and inorganic group. This unacceptable behavior affects to the level of household participation in this RW area. So far, it is recorded that the waste bank only has 11 customers.

With the increase of community activities in SWM, sometimes the waste activities conducted by community groups and waste pickers are quite similar. If they are not managed well, the community activities in SWM can potentially occupy the activities of waste pickers. (Poerbo, 1991). The research findings are in agreement with this literature. The activity of informal waste pickers was pushed out since communities in Yogyakarta established the selected waste banks. All the selected waste banks do not incorporate the waste pickers in their activities. Some the selected waste banks also note that the number of waste pickers operating in their place is being reduced. This is because many households have already managed their inorganic waste to be deposited into the waste banks

According to Ali and Snel (1999) the lack of facilities and equipments remains a problem for community participation in SWM. This is true. The research findings reveal that the majority of the selected waste banks has a problem in placing their waste collected from customers. This is since mostly the selected waste banks do not have their own waste warehouse. In order to put their waste, the selected waste banks just place the waste in directors' terrace or put them at the backyard of a mosque. Besides the waste warehouses, the majority of the selected waste banks also do not have scales to weigh the waste deposited from their customers. So far, they still borrow the equipment from one of the local residents.

Community SWM have a potential to reduce the amount of waste disposed to landfill. Thus, besides reducing the frequency of waste transportation, it can also reduce labor expenses spent by the government. Hence, it can save the waste management budget (Atienza, 2008). The findings are an appropriate with the literature. So far, the selected waste banks have been

able to absorb solid waste from their customers. This waste absorption diminishes the household solid waste that to be transported to the landfill. Therefore, Yogyakarta Municipality benefits with this situation. In one hand, the municipality can reduce a frequency of the waste transportation and the workers. On the other hand, the municipality also benefits in reducing the landfill sharing cost. Consequently, the two advantages can save the budget of the municipality on SWM. The study finding reveals that the selected waste banks are able to reduce the municipality expenses on SWM around IDR 6,811,620/year.

SWM activities are in general heavily under-financed. In order to deal with the limited waste service revenues, municipalities normally receive subsidies from the city's general revenues or transfers from the central government (Coffey and Coad, 2010; Marshall and Farahbakhsh, 2013). This literature is in agreement with the study findings. EAYM as the agency that has full authority in SWM is facing a quite similar problem. So far, the revenue from waste retribution is too small to accommodate the municipality expenses in SWM. From the secondary data of EAYM, the revenue of the waste retribution can only contribute to 18% out of the total municipality SWM expenses. Meanwhile, the rest of the costs are subsidized by the local government budget and also the central government budget.

According to Rogers (2003) local leaders have abilities to influence households to participate in community activities. This theory is also in agreement with the study findings. In Guyub Mulyo waste bank, some households participate in the activity of the waste bank because of the active provocation of its waste bank director. From questionnaires distributed to 15 customers, 10% customers of Guyub Mulyo waste bank say that they participate in the activity of the waste bank due to stipulation of the director.

Community activities in SWM are more social than profit. Therefore, in conducting activities, the community often relies on donors rather than impose a reasonable cost to service users. (Anschütz and Consultants, 1996; Mongkolnchaiarunya, 2005). The research findings differ from the theory. Even though the selected waste banks are operated based on a voluntary basis, the waste banks are able to sustain themselves without depending on external donors. The selected waste banks have adopted a profit sharing system that able to cover all the operational expenses. Moreover, with the revenue from the profit sharing scheme, the selected waste banks are also able to generate an operating surplus in their financial situation.

What is a much more interesting discussion is the facts that the economic value of waste, which previously was only taken seriously by the (informal and formal) private sector and not by the government, is by means of the phenomenon waste banks also catching ground in civil society. The economic value at the moment, households bring the waste to waste banks, waste banks sell to waste buyers, so waste pickers and itinerant buyers are out as a consequence. If waste banks increasing the capacity, they might be even be able to sell waste directly to wholesalers or the recycling industries.

#### **6.4 Recommendations**

Given that some operations of the selected waste banks are not sustainable, the author proposes the following recommendations:

##### ***Environmental sustainability***

##### **Providing sufficient equipments and facilities for waste bank operations**

In order to make the operation of waste banks is more sustainable, it is needed to provide them with sufficient equipments and facilities. Most of the selected waste banks are facing

difficulties in providing a piece of land for constructing waste warehouses. To solve the problem, the municipality can allocate a budget for the land acquisition process from one of the local residents. In doing this effort effectively, the municipality can coordinate with the local land agency.

### **Strengthening the implementation of SWM regulation**

To make a SWM plan to work, it should be supported by legislative measures. The municipality can enforce households to separate their waste and implement strict law enforcement to the households that still dispose their waste illegally into a river. To deal with the personnel shortages, the Municipality can recruit new employees or just shift some personnel from other divisions. The Municipality also needs to avail the law enforcement personnel with standard skill and knowledge in enforcing the law.

### *Social sustainability*

#### **Raising household's awareness on SWM issues**

There is a need to deliberately involve households on waste bank operations. The households are the major source of waste producers in Yogyakarta Municipality. The municipality has a chance to reduce more waste to be transported to the landfill by involving more households in the waste bank activities. This research finding reveals that the majority of motivations of households to participate in waste bank activities are due to awareness on SWM issues. Therefore, by raising the awareness of households on that issue, logically the municipality can easily persuade them to participate in waste bank activities. The municipality can do this by delivering SWM awareness campaigns on a regular basis to households.

#### **Empowering women in SWM**

It is recognized that mostly participants in waste bank activities are women. In order to improve such participations, the municipality can conduct more training related to household waste management, such as recycled craft product from inorganic waste material. Therefore, households have the possibility also to get an extra income from the recycled waste products. On the other hand, through this recycling waste training, it can be used by the municipality as one effort to raise an awareness of women towards taking care of inorganic waste in households.

#### **Integrating waste pickers in waste bank operations**

So far, there is no cooperation between waste banks in Yogyakarta and informal waste pickers. Both of them actually are conducting the same activities, namely collecting the inorganic waste to be sold to waste banks or to waste buyers. The establishing many waste banks has pushed out the waste pickers' position from their job or at least reducing the waste collected by the waste pickers. The municipality should be aware about this. The municipality should find a creative way to incorporate such waste pickers in the operation of waste banks, such as inviting the waste pickers to be customers of the waste banks or just giving the waste pickers a capital so that they can buy waste collected from the waste banks.

### *Economic sustainability*

#### **Promoting recycled craft product of waste banks**

So far, many waste banks have produced recycled craft products. In order to generate an economic value, the products should be sold to customers. Unfortunately, the waste banks are still facing difficulties in creating the market. The municipality has to aware about this problem. Besides creating a recycled craft market, this promoting effort can also be used by the municipality as away to appreciate the waste banks in recycling these waste materials.

The municipality can facilitate the promoting of the products by organizing several local recycled craft exhibitions.

#### **Mobilizing financial resources from CSR programs of private sectors**

In many cases, the waste banks require an additional capital to improve their economic sustainability or to extend the operation of the waste banks. Sometimes, the municipality has a lack of budgets. To deal this condition, the municipality can try to encourage the active participation of private sectors through their CSR programs. In Law 18/2008 on SWM, it has already stated that the private sectors should be responsible about their waste produced. Therefore, the municipality legally has a right to mobilize financial resources from private sectors to support the waste bank activities.

#### **6.5 An area for future research**

The researcher admits and accentuates that this study is not rigorous, and it does not entirely address ISWM aspects. The researcher, therefore, highly encourages the future research to focus on consequences of the growth of waste banks to waste pickers and itinerant buyers.

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## Annexes

### INTERVIEW GUIDE FOR WASTE BANK DIRECTORS

Name of the waste bank :

Location of the waste bank :

#### A. Waste bank operations, management and linkages

1. What is history for the waste bank establishment? (when, how, why its establishment?)
2. Who were the initiators?
3. How much time does it take you?
4. Who are involved in the organization?
5. What are motivations for the waste bank establishment?
6. How is your waste bank's daily operation?
7. What kind of SWM services does the waste bank provide?
8. What kind of facilities does the waste bank use for these services?
9. Where do you store the waste? For how long? When picked up? By whom?
10. How do you set up the price of waste?
11. How do you finance your waste bank's administration?
12. How do you pay your volunteers?
13. What types of waste are received and how they are handled in the waste bank?
14. Have you considered to also do something with organic waste (like composting)?
15. Who are the waste bank customers? How many costumers does the waste bank have? which area do the waste bank's customers come from?
16. How are the waste bank relationships with other waste banks, the local government and recyclable waste buyers?

#### B. The sustainability of the waste bank

##### *Environmental sustainability*

17. How much waste from different types does the waste bank absorb from customers every month?
18. Does the waste bank promote (awareness and advertising) reuse & recycle? in what way?
19. How did you motivate participants? What other awareness does the waste bank conduct?
20. Is the waste bank able to reduce the frequency of waste collection by the municipality? to what extent?

##### *Social sustainability*

21. Are households aware and willing to participate in 3 R's?
22. Does the waste bank empower households to participate in 3R's? What is the role of local leaders & local institutions? In what way? How? How often? How dealing with non participants?
23. How is the position of gender in the waste bank's administration and participants?
24. Does the waste bank offer services to all households regardless of income level?
25. Are there waste pickers in your area being pushed out?

##### *Economic sustainability*

26. What are the resources needed to establish and to operate the waste bank?
27. How does the waste bank obtain the resources purely from tales?



28. Which the percentage of the tale is kept for running the waste bank?
29. What are the average incomes of the waste bank from the profit sharing system?
30. What are the average operating expenses of the waste bank?
31. Is the waste bank able to cover the operational expenses from the profit sharing system?
32. Does the waste bank receive (regular) funds from external funding agencies? From whom?

**C. Government mechanisms to support the waste bank to sustainable SWM**

***Ensuring environmental sustainability***

33. What type of support would you appreciate from the local government? And why?
34. What regulations should be initiated by the local government to support the operation of your waste bank?
35. What facilities & equipments should be provided by the local government to support the operation of the waste bank in a sustainable manner?

***Ensuring social sustainability***

36. What should the local government do to raise the capacity of the waste bank's personnel?
37. What should the local government do to raise the awareness of households in 3R's?
38. What should the local government do to empower women in 3R's?
39. What should the government do to involve waste pickers in the waste bank's activities?

***Ensuring economic sustainability***

40. What should the local government do to support the waste bank's finance?
41. What should the local government do to develop recyclable waste market?

**INTERVIEW GUIDE FOR THE LOCAL GOVERNMENT**  
**(Cleanliness division, Capacity Building division, Solid Waste Recycling section)**

Position :  
Department :

**A. General information**

1. Are the local government officers aware of the existence of waste banks in this city?
2. Do you feel that waste banks reduce the burden of the local government in managing urban waste? To what extent? And why?
3. If yes, what is your opinion?
4. What are their contributions?
5. What are the problems waste banks' faced?
6. Does waste banks fit/ match with the waste collection service of the local government?
7. How much waste do you collect?
8. Has the tonnage of waste to be collected in the area where waste banks operate come down in the last years?
9. How much costs one ton of waste collection & treatment?

**B. Government mechanism**

***Ensuring environmental sustainability***

10. What regulations can the local government initiate to support the operation of waste banks?
11. What can the local government do to support the operation of waste banks?

***Ensuring social sustainability***

12. What can the local government do to raise the awareness of households in 3R's?
13. What can the local government do to raise the capacity of waste banks' personnel?
14. What can the local government do to empower women in 3R's?
15. What can the government do to involve waste pickers in waste banks' activities?

***Ensuring economic sustainability***

16. What can the local government do to support waste banks' finance?
17. What can the local government do to develop recyclable waste market?

**INTERVIEW GUIDE FOR THE MINISTRY OF ENVIRONMENT  
REPRESENTATIVES**

Position :  
Department :

1. Since when did the Ministry of Environment operate the waste bank program?
2. How did the Ministry of Environment get an idea about the waste bank program?
3. For whom is the waste bank program?
4. How does the Ministry of Environment socialize the waste bank program?
5. How does the Ministry of Environment manage the waste bank program?
6. What are the motivations of the Ministry of Environment to operate the waste bank program?
7. What challenges does the Ministry of Environment encounter in operating the waste bank program?
8. How does the Ministry of Environment coordinate with local governments in operating the waste bank program?
9. What has been done by the Ministry of Environment in operating the waste bank program?
10. What has been done by the Ministry of Environment in operating the waste bank program in Yogyakarta?
11. What will be done by the Ministry of Environment to operate the waste bank program in future?

## **INTERVIEW GUIDE FOR RW WASTE COLLECTORS**

Name of RW :

Name of waste bank :

1. Since when did you collect and transport waste from households?
2. How do you collect and transport waste from households?
3. Where are your operations?
4. Where does the waste come from?
5. Where does the waste go?
6. What type of waste do you collect and transport?
7. What challenges do you encounter in your operations?
8. How much waste do you collect and transport from households in the last five years?
9. Roughly how much is waste reduction to be collected and transported before and after the existence of waste banks?
10. What benefits is the existence of waste bank for your task?

## INTERVIEW GUIDE FOR WASTE BUYERS

Position :  
Name of the recyclable waste buyer :

### **A. Government mechanisms to ensure economic sustainability of waste banks (developing recyclable waste market)**

1. How did you know the existence of waste banks in Yogyakarta?
2. How do you conduct transaction with the waste banks?
3. Did they come to your place or did you go to them in doing waste transaction?
4. With how many waste banks do you conduct transaction?
5. Since when did you conduct waste transaction with waste banks?
6. Why do you conduct transaction with waste banks?
7. How much waste do you buy from waste banks every month?
8. How much is the percentage of waste banks' waste of your total waste that you handle?
9. How do you determine the price?
10. Where are your operations?
11. Where does the waste come from? (backward linkages)
12. Where does the waste go? (forward linkages)
13. Are you registered? (formally)
14. Do you get supports from the local government?
15. What difficulties do you face in conducting transaction with waste banks?
16. What should the local government do to success waste trading between waste recyclable buyers and waste banks?

## **INTERVIEW GUIDE FOR THE SELECTED WASTE BANK CUSTOMERS**

Name of waste bank :

Income status of the customer:

1. How did you know about the waste bank?
2. Since when did you participate in the waste bank activities?
3. Who invited you to participate in the waste bank activities?
4. How did you involve in the waste bank activities?
5. What services are offered by the waste bank?
6. What type of waste do you deposit to the waste bank?
7. Where do you store the waste before delivering it to the waste bank?
8. How much waste in average do you deliver to the waste bank in a month?
9. Roughly how much is your daily waste reduction to be disposed to a hand cart after becoming a waste bank customer?
10. How far is your home from the waste bank?
11. How do you transport to the waste bank?
12. What is your motivation to participate in waste bank activities?
13. How much monthly income do you get from saving waste in the waste bank?
14. What benefits is waste bank for your neighborhood?
15. What challenges do you encounter in participating in waste bank activities?

## QUESTIONNAIRE FOR WASTE BANK CUSTOMERS

Dear respondent,

This questionnaire is a bigger research on solid waste projects by a master's thesis at the Institute of Housing and Urban Development Studies, Erasmus University in Rotterdam, The Netherlands entitled "Sustainable Community Waste Activities: The case of waste banks in Yogyakarta". We greatly appreciate your inputs in this survey. All your information will be treated confidentially and will be used for academic purpose only.

*Please answer the questions that indicate an opinion you agree with.*

Gender :  Male  Female  
Age : .....

Education level :  Primary school  Middle school  
 High school  University

Occupation :  Formal  Informal

1. How many family members do you have?

- I live alone  3  Others (please specify) ...  
 2  4

2. What is your montly income?

- Less than Rp 1,000,000  Rp 2,000,000 – Rp 3,000,000  
 Rp 1,000,000 – Rp 2,000,000  Rp 3,000,000 – Rp 4,000,000  
 More than Rp 4,000,000

3. How long do you participate in the waste bank's activities?

- Less than 1 year  2 - 3 years  More than 4 years  
 1 - 2 years  3 - 4 years

4. How did you know about the waste bank?

- From waste bank's socialization  
 From community leaders (RW head, religious leaders, etc)  
 From local institutions (youth group, women group, etc)  
 From neighbours  
 By myself  
 Others (please specify) ...

5. What services are offered by the waste bank?

- Provision of segregated waste bag/bins  
 Door-to-door inorganic waste collection services  
 Awareness campaign  
 Training on waste recycling  
 Others (please specify) ...

6. Do you have a sufficient space to store the waste before delivering it to the waste bank?

- Yes  No

7. Where do you store the waste?
- Putting the waste in segregated bag at my yard
  - Putting the waste in segregated bag in my house
  - Putting mixed waste in a bag at my yard
  - Putting mixed waste in a bag in my house
  - Others (please specify) ...
8. Why do you participate in the waste bank's activities?
- It brings me an extra income
  - Due to awareness for protecting an environment to be healthy and clean
  - I want to contribute in my neighborhood's activities
  - Since the issue of waste bank is becoming a trend
  - Because everyone participates in the waste banks' activities (social pressure)
  - Because RW head and community leaders encourage us to participate in the waste bank
  - Others (please specify) ...
9. In your opinion, what contributions/benefits does the waste bank provide to your neighborhood?
- Cleaner neighborhood
  - Additional income for costumers
  - Raising awareness of households on waste issues
  - Reducing waste collection frequency by the local government
  - Others (please specify) ...
10. How much waste that you bring to the waste bank per month is?
- |   |  |  |
|---|--|--|
| <input type="checkbox"/> Less than 1 kg | <input type="checkbox"/> 2 kgs – 3 kgs | <input type="checkbox"/> More than 4 kgs |
| <input type="checkbox"/> 1 kg – 2 kgs   | <input type="checkbox"/> 3 kgs – 4 kgs |  |
11. What types of waste that you bring to the waste bank are? (may more than one)
- |                                  |                                |  |
|----------------------------------|--------------------------------|--|
| <input type="checkbox"/> paper   | <input type="checkbox"/> cans  | <input type="checkbox"/> glass                       |
| <input type="checkbox"/> plastic | <input type="checkbox"/> metal | <input type="checkbox"/> others (please specify) ... |
12. How much money do you get on average per month from saving waste in the waste bank?
- |  |  |  |
|--|--|--|
| <input type="checkbox"/> Less than Rp 5,000  | <input type="checkbox"/> Rp 11,000 – Rp 15,000 | <input type="checkbox"/> More than Rp 20,000 |
| <input type="checkbox"/> Rp 5000 – Rp 10,000 | <input type="checkbox"/> Rp 16,000 – Rp 20,000 |  |
13. How far is your home from the waste bank?
- |  |  |  |
|--|--|--|
| <input type="checkbox"/> Less than 100 m | <input type="checkbox"/> 200 m – 300 m | <input type="checkbox"/> More than 400 m |
| <input type="checkbox"/> 100 m – 200 m   | <input type="checkbox"/> 300 m - 400 m |  |
14. How do you transport to the waste bank?
- |                                     |  |  |
|-------------------------------------|--|--|
| <input type="checkbox"/> By walking | <input type="checkbox"/> By motorcycle | <input type="checkbox"/> By public transport |
| <input type="checkbox"/> By biking  | <input type="checkbox"/> By car        |  |



15. Which household members take care of waste segregation in your house? (may more than one)
- |                                  |                                    |  |
|----------------------------------|------------------------------------|--|
| <input type="checkbox"/> Husband | <input type="checkbox"/> sons      | <input type="checkbox"/> Maid                        |
| <input type="checkbox"/> Wife    | <input type="checkbox"/> daughters | <input type="checkbox"/> Others (please specify) ... |
16. Who brings the waste to the waste bank? (may more than one)
- |                                  |                                    |  |
|----------------------------------|------------------------------------|--|
| <input type="checkbox"/> Husband | <input type="checkbox"/> sons      | <input type="checkbox"/> Maid                        |
| <input type="checkbox"/> Wife    | <input type="checkbox"/> daughters | <input type="checkbox"/> others (please specify) ... |
17. Are many households in your neighborhood participate in the waste bank's activities?
- Yes                       No
18. In your opinion, why are some / others not participating in the waste bank's activities?
- Time consuming
  - Lack of awareness
  - The system is complicated
  - The profit is too small
  - The location of the waste bank is too far
  - Others (please specify) ...
19. What should be done to motivate them?
- Conducting socialization
  - Increasing the role of local leaders
  - Increasing the role of local institutions
  - Implementing incentive/disincentive mechanisms
  - Forced by rules
  - Others (please specify) ...

**THE SCHEDULE OF ACTIVITIES**

ACTIVITY	MAY				JUNE				JULY				AUGUST				SEPTEMBER			
	Weeks				Weeks				Weeks				Weeks				Weeks			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
▪ Research Design & Presentation																				
▪ Design of Interview guides																				
▪ Questionnaires																				
▪ Colloquium 3																				
▪ Submission of final research proposal Chapter 3																				
▪ Departure for Indonesia																				
▪ Grand tour/ Reconnaissance Survey																				
▪ Conducting in-depth Interviews with 4 waste bank directors																				
▪ Survey 17 costumers																				
▪ Conducting in-depth Interviews with 3 waste bank directors																				
▪ Survey 17 costumers																				
▪ Conducting In-depth interviews with 6 recyclable waste buyers																				
▪ Survey 16 costumers																				
▪ Conducting in-depth Interviews with 8 selected customers																				
▪ Conducting in-depth Interviews with 6 RW waste collectors																				
▪ Conducting in-depth interviews with 5 Environment Agency officials																				
▪ Conducting in-depth interviews with 2 The Ministry of Environment representatives																				
▪ Analysis																				
▪ Cross checking Information gaps																				
▪ Identification & Data Analysis Introductory Data																				
▪ Data Processing coding text into groups																				
• Data Analysis & Presentation of Findings																				
• Improve research findings																				
• Colloquium 4																				
• Conclusion & Summary of thesis																				
• Submission of draft thesis																				
• Submission of final thesis																				

