

DVST 9118: INTERNATIONAL DEVELOPMENT RESEARCH THESIS (18 UNIT)

WHO OWNS THE WASTE?

**The Implementation of Integrated Solid Waste Management (ISWM)
and waste pickers marginalisation in Indonesia**

Savitri Woelandari

Student ID: 2140306

Master of International Development

School of History and International Relations

Flinders University

DECLARATION OF ORIGINAL WORK

I certify that this thesis contains no material which has been accepted for any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text.

Adelaide, 5 August 2016

Savitri Woelandari

CONTENTS

DECLARATION OF ORIGINAL WORK	I
LIST OF FIGURES AND TABLES	IV
ABSTRACT	V
ACKNOWLEDGEMENT	VI
LIST OF ABBREVIATIONS	VII
CHAPTER 1 INTRODUCTION	1
BACKGROUND AND JUSTIFICATION	1
RESEARCH QUESTION	5
RESEARCH SIGNIFICANCE.....	5
RESEARCH APPROACH	6
<i>Research design</i>	6
<i>Methodology</i>	6
LIMITATION	7
RESEARCH STRUCTURE.....	8
CHAPTER 2 LITERATURE REVIEW	10
ISWM IN DEVELOPING COUNTRIES	10
INFORMAL ECONOMY (IE) IN DEVELOPING COUNTRIES.....	16
FRAMING THE POVERTY USING CAPABILITY APPROACH.....	19
CONCLUSION	24
SOLID WASTE AND SOLID WASTE MANAGEMENT IN INDONESIA.....	26
ISWM IN INDONESIA	28
ISWM'S ENDOWMENTS TOWARDS INDONESIA WASTE MANAGEMENT SYSTEM.....	32
<i>ISWM as Justification of development success</i>	32
<i>Gaining Access to International Aid</i>	34
<i>Instant resolution for waste problem in urban areas</i>	36
CHALLENGE TOWARDS THE ENACTMENT OF ISWM	38
<i>Aid dependency, threatening the tenability of ISWM</i>	38
<i>Local actor being marginalised</i>	40
<i>Technology Fantasy</i>	41
CONCLUSION.....	44
CHAPTER 4 WASTE PICKERS AND RECYCLING IN INDONESIA	46
INDONESIAN WASTE PICKERS	46
<i>Waste picker organisation</i>	50
<i>Government policies toward waste pickers</i>	50
RECYCLING INDUSTRY.....	53
<i>The growth and contribution of recycling</i>	54
<i>The structure of Recycling Industry</i>	55
MAPPING THE WELLBEING OF INDONESIAN WASTE PICKERS	57
<i>Economic Capability</i>	58
<i>Human Capability</i>	59
<i>Socio-Cultural Capability</i>	61
<i>Political Capability</i>	61
<i>Protective Capability</i>	62
CONCLUSION.....	63
CHAPTER 5 TOWARD WASTE PICKER INTEGRATION	65
WASTE PICKER INTEGRATION.....	66
CASE STUDIES.....	67
<i>Waste Pickers Integration in Pune India</i>	67
<i>Waste pickers integration in Brazil</i>	71
PROPOSING WASTE PICKER INTEGRATION IN INDONESIA.....	75

CONCLUSION.....	79
CHAPTER 6 CONCLUSION.....	80

LIST OF FIGURES AND TABLES

LIST OF FIGURES

FIGURE 1. INTEGRATED SOLID WASTE MANAGEMENT (ISWM)	11
FIGURE 2. CAPABILITY APPROACH FRAMEWORK	21
FIGURE 3. WASTE AND POPULATION GROWTH IN INDONESIA 2008 - 2014	27
FIGURE 4. WASTE COMPOSITION, SOURCE AND HANDLING IN INDONESIA.....	28
FIGURE 5. THE SHIFTING OF SOLID WASTE MANAGEMENT PARADIGM IN INDONESIA	29
FIGURE 6. THE BUDGET SOURCE COMPOSITION ON ISWM PROJECT IN INDONESIA IN THE PERIOD OF 2006 - 2019.....	35
FIGURE 7. THE RECYCLING INDUSTRY STRUCTURE IN INDONESIA	55
FIGURE 8 : A REPRESENTATION OF THE WELLBEING OF INDONESIAN WASTE PICKERS BASED ON THE COMPONENTS OF THE CAPABILITY APPROACH. (A DETAILED DISCUSSION IS PRESENTED BELOW).....	57

LIST OF TABLES

TABLE 1. THE DEMOGRAPHIC OF WASTE PICKERS IN INDONESIA 2008.....	48
--	----

ABSTRACT

This study aims to bridge the gap between knowledge and policy at the nexus of modernisation of solid waste management, ISWM, and waste picker wellbeing in Indonesia. This research has been motivated by four research questions; (1) How is the modern ISWM implemented in Indonesia? (2) To what extent does ISWM unintentionally increase waste pickers' vulnerability? (3) How is the waste pickers' wellbeing perceived in Indonesia? (4) In what ways can waste pickers be included in ISWM practice in Indonesia? In answering the research questions, this study reviews the literature of ISWM as well as debates the issues at the practical level. First, it examines informal economic and capability approaches as a theoretical basis in determining that waste pickers are part of the poor in Indonesian society. The scholarly articles, government reports, grey literatures from national and international development organisations and newspaper articles, demonstrating the link between ISWM and waste picker wellbeing, have been used as the main sources of data and analysis. The findings of this thesis show ISWM appears to make a limited contribution to waste management provision in Indonesia. In addition, the findings show that ISWM goes beyond matters of waste management, as its systems rely on modern technology and privatisation, causing negative impacts on the wellbeing of waste pickers, the precursors of waste processing. Lastly, in accord with broader literature, this thesis supports a scheme of waste picker integration as a potential strategy to improve waste management provision and reduce poverty in Indonesia.

ACKNOWLEDGEMENT

I would never have been able to complete my thesis without support from a number of people.

First, I would like to thank to Australia Awards Scholarship (AAS) for granting me the opportunity to pursue this study.

My deepest gratitude goes to my supervisor Dr. Priyambudi Sulistiyanto for his continuous trust, support, encouragement, and valuable feedback throughout my writing. Many thanks to Valda Davey, my thesis editor.

I would like to thank my home institution, Pusat Pengendalian Pembangunan Ekoregion Jawa, Ministry of Environmental and Forestry Affairs, for giving me a chance to study in Adelaide. Also, many thanks for my friends in PPEJ and KLHK Jakarta, especially mbak Uut, mas Aan, mas shodiq, mas Aji, mas Widi, Pak Setyo, and Pak Uso.

In Adelaide, I have found 'new' brothers and sisters who have always been supportive and willing to engage in discussion (special thanks to *mbak* Andri, *mbak* Astrid, *mas* lilik, *mas* greg, *mas* yanto *mbak* Zulfa, *mbak* Nismah, *mbak* Alice, *mbak* Ika, and *Mbak* Sari). Also, the Sefyang family for sharing the Australia culture.

I would like to thank to my parents and family for their blessing and prayers which I believe has brought me this far.

Lastly, Pascalis Pramantya, my husband for his never-ending support and my lovely pumpkin and cutie pie 'Ken and Mirah' for your unconditional love.

LIST OF ABBREVIATIONS

3Rs	:	Reduce-Reuse-Recycle
ADB	:	Asian Development Bank
ASEAN	:	Association of South East Asia Nations
Bappenas	:	<i>Badan Perencanaan Pembangunan Nasional</i> (Ministry of National Development Planning/National development Planning Agency)
BPS	:	<i>Biro Pusat Statistik</i> (Statistic Indonesia Board)
BSWP	:	Brazilian Solid Waste Policy
CDM	:	Clean Development Mechanism
EPR	:	Extended Producer Responsibility
GALFAD	:	Gasification Landfill Anaerobic Digestion
GEF	:	Global Environment Facility
GTZ	:	German Technical Cooperation Agency
IPI	:	<i>Ikatan Pemulung Indonesia</i> (Indonesia Waste Picker Association)
ISWA	:	The International Solid Waste Association
ISWM	:	Integrated Solid Waste Management
JICA	:	Japan International Corporation Agency
JNNURM	:	Jawaharlal Nehru National Urban Renewal Mission
KIP	:	Kampong Improvement Project.
KKPKP	:	<i>Kagad Kach Patra Kashtakari Panchayat</i>
MDGs	:	Millennium Development Goals

MNCR	:	<i>Movimento Nacional Dos Catadores De Materiais Reciclaveis</i> (The National Movement of Collectors of (the) Recyclable Materials)
MoCaSME	:	Ministry of Corporation and Small and Medium Enterprise
MoEF	:	Ministry of Environmental and Forestry Affair
MPWH	:	Ministry of Public Works and Housing
NOEI	:	Navigat Organic Energy Indonesia
	:	Organisation for Economic Co-operation and Development
ORPEP	:	<i>Organisasi Pemulung Pacitan</i> (Pacitan Region Waste Picker Organisation)
PPP	:	Public-Private Partnership
SARBAGITA	:	Denpasar Badung Gianyar Tabanan
SDGs	:	Sustainable Development Goals
SMEC	:	<i>Snowy Mountain engineering Corporation</i>
SPPT PBB	:	<i>Surat Pemberitahuan Pajak Terhutang Pajak Bumi dan Bangunan</i> (Tax Return Payable Property Tax)
SWaCH	:	The Solid Waste Collection and Handling
UN	:	United Nations
UNEP	:	United Nations Environmental Program
UNHCS	:	United Nations Centre for Human Settlement
USAID	:	United States Aid
WTE	:	Waste To Energy

CHAPTER 1 INTRODUCTION

Background and Justification

This study addresses the marginalisation of waste pickers in the modernisation of waste management, Integrated Solid Waste Management (ISWM) in Indonesia. Using a transformative paradigm as a framework, this study will unpack the complexities of the implementation of ISWM in Indonesia and the link with the marginalisation of waste pickers. ISWM relates to the effective and efficiently integrated handling of solid waste based on sustainable principles (UNEP 2009, p.10)¹. This thesis criticises the way this system affects the wellbeing of 1.2 million waste pickers and examines the possibility of their integration into the system as suggested by recent literature which describes integration experiences in Pune, India and Brazil as benchmark cases. This introductory chapter has six parts. The first part outlines the background and provides a brief literature review to identify the gaps in the study. The second part presents the research questions, followed by the research significance in the third section. The research design and methodology are presented in the fourth part. Section five acknowledges the limitation of this study. Lastly, section six deals with the thesis structure reflecting the overall organisation of this study.

Indonesia is facing increasing amounts of waste along with its rapid urbanisation, decentralisation, and rising incomes. Records show that in 2010, the amount of waste had almost doubled to 74 million tonnes/year from the 38.5 million tonnes/year in

¹ further elaboration on this system is located in chapter 2.

2008. Existing waste management, reliant on traditional systems is inadequate; damaging to the environment and endangers the wellbeing of the community. Since the 1980s, the government, with international development support, has instigated waste management initiatives which have mainly proved disappointing (Sicular 1992, p.100). Thus in 2008, Indonesia attempted to address the issue by passing the first Waste Management Law number 18/2008. This regulation officially identified the adoption of modern solid waste management system, ISWM, as the national system for managing waste. In theory, the implementation of ISWM aimed to encourage recycling at the household level, replace open dumping into sanitary landfill and improve the service provision to the solid waste management levels in developed countries. However, the expected results have not been achieved. The open dumping practice persists in the landfill system of 95% - 99 % of municipalities; the household recycling rate stays under 25% and the coverage service remains under 60% (BPS 2015b; Landon 2013, p. 4; Sidik 2010, p. 6; SMEC & Aid 2011, pp. 6 – 8). Moreover, the application of ISWM in Indonesia seems to have failed to accommodate the informal sector, where it threatens the livelihoods of 1.2 million waste pickers or 0.47% of the total population involved in the waste management system in Indonesia (BPS 2015c, Munawar & Fellner 2011, p. 2).

Theoretically, the ISWM is a flexible waste management system based on context and need, and hence the waste pickers as a part of the informal private sector ought to be accommodated in the system. However, some researchers believe that this is not necessarily the case and the implementation of ISWM in developing countries leads to the marginalisation of waste pickers (Wilson, Velis et.al. 2006, Wiego 2013, Mac Milan 2007, p.1, Medina 2000, p.9). This trend also occurs in Indonesia where

waste pickers experience social discrimination, and are considered to obstruct modern solid waste management by adding to urban development discomfort (Oepen 1993; Elliott 2012, p. 207; Sembiring & Nitivattananon 2010, pp. 806-7; TCF 2014, p. 65).

Various aspects of ISWM operation explored in chapter 3, indicate promising features in justifying its development success, attracting foreign aid, and being a fast and reliable solution to reduce waste problems in cities. It also confirms the findings of existing literatures which suggest several crucial issues exist such as tenability, aid dependency and marginalisation of local stakeholders' potential. Hence, this study proposes that coercion from Indonesian society and government has a significant impact on waste pickers' wellbeing. Further, this thesis reveals the potential contribution of the waste pickers toward waste management and the national economy through the recycling industry. Chapter 5, draws from the experience of waste picker integration in Pune, India and Brazil, and discusses the potential of waste picker integration into Indonesian waste management systems.

This study argues that the implementation of modern integrated solid waste management systems, in developing countries is not sustainable. The existing ISWM operation in the Global South tends to replicate the technology and standard of ISWM systems of the West; neglecting the local stakeholders and different contexts (Scheinberg, Anne & Mitrovic 2008, p. 1). As a result, its function is neither effective nor sustainable. The developing countries experience difficulties in financing the operation and maintenance of advanced infrastructures and modern equipment associated with ISWM. In addition, waste valorisation being formalised through recycling and Waste to Energy (WTE) hampers involvement by the existing informal

private sector, particularly waste pickers. Thus, disregarding the local context leads to unsustainable practices in modern solid waste management.

Waste picker integration is perceived as a potential solution for improving the enactment of ISWM and therefore reducing poverty. Some scholars suggest that solid waste management in developing countries supports the MDG's first goal of poverty eradication, by providing job opportunities for the poor (Gonzenbach & Coad 2007, pp. 6 - 9). Additionally, there is further literature on the connection between waste picking and ISWM. First, the broader research of Christine Furedy in India (Furedy, 1994), Martin Medina in Mexico (Medina 1997) and Daniel T Sicular in Indonesia (Sicular 1992) focuses on the relationship between the waste pickers and their operation as well as the social context. Then, the scholars draw on the association of ISWM and waste pickers and the proposed the integration (Chikarmane & Narayan 2009; Damásio 2014; Marelló & Helwege 2014; Scheinberg 2012; Velis et al. 2012). This research validates the enormous potential and opportunities for improvement with waste picker integration.

In terms of the Indonesian context, existing research on ISWM and waste pickers is clearly demarcated with limited reference to waste pickers' wellbeing (Oman-Reagan , Murtiningsih 1990, Twikromo 1999, SMECDA 2008, CCT 2009, Azhari 2009, Ghofur 2009, Santos, Luna et al. 2012, F.M & Jacky 2013, Ilia 2013). Other research draws attention to solid waste management in Indonesia (Supriyadi, Kriwoken et al. 2000, Damanhuri 2005, Nawasis 2008, Meidiana & Gamse 2010, SMEC & Aid 2011, Landon 2013, Mursito, Sari et al. 2013), while some researchers focus on waste valorisation particularly recycling (Damanhuri & Padmi 2009, Sasaki & Araki 2013) and WTE (Herder & Larsson 2012, Patimah 2014, Gezelius & Torstensson 2015). Few studies

have examined the impact of ISWM on waste pickers. As a member of staff of the Ministry of Environment and Forestry Affairs, I have witnessed the hardship caused by ISWM application. Some of these experiences are well described in the academic literature, but waste pickers' vulnerability due to the ISWM application remains undocumented. Lastly, my studies in international development gives me insight and understanding of global developments, including the ISWM. This learning journey allows me to reflect on the complexity of ISWM and waste picker issues in Indonesia and motivates me to identify lessons learned from similar cases in other countries.

Research Question

Exploring ISWM operations and the marginalisation of waste pickers together with the limited research available, this thesis focuses on identifying the relationship between the newly adopted modern solid waste management system (ISWM) and waste pickers' wellbeing by prompting four broad based questions:

1. How is the modern ISWM implemented in Indonesia?
2. To what extent does ISWM unintentionally increase waste pickers' vulnerability?
3. How is the waste pickers' wellbeing perceived in Indonesia?
4. In what ways can waste pickers be included in ISWM systems in Indonesia?

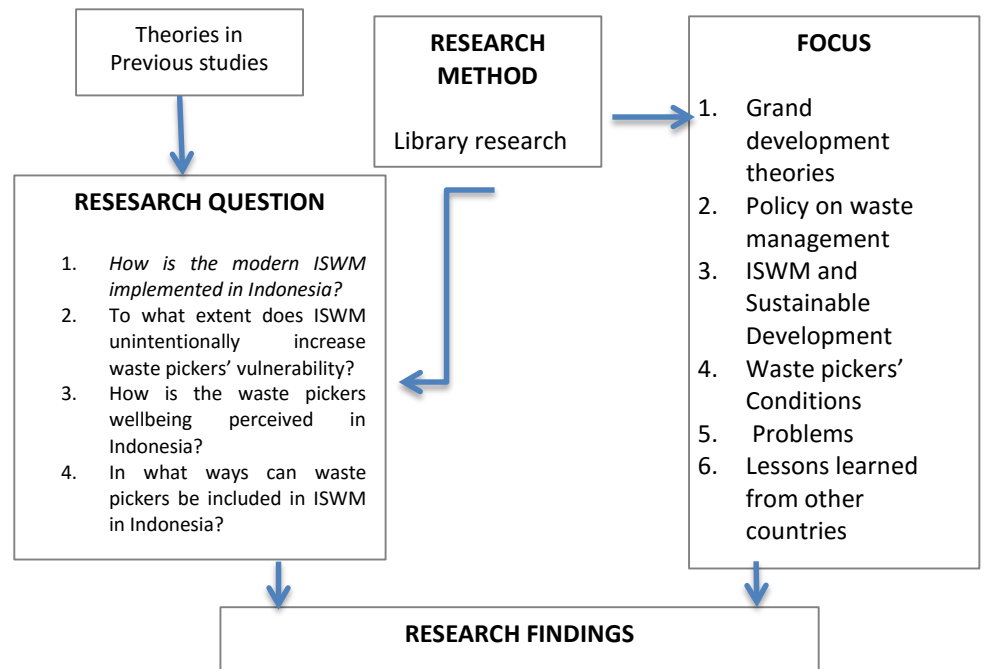
Research Significance

This study aims to unpack the complexity of ISWM and especially the impact of its implementation on waste pickers, the precursors of solid waste management in Indonesia. As the ISWM is still in the planning stage, the findings of this study could enrich the innovation of ISWM implementation. In addition, by drawing on the

association between ISWM and waste pickers, this thesis seeks to contribute to the understanding of the potential of waste picker integration in Indonesia.

Research Approach

Research design



The design of the thesis examines the impact of ISWM application on waste pickers at the national level. The literatures review on this issue raises questions, which guide the process of determining the answers to the research questions and thus formulate the findings.

Methodology

Transformative paradigm will be used as the structure for this research. Transformative paradigm is one that considers the living conditions and experiences of marginalised groups such as women and the poor (Kosheleva 2015, p. 1) and offers a better understanding of the values and position of those sectors (Somekh & Lewin

2005 as cited in Mackenzie & Knipe 2006, p. 4.). The paradigm also provides a framework for analysing the objective's complexities and identifying the needs of the stakeholders (Chilisa 2011, p. 35; Mertens 2007). Other research suggests that the methodology will provide direction for the inclusion of the marginal groups (Kosheleva 2015, pp. 2 - 3). In this study, it is believed that transformative paradigm will help to both examine the impact of the implementation of modern waste management, ISWM, in developing countries and to find an innovative mechanism which will accommodate the needs of ISWM and waste pickers.

A qualitative method has been chosen for this study because it is able to provide details of descriptive data in the study's own terms; ensuring a greater chance to unpack the complex situation (Ritchie et al. 2013, p. 27). Data collected for this study is secondary data and is sourced from books, journal articles, reports, newsletters, and publications of organisations. All electronic materials will be obtained from reliable sources, such as articles from Habitat International, Elsevier, and organisations' websites, including JICA, UNEP, World Bank, WIEGO. Additionally, some recent data will be collected from reputable online newspapers in Indonesia, such as *The Jakarta Post*, *Tempo*, and *Kompas* and local newspapers. Lastly, particular journals and reports in *Bahasa Indonesia* will also be used to address the limited data on this issue.

Limitation

This study has some limitations in terms of substance, methodology, data availability and data collection. It is not able to address the complex picture of waste pickers and ISWM in Indonesia, as for example, it limits discussion on issues of gender and child labour. Essentially, this thesis covers three aspects of waste pickers' living conditions:

economic, social, and health. Aspects related to particular technicalities of ISWM associated with the main topic are also not discussed. Additionally, it is important to acknowledge that the transformative paradigm itself has limitations in that it only covers a small scope of social research (Tashakkori & Teddlie 2003 as cited in Hall 2013, p. 4). Thus, the findings of this study cannot not be generalised and applied to other research contexts.

This thesis acknowledges the data limitation of random and scattered data. Since waste and waste management are not considered a priority of development in Indonesia, the national government does not conduct regular data collection². It is important to note that most of the collected data on waste, waste management and waste pickers is unpublished. In line with the requirements of this research topic, the raw unpublished data will not be used.

Research Structure

The thesis is organised into six chapters. Chapter 1 introduces the background and purpose of the research; Chapter 2 provides a theoretical background and analysis of ISWM as part of development, waste pickers as part of the informal sector and the poor. Chapter 3 discusses the implementation of ISWM in Indonesia, including reasons for potential successes and failures. Chapter 4 reviews the position/role of waste pickers as the prominent and marginalised stakeholders in ISWM. This chapter discusses the contradiction of the contribution and vulnerability of waste pickers in the context of ISWM. Chapter 5 proposes the integration of waste pickers using the experiences of Brazil and India where waste-pickers are involved in ISWM systems.

² Waste picking is not recognised as employment; therefore, BPS (National Statistic Board) does not conduct an official survey on waste picking. The only and recent national data on waste and waste management was produced by Ministry of Environmental Affairs and JICA on 2008.

The conclusions of this study are presented in Chapter 6 and are based on the findings related to ISWM in Indonesia, the waste picker sector and the proposal to improve the existing situation.

CHAPTER 2 LITERATURE REVIEW

This chapter explores ISWM and the waste picker activity as the two contenders central to this study, by presenting a conceptual framework of ISWM and its application in developing countries. Arguing that there is a strong correlation between ISWM and the recycling industry, it will investigate the position and role of waste pickers in the recycling industry as the basis of the informal economy in Indonesia and then use the capability approach as a conceptual framework to explore the waste pickers' wellbeing.

ISWM in developing countries

This section elaborates on the concept ISWM, defined by UNEP as an effective and efficient integrated handling of solid waste based on sustainable principles (UNEP 2009, p.10). In the context of ISWM, solid waste refers, in the first instance, to discarded or unwanted materials and in the second, to discarded materials which have economic value. Both kinds of waste should be managed safely with minimum cost after procuring the maximum benefit through waste utilisation. The term integration refers to the incorporation of different waste handling methodologies with an interconnected set of systems and stakeholders from economic, environmental, technical and socio-economic areas, generally determined by the local region. (Klunert & Anschutz 2001, p. 15). Furthermore, sustainability of an ISWM requires a capacity to be ongoing and independent in fulfilling present needs without compromising resources for future generations (Klunert & Anschutz 2001, pp. 11 - 2).

This clearly demonstrates that the sustainable planning in ISWM is the proliferation of the sustainable development principle³.

There are three main dimensions in ISWM development: stakeholders, waste system elements for waste handling, and aspects to be considered, as shown in diagram below.

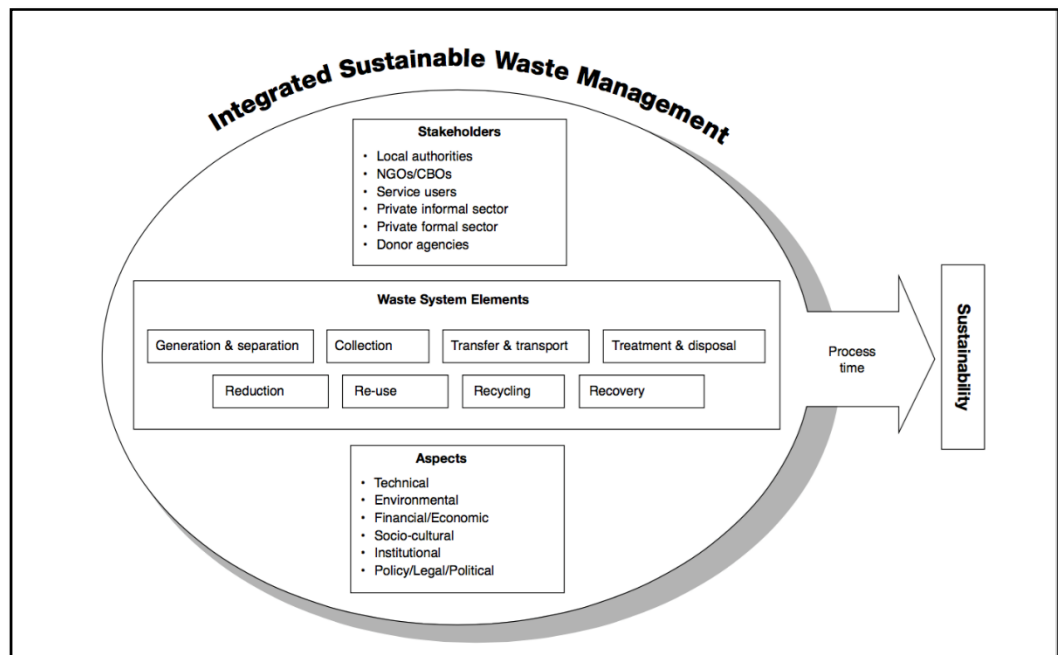


Figure 1. Integrated Solid Waste management (ISWM)

Source: (van de Klundert & Anschütz 2001, p. 14)

The framework indicates stakeholders as individuals or organisations with a role and an interest in waste management (Klunert & Anschutz 2001, p. 12). It shows that in developing countries, the government has the highest power and authority in determining the ISWM policy. Therefore, with due regard to the sustainability and integration principles mentioned previously, the government should consider the local context in formulating the stakeholders' involvement.

³ Brutland Report 1987 states that "Sustainable Development seeks to meet the needs and aspirations of the present without compromising the ability to meet those of the future" (Brutland Commission 1987, p. 39).

Waste system elements refers to official decisions of waste handling stages within particular regions. ISWM determines four main elements: collection, transfer, disposal, and treatment with the process based on the principles of waste minimisation, re-use and recycle (Klunert & Anschutz 2001, p. 13).

The final dimension in Figure 1 highlights the complexity of ISWM. It shows that ISWM is not solely a waste management technique but it also covers the interplay of non-technical aspects in the region (Klunert & Anschutz 2001, pp. 13 - 4). Aligned to the concepts of integration and sustainability, these aspects should be taken into account in the implementation of ISWM. Thus, in theory, sustainability in waste management will be achieved if ISWM involves all stakeholders, conducts environmentally sound waste handling, and considers the integration of all aspects in the region.

The concept of sustainable ISWM used to solve waste management problems in developed countries gained success between the 1970s-1990s (Scheinberg, Wilson & Rodic 2010, p. 23). This success inspired the international community to provide support and help solve problems of the poor waste management in developing countries. It was further strengthened by global warming, particularly by the notion that poor waste management in developing countries was responsible for an increase of 5% of global warming (Araujo 2014, p. 2; Hoornweg & Bhada-Tata 2012, p. 29 ; UNEP 2011, p. 290). Many international covenants and commitments such as the Basel Convention, Stockholm Convention, Montreal protocol, Agenda 21, Kyoto Protocol, Millennium Development Goals (MDGs), and Sustainable Development Goals (SDGs) relate to ISWM systems (Hyman, Turner & Carpintero 2013, pp. 88 -

98)⁴. These international agreements have provided both pressure and substantial support from international assistance in the implementation of ISWM to ensure environmentally sound waste management in developing countries. As an illustration, pressure from the OECD forced Bulgaria to modernise their solid waste management and reach a certain level of recycling to warrant its affiliation with European Union (Scheinberg & Mol 2010, pp. 18 - 9 ; Scheinberg, Anne & Mitrovic 2008, p. 1). International support in the form of significant loans, grants and mechanisms for change has come from agencies such as United Nations Environment Programme (UNEP), the World Bank, Japan International Corporation Agency (JICA), German Technical Cooperation (GTZ), Asian Development Bank (ADB) and many more (Lerpiniere et al. 2014, p. 13). The aid is focused on providing capital to tackle limited infrastructures and improve the capacity of governance using a systemic approach (Ibid, P.19). International support to developing countries confirms worldwide commitment to ISWM.

Despite the promises of the benefits of ISWM, this study has identified the gaps in its implementation in developing countries and from case studies conducted in other countries (Bell & Bremmer 2013; Dangi, Schoenberger & Boland 2015; Tangri 2003). Raised by the proponents of ISWM, these deficiencies emerge as cause for self-criticism (Scheinberg & Mitrovic 2008: Scheinberg 2007). The first criticism is leveled at the inequities in relationship and knowledge between the Global North and South in terms of ISWM implementation which is recognised as the blue print or solution for all problems (Scheinberg 2007). This notion is reinforced with the finding that

⁴ Details information on international arrangement of ISWM can be accessed in (Hyman, Turner & Carpintero 2013)

developing countries tend to replicate the ISWM character of developed countries by adopting advanced infrastructure-technology and privatisation (Ojeda-Benitez, Armijo-de-Vega & Ramírez-Barreto 2002, p. 275; Scheinberg & Mitrovic 2008, p. 2). However, instead of producing significant improvement in waste management in developing countries, a marginalisation of an existing informal sector in waste disposal systems occurs due to its incompatibility with the North (Moreno-Sanchez & Maldonado 2006; Scheinberg, Anne & Mitrovic 2008, p. 2). In addition, the environmental consideration of sustainability goals in ISWM is being questioned where it finds inherent environmental risks of modern technologies in managing waste. There is a growing concern for immeasurable transboundary environmental risks in the application of Waste To Energy [WTE]⁵. It is believed that even the most modern WTE increases air pollution with the potential to harm the health of populations living near the WTE sites (Bell & Bremmer 2013, p.20). All of these factors clearly indicate that the ISWM has been implemented without considering the social, economy and environmental risks of the local context.

Moreover, this thesis claims that the implementation of foreign aid for an Indonesian ISWM is not sustainable. It argues that the donor development project confirms the powerful position of international donors in developing countries (Campos & Zapata 2014, p. 42) enabling them to embed the knowledge, technology, and procedures based on their experience and alignment, but mostly ignoring the local conditions (JICA 2005, pp. 994 - 5; Marshall & Farahbakhsh 2013). Furthermore, it outlines that donor support presupposes terms and conditions; for example, equipment or

⁵ Waste to energy (WTE) is covers the technology of gasification, plasma arch, mass combustion (Bell & Bremmer 2013, Pp. 2 - 3)

consultants for a feasibility study originate from the donor countries (Scheinberg 2001, p. 10). It confirms that after the donor support is terminated, much of the facilities and equipment may be abandoned due to lack of capacity in financing the operational and maintenance costs (Dangi, Schoenberger & Boland 2015, pp. 396 - 401).

While market-based mechanisms cannot be detached from the character of ISWM in developing countries, it can be argued that the international global waste management corporations, including engineering consultation firms, have a significant role in determining the character of ISWM (Sicular 1992, p. 100). This notion aligns with the finding that waste management companies have been successful in becoming familiar with technology as a solution for solid waste management problems in developing countries (Scheinberg, Anne, Wilson & Rodic 2010, pp. 23 - 4). In another example, the global networks of Waste to Energy (WTE) companies have expanded their markets to Asia Pacific and Australia (Bell & Bremmer 2013). This infiltration is supported by the successful image of western development and promise of financial aid as discussed above.

However, despite the benefits for the waste management in developing countries, it is argued that this arrangement is not suitable in the context of developing countries due to excessive developmental and operational costs, which merely benefit the companies (Tangri 2003, P.2009).

These factors highlight the complexities associated with the implementation of ISWM in developing countries. While in theory, ISWM has flexibility to be based on the local context, there is a strong drive to replicate western technology and standards, with

global companies shaping the character of ISWM in developing countries. Thus, an exploration of the relevant literature will be used as the basis to discuss the implementation of ISWM in Indonesia.

Informal economy (IE) in developing countries

Another focus of this research is the private informal sector within the ISWM framework. The sector is prominent in waste management in developing countries, but has minimal effect in developed countries. This section will explore the informal sector from three perspectives: dualist, structuralist, and liberalist.

The dualistic approach focuses on the dichotomy between the economy and traditional bazaar or small firm economy (Geertz 1963); formal and IE (Hart 1973); upper circuit and a lower circuit (Santos 1979); informal sector and modern sector (Germani 1973). The dualist scholars outline that bazaar/informal economy/lower circuit/informal sector is characterised by labour intensiveness, low productivity, low wage earning, and access to all groups in a society (Geertz 1963, pp. 26 - 7; Hartz 1973, p. 68; Heintz & Posel 2008, ILO 1973, p. 6). The dualist argues that the driving factors of IE are: (1) the disparity between workforce skills and the demand; and (2) the gap between workforce and job opportunities. In this situation, IE plays a role as a survival mechanism for the poor/marginalised groups that do not have access to the formal economy (McGee 1979, pp. 53 – 4, WIEGO 2015). However, as dualists believe that the informal economy is a sign of backwardness, the policy direction under this approach is repressive toward waste pickers, as evident in some parts of India and Argentina (Chintan 2003 as cited in Medina 2007, pp.208 – 22; Schamber and Suarez 2002, as cited in Navarrete-Hernandez 2015, pp. 9 – 10).

Similarly, the structuralist recognises the structure between the formal and informal economy; it defines IE as subordinate to the formal/capitalism sector due to inferior outputs and out-dated techniques while providing cheaper raw materials and cheap labour (Jutting & Delaiglesia 2009, pp. 2 – 3; Tokman 1989, pp. 1069 – 70). The structuralists believe that the primary cause of the existence of IE is the failure of capitalism to distribute assets equally and provide jobs for an abundant workforce due to the introduction of technology in industry (Jutting & Delaiglesia 2009, p. 4; Marx, 1939 as cited in Barnes 2012, pp. 144 – 5; Tokman 1989, pp. 1068 - 9). Additionally, structuralists challenge the idea that IE is the catalyst for growth, emphasising that IE is one of the leading causes of poverty, health and illness concerns due to high-risk work, such as scavenging (Jutting & Delaiglesia 2009, p. 4; Wilson, Velis & Cheeseman 2006, p. 800). In contrast to the dualists, the structuralists do not intend to eliminate IE but demand a fundamental change of the system production as a solution of IE marginalisation (Jutting & Delaiglesia 2009, pp. 6 - 7; Tokman 1989, pp. 1072 - 3). Furthermore, the structuralist argues that waste pickers should not be viewed as a portrait of poverty but should be engaged in recuperative work that provides income and contributes to the macro economy by providing raw materials for industry (Birkbeck 1978, pp. 1173 - 4; 1979, p. 161; Sicular 1991, p. 139). Additionally, they outline that there is a hierarchy in recycling industry where waste pickers are considered to be at the lowest level (Wilson, Velis & Cheeseman 2006, p. 800). Within this protocol, the waste pickers sell the recyclable materials at a lower price because of limited access to industry and their obligation to pay for protection (Birkbeck 1979, pp. 179 - 80; Sasaki & Araki 2013, p. 56; Sicular 1992, pp. 38 – 9). The structuralist suggests upgrading waste pickers' organisational skills to raise the level

of service and social status, and to prevent harassment and violence (Birkbeck 1978, pp. 1184 – 5; Dias & Fernandez 2012; Gupta 2012).

In a very different perspective, neoliberals consider the IE as the basis of economic growth. De Soto (2000) emphasises that the poor, being a massively undercapitalised sector, are the solution for economic backwardness (pp. 24 - 31). In addition, this scholar believes that capitalism or the free market can support the surplus economic values by encouraging competition. Thus, the IE should be transformed into a formal economy, joining the market competition (OECD 2006, p. 38). The government should support this scheme by simplifying the bureaucratic procedures, creating mechanisms for capital conversion through property rights legalisation, and supporting credit access (WIEGO 2015; TRF 2013, p. 10). The neoliberals believe that IE is a means of economic growth and poverty reduction and view waste pickers as micro-entrepreneurs that support economic growth and alleviate poverty (Medina 2007, pp. 258 - 62). At the same time, waste picking activities protect the environment by lowering the pace of industries exploiting raw materials as well as reducing pollution from waste disposal (Besiou, Georgiadis & Van Wassenhove 2012, pp. 14 – 5; Foundation 2013). Neoliberal policy on waste pickers refers to the formalisation of the industry. Thus, improvement will come from the competition between service providers in ISWM (Dias, SM 2011). The World Bank and UN family organisations claim the green economy project in Brazil is a role model that demonstrates the capacity of formalised scavenging as a way of supporting growth, alleviating poverty and benefiting the environment (Dias, S 2011, p. 2; TRF 2013, p. 15; Tandon 2012, p. 41).

The three theoretical approaches to IE have evolved in diverse ways based on the context. This thesis has determined that each of these three perspectives is important in the framework of analysis for this research. Dualist characteristics encompass an informal sector autonomous from modern capitalist sector and are represented by the waste pickers in the context of developing countries. The paper also draws attention to three substantial structuralist findings: first, scavenging which exists as an economic survival activity due to limited job opportunities and assets; second, the results of the structure of the recycling industry; and third, the position of waste pickers as bottom-line actors. The structuralists argue that governments should address the unequal relationship between formal commercial business and subordinated workers by regulation. Finally, this research will borrow the neoliberal approach to explore the waste pickers' position in a global context, particularly, in relation to the global recycling industry and ISWM. Currently, under the capitalist system, while recyclable raw materials have become a growth industry, it is difficult to find evidence that the waste pickers get a reasonable return in this system.

Framing the poverty using capability approach

Based on the initial discussions in chapter 1 on the ISWM and IE theory, there is a definite association with waste pickers and poverty. The association is based on the simple observation of income, health, social, and living conditions. However, this research believes that poverty might not be limited to the identification of these conditions and questions whether these indications are connected and could become causes or effects. Therefore, this research explores these issues using the capability approach.

The capability approach has been chosen since it is relevant for analyses in social science research; and the approach can be used in any context beyond political matters (Deneulin 2011, p. 3). It is important to note that the root of the capability approach is the liberal spirit that rejects judgments based on people's primary goods and entails measurements based on the freedom to choose their own ways of living (Sen 1990, p. 114). Consequently, it expects the state to provide opportunities for citizens to pursue their intentions (Alkire 2005, p. 117; Deneulin 2011, p. 5; Nussbaum 1998, pp. 283 - 5).

The capability approach fosters an understanding of the depth of poverty and inequality which goes beyond income and material resources and considers the capacity of people to achieve their goals (Deneulin 2011, p. 1; Robeyns 2003, p. 63; 2005, p. 94; Sen 1994, p. 271). Other definitions include being unable to experience wellbeing, such as enjoying a healthy life and having equal interactions with others (Godoy 2004, p. 10). A criticism of this approach targets the lack of clarity in the term 'capability' as a measurement (Clark 2005, pp. 5 - 6). In completing Sen's Capability approach, some scholars resort to a list such as Martha Nussbaum's ten central capabilities and the OECD's 'capability poverty framework' (Nussbaum 2000, pp. 77 - 80; 2011, pp. 33 - 4 White 2009, p. 255). This paper borrows from the capability approach translated into a poverty framework by OECD to examine poverty by considering five core dimensions and the causal links between them: economic, human, political, socio-cultural and protective capabilities.

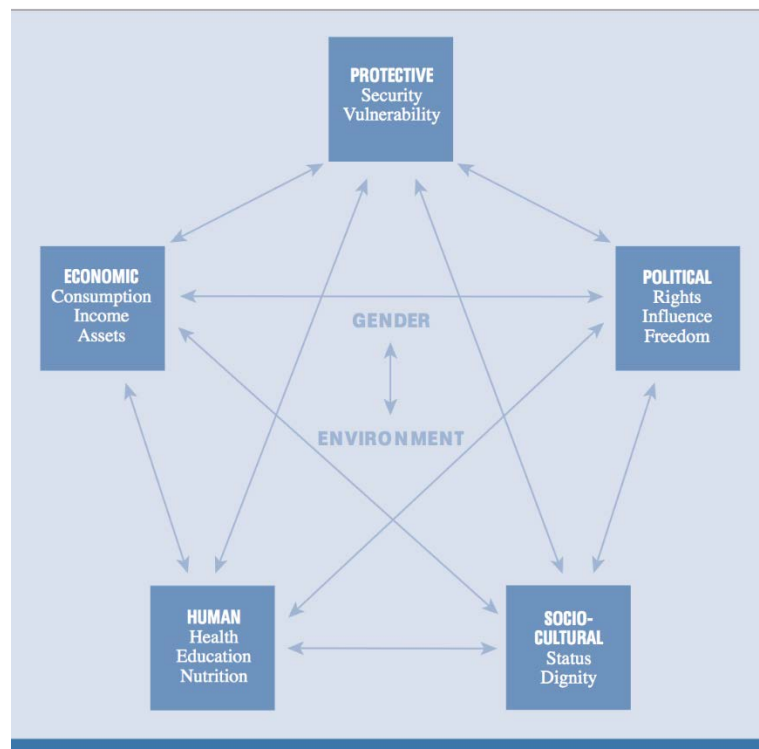


Figure 2. Capability Approach Framework

Source: (OECD 2001, p. 39)

Economic capability refers to the ability to earn money to fulfil needs and own assets (OECD 2001, pp. 38 - 9). The capability approach considers those three aspects as the means to achieve a level of material wellbeing, food, security, and social status. While it is argued that income varies, the majority of sources consider the poverty rate to be less than US\$2/ day (Ezeah, Fazakerley & Roberts 2013, pp. 2510 - 2511; Robert 2013; Supriyadi, Kriwoken & Birley 2000, p. 559). On the other hand, some researchers found that their income might be equal or higher than the regional minimum wage (Sasaki et al. 2014, pp. 18 - 9). However, their poverty is not founded on their respectable income but attributed to other factors. For example, urban waste pickers need to purchase necessities such as water, waste service, food, and pay rent for housing that might be cheaper or free in the rural area (Baker 2008, pp. 7 - 8; Wratten 1995, p. 22). For the poor, this commodification means spending all of their income for basic needs and eliminating other expenditures such as education,

health insurance or owning an asset (pp. 23). This cycle, in the short term, reinforces inequality and increases poverty. In these circumstances, waste pickers are considered poor in terms of limited economic capabilities.

Human capability represents the ability to access education, nutrition, water, adequate medical care and proper housing. If health and education are the keys to productivity and poverty reduction (OECD 2001, pp. 38 - 9; Nussbaum 2011, p. 33), it can be argued that waste pickers belong to the poor in terms of human capabilities. They face constant health risks while handling mixed waste that could contain hazardous materials (MacMillan 2007, p. 1), and risk of death due to landslides in the landfill (Chaerul, Tanaka & Shekdar 2007, p. 41; Lavigne et al. 2014, pp. 1 - 2). This paper also considers the health risk due to their poor living conditions near waste or landfills infested with pests, using polluted water for cooking, bathing and consuming dumped food (Sasaki et al. 2014, p. 17; Hodal 2011). Economic capabilities show that education for waste pickers is secondary to their need for income to survive. Lack of education will continue to perpetuate long-term poverty (Landau 2007, p. 22).

Political capability focuses on the ability to participate effectively in political choices that affect a person's life; and the right to political freedom (OECD 2001, pp. 38 - 9). Participating in politics or by association, as Nussbaum states, as having political control over one's environment (Nussbaum 2000, p. 80), requires legal recognition from municipal governments. Since, most of the waste pickers live in illegal settlement areas or slums, they are not entitled to advocate for their needs as citizens or receive government support. In fact, waste pickers have never been treated as real stakeholders in ISWM or in their personal lives (Scheinberg 2007, p. 4).

Socio-cultural capability refers to respect for dignity and equal social status within the community (OECD 2001, pp. 38 - 9). It links with the ability to have equal relations with others based on self-respect (Nussbaum 2011, p. 34). However, in terms of the socio-cultural aspect, the waste pickers experience discrimination because of their 'dirty job' and are ostracised by society. Waste pickers who live on the fringes, are associated with crime and are relegated to the lowest of society's levels. (Damanhuri 2005, p. 6; Furedy 1997; Supriyadi, Kriwoken & Birley 2000, p. 559). As a result, most communities and governments put a restriction on their presence. It can be argued that this condition is one factor that keeps them in poverty.

Protective capability concerns the ability of people to survive changes and pressures, such as economic crises, illness, and disaster (OECD 2001, pp. 38 - 9). This dimension expands with the concept of security in a broader sense: safety from chronic threats, such as hunger, repression, and cruel disruptions in daily life (Gómez & Gasper 2013, p. 2). Understandably, waste pickers lack protective capabilities as they constantly live with risk. (Cities Alliance 2006, p. 196; the World Bank/UNHCS as cited in Gilbert 2007, p. 697;). Natural disasters increase their vulnerability to loss of personal effects, social networks and income (Baker 2008, p. 6). Poor living environments increase their risks of contracting infectious and communicable diseases (Baker 2008, p. 8; Cattaneo et al. 2009, pp. 79 - 80; Montgomery & Hewett 2005, p. 31; Surjadi 1993). Moreover, health is a crucial element, since the poor rely on labour as their major source of income (Jutting & Delaiglesia 2009, p. 4). Lastly, the waste pickers are incapable of standing against government repression due to their illegal status and criminal stigma (Ezeah, Fazakerley & Roberts 2013, p. 2510; Simpson-Hebert et al. 2005, p. 46). The capability approach may help this research to identify linkages with

the factors described in this section and validates the premise that waste pickers belong to the poor in society.

CONCLUSION

This chapter has examined the disconnection between a modern ISWM and peripheral waste pickers in developing countries. ISWM is defined as the effective and efficient integrated handling of solid waste based on sustainable principles. This system demands the integration of stakeholders, waste system elements in handling waste and the means to achieve sustainability. Despite the promising successes and substantial international development support to proliferate this system, existing literatures outline gaps in the implementation of this concept. The first is the tendency to replicate the technology and privatisation of ISWM practices in developed countries, resulting in the phenomena of informal sector marginalisation and incompatible technology systems. The other issues that are recognised are linked with unsustainable aid dependency, and powerful global market pressures distributing modern technology into developing countries without considering the compatibility with local conditions. These findings will be used as a framework to examine the application of ISWM in Indonesia.

Moreover, an exploration of informal economy and capability approach theories will provide a framework to examine the waste picker position, role, contribution and their wellbeing. The informal economy theory shows that perspectives towards waste pickers vary, thus the policy implications also differ based on the perspective. As an illustration, the repressive policy towards waste pickers may have originated from the view that waste pickers' work is symbolic of a lack of progress thus ought to be eliminated as suggested by the dualist scholars. Furthermore, the exploration of

the capability approach theory provides the frameworks to capture the complexity of the waste pickers' conditions.

By incorporating these literatures, this study will offer an alternative perspective to discuss the ISWM and waste pickers in Indonesia. The following chapter will examine the implementation of ISWM in Indonesia.

CHAPTER 3. THE ENACTMENT OF INTEGRATED SOLID WASTE MANAGEMENT IN INDONESIA

Proposing that ISWM operations should be based on integration and sustainability principles as discussed in Chapter Two, this chapter aims to examine this argument in the Indonesian context and in association with the literature review on ISWM. It is expected that the discussion in this chapter could answer the two research questions of how the modern ISWM is implemented in Indonesia and the extent the ISWM unintentionally increases waste pickers' vulnerability.

This chapter describes the condition of solid waste in Indonesia, then discusses how ISWM is implemented in terms of regulations, institutional matters, policy and programs. The third part of this chapter presents the advantages of the implementation of western style ISWM, particularly as it is justified by the development achievements; its ability to attract foreign aid; and its capacity to provide an effective solid waste management system. The fourth part critically discusses the shortcomings of ISWM implementation in Indonesia.

Solid waste and solid waste management in Indonesia

Indonesia is facing an ever increasing waste problem with population growth and industrialisation. Some researchers indicate that Indonesia shares many similarities with other developing countries in terms of the escalating amount of waste, waste generation, and poor waste management service (Inanc et al. 2004; Damanhuri 2005; Landon 2013). Indonesia is a densely inhabited country with a total population of about 255,461,700 in 2015 (BPS 2015). Administratively, the country is divided into

34 provinces and more than 510 municipalities which consist of 413 districts and 97 cities.⁶

The amount of waste and the number of population, which reflect the waste growth, are shown by the following graph.

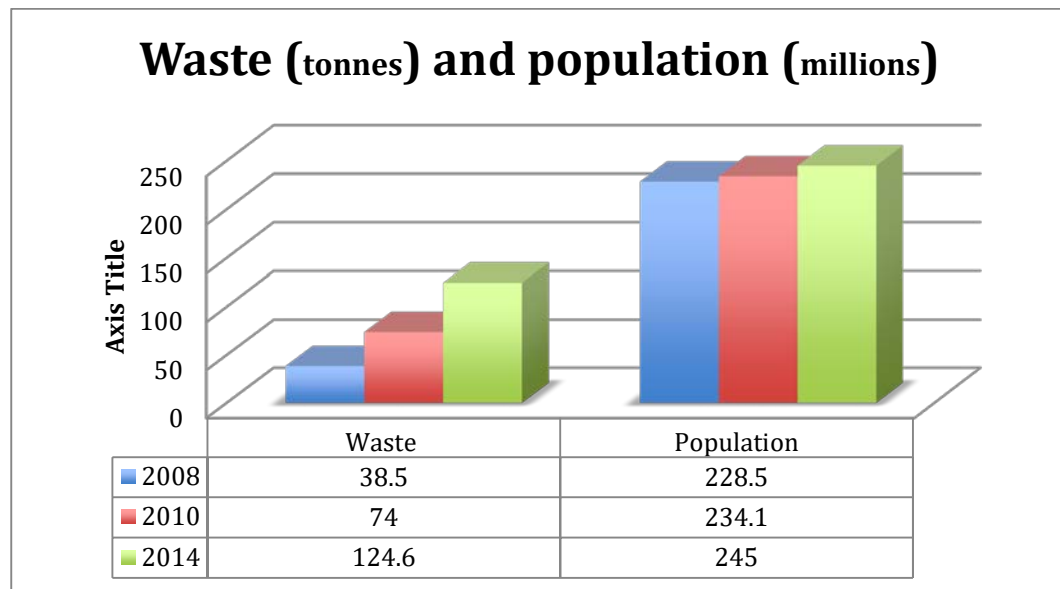


Figure 3. Waste and Population Growth in Indonesia 2008 - 2014

Source: Data processed from Ministry of Public Works and Housing (2010); Ministry of Environment and Forestry (2015), Ministry of Environmental Affair (2008)

The graph in Figure 3 shows the amount of waste has doubled from 38.5 million tonnes in 2008 to 74 million in 2010, and reached 124.6 million tonnes in 2014. Combined with population growth data, it shows that in the two year period, from 2008 to 2010, the population growth was about 2% and the waste growth was approximately 92%. The graph in Figure 4 summarises the composition, sources and handling.

⁶ Data is processed from http://www.otda.kemendagri.go.id/images/file/data2014/file_konten/jumlah_daerah_otonom_ri.pdf and <http://www.jdih.setjen.kemendagri.go.id> viewed 16 January 2016,

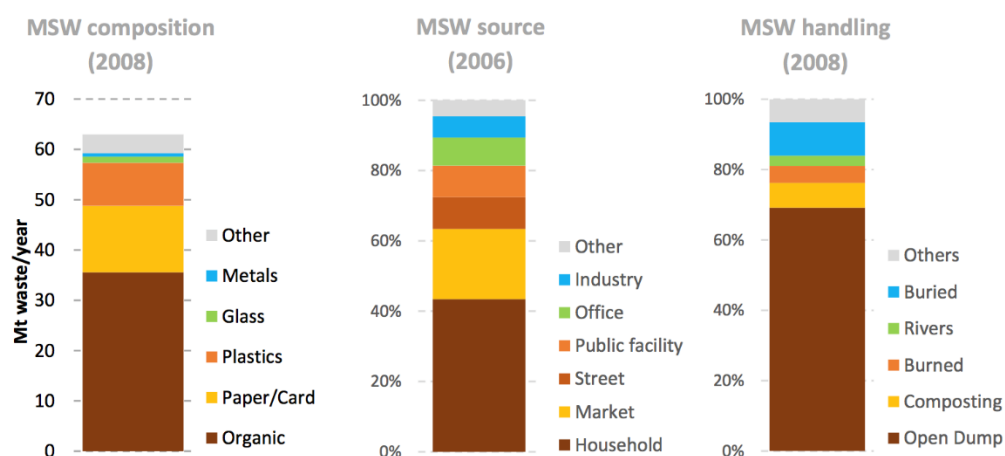


Figure 4. Waste composition, source and handling in Indonesia

Source: (Rawlins et al. 2014, p. 9)

Organic material accounts for the highest component, followed by recyclable materials such as paper and plastic. The sources of waste vary, but households are the biggest contributor of waste. The waste handling graph shows that non-environmentally sound practices, such as burning, burying, throwing waste into rivers, and open dumping landfill, persist. As households are at the centre of waste contributing to open dumping landfill, waste composition data shows potential for waste to be recovered by composting and recycling.

ISWM in Indonesia

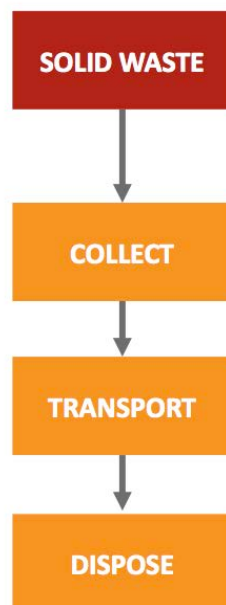
Indonesia has adopted ISWM gradually. In the 1980s, ISWM was trialled in the development of a modern waste management system in Bandung and Surabaya under the Urban Development Project⁷. Indonesia formally announced an alignment

⁷ Bandung urban development and sanitation project (BUDP) was a customised project of waste management that is funded by loan from Asian Development Bank (ADB) to build sanitary landfill and waste management systems in the community. This project was conducted in a 10-year period 1976 – 1986, with an unsatisfactory result. Further information regarding this project can be accessed in Sicular 1992, Pp. 118 - 125; BUDP 1976

Surabaya Kampong improvement project (KIP) is the waste management project that is funded by The World Bank loan as a part of Urban development project It is recognised that this project has a better approach compared with BUDP as stated in Sicular 1992, Pp. 126 – 130.

with ISWM through Waste Management Law number 18 /2008 ⁸. The substance of this law covers a broad range of the principles in waste management, including the view that good waste management practice is compulsory in the public service, and governments have shared responsibility and authority to involve the private sector in waste management and hand out penalties for breaches of the Law. Furthermore, it asserts that this regulation is a formal sign of the shift from traditional to modern solid waste management, as shown in the diagram below.

OLD PARADIGM



NEW PARADIGM

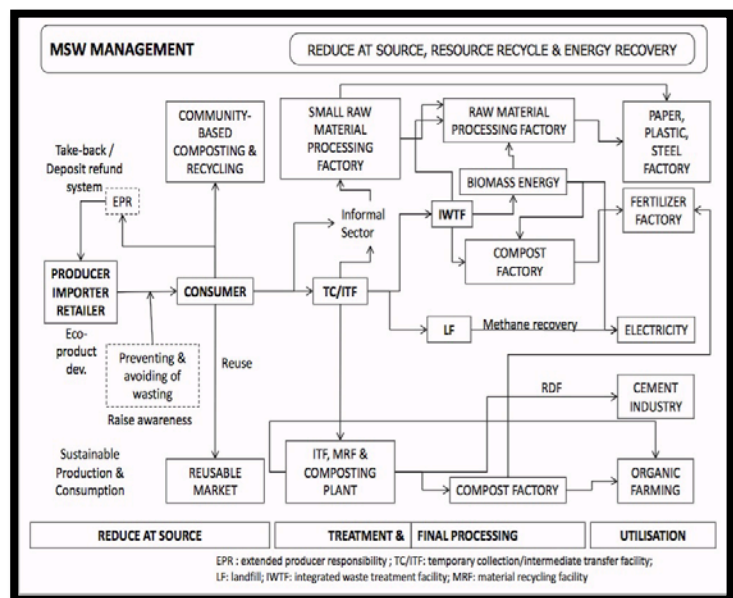


Figure 5. The shifting of solid waste management paradigm in Indonesia

Source: (Mursito, Sari & Bramono 2013; Sidik 2010)

The old paradigm considers waste as materials to be dumped and it relies on landfill to dispose of the waste. However, the new paradigm attributes economic value to waste; it encourages waste utilisation in an environmentally sound manner (Mursito,

⁸ Law number 18 / 2008 on Waste Management is the first management law in Indonesia. This Law was enacted on May 2008.

Sari & Bramono 2013). Some scholars suggest that the environmental aspect in law number 18/2008 refers to the consideration of waste as resources, the application of the prevention and mitigation as a pattern in managing waste, the promotion of environmentally friendly technology, and the corporate strategy to manage waste professionally (SMEC & Australian Aid 2011, p. 14). The environmental factor within the ISWM framework as mentioned in chapter 2, suggests that ISWM should involve all existing stakeholders but it seems that the government has precluded the private informal sector. While this seems reasonable in the belief that the involvement of informal sector will not bring any benefit to a modern system, it is unclear whether this decision benefits the system. At a practical level, the informal sector has provided an informal collection service and conducts recycling activities. This issue will be discussed further at the end of this chapter.

The new paradigm of waste management (ISWM) is translated into two implementation strategies namely: waste minimisation and waste to resource (Sidik 2010). Waste minimisation refers to the application of Reduce-Reuse-Recycle (3Rs) at the source of the waste (households, public facilities, etc.). It is expected that by employing this principle, the amount of waste to be dumped in landfill will decrease significantly. In the waste minimisation strategy, some flagship programs namely: waste-bank, ADIPURA, best practice, and Extended Producer Responsibility (EPR)⁹,

⁹ Waste Bank is a community-based recycling program that is endorsed by the Ministry of Environment and Forestry to encourage recycling at the community level. It is reported that by May 2012 there were 868 waste banks in Indonesia with a monthly turnover of about IDR 3.182.281.000. Further information on waste banks can be accessed from the Ministry of Environmental Affairs 2012. Adipura is the green and clean city award that is given by National government (department of Ministry of Environmental Affairs and Forestry) to the municipal government. Best Practice is waste management program on the community level that is promoted by Ministry of Public Works and Housings. Further information on this program can be accessed from Ministry of Public Works and Housings 2007

specifically target the community as the producer of waste. However, this strategy has had limited success. The latest data on recycling rates show that more than 76.31 % of households do not conduct the 3Rs (BPS 2014).

In applying the second strategy, waste to resource, the government is mainstreaming two plans: recycling industry waste to energy [WTE] and composting in the landfill as shown in the scheme above¹⁰. The recycling industry is a continued effort of the 3Rs in the waste minimisation stage. The government expects that the recycling will be conducted under privatisation, similar to the methods of recycling in western countries. This approach is capital intensive and requires advanced technology and skilful human resources for its operation.

In a decentralised structure, waste management is conducted by multiple agencies at national and regional levels. The municipal governments have full responsibility of implementing waste management within their area of jurisdictions based on national and provincial laws and systems¹¹. The provincial governments play an important role as the representatives of the National government in their regions. Lastly, some ministries at the national level play a central role as regulators; they also develop infrastructures and provide technical assistance to the municipal governments¹²

¹⁰ Waste to energy [WTE] or waste incinerator is a series of the methods such as plasma arc, gasification, and mass-combustion to transform waste to energy (Bell & Bremmer 2013, pp. 2 - 3).

¹¹ Law number 32/2004 concerning decentralisation states that the provision of general facilities and infrastructure is one of the compulsory obligations and responsibilities of municipal and provincial government (article 13 paragraph 1; Article 14 paragraph provincial government (Article 13 paragraph 1; Article 14 paragraph 1) based on the minimum service standard that is published by the national government (Article 11 paragraph 4).

¹² At the National level, solid waste management is mainly handled by two ministries; Ministry of Public works and Housing (MPWH) for infrastructure planning and implementation and the Ministry of Environmental and Forestry Affairs (MOEFA) for controlling and monitoring pollution levels. There are some ministries involved at the intersection of issues such as Ministry of Internal Affairs for formulating the regional arrangement of waste management, the Ministry of Health that focuses on the health impact of poor waste management and the Ministry of Energy and Minerals in promoting waste to energy.

(Meidiana & Gamse 2010, pp. 20-1). This arrangement is in agreement with the finding that under a decentralised system, public service responsibility is mostly shared by multiple agencies in multi-level governments (Smoke 2003 as cited in Lewis 2010, p. 651).

However, the reshuffle of multiple agencies does not work effectively in Indonesia. The failure of sanitary landfill implementation is the clear example. The Ministry of Public Work and Housing (MPWH) builds sanitary landfills without considering that their operation is not affordable for the municipal government. As a result, most sanitary landfills operate with the open dumping method. This finding provides evidence that multiple agencies are involved in waste management in developing countries. It also aligns with the suggestion that scheduling of these agencies jeopardises effective implementation programs because of their inconsistent and overlapping responsibilities (JICA 2005, p. 13).

ISWM's endowments towards Indonesia waste management system

This thesis outlines three significant ISWM contributions since its official implementation. There is evidence that ISWM systems are justified because of their development success; it attracts international grants; it offers a fast and reliable solution for the waste problem especially in urban areas.

ISWM as Justification of development success

ISWM provides a strategic benchmark to measure and justify development success and gain international recognition such as in Millennium Development Goals (MDGs). It argues that the level of good governance is reflected by the quality of waste management (Whiteman et al. 2001). It is clarified by Scheinberg's (2007)

explanation that a clean and healthy city is the prerequisite of development cooperatives and investment. ISWM has worldwide recognition as being able to improve the waste management service. Indeed, from 2010 to 2014, MPWH has developed 428 waste management facilities and infrastructures for 2352 areas to improve the waste management service coverage (Ministry of Public Work and Housing 2015, p. 10). Meanwhile, for the period 2015 – 2019, the ministry has prepared a plan to develop additional landfills in 163 regions, and provide 3Rs facilities in 850 areas and temporary waste treatment facilities in 45 regions (p.65). In addition to these projects, some flagship programs have been introduced to embrace the improvement of waste management, such as the environmentally sound city through *ADIPURA* program and the waste bank as an establishment of 3Rs practice at community level¹³. It has been recorded that up to 2012, 886 waste banks have been in operation in an effort to reduce the amount of domestic waste as well as providing additional income for households (Ministry of Environmental Affairs 2012). These improvements align with the requirements of ISWM, promoting 3Rs and environmentally good infrastructure. It also becomes evident that the application of ISWM supports the achievement of MDG's Goal number 7c to halve the proportion of households without sustainable access to drinking water sources and basic sanitation facilities by 2015. Furthermore, the 2014 Indonesia Millennium Development report mentions that the basic sanitation access percentage improved from 37.73% in 1993 to 61.04% (Bappenas 2015). In summary, these statistics are more than enough to justify the improvements in development and good governance with ISWM implementation.

¹³ See footnote number 9 for Adipura and waste bank programs

Gaining Access to International Aid

ISWM offers prospects of international financial support to provide infrastructure for waste management. The major impediment to waste management in Indonesia is lack of a dedicated budget. Waste management¹⁴ is not a priority of Indonesian development. It is placed after poverty reduction, improvements of educational attainment, and management of poor health issues (GEF 2015, p. 83). The average waste management budget in Indonesia's municipalities is only about 2% of the total annual regional budget, and the allocation mainly covers traditional waste management and garden maintenance (Landon 2013, p. 6). Therefore, Indonesia relies on international aid to finance waste management projects. Information concerning financial aid is available on the Open Aid database which shows that in the period of 2000 – 2013, Indonesia was ranked 7th of 154 countries as the largest receivers of aid for the water supply and sanitation sector. It is documented that in this sector, the amount of grants or loans for waste management or disposal is US\$51,773,816 (openaiddata.org 2016). This finding validates ISWA that shows Indonesia as ranked 13th of 139 countries in waste management aid in the period 2003 – 2012 (Lerpiniere et al. 2014, p.42).

This notion is also corroborated by the statement of the Director of Program Development, Directorate General Human Settlements MPWH who reveals that up until 2012, the development of 220 sanitary landfills were funded by grants and loans (*Grand funds for local sanitation projects* 2011, p. 26). The graph below indicates the budget source composition of ISWM projects.

¹⁴ Similar with MDG's and SDG's, in Indonesia waste management is accounted as a part of the sanitation program.

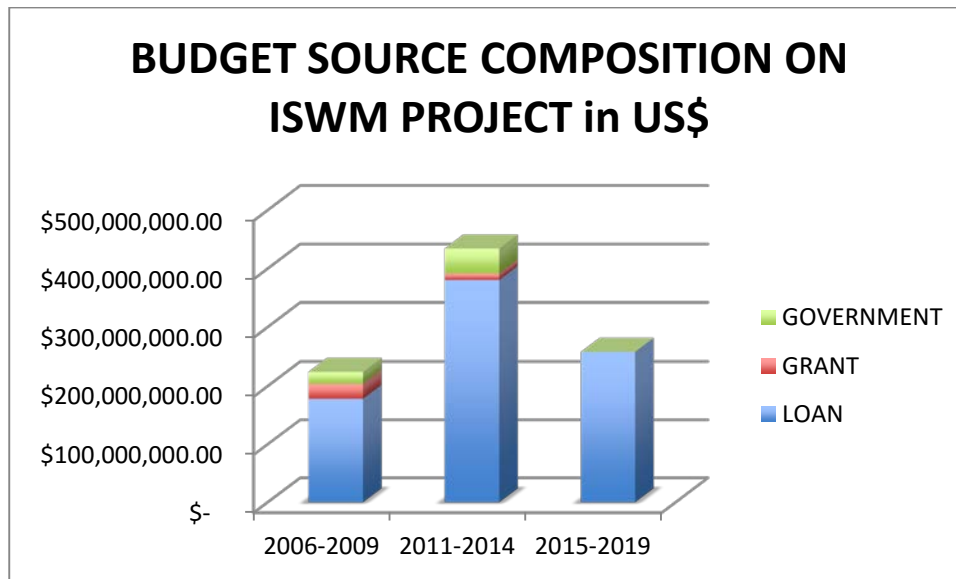


Figure 6. The budget source composition on ISWM project in Indonesia in the period of 2006 - 2019
Source: Author research from Bappenas (n.d.-a – g) ; Bappenas (2009); Bappenas (2008)

The data from *Badan Perencanaan Pembangunan Nasional (Bappenas)*¹⁵ shown in Figure 6, identifies a consistency in the three periods of the 5 year Indonesia mid-term development plan, in that loans have become the biggest source of funding for ISWM projects. Relating this fact with the broader literature, it is found that a similar situation also occurred in Addis Ababa Ethiopia (Bjerkli 2015, p. 23)

This thesis puts forward the claim that loans and grants for waste management are sporadic contributions with some international development arrangements. As an illustration, in the period of 1980 – 1990, waste management was placed in the context of an urban development project (Nas & Jaffe 2004; Sicular 1992). Meanwhile, post the issuance of MDG's, the solid waste management aid has been placed under the control of the sanitation program¹⁶. The Kyoto Protocol also provides grants for transforming waste to energy (WTE) by Clean Development

¹⁵ Translation Ministry of National Development Planning/ National Development Planning Agency

¹⁶ The example of waste management under sanitation project are Support on water and sanitation program from USAID, further information see Roger et.al 2009

Mechanisms (CDM) or Joint Initiation (The World Bank 2001, p. 105)¹⁷. Additionally, OECD statistics identify Japan as the biggest donor for a period of ten consecutive years 2005 – 2014, followed by Canada, Sweden, Switzerland, and Germany (OECD 2016). Consequently, Indonesia has placed ISWM on the same development scheme as per the international requirements in order to access funding.

Instant resolution for waste problem in urban areas

ISWM is a fast and reliable solution for tackling the waste problem in urban areas. It suggested that incinerator use in the Waste to Energy (WTE) scheme will overcome the problem of limited landfills and offers an additional economic value (Rawlins et al. 2014, p. 12). The combustion method of waste incineration is effective in reducing the amount of waste by transforming it to ash overcoming the limited landfill problem (Kamuk & Haukohl 2013, p. 2). Additionally, from an economic point of view WTE is lucrative technology since it produces negative price energy (World Energy Council 2013, p. 2). The large-scale project of WTE generates a considerable amount of electricity between 2 to 9.6 MW (Veritas 2007). Lastly, as a reliable solution, WTE is claimed to be associated with green energy. It reduces the use of energy from fossil fuels; it could potentially transform pollution from the methane gas putrefaction process into energy thus reducing the use of fossil fuel energy (Sukarna 2012, pp. 22 - 3)¹⁸. Government commitment to WTE features in some regulations, such as exemptions on WTE machinery, foreign investor tax reduction and the income

¹⁷ The example of waste management project under CDM Bekasi landfill Gas Flaring, Tamangapa landfill, Methane collection and Flaring Makasar. The information of these projects can be accessed at <http://www.worldbank.org/projects/P099679/bekasi-landfill-gas-flaring?lang=en> and <http://www.worldbank.org/projects/P104022/makassar-tpa-tamangapa-landfill-methane-collection-flaring?lang=en>

¹⁸ Uptil 2012, Indonesia has relied on fossil fuel energy (80 %) and has introduced targets to be utilising renewable energy sources from 5 % in 2011 to at least 17 % in 2025 (Wibowo 2014 Pp. 4)

business plan for WTE (Aprilia, Tezuka & Spaargaren 2010, p. 2; Damuri & Atje 2012, p. 9). Lately, this commitment was emphasised in the enactment of Presidential Decree number 16/2016 regarding waste to energy and its official statement by the President that WTE is the principal way to manage waste and generate energy (Amindoni 2016; Setkab 2016). At a practical level, it is documented that there are 38 waste-to-energy projects in Indonesia, with seven cities chosen as the pilot studies namely; Jakarta, Bandung, Tangerang, Surabaya, Solo and Makasar (Damuri & Atje 2012). The government belief in the WTE scheme is justified by some research findings that the waste in Medan North Sumatera has the potential to produce 21.744 MW of electricity or generate 4.99% electricity (Safrial 2014, p. 127). In addition, the economic benefit of the WTE scheme is also confirmed by scholars conducting research in the municipalities of Jember-East Java and Padang-West Sumatera (Dodi, Syafii & Raharjo 2015, pp. 30 - 1; Sujanarko 2014, pp. 17 – 8). This discussion, therefore, validates the opinion that WTE, as a representation of modern technology is effective in tackling the waste problem in Indonesia.

In summary, there are some valuable features of ISWM in Indonesia. First, ISWM is epitomised in the substantial development of environmentally sound waste management infrastructures. In turn, this proliferation works well in justifying the progress of development in waste management and sanitation. Second, the position of ISWM as the archetype of environmentally sound waste management works well in ensuring international support for waste management improvement. It is important to note that the lack of budget is one of the major impediments to proper waste management in Indonesia. Third, the WTE component in ISWM provides a fast and reliable solution for escalating the amount of waste, especially where landfill

areas are lacking. In addition, this thesis highlights the economic visibility of this scheme. However, these claims need to be treated with caution. There are some issues that are overlooked in the implementation of ISWM in Indonesia since there is a significant difference in the context of the origin of ISWM in developed countries and the local context of Indonesia. It considers that ensuring the compatibility with the local condition is a necessity in ISWM implementation since there is no ability to copy and paste the system under a different context (Tangri 2003, p. 3).

Challenge towards the enactment of ISWM

In a challenge to these three well-established beliefs supporting the implementation of the modern ISWM, this thesis puts forward the claim that the adoption of ISWM in Indonesia has some weaknesses regarding tenability, marginalisation of the existing local actors particularly waste pickers and being trapped in the technology fantasy. These claims will be discussed and presented in the next section.

Aid dependency, threatening the tenability of ISWM

The first issue that is overlooked in ISWM implementation is aid dependency. The largest source of funds for ISWM projects in Indonesia comes from loans. JICA 2005, states that the lack of fiscal planning in the operational stage is the major issue for the ISWM, under the donor support scheme. As a result, most of the projects become dormant when the funding is terminated (JICA 2005, p. 13). Donor aid is promoted as successfully providing environmentally sound infrastructures and there is an expectation that substantial development will back up the implementation. However, it seems that this mechanism fails to consider the capacity of municipalities to finance the operational stages. The lack of budget at the operational level remains and is unable to be resolved under the aid agreement. It cannot be denied that the

advanced infrastructures and equipment of western ISWM require high maintenance, expensive spare-parts and exorbitant operational costs prohibitive for the local government. In these circumstances, the project will lie dormant or be operated under a previous scheme which may not be environmentally sound. To illustrate this situation, 99% of open dumping practice persists, although 70% of landfills have been designed and equipped with sanitary or controlled landfill facilities¹⁹ (ADB 2013, p. 12; Coordinator Ministry of Economy 2013, p. 2; Kaunang & Hidayat 2011a, p. 18; 2011b, p. 17). Another example from an article describing abandoned ISWM equipment in the municipalities due to the lack of an operational and maintenance budget, has been investigated by local newspapers (Indra 2016; Ahmadi, Mardiana & Jarkasih 2016; Oke 2016; Hamluddin 2012). This shows a naive consideration towards the complexity of modern facilities and equipment leading in due course to futility.

Linked with ISWM theory referred to in Chapter 2, ISWM aid dependency is shown as a major disadvantage of global international development support. In this case, ISWM has been predicated on the claim of being the only way to manage waste effectively. Aid donations are contingent on acceptance of the full package of foreign funds, knowledge and equipment negating the local context and eliminating the opportunity to implement waste management differently. Indonesia and ISWM are parts of this phenomenon.

¹⁹ Article 44 waste management law number 18/2008 requires the closure of open dumping landfill in the municipalities by 2013. Apart from infrastructure, the main difference from open dumping landfill and controlled/sanitary landfill is the waste handling method. In the open dumping landfill waste that comes straight untreated. In controlled and sanitary landfill trash coating, gas and leachate management must be done. Waste that comes assumed was rubbish disaggregated, the rest of the garbage to the landfill will be compacted and covered with soil cover to prevent pollution and odour. The coating should be done every seven days for controlled landfill and every day at the sanitary landfill (Munawar and Fellner 2013)

Local actor being marginalised

Considering ISWM as a representation of modernity that has a major effect of altering the social characteristic, this thesis argues that enactment of western ISWM has a detrimental social impact (WIEGO 2013). There is limited room for the roles of local informal actors to be accommodated in this system. These are the waste pickers and middlemen who are involved in the waste management and recycling industry, (further discussions on these actors are presented in chapter 4). They are marginalised by regulation and privatisation and by the substance of law number 18/2008 regarding sanitary/controlled landfills. One requirement of sanitary/controlled landfills is the mechanisation and reduction of direct human contact with waste. It is asserted that these changes will affect the income of many families of waste pickers and the remainder of informal recycling actors previously conducting activities in landfill areas (Meidiana & Gamse 2011, p. 27). Regulations and government pressure has been flagged with the Surabaya city mayor terminating support to the waste picker organisation (Fransilia 2015; Tito 2015)²⁰. Another example is the regulation approved by the Solo city mayor in restricting waste picking activities in Putri Cempo landfill Solo-Central Java (Suwanto 2014; Widodo 2015; Jalil 2015; T.W.)²¹. These incidents mirror the experiences of other developing countries such as Ethiopia and Egypt (Bjerkli 2015, pp. 22 – 3; Fahmi 2005).

The local actors are also marginalised by the presence of the formal private sector.

Basha (2007, pp. 33 - 4) defines privatisation as a system in delivering goods/services

²⁰ Surabaya city mayor regulation number 61/2014 withdraw the city mayor regulation number 17/1990 regarding the government support on waste picker organisation.

²¹ City Major regulation number 3 /2010. Article 36 Paragraph 1 states that only official staff could perform scavenging. In the implementation, the government banned the waste pickers' activities in Putri Cempo landfill due to the WTE arrangement and the danger of methane gas and hazardous waste.

that is conducted by the formal private sector to increase efficiency. Bell and Bremer (2013) find that the privatisation in waste management assumes that corporations and multi-national companies are the remedy for a lack of budget. Furthermore, it is commonly believed that technology will skilfully perform clean and healthier waste management as well as making money for the government (Bell & Bremmer 2013). The concept of privatisation in Indonesia marginalises waste pickers due to its capital-intensive character and the economic value of waste²². Capital intensity relies on machinery and requires less labour. Second, the waste becomes the right of companies to be recycled or converted into energy (Chintan 2007, p. 7; Cohen, Ikgosse & Sturzenegger 2013, p. 13). Therefore, there is fewer opportunities to join the workforce and even when wastepickers are employed, there is little chance to gain extra revenue (Chintan 2007, p. 8). The case detailing waste privatisation in Tamangapa landfill, Makasar shows that the waste picker involvement depends on the World Bank support and not from private sector good will (Nahrudin, Sangkala & Ahmad 2013, p. 7). While privatisation is associated with successful waste management in developed countries, there is little evidence that such a scheme is effective in Indonesia, especially without harming the existing informal actors.

*Technology Fantasy*²³

WTE has become a technology fantasy for the enactment of ISWM in Indonesia. This fantasy is reflected in the hasty adoption of WTE; with the result that none of the

²² The government promoting waste management privatisation as a part of sanitation privatisation package with the slogan 'the sanitation business 100 Million Customers await you!' In this scheme, there are five components in the waste management have been offered for privatisation; waste transportation, composting, recycling, managing landfill and WTE (Bappenas 2008).

²³ The term technology fantasy is borrowed from Scheinberg (2007), privatisation and the informal sector: Thinking locally, act globally. It refers to the situation when the developing countries believe that privatisation and scientific modern technology in ISWM equals cleanliness and healthiness as well as an income generator for the government. Furthermore, she asserts that this belief emerges from

WTE installations run smoothly. In favour of the notion that modernity hides risk and hazards by promulgating rationality and technology (Beck 1992, pp. 19 - 20), this thesis asserts that the limited success of WTE is due to expensive investment and unmanageable environmental risks of advanced technology.

Economically, WTE is an expensive investment particularly since Indonesia is considered as an area of risk for WTE with its lack of successful application (Rawlins et al. 2014, p. 4). There has been high investment on infrastructure development, imported machinery, and in operational costs. The recent estimation of the installation price in Indonesia is between US\$26 million – US\$70 million depending on the capacity and the origin of the WTE technology (Gezelius & Torstensson 2015, p. 92; Rawlins et al. 2014, pp. 27 - 8)²⁴. From the total expenditure on development, the portion of the local (Indonesian) outlay is only one third due to the conditions imposed on imported materials, foreign experts, and with lack of knowledge and experience of the local experts and developers taken into account (Corporation, Ltd. & Smart Energy Co. 2012). The high operational cost is attributed to the maintenance, imported spare parts and salaries for foreign experts. There is a requirement for maintenance to be conducted once per month since the machine operates 24 hours/day and is performed by the foreign experts (Gezelius & Torstensson 2015, p. 110; Corporation, Ltd & Smart Energy Co. 2012, p. 5.8). This thesis asserts that market mechanisms have the power to determine the development concept. In considering choice of WTE technology options, Europe and Japan are the dominant players, even though other countries, such as China and Korea, offer cheaper prices (Gezelius &

the knowledge and power inequalities between North and South.

²⁴ The cheapest plan comes from China and the most expensive is the European plan (Gezelius & Torstensson 2015, p. 91)

Torstensson 2015, p.67). Chinese technology is not considered as a 'green technology' since it does not meet the European Union emission standards (Lang & Xu 2013, p.833). In fact, emission is one of the preliminary requirements to gain support from the CDM scheme. At this point, this thesis agrees with the notion that WTE is loaded with economic interests, mostly benefitting the multinational companies as the originators of the technology (Tangri 2003, p. 29).

Lastly, this thesis asserts there is a hidden environmental risk in the incinerator usage that is not well considered. It is argued that the combustible residue of incinerators might be harmful to the environment. Air pollution caused by CO₂ emissions is larger than the coal combustion process. Air pollution impairs public health by dioxin, mercury and Nano particle emissions poisoning (Bell & Bremmer 2013, p. 44), and is more difficult to control and measure because of its nature and the likelihood of being spread across regions. Water and soil contamination risks from ash and slag as burning residue become hazardous waste and remain unmanageable. This last point accentuates the perception that incinerators being the beneficial problem solvers for vast amounts of waste is problematic.

The failure of the WTE project in Suwung landfill, Bali (GALFAD) reflects the discussion above. GALFAD project is the PPP in WTE involving Sarbagita²⁵ and PT. Navigat Organic Energy (PT. NOEI) which commenced in 2004. Project calculations suggested it would produce 9.6 MW by May 2012 and contributes to the reduction of emissions of about 123,423 tCO₂e/year (Veritas 2007, pp. 2.6 - 2.9). In fact, this industrial approach to waste management failed; the open dumping persisted. There was no

²⁵ Sarbagita is the joint administration of waste management of Regencies of Denpasar, Badung, Gianyar and Tabanan

production of electricity, let alone carbon emission reduction (MacRae 2011, pp. 3 - 4). After 12 years of uncertainty, on February 2012, the Bali Provincial Government decided to terminate their PPP with PT. NOEI (Kristianto 2016). Some findings suggest that this failure was caused by corruption and bribery from within the government sector, an insufficient amount of waste, and the ineffective maintenance of the existing facilities²⁶ (Herder & Larsson 2012, pp. 24 - 8; Patimah 2014). Additionally, Herder and Larsson (2012, p.36) determined that the other cause of the failure of the GALFAD project in Suwung landfill, was the absence of the recognition of the gap between advanced modern technology and the local conditions. In this case, the technology did not fit with the local context and therefore, lacked the support of the community. In contrast, the lesson learned from the success of Temesi recycling shows that in Suwung area, low cost, low risk, and modest technology is more suitable to waste disposal and the local character²⁷.

Conclusion

This chapter has examined the enactment of ISWM in Indonesia. It cannot be denied that the implementation of ISWM in the waste management both internationally and particularly in Indonesia has several benefits which can be demonstrated by a number of key indicators. First, the application of ISWM provides material evidence to support the government's claims on the achievements of development programs. As one of development parameters derived from global conventions, the application of ISWM itself is explicit proof that Indonesia is committed to contributing to the

²⁶ The Suwung landfill infrastructure and equipment bought from Austria. If the facilities break the maintenance the reparation can only be done by Austria expert (Herder & Larsson 2012)

²⁷ The Temesi Recycling is the non-profit organisation that conducts recycling and composting. These activities could reduce 90 % of waste by using modest technology. Further Information on Temesi could accessed in <http://temesirecycling.com>

mandate of SDG's. Second, the application of ISWM paves the way for the Indonesian government to access available international funding used to finance most of waste management projects in Indonesia. Third, the character of modern technology used in ISWM is believed to be the most appropriate mechanism to address the problems of waste management in urban areas. However, the ISWM's implementation is not progressing without problems. As discovered by many developing countries, implementation leads to dependency of international grants, the marginalisation of local actor functions in waste management, and the emergence of gaps in technological expertise. Eventually, all of these detrimental implications become significant challenges in the waste management mechanism in Indonesia and shows that sustainability and integrated principles are not well applied in Indonesia context. The following chapter will examine the position, role and situation of waste pickers in the recycling Industry and ISWM. It also provides a descriptive analysis of the condition of waste pickers' wellbeing in Indonesia.

CHAPTER 4 WASTE PICKERS AND RECYCLING IN INDONESIA

This chapter will explore the part played by waste pickers through a discussion of their position, role and situation within the recycling industry, having been the foundation of waste management in Indonesia. Furthermore, it will examine its association with ISWM with particular reference to the recycling and waste utilisation scheme. This is followed by the implementation of capability approach theory as discussed in Chapter two, capturing the complex picture of waste pickers' condition in Indonesia in order to specify the areas of improvement for waste picker wellbeing. This chapter argues that waste pickers are the most prominent yet defeated actors in the recycling industry and ISWM.

This chapter is divided into three sections. The first section describes the Indonesian waste pickers. The next section outlines the range of activities in the recycling industry in Indonesia as basis of of recycling conducted by waste pickers. The third section of this chapter maps the waste pickers' condition using the capability approach as the basis for proposing an inclusion policy for the next chapter.

Indonesian waste pickers

In Indonesia, a waste picker is known locally as *pemulung*, *bakul rosok*, *tukang rombeng*, *tukang mulung*, *tukang nyari*, *mayeng* (Sicular 1992, p. 53; Supriyadi, Kriwoken & Birley 2000, p. 559). The translation of *Pemulung* is a person who makes a living by looking for and picking up second-hand goods (such as cigarettes), and selling them to collectors to be reused and recycled (Yakob Rebong & Yoto Widodo 1996 as cited in SMECDA 2008, p. 2)

Identifying the number of waste pickers is not an easy task as there is no requirement for registration (Supriyadi, Kriwoken & Birley 2000, Ghofur 2009, p. 14). Thus, research on waste pickers has been mainly conducted on a regional basis (Mahyuni 2012; Moerad 2012; Mustikawati 2013). The latest data regarding the number of waste pickers nationally was issued by the Ministry of Cooperation and Small and Medium Enterprise. The data indicates that the number of waste pickers at the national level was about 1.2 million in 2008 (Munawar & Fellner 2011, p. 6). To outline the fundamental characteristics of this waste picker cohort, this research borrows from MoCSME research data covering five landfills in Indonesia. However, the data is limited to landfill waste pickers and does not cover street waste pickers. In view of the data limitation, the results of this research may only be valuable for general comparisons.

Table 1. The demographic of waste pickers in Indonesia 2008

INDICATOR/LANDFILL ²⁸	GENDER (%)		EDUCATION (%)				AGE (%)				STAY (%)
	MEN	WOMEN	N.SC	ELEMENT- ARY	JUNIOR HIGH	SENIOR HIGH	X > 30	20 - 30	X < 20	LANDFILL	OUTSIDE
SARIMURTI / 385 WASTE PICKERS	75 %	25 %	1 %	45 %	31 %	23 %	82 %		18 %	98 %	2 %
BANTAR GEBANG / 6000 WASTE PICKERS	75 %	25 %	5 %	45 %	31 %	13 %	55 %		45 %	98 %	2 %
RAWA KUCING / 400 WASTE PICKERS	81 %	19 %	45 %	48 %	7 %		29 %	61 %	10 %	12 %	88 %
JATIBARANG / 245 WASTE PICKERS	73 %	27 %	7 %	53 %	40 %	0	27 %	73 %	0	2 %	98 %
TERJUN-NAMO BINTANG / 1000 WASTE PICKERS	57 %	43 %	5 %	42 %	31 %	23 %	31 %	62 %	8 %	2 %	98 %

Source: (SMECDA 2008)

²⁸ The municipalities-provinces of the landfill: Sarimurti landfill Bandung- West Java; Bantar Gebang Bekasi – West Java; Rawa Kucing Tangerang- Banten; Jatibarang Semarang – Central Java; Terjun-Namo Bintang Medan North Sumatera

The data indicates the global finding that the key characteristic of waste picking is that it is an easy activity to enter. There is no limitation on age, education level, and gender. The vast majority of waste pickers from four locations, namely Sarimurti, Rawa Kucing, Jati Barang, and Terjun and Namo Bintang, are aged above 20 years. A different age composition can be seen in Bantar Gebang, where 45% of waste pickers are under 20 years. This finding aligns with a study which reveals that 550 children are engaged in waste picking activities in Bantar Gebang (Oman-Reagan, p. 5). In general, waste pickers are considered to be poorly educated people and illiterate. The data justifies this argument and shows that the vast majority of waste pickers (45 – 53%) in the five landfills only having elementary school background and only (31% – 40%) have junior high school educational background while a significant number of unschooled waste pickers are found in Rawa Kucing landfill, Bogor. The data on age composition and education validates the global finding that waste picking is considered a low skilled and easy-to-enter job.

The data also indicates that waste picking in Indonesia is male dominated since it requires physical strength and there is a view that women should stay at home. This finding is also validated by other studies on waste pickers in certain areas of Indonesia such as Mojokerto and Semarang (Rini et al. 2013; Siwi 2009). However, this thesis does not address the gender issue in waste management and thus, it could be raised as a matter for further research²⁹.

²⁹ The initial discussion on women waste pickers in Indonesia could be accessed in (Ilia 2013)

Waste picker organisation

Official data about waste pickers' organisations in Indonesia is hard to obtain. The data is available sporadically in some literature and online but provides minimum information of the activities of waste picker organisations in cities such as Jakarta, Bandung, Batam, Surabaya, and Yogyakarta. Some tertiary data has been found on social media but lacks information clarity and accountability. The existing literature on waste picker organisations provides information on how the waste picker organisations such as *Serikat Peduli Lingkungan Bersih* in Medan, *Ikatan Pemulung Indonesia/IPI* and *Organisasi Pemulung Pacitan/ORPEP* in Pacitan were formed (Pacitan 2015; DP 2015; F.M & Jacky 2013; IPI n.d.; Sarwani 2011). However, there is no further information regarding the activities of these organisations.

Hence, the limited finding is insufficient for a valid analysis of waste picker organisations in Indonesia. However, the broader literature suggests that similar groups in developing countries, if they do exist, are mainly categorised as low-level organisations because they have relaxed commitments, minimum equipment, and lack the knowledge on how to run a modern organisation (Damásio 2014, pp. 74 - 5).

Government policies toward waste pickers

Although the informal economy is not restricted in Indonesia, the views and approach of the government on waste pickers as a part of the informal sector in the recycling industry vary at both national and regional levels. In the Suharto era, the government acknowledged the waste pickers' contribution in benefiting the environment and

economy. The government supported the waste picking activities by establishing waste picker cooperatives (Nas & Jaffe 2004)³⁰.

More recently, the government's view on waste pickers can be better understood from the position of the ISWM and the social security policy where ISWM considers waste pickers as a hindrance to its advancement as discussed earlier [see chapter three]. On the other hand, the Ministry of Social Welfare and Ministry of Cooperation and Medium and Small-scale Enterprises [MoCSME] considers waste pickers as a part of a vulnerable group that uses waste as an income source. The MoCSME clearly determines that waste pickers account for the poor and marginalised in the community, particularly in the urban areas (SMECDA 2008).

Similarly, the Ministry of Social Welfare considers waste pickers as part of the group with ongoing social welfare issues (*penyandang masalah kesejahteraan sosial*). Waste picking is regarded as a problem since it represents involvement in an adverse job, impermanent of nature and dependent on good collecting³¹. Therefore, the government feels it has an obligation to fix the deviation with a wide range of approaches from rehabilitative to repressive actions (Ghofur 2009, p. 3). Twikromo

³⁰ Surabaya city government issued the city mayor regulation number 17/1990 regarding organisation and waste picker development in Surabaya city. This regulation state the support development of waste picker organisation namely *paguyuban mitra pasukan kuning* as government partner in managing the waste as well as poverty reduction strategy.

³¹ According to Ministerial regulation number 08/2012³¹, a waste picker/*pemulung* as part of the group with the social issue is defined as:

orang-orang yang melakukan pekerjaan dengan cara memungut dan mengumpulkan barang-barang bekas yang berada di berbagai tempat pemukiman pendudukan, perkotaan dan atau pasar-pasar yang bermaksud untuk didaur ulang atau dijual kembali sehingga memiliki nilai ekonomis. Dengan kriteria tidak mempunyai pekerjaan tetap dan mengumpulkan barang bekas [translation: people who do their job by picking and collecting used goods from the community settlements, CBD, markets. The purpose is recycling or reselling; so, the used goods have an economic value. The criteria: (the waste pickers) do not have a permanent job and collecting the goods].

(1999, pp. 115 – 25) outlines the government’s rehabilitation schemes which conduct training and restorative programs prior to including the waste pickers in a transmigration program³² so as to provide normal and decent life for the waste pickers.

The existing literature shows that government support for this group occurs on a partial basis, and sometimes contradictory of other regulations. As an illustration, when ISWM tried hard to sterilise the landfill from waste pickers under the guise of sanitising the landfill (Sasaki et al. 2014, p. 12), the Ministry of Social Welfare provided 50 units of government housing in the landfill neighbourhood to support the waste picking activities in landfill (Sarjono 2013). Repressive actions towards waste pickers are mostly enacted by local governments with the view that waste picking is incompatible with ISWM policy, and additionally, the notion that the waste pickers’ appearance could damage the city profile (Fransilia 2015; Ghofur 2009; Sembiring & Nitivattananon 2010, pp. 806 – 8). Chapter three provides case examples of waste picker recycling prohibition in Putri Cempo landfill Solo, and the termination of the government allegiance with a waste picker organisation in Surabaya (Fransilia 2015; Tito 2015).³³

In summary, government policy and approach toward waste pickers is inconsistent.

Related government agencies define the problem differently, formulating and setting

³² Transmigration is the government resettlement program in Indonesia from the overpopulated islands to the outer islands. It is expected that this program could support the development in the outer islands. However, this program had been criticised due to deforestation and human rights violation (World Bank 2012; Fearnside 1997, p. 553)

³³ Waste picker limitation in Surabaya is signed by the issuance of the regulation by the city mayor number 61/2014 to cancel number 17/1990 regarding organisation and waste picker development in Surabaya city.

different goals to manage the waste pickers. As a result, there are contradictory policies between government institutions, constructed without considering the views and needs of the waste pickers. At this point, the author agrees with Wiego 2012, p. 1, that there is a negative attitude toward waste pickers (Wilson, Velis & Cheeseman 2006). It is evident that the government does not involve waste pickers in making decisions with regard to their means of support.

Recycling Industry

Waste picking and 3Rs in ISWM³⁴ cannot be detached from a recycling industry that was born hundreds of years ago, and has supported the livelihood of millions of human beings (Gunsilius, Spies & Garcia-Cortes 2011, p. 5). In fact, research substantiates that the first recycling industry to be recognised was in 1950 in Indonesia (Jellineck, 1994 as cited in Ghofur 2009, p. 14).

This thesis associates the recycling industry in developing countries with the informal economy³⁵. The recycling industry consists of the upper circuit/formal economy which is represented by the recycling factories that create demands and the lower circuit/informal economy which forms the supply side sustained from informal sector activities, including waste picking, sorting and processing scrap into recyclable raw materials. The intersection of these systems is the market, where supply and demand meet.

³⁴ ISWM repackaged the recycling activities as 3Rs (Reduce – Reuse – Recycle). See Scheinberg 2012 for further discussion.

³⁵ See Chapter two on informal economy discussion

The growth and contribution of recycling

The recycling industry grows at the pace of the global market's demand for recyclable materials. Globally, in the period from 1990 to 2008, there were 100 times and ten times growth demands of recyclable plastic and metal respectively (Michida 2011, p. 9). Hence, Asia has become the centre for exports, imports and an intermediate processor of recyclable materials (Michida 2011, pp. 9 - 10; Velis 2014, pp. 4 - 6). Among ASEAN countries in 2011, Indonesia was considered the second largest exporter of scrap plastic to China, after Thailand, 20.2% and 28.2% respectively (Velis 2014). It constantly supplies the plastic industries in Singapore, Taiwan, Malaysia and Philippine (Ministry of Environmental Affair 2008a, p. 3). The data indicates that the global demand has a significant impact on the recycling industry in Indonesia.

While the recycling industry in Indonesia continues to expand, and there being no time series data regarding this matter, the Ministry of Cooperation and Small-Medium Scale Enterprise [MoCaSME] predicted that by 2008, the turnover of the recycling materials in Indonesia would be about US\$2.1 million/day. To date, this number is equal with the 2008 annual budget of DKI Jakarta province (Munawar & Fellner 2011, p. 6). It could be assumed that this number has increased since there is an expanding domestic and international demand for recyclable materials (Wasono 2010), such as the increased demand for scrap paper from 2.5 million tonnes in 2010, is predicted to grow continuously to 13.7 million tonnes by 2020 (Wrap 2010).

Recycling also makes a significant contribution to reducing the cost of waste handling. Since there is no mechanism in valuing the recycling contribution in Indonesia, this paper refers to the broader literature which suggests that informal recycling subsidises the cost of waste handling by charging a much cheaper cost compared with

private recycling (Chintan 2007, p.1). As well as the indirect economic contribution, this thesis acknowledges the possible contribution of Indonesian recycling activities to the environment by borrowing research from the global context. Informal sector recycling protects climate change by reducing soil and water pollution. In a comparison of the carbon footprint, the informal sector contributes less carbon than the formal sector due to its manual handling processes (Gunsilius, Spies & Garcia-Cortes 2011, p.23). While no direct calculations have been documented, the concepts discussed indicate that recycling, particularly informal sector recycling contributes significantly to the economy and environment in Indonesia.

The structure of Recycling Industry

The informal economy is generally considered the material provider but research into the recycling industry in Indonesia, has found it can also be attributed to the supply side of the recycling chain. It is generated by the activities of scrap dealers [*Bandar*], middle man [*lapak*], and waste pickers [*pemulung*] within a hierarchical relationship (Damanhuri 2010; Nas & Jaffe 2004; Sasaki & Araki 2013; Sicular 1992) as shown Figure 7 below.

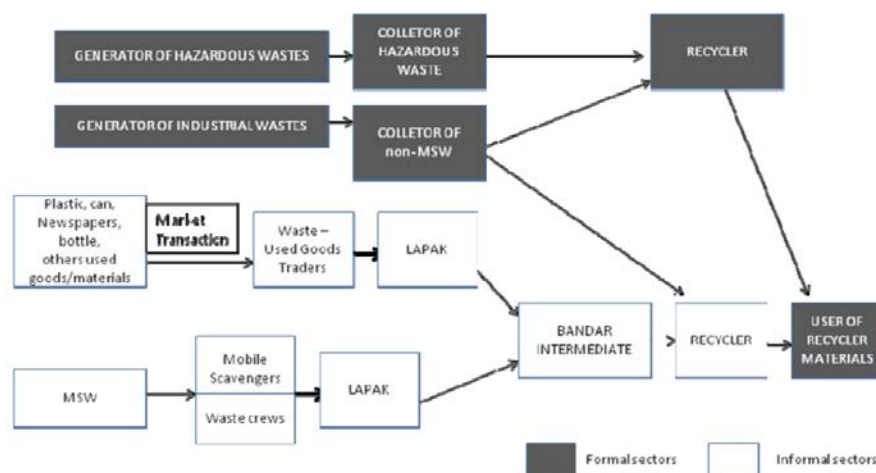


Figure 7. The recycling industry structure in Indonesia
Source (Damanhuri 2010, p. 83)

The diagram shows tiered and uni-directional relationships among the participants in the recycling chain. Each participant has a single stream relationship direction with the direct upper level participant within this hierarchy. There is no possibility to pass up the direct line. As an illustration, the waste pickers can only sell the materials to the middlemen who then onsell to Bandar. The waste pickers cannot sell the materials directly to the scrap dealers nor the middle men to the recycler.

Waste pickers are positioned in the industry by means of two types of relations with the middle men. The first is a patron-client relationship, where the waste pickers consider middlemen as their boss in order to gain protection from government pressure, access to waste, housing facilities, and financial support. In return, the waste pickers can only sell the materials to their boss. Thus, the middlemen have power to mandate the sorting requirements and charge a lower price for materials resulting in a dependency which significantly lowers waste picker bargaining positions to seek a higher price for their recyclable materials (Damanhuri 2010, p. 83; Sicular 1992; Gill 2007, pp. 1453 – 4). This relationship is typically given to newly arrived emigrants from rural areas. Similar types of relationship are explained by Hayami, Dikshit and Mishra (2006, p. 53). The second is the selling buying scheme, which enables waste pickers to be more independent and to choose buyers for their recyclable materials and thus obtain a higher income. While this type of relationship is mainly chosen by local waste pickers, there is a possibility the middlemen may limit their access to the waste source. In general, the status of the waste pickers determines the chosen relationship.

In terms of income, the uni-directional relationship predominantly benefits the participants in the higher recycling chain. There is a huge gap in income between the

waste pickers and other actors in the recycling hierarchy that stems from the opportunity to upgrade the price of recyclable materials. As an illustration, *Lapak* and *Bandar* in Bantar Gebang may increase the price of the materials up to 49.30 % and 130.29 % respectively. Thus, the selling price of plastic materials from waste pickers is IDR 250/kg. It increases to IDR 500/kg in *Lapak* and the *Bandar* sell them up to IDR 2700/kg (SMECDA 2008, p. 126). Hence, the line tiered relationship demonstrates the causal effect of the weak bargaining power of the lowest actors in the hierarchy (Damanhuri 2010; Nas & Jaffe 2004; Sasaki & Araki 2013; Sicular 1992).

Mapping the wellbeing of Indonesian waste pickers

In line with the capability approach, this section outlines the condition of waste pickers; particularly their economic, human and socio-cultural capabilities. However, limitations exist on the discussion of the political and protective capabilities due to restricted secondary data on those issues.

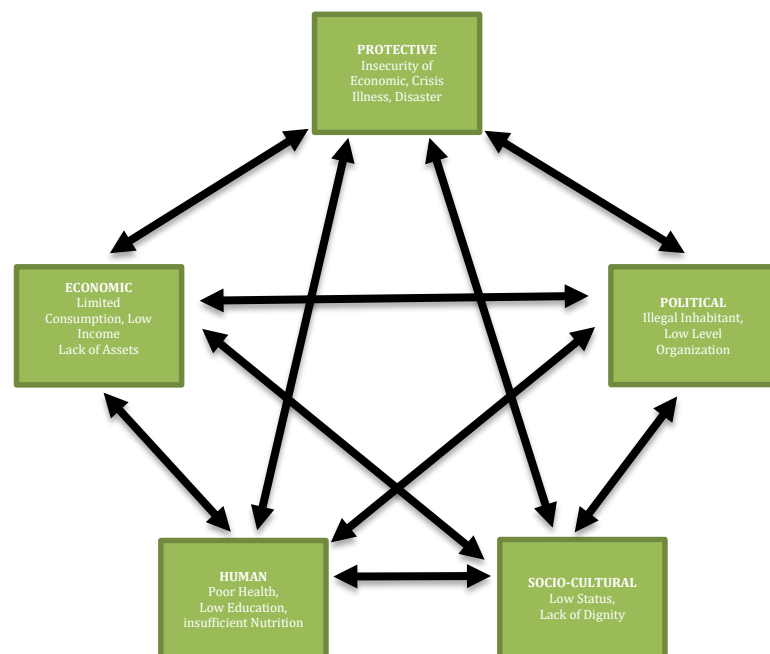


Figure 8 : A representation of the wellbeing of Indonesian waste pickers based on the components of the capability approach. (A detailed discussion is presented below)

Source: The diagram is adapted from OECD 2001, p. 39

Economic Capability

According to the theory that has been discussed in chapter two, there are three elements which can be used for measuring economic capabilities: income, consumption, and assets. This thesis argues that the waste pickers belong to the poor in terms of limited economic capabilities. To measure the income of the waste pickers, the researcher employed the comparative data of research on waste pickers in five landfills, in five cities conducted by the Ministry of Cooperation, Small and Medium Enterprise. From the massive amount of recycling industry turnover, waste pickers gain the smallest amount of income. In 2008, the monthly income of waste pickers in Bantar Gebang Landfill, Jati Barang, Namo Bintang, Rawa Kucing, Terjun was IDR 440,750 (US\$ 47.32); IDR 382,200 (US\$41.03); IDR 424,325 (US\$45.56)³⁶; IDR 38,650 (US\$41.40), IDR 398,775 (US\$42.81) (SMECDA 2008). To measure the minimum expense for decent consumption, this thesis uses the regional minimum payment as a baseline. In 2008, the minimum monthly income for Jakarta, Semarang and Medan was IDR 972,604.80 (US\$104.43), IDR 715,679 (US\$76.84), IDR 822,205 (US\$88.28), IDR 953,850 (US\$102.421), IDR 822,205 (US\$88.28) respectively³⁷. The figures clearly demonstrate that the income of the waste pickers is about half of the minimum regional payment. Therefore, it could be argued that their income is insufficient to meet a decent living standard. This is also supported by the finding

³⁶ US\$1 = IDR 9313 based on Bank Indonesia middle value of US Currency in June 2008 (Bank Indonesia, 2008).

³⁷ Based on the Governor Regulation number 143/2007, the Minimum Regional Income of DKI Jakarta province in 2008 was IDR 972,604.80 (US\$104.43).

Minimum Regional Income for Semarang city was IDR 715,679 (US\$76.84)

Source: <http://nakertransduk.jatengprov.go.id/index.php/page/details/page-1379400077/upah-minimum-per-kabkota-tahun-2008-2013.html>

Minimum Regional Income for Sumatera Utara province was IDR 822,205 (US\$88.28)

Source: <http://www.pajak.net/blog/peraturan/ump2008.pdf>

related to waste pickers' food consumption patterns. Waste pickers allocate the biggest portion of their income to purchase food and because of limited funds may only eat twice a day and consume additional food from the waste piles (Rahardian 2012 as cited in Iliia 2013, pp. 3 – 4; SMECDA 2008). The income, consumption standard, and consumption pattern indicate that the waste pickers do not earn a sufficient income to fulfil their needs.

Data regarding the assets of the waste pickers is limited. Asset indication is captured from data showing that local waste pickers have land/house ownership certificates (SPPT PBB)³⁸ and pay electricity bills, or that the emigrant waste pickers have assets in their hometowns (SMECDA 2008). However, there is lack of clarity on the number and sources of assets and doubt that the assets were purchased with their waste picking income. Therefore, a study of the waste pickers' assets is needed. Based on this discussion, it is fair to say that the waste pickers belong the poor in terms of their lack of economic capabilities.

Human Capability

Human capability is the element that measures the level of ability to obtain decent healthcare, education, water, sanitation, nutrition and housing. This thesis contends that overall the Indonesian waste pickers have limited human capability and considers the working environment as a determinant of the condition of waste pickers' health. Waste picking is deemed as high-risk due to manual handling requirements and direct contact with various mixed waste. As previously discussed,

³⁸ SPPT PBB is *Surat Pemberitahuan Pajak Terhutang Pajak Bumi dan Bangunan* (translation: property tax return payable)

about 99% of landfills in Indonesia are practising open dumping methods³⁹; this situation imposes greater health risks due to mixed hazardous, medical, and sharp waste. Moreover, safety equipment for the waste pickers is inadequate. The combination of these conditions result in various health risks, such as infection (SMECDA 2008, p. 131). This finding aligns with research into hazardous working conditions in Chennai-Southern India (Kandasamy et al. 2013, p. 58) and relates to the poor settlement in the slum, landfill or the nomad⁴⁰. The poor settlements also lack access to clean water and sanitation, exemplified by the poor living conditions of the waste pickers in Bantar Gebang landfill who deal with the odour of waste and have direct contact with rats, mosquitoes, and flies (Sasaki et al. 2014, pp. 17 – 8; SMECDA 2008). Discussions focused on income and eating patterns, combined with long working hours⁴¹ restrict waste pickers' capability to access a healthy and balanced diet. The health vulnerability leads to common illnesses such as headaches, stomach aches, skin diseases, and respiratory infections (SMECDA 2008). Studies conducted in Kolkata and Bandung reported similar findings, revealing that poor working conditions and poor living environments cause similar illnesses (Teri 1998 as cited in Azhari 2009, p. 700; Hazra & Goel 2009, p. 476)

The majority of waste pickers have a low level of education. Furthermore, the low educational attainment of children of the waste pickers is clearly related to their inability to pay school fees and purchase books due to their limited income (SMECDA

³⁹ See Chapter 3 , sub heading tenability issue

⁴⁰ In some cities like Jakarta and Yogyakarta, there are some groups of waste pickers who live a nomadic style, which is known as *Manusia Gerobak* [translation: cart people - those who live in a cart]. Further discussion about this group could be accessed in Ghofur (2009) and Twikromo (1999)

⁴¹ Waste pickers mostly work 7 days in a week, 9 – 12 hours/day (SMECDA 2008)

2008, p. 181). This evidence supports the capability approach theory, which claims that economic capabilities have a direct impact on human capabilities.

Socio-Cultural Capability

The findings indicate that, in general, the community undervalues waste pickers because of their 'dirty job' which then leads to other social pressures and discrimination. However, when the waste pickers in the community conduct their job properly, discrimination is targeted at emigrant waste pickers from other parts of the country. For example, most of the community and public services put a restriction on their presence, such as erecting signs of *Pemulung Dilarang Masuk* [translation: waste pickers are not allowed to enter the settlement area] (Ilia 2013, p. 2) (Oman-Reagan, p. 6). Emigrant waste pickers also experience discrimination in the health service where they are often treated with less respect during medical examinations in social health centres (SMECDA 2008, p. 255)⁴². On the contrary, the local waste pickers have better experiences in their community. They are still engaged, involved, and well accepted in community activities, such as *arisan and gotong royong* (Twikromo 1999, p. 147)⁴³.

Political Capability

Chapter 2 mentions three aspects for measuring political capabilities: right, influence, and freedom. It is difficult for this research to address the political capabilities as the existing literatures on waste pickers in Indonesia mainly focus on economic, environment, health and social aspects. This paper considers that legal recognition is

⁴² See (Sembiring & Nitivattananon 2010, p. 807) for details discrimination and limitation on waste pickers activities in Yogyakarta

⁴³ Gotong royong is a communal work to accomplish a task in the society that reflect generalised reciprocity among community members (Bowen 1986, pp. 545-7)

the main requirement to participate in any government programs as well as gaining access to government support and facilities. Considering that most of waste pickers are emigrants from rural areas living in slums or illegal areas in the city and are unable to get legal recognition from the local government, they experience difficulties in accessing government facilities and support or lack the capacity to deal with politics. However, this perception has never been studied thoroughly. Determining whether legal recognition as citizens has a significant impact on the improvement of waste pickers' political capabilities, requires a further study.

The experience of waste picker organisations in Brazil and India shows that a waste picker collective could generate a movement to influence society and government to be more accommodating of this group (Gerdes & Gunsilius 2010, p. 14). However, limited data on the waste picker organisations impede the analysis on this issue. Therefore, this could become another recommendation for further research.

Protective Capability

The protective capability of the waste pickers can be measured by looking at the other dimensions of the capability approach focussing on the ability to protect health and to survive from economic crisis. It is evident that the waste pickers do not have this capability due to the nature of their hazardous working conditions combined with limited access to the healthcare services, poor nutrition, and long working hours. In terms of the ability to survive a crisis, it has been observed that waste pickers remain active as long as they earn an income. However, it does not mean that the income is sufficient. The gap between their income and the minimum regional income shows that the income is insufficient for survival. Therefore, it can be assumed that the waste pickers have limited protective capabilities.

CONCLUSION

This chapter has explored the position of waste pickers in Indonesia. In the context of the recycling industry, it shows that waste picker has been at the forefront of recycling in Indonesia even before ISWM was enacted. This finding validates the literature reviews on the informal economy claiming that the recycling industry creates demand and the waste picker, as an actor in the informal economy, plays a role as the supplier. In respect to the significant contribution of the recycling industry to the national economy, the premise of waste pickers being the catalyst for growth is validated. However, this chapter also finds that due to market mechanisms and their positions as the lowest participants in recycling industry hierarchy, waste pickers do not get significant return from their contribution.

The government perspective and regulation towards waste pickers is ambiguous. On the one hand, based on policy and regulation, the waste picker is seen as a problem impeding the advancement of modern solid waste management and ISWM policy, thus there is no support of waste picker involvement. On the other hand, at a practical level, the government tolerates the waste picker activities in landfill and waste service, taking advantage of the economic contribution from the recycling activities.

Waste picker's wellbeing based on the capability approach shows that the status of waste pickers in the recycling industry and ISWM, significantly impacts on their wellbeing. The position that waste pickers hold in Indonesia reflects the complex picture of multi-dimensional incapability created by hazardous working and living conditions, being economically impoverished and powerless in society and dictated to by social pressures. The multi-dimensional capability approach shows a systemic

cause and effect of social, economic, human rights and political challenges in determining people's wellbeing. The findings in this chapter supports the argument that waste pickers are the prominent and defeated actors in the recycling industry and ISWM. The research on the existing performance of ISWM systems and waste pickers in Indonesia, will be examined to determine waste picker integration as the opportunity to unify waste management requirements and waste picker improvement.

CHAPTER 5 TOWARD WASTE PICKER INTEGRATION

This chapter will examine the possibility of officially recognised waste picker integration into waste management systems in Indonesia. Although data is limited, studies on ISWM and waste pickers in Indonesia indicate that inclusion of waste pickers has the potential to improve waste management services and reduce poverty among waste pickers (Damanhuri 2010; Nas & Jaffe 2004; Sicular 1992). These scholars believe that in Indonesia, where waste, an informal economy, and unemployment are inseparable, the recycling industry is a potential solution for reducing poverty of waste pickers. This notion aligns with international recognition of RI as an effective strategy to reduce environmental pressures as well as create job opportunities and encourage investments (Scheinberg 2012; UNEP 2011, p. 26; Van Beukering 2001, p. 1). Agreeing with this premise, this chapter makes a case for the inclusion of waste pickers into the waste management systems in Indonesia.

To achieve this goal, this study will group the arguments into three sections. The first section will briefly elaborate on the basic concept of integration and potential strategies to realise it. The second section will examine case studies of waste picker inclusion in Pune, India and Brazil, with particular reference to their government policies and waste picker organisations. Brazil and India have been chosen as these countries share similar socio-economic and political ideologies towards the informal economy and waste management with Indonesia. Moving beyond the justification that inclusion is the best solution, this section aims to map the process, actors, successes, and challenges of the inclusion in these regions. The third section discusses the opportunity of waste picker integration in Indonesia. It is understood that there

is no such easy or transferable approach given the varying nature of the informal sector, the existing policy on ISWM and recycling industry. Therefore, the findings in chapters three and four will determine policy proposals for Indonesia.

Waste Picker Integration

Scheinberg (2012, p. 25) defines integration as an effort to build government commitment and policies in order to allow for the participation of the informal sector, but formally manages the recycling of materials. The term 'integration' in some literatures may suggest 'inclusion', 'formalisation' or 'legalisation'. In agreement with Velis et.al (2012, p. 43), this paper uses those terms interchangeably.

The idea of integrating the informal recycling system into the formal ISWM in developing countries stems from the increasing evidence that without the involvement of the informal sector modernised waste management (ISWM) and waste disposal services cannot be sustained, and is neither fair nor effective (Gunsilius, Spies & Garcia-Cortes 2011, p. 7). While ISWM seems useful and efficient, it is actually unaffordable. Its operational process is complicated, and breaches the environmental safety norms (for the Indonesian case, see chapter 3 on WTE). In contrast, the informal system which performs effectively in recycling in a traditional sense has become the main income for millions of people (Ezeah, Fazakerley & Roberts 2013, p. 2516). It produces a high rate of recycling with minimal cost; however, it cannot meet the standards of safe working conditions and is the face of socio-economic discrimination within the recycling chain (for the Indonesian context see chapter 4). Thus, integration emerges as a way to combine the two approaches. The integration model restates the key concepts of sustainable development and encourages the balance of four interdependencies: the contribution to ISWM, the

recycling material chains, social impact, and organisation and empowerment of waste pickers (Velis et al. 2012, p. 63)⁴⁴. It is expected that their inclusion will result in a win-win solution by combining high and low technologies in waste collection and treatment conducted by all stakeholders in ISWM, employing both formal and informal actors. Moving forward, it is believed that the integration will benefit community health, support poverty reduction, reduce the cost of waste management, and increase the recycling rate (Wilson et al. 2009, p. 632; Wilson, Velis & Cheeseman 2006, pp. 806 – 7). The analysis has drawn attention to bold opportunities demonstrating how inclusion can improve both the waste service provision and conditions for the waste pickers. It also shows the differences in terms of the degree of application based on context. Therefore, this paper explores the application of the inclusion model in two locations: Pune, India and Brazil, to identify policies, successes and limitations. Pune has been chosen as a representation of inclusion at the municipal level, while Brazil is an example of national level inclusion. Based on the lessons learned from the case studies, this paper will formulate a proposal for the inclusion of waste pickers in Indonesia.

Case Studies

Waste Pickers Integration in Pune India

Pune City is part of Pune Urban Agglomeration with a population of 3.11 million and has 8,000 waste pickers who are regarded as poor, with a low level of education

⁴⁴ In relation to ISWM, the integration demands access to waste and recognition of the informal sector, protecting public health and strengthening the interface as a possible intervention. In the material and value chain, the main interventions are the improvement of recyclable material quality, and adding value and improving linkage in the value change. The type of intervention in social aspect are the government legal recognition, paying more attention to children workers and gender issue, and lastly considering the occupational and safety. The last, but the most important, is the organisation and empowerment. In this area, there are three main groups of intervention: supporting the development of waste pickers organisation, financial viability, and capacity building. (Ezeah, Fazakerley & Roberts 2013; Velis et al. 2012)

(Chikarmane 2012, p. 2; Chikarmane & Narayan 2009, p. 30). It is documented that the waste pickers in Pune reduce 22% of recyclable materials from landfill, with a financial benefit to the city of about US\$3,615,900 in 2006 (as cited in Scheinberg et.al 2010 Chikarmane 2012, p. 3). Prior to their inclusion, the waste pickers of Pune experienced social pressures, faced the health risks⁴⁵, were invisible to the government, earned the lowest incomes in the recycling chain, and were marginalised by modern waste management schemes. It is clear that the informal recycling sector of both India and Indonesia share at least three similarities. First, they contributes to a reduction of the amount of waste. Second, they have a similar demographic backgrounds, except where cultural custom designates a particular caste as the assigned waste pickers. Lastly, they are both under pressure from society, government, and the recycling industry.

India introduced modern solid waste management systems in the 1970s by building a number of substantial WTE and composting plants across the country. The decision to employ modern technology in managing waste gained credibility with the Municipal Solid Waste (MSW) regulation in 2002. However, the breakdown of this approach was attributed to the failure to adapt to local conditions (Annepu 2012, pp. 25 – 7).

An initiative to improve waste pickers' wellbeing in Pune was started in 1993 by a waste picker union, *Kagad Kach Patra Kashtakari Panchayat* (KKPKP) (Chikarmane & Narayan 2005, p. 4)⁴⁶. KKPKP which aimed to ensure better working environments

⁴⁵ The waste pickers are suffering from some chronic diseases (tuberculosis, musculo-skeletal illness) due to direct contact to the waste and poor living condition (Chikarmane & Narayan 2009, p. 15)

⁴⁶ For the history of KKPKP, please see (Chikarmane & Narayan 2005)

and access to the waste sources, successfully engaging waste pickers to advocate their needs through the organisation. As a result, Pune waste pickers enjoyed better working agreements such as having an identity card as a self-employed worker, having an exclusive right to conduct door-to-door waste collection for 350,000 households and business entities, and receiving health and life insurance from the government (Bhaskar & Chikarmane 2012). For the waste pickers, the union support worked well- improving their wellbeing, including improving hygiene, income, better access to water and sanitation, access to electricity, and improving the education attainment for their children (Bhaskar & Chikarmane 2012, p. 600). It is important to note that these researchers emphasised that the KKPKP also gained success in reducing the social pressures applied to this group (Chikarmane 2012, p. 10).

The Government of Pune municipalities funded and regulated the waste management system to ensure the integration of the waste pickers. The Solid Waste Collection and Handling (SWaCH) was formed and assigned as the intermediary institution between the municipal government and KKPKP in arranging waste services for the community (Chikarmane & Narayan 2009). Financial support was also given by the government to build the recycling site and waste collection equipment. Finally, this support resulted in significant improvements in productivity and performance. Regulation granted waste pickers legal right to conduct door-to-door waste collection using a fee-based model⁴⁷. This mechanism was ultimately effective in tackling poor waste management services and improving waste pickers' living conditions.

⁴⁷ In the fee-based model, the collectors gain the income from the community payment and selling the recyclable material from the collection process

Bhaskar and Chikarmane (2012), and Chikarmane and Narayan (2009) assert that the success of waste picker inclusion in Pune was generated by the persistence of the waste picker organisation's struggle combined with the pro-poor policy held by the government resulting in a decentralised waste collection for the city⁴⁸. The elements of the proposed integration model included door-to-door waste collection, composting technologies to process the organic waste, segregation of waste and a restructure of solid waste management (Bhaskar & Chikarmane 2012). The municipality and council approved the KKPKP's proposal to conduct door-to-door waste collection in 2006. In addition, the government agreed to finance the initial equipment for 1200 waste pickers, the management and the welfare costs for 5 years ⁴⁹ (Chikarmane & Narayan 2009). In effect, a combination of national government regulations, innovative waste programs and community demand for better landfill management were the drivers of change in waste management. As demonstrated evidence, the Maharashtra government resolution and the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) supported the process of the city and waste picker inclusion (Chikarmane 2012, p. 5).

The literature documenting the Pune inclusion program also outlines challenges in the waste picker integration. First, the KKPKP and SWaCH organisations face internal challenges in managing the transformation of waste pickers from an informal to a

⁴⁸ KKPKP conducted a series of lobbies and demonstrations to show that they had a significant number of members. KKPKP also formed a loose alliance 'waste matters' to promote the importance of recycling waste and the role of informal sector. This alliance is supported by the Centre for Environment Education, KKPKP, SNdT department of Continuing and Adult Education, Janwan

⁴⁹ The political support to the PPKPK came from the incumbent Municipal commissioner who had a background as a doctor with an interest in promoting community health. This agreement was mandated on resolution No. 476 of the 2006 Pune Municipal Corporation General Body.

formal economic model. Formalisation demands a shift from the traditional characteristic of informal waste pickers to being regular participants in semi-formal employment (Chikarmane & Narayan 2005)⁵⁰. Bhaskar and Chikarmane (2012, pp. 604 – 5) outline the details that the waste pickers experience difficulties in performing service regularly because as members of the cooperative, they are not paid by the municipality for this work but collect door to door in a user pays model. This raises the issue of competition with private sector as one of the challenges. With the government requiring SWaCH to expand their service coverage in the middle-low income settlement, this becomes problematic where inhabitants refuse or are incapable to pay higher service fees. One area that should be given attention is the residual problem of competition from the private collection system. Since recycling is considered a lucrative business, the private sectors are keen to provide a similar service and combine it with a modern approach such as WTE (Bhaskar & Chikarmane 2012, p. 607).

Waste pickers integration in Brazil

Solid waste management accounts for a major problem in Brazil where the government faces difficulties in meeting the needs of the community. Evidence of poor waste management can be seen in the open dumping landfills, the piles of garbage in public places, and in advanced but problematic solid waste programs such as WTE. Technically, waste composition in Brazil is similar to that of Indonesia: 55% organic, 40% recyclable, and 5% mixed waste (Corsten, Worrell & Dael 2012).

⁵⁰ The waste pickers feel it is hard to conduct the collection on a regular basis.

Brazil applied an Integrated Solid Waste Management (ISWM), in line with the Brazilian Solid Waste Policy (BSWP) 12,305 enacted in 2010. The principle of this ISWM is similar to the Indonesian and Indian 3Rs, transforming waste to resources and environmentally friendly disposal (Ferri, Chaves & Ribeiro 2015, p. 173). However, it differs in terms of the other target of BSWP, which is to support waste pickers' economic improvement by conducting a gradual formal inclusion (Donoso 2010)⁵¹.

The total number of waste pickers in Brazil is predicted to be about 800,000 and about two thirds of them live in poor conditions (Tirado-Soto & Zamberlan 2013, p. 1006). Furthermore, Fergutz, Dias and Mitlin (2011); Pereira and Teixeira (2012); and Tirado-Soto and Zamberlan (2013) assert that before the enactment of BSWP, waste pickers experienced social stigma, unequal treatment by the government and exploitation by recycling industry. Pereira and Teixeira (2012, p. 65) detail the community disrespect and prejudice towards them, made worse by government pressures, harassment, and no legal protection from police and government officers. Waste pickers were also exploited by the recycling industry with low prices paid for recyclable materials and manipulated by a biased recycling structure. They face challenges of travelling long distances to recycling venues and having to meet recycling business scrap quotas on time. (Fergutz, Dias & Mitlin 2011, p. 602).⁵² In summary, there is no return from their contribution in performing the high-risk job in landfill cities and being appreciated by the government and society.

⁵¹ Article 7 paragraph XII in BSWP demands the involvement of waste pickers (*catadores*) in managing waste shared responsibility for product life cycle. BSWP could be accessed in <http://wiego.org/sites/wiego.org/files/resources/files/Pereira-Brazilian-Waste-Policy.pdf>

⁵² The waste pickers could not fulfil the recycling industry demand; a particular amount of clean-sorted-pressed material in regular basis. Additionally, the waste pickers do not have access to the recycling industry region due to lack of transportation (Fergutz, Dias & Mitlin 2011, p. 602).

Waste pickers are at the core of recycling in Brazil. While it has been recorded that the existing recycling program by the government only achieved 4% of its 20% recycling target by 2015, it is reported that Brazil is the biggest contributor to aluminium can recycling in the world at about a 98% rate. In that case, it is clear that the waste pickers are the main actor of this service. Additionally, though unintentionally, waste pickers help the landfill last longer by reducing the quantity of dumped waste (Fergutz, Dias & Mitlin 2011, p. 598).

The drivers of inclusion in the Brazilian context are the waste pickers organisation movement and the government's political commitment and policy. Brazil is home to 500 waste picker cooperatives which started as small-scale enterprises focused on fulfilling basic needs, such as food, housing and health in late 1980s (Pereira & Teixeira 2012, p. 61). Their transformation into the national scale waste picker organisation, MNCR⁵³, occurred in 1999. In 2001, the MNCR issued the *Carta de Brasília* which formulated 3 goals, demanding the fair regulation of the recycling trade, proposed inclusion and waste picker involvement in all stages of the recycling process. In advocating for their needs, MNCR conducted a series of demonstrations, lobbied the municipal government and parliament with the support of religious organisations and the civil society. MNCR with the support of international and local donors, facilitated members to enhance their capacity by organising training courses (Fergutz, Dias & Mitlin 2011, p. 599).

⁵³ MNCR is stand for Movimento Nacional Dos Catadores Reciclaves Dematerials Reciclaves (Translation: The National of Collectors Movement (the) Recycable Materials

This case study emphasises that political will and regulation are the drivers of inclusion with the BSWP accommodating the scavengers as part of the ISWM system. The promotion of partnerships with waste pickers and governments, companies and other organisations in conducting 3Rs supports the zero hunger program and the eradication of dump sites. It is claimed that international conventions and the law have a strong influence in shaping the pro-poor policy in waste management⁵⁴ (Santos et al. 2012). However, it is important to note that the national policy is implemented to varying degrees in Brazilian cities. The nature of local political, economic and social dynamics determines the level of its application.

The movement of waste picker organisations and the implementation of BSWP allowed gradual changes to the relationship of waste pickers and the government. Initially, the government assigned the inter-ministry bodies to handle the inclusion of waste pickers and then agreed to finance an inclusion plan based on MNRC's proposal of about R\$178 million to generate 3.9 million jobs in 1999 cities (Fergutz, Dias & Mitlin 2011, p. 599). This fund translates into the provision of recycling infrastructure and equipment for waste pickers.

In summary, India and Brazil share similar backgrounds as both are developing countries and have an informal recycling sector with comparable problems and characteristics in waste management. Waste picker inclusion works well in the recycling systems of both the ISWM (3Rs) and recycling industry. It works in 3Rs by increasing the recycling rate, benefiting the environment, providing extended waste management services to the community and financing waste management. The

⁵⁴ The series of international convention that is in agreement with the waste pickers cooperatives are: Principle 5 of Rio declaration, the ILO 1981 Convention 155 (Security and Health of Workers and the Work Environment; the 1966 UN International Pact for Economic, Social and Cultural Rights

inclusion also supports the waste pickers to receive a better income and safer working conditions in sorting the recyclable waste as well as advancing the recycling industry. It is important to note that the inclusion in India and Brazil is driven by similar waste picker organisations and pro-inclusion government policies. KKPKP and MNCR succeeded in organising the waste pickers, formulating strategies and negotiating with the government to advocate for their needs. Associated with the theory related to the informal sector in chapter two, it could be safely assumed that the respective governments employ a combination of structural and neoliberal approaches in dealing with this issue. Both Brazilian and Indian Governments recognise that the informal economy is a means of growth. The structural approach is represented by the government policy which provides the equipment, facilities and grants the access to conduct a waste service. It is important to note that both countries use the same policy instruments in enacting the inclusion of waste pickers namely regulation, economy, and institution.

Proposing waste picker integration in Indonesia

Reference to the case studies in Brazil and India case studies, show there is opportunity for waste picker inclusion to be applied in the Indonesian context. Three drivers of the inclusion exist: 1.2 million waste pickers account for 0.4% of the total population; a sizeable recycling industry as a superstructure of the informal sector; and, although not successfully implemented, there is a government commitment to recycling through a 3Rs scheme within ISWM.

The case studies suggest that the prominent advocates of the inclusion are the government and waste picker organisations. However, the discussion on waste picker organisations in chapter 4 shows that, although they exist, the waste picker

structured groups in Indonesia are at a low level. They have limited capacity and require powerful support in terms of finance and training (Damásio 2014, pp. 74 – 5). In contrast to the case studies, the inclusion will rely heavily on the government's willingness to create policy to implement the inclusion. The government should consider an integrated solid waste management that truly involves the existing actors as suggested in the basic vision of ISWM (see chapter 2). Brazil and India have demonstrated that waste picker inclusion in SWM does not fully challenge the existing arrangements of the private sector and advanced technology, but that can be adjusted and the informal sector could participate legally.

As Wilson et al (2006, p. 805) suggest, the biggest challenge for inclusion is shifting the government views and attitude toward waste pickers from problematic to potential. The Indonesian Government considers waste pickers as a problem in the context of ISWM or its city image. Ojeda- Benitez et al. (2002, Pp. 281 – 2) argue that there is insufficient data to persuade the government of the value of the informal sector's contribution in the modern waste system and recycling industry. Indeed, Chapter Three reveals that the government is keen to choose the private sector as a partner in ISWM, given its compatibility with the modern systems of waste management, overlooking waste pickers' participation. This position is also reaffirmed by the social welfare policy that considers waste pickers as part of the poor and perceived as city deviants. Despite their productive value generated for society, the waste pickers suffer repression. In stark contrast, the basic principle of inclusion considers waste pickers as a potential solution, not a problem. Therefore, the first step is to change the perception and attitudes of the government both at national and regional levels by recognising the waste pickers' contribution (Wilson,

Velis & Cheeseman 2006, p. 806).

Assessing the ISWM and valuing the benefits of the informal economy should be the start of government intervention (Wilson, Velis & Cheeseman 2006, p. 805). While it is clear that the informal sector contributes significantly to the economy, environment and, inadvertently, supports the recycling program in ISWM, it is not surprising given the evidence, that even without ISWM, the waste pickers have become the most vulnerable participants in the recycling industry. As the lowest actors in the recycling structure, they do not have the bargaining position to gain better incomes [see chapter 4]. The waste pickers also suffer social stigma [see chapter 4]. Chapter 4 also shows that the broader policy in Indonesia considers waste pickers as a problem, Therefore, the approach toward this group is repressive. Altogether, this creates a systemic incapability for the waste pickers; they face hardship even in fulfilling their basic needs such as food, health and shelter). In summary, the experience of waste pickers in Indonesia resembles the experiences of their counterparts in India and Brazil.

Thus, it could be suggested that the government could consider the strategies of Indian and Brazilian governments. Brazil and India employ regulation, economy and institution as key instruments of their inclusion policy, recognised as effective in achieving legitimacy of the new system (Howlett 2009, p. 77). The regulation could be enacted to assign the waste pickers as official door-to-door waste collectors. It is believed that as a part of providing income assurance, this strategy is effective in reducing the negative stigma and encourages respect for waste pickers. In terms of economy, the integration scheme suggests that the government should support the waste pickers by providing facilities to add to the value of recyclable materials and

reprocessing facilities (Velis et al. 2012, pp. 51 – 5). In Brazil and India, this strategy is translated into the development of recycling and storage sites, providing reprocessing machines and conducting micro-credit programs. It is important to note that this strategy is also effective in reducing health risks by restricting direct contact with mixed waste. Thus, these strategies might be suitable to be implemented in Indonesia.

One area that has received much attention is the different nature of the waste picker organisations in Indonesia and the other two countries. Since the organisation is essential for the successful inclusion, this policy should emphasise the strategy to assist scavenger organisations upgrades (Ezeah, Fazakerley & Roberts 2013, p. 2517; Velis et al. 2012, p. 45). It is believed that an organisation is a strategic tool for achieving certain goals. Hence, the organisation can lead to a stronger bargaining position in advocating waste picker needs to the government and the recycling market (Damásio 2014, pp. 82 – 3). Bhaskar and Chikarmane (2012) stress that the major challenges in the concept of inclusion are introducing and developing the formal culture among the waste pickers. Even in India which has well-established organisations, the integration still has to deal with this issue. It can be predicted that Indonesia will face more challenging situations.

Finally, there is a potential conflict with the existing private sectors involved under the public-private-partnership arrangement. The private sector is mainly involved in WTE scheme. At the intersection of WTE and recycling, is the prospect of utilising recyclable waste as raw materials and its associated financial profits. It is also important to note that the existing modern waste management schemes are also closely linked with the international development with powerful influence over

Indonesia waste management, as discussed in Chapter Three. It seems that disregarding these schemes may not be strategic due to the substantial investment and the fact that most of the waste management projects are financed by the donors. While it is hard to identify clear suggestions or experiences in dealing with this issue, this study recognises that the final outcomes of this case will be heavily influenced by the international donors and the alignment and bargaining power of the Indonesian Government (Sicular 1992, p. 172).

Conclusion

This chapter has examined a possible scheme to establish sustainable waste management and reduce waste pickers' poverty at the same time through integration. The experiences of India and Brazil in conducting similar inclusion schemes identify the government and organisations as the main drivers of the approach. In the Indonesian case, different structures may form due to a weak waste picker organisation. However, inclusion will occur if the government has the political will and provides the institutional, regulatory and financial supports to the waste picker organisation as a pre-liminary condition of the inclusion program. This proposal, however, is unproven. Considering the involvement of international development actors as discussed in Chapter Three, the implementation will depend on the strength of government commitment and the recent approach of international development actors. The following chapter will conclude the thesis and answers the research questions from the discussions in chapters two to five.

CHAPTER 6 CONCLUSION

This study explores the modernisation of waste management in Indonesia, ISWM (Integrated Solid Waste Management). It has identified its impact on waste pickers as the informal actor of waste management and recycling, particularly on their wellbeing. The study has also discussed whether the implementation of waste picker integration could improve the waste management service and reduce poverty among waste pickers. The existing literature on this issue particularly in the context of Indonesia are inconclusive on some vital issues within the discourse. This thesis addresses four research questions: (1) how is the modern ISWM enacted in Indonesia? (2) To what extent does ISWM unintentionally increase waste pickers' vulnerability? (3) How is the waste pickers' wellbeing perceived in Indonesia? (4) In what ways can waste pickers be included in ISWM in Indonesia?

The existing literature regarding ISWM implementation in developing countries reveals that despite the contributions to improve the quantity of modern infrastructure, some scholars such as Scheinberg (2007), Scheinberg and Mitovic (2008), Wilson and Cheeseman (2006) ascertain that the quality of implementation has some weaknesses. These include the tendency to replicate the technology systems and privatisation schemes of developed countries; a lack of sustainability related to aid dependency and incompatible local area technology and the marginalisation of the local actors in the traditional waste disposal system. Moreover, there is lack of discussion of the complexities of ISWM implementation in the Indonesian context. This study offers an overview of these complexities in Indonesia particularly at the nexus between ISWM and the waste pickers who represent the local actors in waste management.

The findings are discussed in the specific chapters: the enactment of ISWM in Indonesia, waste pickers and recycling in Indonesia, and toward waste picker integration. The empirical findings have been synthesised to answer all three of the research questions. The findings of chapter three suggest that the modern ISWM's implementation is based on the substantial contribution of advanced technology in the control of international investment and corporations. Indeed, the enactment of ISWM justifies that the development of modern solid waste management in Indonesia is in accord with the developed world's protocols in managing waste. As a result, Indonesia has been the recipient of international support for solid waste management modernisation projects for over three decades. While the government considers modern technology as the most appropriate solution to tackle waste management problems in urban areas, the gap between knowledge and local capability to ensure tenability of projects is unresolved. Thus, modern infrastructure and advanced equipment are abandoned after the donors' support is terminated. This validates what the broader literature indicates, that most ISWM projects in developing countries are trapped in aid dependency. In addition, this study reveals that Waste to Energy (WTE) schemes are not considered properly. The failure of WTE plan in Suwung landfill, Bali shows that advanced technology and privatisation do not answer the need of waste management due the differing nature of waste and social context as well as unaffordability in financing the project.

The findings in Chapter Three and Four answer the second research question, that is to describe the extent of waste pickers' vulnerability with the introduction of ISWM. Chapter three shows that the vulnerability occurs under the control of restrictive regulations. The existing solid waste management laws and regulations at the

national and regional levels in Indonesia do not acknowledge waste pickers as intended actors in waste management. There is no scheme or program to enhance and facilitate the involvement of waste pickers in the waste management. In addition, the findings outline that the privatisation scheme of ISWM in Indonesia, considers that waste pickers obstruct professional waste management which is a clear demonstration that ISWM increases the waste pickers' vulnerability.

The fourth research question considers waste pickers' wellbeing, and from a capability approach perspective, it is found that waste pickers belong to the poor. The waste pickers are poor because they lack economic, human, social-cultural, political and protective capabilities. Waste picker income is insufficient to have a decent life, which leads to problems of poor health, low education levels, and malnutrition. Moreover, the waste pickers endure societal discrimination and are considered part of the lowest levels in the community, living on the periphery, in hazardous environments and unsafe neighbourhoods with high rates of crime and violence. The waste pickers also lack political capability, not recognised as citizens and experience inadequate protection of their rights and entitlements, have limited representation and power within political systems and administrative structures.

Despite the low level of wellbeing, Chapter Four clearly indicates that the position of waste pickers in recycling industry is irreplaceable. The waste pickers are the biggest contributor of recyclable materials. As the foundation of recycling, the waste pickers also contribute significantly to the ISWM's success, especially in the Reduce-Reuse-Recycle (3Rs) scheme and in decreasing the amount of waste in landfill. Based on this finding, this study has examined the possibility of a waste picker integration scheme

to answer the last research question concerning ways to include waste pickers in ISWM in Indonesia.

Based on the lessons learned from cases of waste picker integration in Pune, India and Brazil, Chapter Five shows that there is potential for waste picker integration as a means to improve the waste service provision in developing countries as well reducing the poverty of waste pickers. In general, ISWM systems are improved when supported by powerful waste picker organisations and the government's political will in passing supportive regulations to integrate waste picking with the formal waste management system. Chapter Five also shows that the integration will successfully improve the quality of waste management as well as waste pickers' wellbeing. This study suggests that the integration of waste pickers can potentially be applied in Indonesia. However, Indonesia may need to take a different route as waste picker organisations are not as strategically active as in Pune , India and Brazil. The waste picker integration in Indonesia is possible with government support and regulations for waste picker organisations whereby waste collection could be expanded to create jobs within the 3Rs which would benefit those on low incomes. Thus it would involve a paradigm shift from a difficult problem to a valuable solution in the collection, disposal and recycling of solid waste.

This research offers an alternative perspective in discussing the nexus between ISWM enactment and the informal private sector, with particular reference to the waste picker. However, as the direct consequences of the methodology and research questions boundaries, this research certainly has its own limitations. Much of the important and significant data was deliberately left out. As an illustration, to mention a few, the data relating to aid in ISWM in the period of 80s until now, the time series

data on the amount and generation of waste, and finally, data detailing the number and organisation of waste pickers could not be obtained. In addition, to the above limitation, although covering the complexity of the nexus between ISWM and the waste pickers wellbeing in Indonesia, this research has not been able to include an investigation and in-depth discussion on the cross section of the economy and politics. In terms of economy, this study finds that the waste picking has a significant economic contribution to reducing the cost of waste handling in waste management. However, there is no clear finding on the economic values of this matter, and it is believed that clarity of this value would improve the bargaining position of the waste pickers. With regard to the cross section of economy and politics, it is considered that the involvement of international development actors and aid have a significant influence in determining the framework of ISWM in Indonesia. Thus, there is need for more research to allow further assessment on this subject.

REFERENCES

- ADB, ADB 2013, *Indonesia Water Supply and Sanitation Sector Assessment, Strategy, and Road Map December 2012*, Asian Development Bank/ADB, Manila.
- Ahmadi, Mardiana & Jarkasih 2016, *Anggaran ngucur, alat berat tak difungsikan* (, *Satelitnews* online, viewed 25 April 2016, <<http://satelitnews.co.id/anggaran-ngucur-alat-berat-tak-difungsikan/>>.
- Alkire, S 2005, 'Why the capability approach?', *Journal of human development*, vol. 6, no. 1, pp. 115-35.
- Amindoni, A 2016, *Waste-based power plants to be developed in seven cities*, *thejakartapost.com*, viewed 20 April 2016, <<http://www.thejakartapost.com/news/2016/02/06/waste-based-power-plants-be-developed-seven-cities.html>>.
- Annepu, RK 2012, 'Sustainable solid waste management in India', *Columbia University, New York*.
- Aprilia, A, Tezuka, T & Spaargaren, G 2010, 'Municipal solid waste management and waste-to-energy in Indonesia: A policy review', in *International Renewable Energy Symposium, Hanoi, Vietnam*.
- Araujo, LMD 2014, 'Sustainable development: public policies to solid waste in Brazil', paper presented to 8th Conference of European Consortium for political research, Glaslow, Scotland, <<http://ecpr.eu/filestore/PaperProposal/13b13219-d640-474-b8e0-9c89cb03ab25.pdf>>.
- Azhari, SK 2009, 'Sketsa Masyarakat Pemulung Kota Bandung (The sketch of Bandung city waste picker community)', *Jurnal Sositologi*, vol. 8, no. 17, pp. 696-701.
- Bank Indonesia, 2008, *Kurs Bank Indonesia berdasarkan tanggal* (Bank Indonesia foreign currency based on date) <http://www.ortax.org>, viewed 1 June 2016, <<http://www.bi.go.id/id/moneter/informasi-kurs/transaksi-bi/Default.aspx>>.
- Bappenas 2015, *Laporan pencapaian tujuan pembangunan milenium di Indonesia 2014* (Millenium Development Goals Report 2014), Bappenas, Jakarta.
- Bappenas 2008, *List of medium-term planned external loans and grants (DRPHLN-JM) 2006 – 2009 2008 revision*, by Bappenas/Ministry of

National Development Planning/ National Development Planning Agency/ Bappenas.

Bappenas 2009, *List of medium-term planned external loans and grants (DRPHLN-JM) 2006 – 2009 3rd revision – 2009*, by Bappenas, Ministry of National Development Planning/ National Development Planning Agency/ Bappenas.

Bappenas n.d.-a, *List of medium-term planned external loans 2015-2019 – 1st Book –*
, by Bappenas, Ministry of National Development Planning/ National Development Planning Agency/ Bappenas.

Bappenas n.d.-b, *List of medium-term planned external Loans 2015-2019 – 2nd Book -*, by Bappenas, Ministry of National Development Planning/ National Development Planning Agency.

Bappenas n.d.-c, *List of medium-term planned external loans and grants (DRPHLN-JM) 2011-2014 – 1st Book -*, by Bappenas, Ministry of National Development Planning/ National Development Planning Agency/ Bappenas.

Bappenas n.d.-d, *List of Medium-Term Planned External Loans and Grants (DRPHLN-JM) 2011-2014 – 3rd Book -*, by Bappenas, Ministry of National Development Planning/ National Development Planning Agency/ Bappenas.

Bappenas n.d.-e, *List of planned medium-term foreign loans (DRPHLN-JM) 2011-2014 – 2nd Book -*, by Bappenas, Ministry of National Development Planning/ National Development Planning Agency/ Bappenas.

Bappenas n.d.-f, *Project and technical assistance proposals 2006 – 2009 Volume II technical assistance proposals*, by Bappenas, Ministry of National Development Planning/ National Development Planning Agency/ Bappenas.

Bappenas n.d.-g, *Project and Technical Assistance Proposals 2006 – 2009*, by Bappenas, Ministry of National Development Planning/ National Development Planning Agency/ Bappenas.

Barnes, T 2012, 'Marxism and informal labour', *Journal of Australian political economy*, no.70.

Basha, T 2007, 'Is privatization an option for a better municipal solid waste management of Addis Ababa?', *Academia*.

- Bell, L & Bremmer, J 2013, 'Burning waste for energy It doesn't stack-up'.
- Bergita, E 2013, 'From trash to cash: Stories of two waste banks', *Prakarsa*, no. 15.
- Besiou, M, Georgiadis, P & Van Wassenhove, LN 2012, 'Official recycling and waste pickers: Symbiotic or conflicting?', *European Journal of Operational Research*, vol. 218, no. 2, pp. 563-76.
- Bhaskar, A & Chikarmane, P 2012, 'The story of waste and its reclaimers: organising waste collectors for better lives and livelihoods', *Indian Journal of Labour Economics*, vol. 55, no. 4, pp. 595-619.
- Birkbeck, C 1978, 'Self-employed proletarians in an informal factory: the case of Cali's garbage dump', *World development*, vol. 6, no. 9, pp. 1173-85.
- 1979, 'Garbage, industry, and the 'vultures' of Cali, Colombia', in R Bromley & C Gerry (eds), *Casual work and poverty in Third World cities*, John Wiley & Sons, New York, pp. 161-83.
- Bjerkli, CL 2015, 'Power in waste: Conflicting agendas in planning for integrated solid waste management in Addis Ababa, Ethiopia', *Norsk Geografisk Tidsskrift-Norwegian Journal of Geography*, vol. 69, no. 1, pp. 18-27.
- Bowen, JR 1986, 'On the political construction of tradition: Gotong Royong in Indonesia', *The Journal of Asian Studies*, vol. 45, no. 03, pp. 545-61.
- Brutland Commission, 1987, 'Our common future: Report of the World Commission on Environment and Development', *UN Documents Gatheringa Body of Global Agreements*.
- Bps, statistic Indonesia 2015a, *Number of poor people, percentage of poor people and the poverty line, 1970-2013*, BPS, viewed August 1, 2015, <<http://www.bps.go.id/linkTabelStatis/view/id/1494>>.
- 2014b, *Percentage of households by province and sorting garbage treatment, 2013*, BPS, viewed August, 1 2015, <<http://www.bps.go.id/linkTabelStatis/view/id/1360>>.
- 2015c, *Population Projection by province, 2010-2035 (thousand)*, BPS, viewed August 1, 2015, <<http://www.bps.go.id/linkTabelStatis/view/id/1274>>.
- BUDP 1976, *Bandung Urban Development Project a general view*, Bandung Urban Development Project, Bandung.

- CalRecovery & (IETC), UIEtC 2005, *Solid waste management (Volume II: Regional overviews and information sources)*, Japan.
- Cattaneo, MD, Galiani, S, Gertler, PJ, Martinez, S & Titiunik, R 2009, 'Housing, health, and happiness', *American Economic Journal: Economic Policy*, pp. 75-105.
- Chaerul, M, Tanaka, M & Shekdar, AV 2007, 'Municipal solid waste management in Indonesia: status and the Strategic actions', *Journal of the Faculty of Environmental Science and Technology*, vol. 12, no. 1, pp. 41-9.
- Chalmin, P & Gaillochet, C 2009, *From Waste to Resource: An Abstract of World Waste Survey 2009 (2009)*.
- Chandrappa, R & Brown, J 2012, *Solid waste management: principles and practice*, Springer Science & Business Media.
- Chikarmane, P & Narayan, L 2005, 'Organising the Unorganised: A Case Study of the Kagad Kach Patra Kashtakari Panchayat (Trade Union of Waste-pickers)', *Pune: KKP KP*.
- Chikarmane, P & Narayan, L 2009, *Rising from the Waste: Organising Wastepickers in India, Thailand and the Philippines*, Committee for Asian Women.
- Chikarmane, P 2012, 'Integrating waste pickers into municipal solid waste management in Pune, India', *WIEGO Policy Brief (Urban Policies)*, vol. 8, p. 23.
- Chintan 2007, *wasting our local resources, the need for inclusive waste management policy in India*, Chintan
- Cohen, P, Ikgosse, J & Sturzenegger, G 2013, *Preparing informal recycler inclusion plans: an operational guide*, IDB, OVIIN, AVINA, Coca Cola Latin America, Latin America.
- Cities Alliance 2006, 'Cities Alliance for Cities without Slums: Action Plan For Moving Slum Upgrading to Scale', *World Bank, Washington DC*
- Clark, DA 2005, 'The Capability Approach: Its Development, Critiques and Recent Advances', <<http://www.gprg.org/pubs/workingpapers/pdfs/gprg-wps-032.pdf>>.

- Coordinator Ministry of Economy, 2013, *Kajian kebijakan sanitary landfill di Indonesia tahun 2013*, Coordinator Ministry of Economy, Jakarta.
- Corporation, HZ, Ltd, ERI & Smart Energy Co., L 2012, *Study on the integrated waste to energy project in greater Malang, The republic Indonesia, Final Report*, Hitachi Zosen Corporation, EX Researc Institute Ltd, Smart Energy Co., Ltd.
- Corsten, MAM, Worrell, E & Dael, JCMv 2012, *The potential for Waste Management in Brazil to Minimize GHG emissions and Maximize Re-use of Materials*, MWH, University of Utrecht, viewed 20 December 2015, <[http://www.abrelpe.org.br/arqfonts/The potential for Waste Management in Brazil to Minimize GHG emissions and Maximize Re-use of Materials.pdf](http://www.abrelpe.org.br/arqfonts/The%20potential%20for%20Waste%20Management%20in%20Brazil%20to%20Minimize%20GHG%20emissions%20and%20Maximize%20Re-use%20of%20Materials.pdf)>.
- Damanhuri, E & Padmi, T 2009, 'Current situation of waste recycling in Indonesia', *3R Policies for Southeast and East Asia*, pp. 23-52.
- Damanhuri, E 2005, 'Some principal issues on municipal solid waste management in Indonesia', in *Expert Meeting on Waste Management in Asia-Pacific Islands, Oct*, vol. 2729.
- , E 2010, 'Informal collectors of recyclable waste and used goods in Indonesia', *Policies For Southest And East Asia*, p. 71.
- Damásio, J 2014, 'Waste pickers' cooperatives in Brazil: Social inclusion while recycling', *Claiming the City Civil Society Mobilisation by the Urban Poor*, p. 73.
- Damuri, YR & Atje, R 2012, 'Investment Incentives for Renewable Energy: Case study of Indonesia', *Trade Knowledge Network*.
- De Soto, H 2000, *The mystery of capital: Why capitalism triumphs in the West and fails everywhere else*, Bantam Press, Great Britain.
- Deneulin, S 2011, 'The Capability Tradition: A Note on Two Interpretations', in *seminar on Martha Nussbaum and the Capability Approach. University of Bielefeld, June*, vol. 26.
- Dias, S & Fernandez, L 2012, 'Wastepickers: A Gendered Perspective', in B Cela, I Dankelman & J Stern (eds), *Powerful Synergies: Gender Equality, Economic Development and Environmental Sustainability*, UNDP, New York.
- Dias, S 2011, 'Recycling in Belo Horizonte, Brazil—An overview of inclusive programming', *WIEGO Policy Brief (Urban Policies)*, no. 3, pp. 1-8.

- Dias, SM 2011, 'Overview of Legal Framework for Social Inclusion in Solid Waste Management in Brazil', *WIEGO-Urban Policy briefing Note*, no. 8.
- Dodi, N, Syafii, S & Raharjo, S 2015, ' *Studi kajian kelayakan pembangunan pembangkit listrik tenaga sampah (PLTSa) kota Padang (Studi kajian di TPA Air Dingin kota Padang)* ' (Feasibility study of waste power plant (PLTSa) Padang city (Case Study of Air Dingin Landfill Pandang city), *Jurnal Teknik Elektro ITP ISSN 2252-3472*, vol. 4, no. 2.
- Donoso, M 2010, *Brazil sanctions law to formalize the work of recyclers*, gaia, viewed 4 June 2016 2016, <<http://www.no-burn.org/brazil-sanctions-law-to-formalize-the-work-of-recyclers>>.
- DP 2015, *Pemulung sampah di Medan Labuhan membentuk serikat (waste pickers in Medan develop an organisation)*, *harianandalas.com*, viewed 1 June 2016 2016, <<http://harianandalas.com/kanal-komunitas/pemulung-sampah-di-medan-labuhan-membentuk-serikat>>.
- Elliott, J 2012, *An introduction to sustainable development*, Routledge.
- Ezeah, C, Fazakerley, JA & Roberts, CL 2013, 'Emerging trends in informal sector recycling in developing and transition countries', *Waste management*, vol. 33, no. 11, pp. 2509-19.
- F.M, AR & Jacky, M 2013, 'Konflik dan integrasi dalam perspektif pemulung di Surabaya' (The waste picker's perspective of conflict and integration) , *Paradigma*, vol. 01, no. 03.
- Fahmi, WS 2005, 'The impact of privatization of solid waste management on the Zabaleen garbage collectors of Cairo', *Environment and Urbanization*, vol. 17, no. 2, pp. 155-70.
- Fearnside, PM 1997, 'Transmigration in Indonesia: lessons from its environmental and social impacts', *Environmental Management*, vol. 21, no. 4, pp. 553-70.
- Fergutz, O, Dias, S & Mitlin, D 2011, 'Developing urban waste management in Brazil with waste picker organizations', *Environment and Urbanization*, vol. 23, no. 2, pp. 597-608.
- Ferri, GL, Chaves, GdLD & Ribeiro, GM 2015, 'Reverse logistics network for municipal solid waste management: The inclusion of waste pickers as a Brazilian legal requirement', *Waste management*, vol. 40, pp. 173-91.

- Forsyth, T 2005, 'Building deliberative public-private partnerships for waste management in Asia', *Geoforum*, vol. 36, no. 4, pp. 429-39.
- Fransilia, M 2015, *Peraturan Walikota Surabaya bisa bubarkan eksistensi paguyuban pemulung* (The Surabaya city Major regulation could dissolve the existence of waste picker organisation), Surya online, viewed 1 June 2016, <<http://surabaya.tribunnews.com/2015/06/03/peraturan-wali-kota-surabaya-bisa-bubarkan-eksistensi-paguyuban-pemulung>>.
- Furedy, C 1997, 'Reflections on some dilemmas concerning waste pickers and waste recovery', paper presented to Source Book for UWEP Policy Meeting 1997 (Revised April 1999), <http://www.yorku.ca/furedy/papers/wpick.htm>
- Geertz, C 1963, *Peddlers and princes: Social development and economic change in two Indonesian towns*, vol. 318, University of Chicago Press.
- GEF, Gef 2015, *Indonesia Progress Report on the Millenium Development Goals*, Global environment Facility/GEF, Wahington DC.
- Gerdes, P & Gunsilius, E 2010, *The Waste Experts: Enabling Conditions for Informal Sector Integration in Solid Waste Management: Lessons Learned from Brazil, Egypt and India*, GTZ.
- Germani, G 1973, *Modernization, urbanization, and the urban crisis*, Transaction Publishers.
- Gezelius, J & Torstensson, J 2015, *Waste-to-Energy in Kutai Kartanegara, Indonesia*, SLU, Swedish University of Agricultural Science Uppsala Universitet, Swiss, Uppsala.
- Ghofur, A 2009, 'Manusia Gerobak: Kajian mengenai Taktik-Taktik Pemulung Jatinegara di Tengah Kemiskinan Kota' (Cart man: the study of the Jatinegara waste picker's strategies within the urban poverty), *Lembaga Penelitian SMERU, Jakarta*.
- Gilbert, A 2007, 'The return of the slum: does language matter?', *International Journal of Urban and Regional Research*, vol. 31, no. 4, pp. 697-713.
- Gill, K 2007, 'Interlinked contracts and social power: Patronage and exploitation in India's waste recovery market', *The Journal of Development Studies*, vol. 43, no. 8, pp. 1448-74.
- Gómez, O & Gasper, D 2013, 'Human Security: A Thematic Guidance Note for Regional and National Human Development Report Teams'.

- Gonzenbach, B & Coad, A 2007, 'Solid waste management and the Millennium Development Goals', *Collaborative Working Group on Solid Waste Management in Low-and Middle-income Countries, St. Gallen, Switzerland, 34p.*
- Grand funds for local sanitation projects, *Sustaining Partnership*, no. November 2011, November 2011.
- Gunsilius, E 2010, 'Role of informal sector in solid waste management and enabling conditions for its integration. Experiences from GTZ', *German Technical Cooperation Agency (GTZ), Eschborn.*
- Gunsilius, E, Spies, S & Garcia-Cortes, S 2011, *Recovering resources, creating opportunities: integrating the informal sector into solid waste management*, Dt. Gesellschaft für Intern. Zusammenarbeit (GIZ).
- Gupta, SK 2012, 'Integrating the informal sector for improved waste management', *Private Sector and Development*, [www. Proparco. Fr/jahia/webdav/site/proparco/shared/PORTAILS/Secteur_prive_developpement/PDF/SPD15/SPD15_Sanjay_k_Gupta_uk. Pdf](http://www.proparco.fr/jahia/webdav/site/proparco/shared/PORTAILS/Secteur_prive_developpement/PDF/SPD15/SPD15_Sanjay_k_Gupta_uk.Pdf) (accessed 3 October 2014).
- Hajramurni, A 2015, 'Garbage banks continue to flourish nationwide', *Archipelago*, viewed August 1, 2015, <<http://www.thejakartapost.com/news/2015/09/19/garbage-banks-continue-flourish-nationwide.html>>.
- Hamluddin 2012, *120 unit mesin pengolah sampah bekasi mangkrak* (120 redundant waste machine in Bekasi) , *Tempo.co*, viewed 25 April 2016, <<http://m.tempo.co/read/news/2012/06/21/083411935/120-Unit-Mesin-Pengolah-Sampah-Bekasi-Mangkrak>>.
- Hart, K 1973, 'Informal income opportunities and urban employment in Ghana', *The journal of modern African studies*, vol. 11, no. 01, pp. 61-89.
- Hayami, Y, Dikshit, A & Mishra, S 2006, 'Waste pickers and collectors in Delhi: poverty and environment in an urban informal sector', *The Journal of Development Studies*, vol. 42, no. 1, pp. 41-69.
- Hazra, T & Goel, S 2009, 'Solid waste management in Kolkata, India: Practices and challenges', *Waste management*, vol. 29, no. 1, pp. 470-8.
- Heintz, J & Posel, D 2008, 'Revisiting informal employment and segmentation in the South African labour market', *South African Journal of Economics*, vol. 76, no. 1, pp. 26-44.

- Herder, K & Larsson, K 2012, 'The growing piles of waste on Bali-a problem or an opportunity to make money?'
- Hodal, K 2011, 'Living off the landfill: Indonesia's resident waste pickers', *Cities development*, viewed August 1, 2015, <<https://www.theguardian.com/world/2011/sep/27/indonesia-waste-tip-scavengers>>.
- Hoorweg, D & Bhada-Tata, P 2012, 'What a waste: a global review of solid waste management'.
- Hyman, M, Turner, B & Carpintero, A 2013, *Guidelines for national waste management strategies: Moving from challenges to opportunities*.
- Ilija, EN 2013, 'Pemulung perempuan (Studi Deskripsi Kehidupan 6 Pemulung Perempuan di Tempat Pembuangan Akhir Desa Kertosari Kecamatan Pakusari Jember)' (Female waste picker (descriptive study of six female waste pickers in landfill at Kertosari village, Pakusari district Jember) .
- ILO 1973, *Employment, incomes and equality: a strategy for increasing productive employment in Kenya; report of an inter-agency team financed by the United Nations development programme*, International Labour Office.
- Imran, S, Wardhani, C, Fatimah, S, Barlinti, YS, Setiawan, B, Tarsidin & Rosadi, A 2008, *Institutionalization of sustainable solid waste management: An extension program of environmental awareness in Jakarta and West Java*, University of Indonesia, University of Gadjah Mada, Jakarta.
- Inanc, B, Idris, A, Terazono, A & Sakai, S-I 2004, 'Development of a database of landfills and dump sites in Asian countries', *Journal of Material Cycles and Waste Management*, vol. 6, no. 2, pp. 97-103.
- IndII Australian Aid, Jakarta. SMEC & Aid, IA 2011, *Scoping solid waste management in Indonesia*, SMEC
- Indonesian Waste Pickers Association*, Ikatan Pemulung Indonesia, viewed 23 January 2016, <<http://ikatanpemulungindonesia.blogspot.com.au/>>.
- Indra 2016, *Aset Pemkab Tamiang bernilai miliaran terbengkalai* (Billion worth of Tamiang Regency asset dormant), PT. Media Suara Tamiang, viewed 25 April 2016, <<http://tamiangnews.com/2016/04/aset-pemkab-tamiang-bernilai-miliaran-terbengkalai/>>.

- Indrayana, E & Silas, J 1993, 'Waste management in Surabaya: a partnership approach', *Regional Development Dialogue*, vol. 14, no. 3, pp. 51-66.
- Institut, ER & Corporation, A 2012, *Study on the waste treatment facility BOT project in DKI Jakarta, The Republic Indonesia, Final Report*, Jakarta.
- Jalil, A 2015, *Pemulung TPA Putri Cempo Tolak Kebijakan DKP*, Solo Pos (Waste picker in Puri Cempo landfill refuse the policy of DKP Solo), viewed 16 January 2016, <<http://m.solopos.com/2015/09/28/penanganan-sampah-solo-pemulung-tpa-putri-cempo-tolak-kebijakan-dkp-647009>>.
- JICA 2005, *Supporting capacity development for solid waste management in developing countries Towards improving solid waste management capacity of entire society*, JICA, Tokyo.
- Jutting, J & Delaiglesia, J 2009, *Is informal normal? Towards more and better jobs*, OECD, viewed Policy Brief 2015, <<http://www19.iadb.org/intal/intalcdi/PE/2009/03433.pdf>>.
- Kamuk, B & Haukohl, J 2013, *ISWA guidelines: Waste to energy in low and middle income countries*, ISWA, Vienna.
- Kandasamy, SP, Akolkar, AB, Manoharan, A & Paranji, S 2013, 'Municipal solid waste management at Chennai in southern India—an occupational health perspective', *International Journal of Health Promotion and Education*, vol. 51, no. 1, pp. 50-61.
- Kardono 2007, 'Integrated solid waste management in Indonesia', in *International symposium on Eco Topia Science 2007*, Nagoya Japan.
- Kaunang, S & Hidayat, AS 2011a, 'Legok Nangka ready to replace Sarimukti TPA', *Sustaining Partnership*, vol. November 2011.
- 2011b, 'Putri Cempo is Waiting for Investor ', *Sustaining Partnership*, vol. November 2011, November 2011.
- Kgathi, D & Bolaane, B 2001, 'Instruments for sustainable solid waste management in Botswana', *Waste management & research*, vol. 19, no. 4, pp. 342-53.
- Kgathi, D & Bolaane, B 2001, 'Instruments for sustainable solid waste management in Botswana', *Waste management & research*, vol. 19, no. 4, pp. 342-53.
- Kristianto, F 2016, *TPA Suwung: Bali siap memutus kontrak Navigat Organic* (Suwung landfill Bali prepared to terminate the contract with Navigat

Organic), bali.bisnis.com, viewed 4 May 2016, <<http://bali.bisnis.com/read/20160216/1/57430/tpa-suwung-bali-siap-memutus-kontrak-navigat-organic>>.

Landau, LB 2007, 'Shaping urban futures: Reflection on human mobility and poverty in Africa's Globalizing cities', in AM Garland (ed.), *Global urban poverty: setting the agenda*, Woodrow Wilson International Center for Scholars.

Landon, N 2013, 'Indonesia's solid waste management sector: An overview', *Prakarsa*, no. 15.

Lang, G & Xu, Y 2013, 'Anti-incinerator campaigns and the evolution of protest politics in China', *Environmental Politics*, vol. 22, no. 5, pp. 832-48.

Lavigne, F, Wassmer, P, Gomez, C, Davies, TA, Hadmoko, DS, Iskandarsyah, TYW, Gaillard, J, Fort, M, Texier, P & Heng, MB 2014, 'The 21 February 2005, catastrophic waste avalanche at Leuwigajah dumpsite, Bandung, Indonesia', *Geoenvironmental Disasters*, vol. 1, no. 1, pp. 1-12.

Lerpiniere, D, Wilson, DC, Velis, C, Evans, B, Voss, H & Moodley, K 2014, 'Review of international development co-operation in solid waste management'.

Lewis, BD 2010, 'Indonesian decentralization: Accountability deferred', *International Journal of Public Administration*, vol. 33, no. 12-13, pp. 648-57.

MacMillan, N 2007, 'Community Solutions for Indonesia's Waste', *International Development Research Centre*.

MacRae, G 2011, 'Solid waste management in tropical Asia: what can we learn from Bali?', *Waste management & research*, p. 0734242X10386138.

Mahyuni, EL 2012, 'Dermatosis (Kelainan Kulit) Ditinjau Dari Aspek Keselamatan Dan Kesehatan Kerja Pada Pemulung Di Tpa Terjun Medan Marelان' (Dermatosis (skin disorder) from the perspective of the working safety and health aspect of the waste pickers at Terjun Marelان landfill Medan), *Media Kesehatan Masyarakat Indonesia*, vol. 11, no. 2, pp. 101-9.

Marello, M & Helwege, A 2014, *Solid Waste Management and Social Inclusion of Waste Pickers: Opportunities and Challenges*.

- Marshall, RE & Farahbakhsh, K 2013, 'Systems approaches to integrated solid waste management in developing countries', *Waste management*, vol. 33, no. 4, pp. 988-1003.
- McGee, TG 1979, 'The poverty syndrome: Making out in the Southeast Asian city', in *Casual Work and Poverty in Southeast Asian Cities*. John Wiley and Sons, Chichester, UK, John Wiley & Son, Ltd, New York, pp. 45-68.
- Medina, M & Dows, M 2000, 'A short history of scavenging', *Comparative Civilizations Review*, vol. 42, pp. 7-17.
- Medina, M 2000, 'Scavenger cooperatives in Asia and Latin America', *Resources, Conservation and Recycling*, vol. 31, no. 1, pp. 51-69.
- Medina, M 2002, 'Globalization, development, and municipal solid waste management in third world cities', *Tijuana, Mexico: El Colegio de la Frontera Norte*.
- 2007, *The world's waste pickers: salvaging for sustainable consumption and production*, Rowman Altamira.
- Meidiana, C & Gamse, T 2010, 'Development of waste management practices in Indonesia', *European journal of scientific research*, vol. 40, no. 2, pp. 199-210.
- 2011, 'The new Waste Law: Challenging opportunity for future landfill operation in Indonesia', *Waste management & research*, vol. 29, no. 1, pp. 20-9.
- Michida, E 2011, 'International Trade of Recyclables in Asia: Is Cross-border Recycling Sustainable?', *Michikazu Kojima and Etsuyo Michida, Economic Integration and Recycling in Asia: An Interim Report, Chiba: Institute of Developing Economies*.
- Ministry of Environmental and Forestry Affair 2015, *Rencana Strategis 2015 - 2019*, Ministry of environment and forestry Jakarta.
- Ministry of Environmental Affair 2008, *Indonesian domestic solid waste statistics year 2008*, Ministry of Environmental Affair, Jakarta
- 2008a, *Panduan Praktis Pemilahan Sampah* (The practical guidance in managing waste), supported by Japan International Cooperation Agency (JICA). Jakarta.

- 2012, *Buku profil Bank sampah Indonesia Tahun 2012*, Ministry of Environmental Affair Jakarta.
- Ministry of Public Works and Housing 2007, *Kisah sukses pengelolaan persampahan di berbagai wilayah Indonesia, Best practices of solid waste management in Indonesia*, Ministry of Public Works, Jakarta.
- 2010, *Rencana strategis Direktorat Jenderal Cipta Karya 2010 - 2014*, Ministry of Public House and Housing Jakarta.
- 2015, *Rencana strategis kementerian pekerjaan umum dan perumahan rakyat Tahun 2015 - 2019*, Ministry of Public Works and Housing, Jakarta.
- Moerad, SK 2012, 'Peran serta masyarakat pemulung dalam pengelolaan lingkungan binaan di TPA Benowo Surabaya ', *NUANSA: Jurnal Penelitian Ilmu Sosial dan Keagamaan Islam*, vol. 9, no. 2.
- Montgomery, MR & Hewett, PC 2005, 'Urban poverty and health in developing countries: household and neighborhood effects', *Demography*, vol. 42, no. 3, pp. 397-425.
- Munawar, E & Fellner, J 2011, 'Injury time for Indonesian landfills ', *Retrieved online from: Waste Management World: <http://www.waste-management-world.com/articles/print>*, vol. 14.
- Municipal Government of Pacitan, K 2015, *Sambang pemulung, Bupati Indarto serahkan bingkisan* (visting waste pickers, the Pacitan regent, Indarto, give the gifts), [Pacitankab.go.id](http://pacitankab.go.id), viewed 1 June 2016, <<http://pacitankab.go.id/berita/berita.php?id=1343>>.
- Mursito, D, Sari, TP & Bramono, SE 2013, 'Managing municipal solid waste in Indonesia: A government perspective', *Prakarsa*, no. 15.
- Murtiningsih, S 1990, 'Pengaruh organisasi usaha pemulung terhadap produktivitas kerja pemulung: studi kasus di Lokasi Pembuangan Akhir (LPA) sampah Cakung Cilincing Jakarta (The influence of waste pickers cooperation to the waste pickers productivity: case study at the Cakung Cilincing landfill Jakarta)'
- Mustikawati, IS 2013, 'Perilaku Personal Hygiene Pada Pemulung Di Tpa Kedaung Wetan Tangerang (Personal hygiene behaviour of the waste pickers in Kedaung Wetan landfill Tangerang) ', in *Forum Ilmiah*, vol. 10.
- Nahrudin, Z, Sangkala & Ahmad, B 2013, 'Kemitraan publik-privat dalam pengelolaan sampah di TPA Tamangapa Kota Makasar (Public private

partnership in waste management in Tamangapa landfill Makasar)', University of Hasanuddin Makasar, Indonesia.

Nas, PJ & Jaffe, R 2004, 'Informal waste management Shifting the focus from problem to potential', *Environment, Development and Sustainability*, vol. 6, no. 3, pp. 337-53.

Navarrete-Hernandez, P 2015, 'Scavenging Revisited: Supporting Waste pickers in Santiago de Chile', paper presented to RC21 International Conference on "The Ideal City: between myth and reality. Representations, policies, contradictions and challenges for tomorrow's urban life", Urbino Italy, 27 - 29 August 2015, <http://www.rc21.org/en/wp-content/uploads/2014/12/A3.1_Navarrete.pdf>.

Nawasis, P 2008, *Strategi sanitasi kota Surakarta 2008 - 2010*, PPSP Nawasis, Jakarta.

Nurbianto, B 2013, 'Winding road of Jakarta waste management', *Environment*, viewed August 1, 2015, <<http://www.thejakartapost.com/news/2013/05/22/winding-road-jakarta-waste-management.html>>

Nussbaum, MC 1998, 'Political animals: luck, love and dignity', *Metaphilosophy*, vol. 29, no. 4, pp. 273-87.

—2000, *Women and human development: The capabilities approach*, vol. 3, Cambridge University Press, Cambridge.

—2011, *Creating capabilities*, Harvard University Press.

OECD 2001, *The DAC guidelines: poverty reduction*, OECD, <<http://www.oecd.org/dac/povertyreduction/2672735.pdf>>.

—2006, *Promoting pro-poor growth private sector development* OECD, Paris, <<http://www.oecd.org/dac/povertyreduction/36427804.pdf>>.

—2016, *Creditor Reporting System (CRS) Indonesia*, oecd.org, viewed 4 May 2016, <<http://stats.oecd.org/index.aspx?DataSetCode=CRS1>>.

Oepen, M 1993, 'Scavengers and recycling in Indonesia', *Gate: questions, answers, information*, no. 1, pp. 21-3.

- Ogawa, H 2008, 'Sustainable solid waste management in developing countries: waste management', *IMIESA*, vol. 33, no. 9, pp. 57-9, 61, 3, 5-71.
- Ojeda-Benitez, S, Armijo-de-Vega, C & Ramirez-Barreto, ME 2002, 'Formal and informal recovery of recyclables in Mexicali, Mexico: handling alternatives', *Resources, Conservation and Recycling*, vol. 34, no. 4, pp. 273-88.
- Oke 2016, *Dana miliaran pesin pengelola sampah daerah terbengkalai begitu saja (billion worth waste equipment being neglected)* , <http://www.konfrontasi.com>, viewed 25 April 2016, <<http://www.konfrontasi.com/content/nasional/dana-miliaran-mesin-pengelola-sampah-daerah-terbengkalai-begitu-saja>>.
- Oman-Reagan, MP 'Bantar Gebang: An Urban-Refuse Waste Picker Community at Indonesia's Largest Landfill'.
- Openaiddata.org 2016, *Water supply and sanitation Indonesia*, <http://www.openaiddata.org>, viewed 4 May 2016 2016, <<http://www.oepaniaddata.org/purpose/728/140/top/>>.
- Patimah, S 2014, 'Kemitraan kolaboratif pemerintah daerah SARBAGITA (Denpasar, Badung, Gianyar, Tabanan) dengan pihak swasta PT NOEI dalam pengelolaan sampah di wilayah SARBAGITA' (The collaborative partnership of the regional government SARBAGITA (Denpasar, Badung, Gianyar, Tabanan) with the private sector PT. NOEI in managing waste in SARBAGITA region) , *Citizen Charter*, vol. 1, no. 1.
- Pereira, MCG & Teixeira, MAC 2012, 'Recognition and Public Policies: Analyzing the Relations between Scavengers and Public Power in Belo Horizonte, Brazil', *Public Administration Research*, vol. 1, no. 1, p. 61.
- Pfaff-Simoneit, W, Entwicklungsbank, K, Nassour, A & Nelles, M 2010, 'Sectoral Approaches in Solid Waste Management to Link Climate Change Mitigation and Development', in *ISWA Annual Congress*.
- Ravallion, M 2003, 'The debate on globalization, poverty and inequality: why measurement matters', *International Affairs*, vol. 79, no. 4, pp. 739-53.
- Rawlins, J, Beyer, J, Lampreia, J & Tumiwa, F 2014, 'Waste to energy in Indonesia: Assessing opportunities and barriers using insights from the UK and beyond', *United Kingdom: Carbon Trust*.

- Rini, TS, Rachmansyah, A, Muhaimin, AW & Suyadi 2013, 'Participation of waste pickers in waste management: A case study at Randegan Landfill Mojokerto, Indonesia', *World Applied Science*, vol. 25, no. 7.
- Ritchie, J, Lewis, J, Nicholls, CM & Ormston, R 2013, *Qualitative research practice: A guide for social science students and researchers*, Sage.
- Robert, G 2013, *Life on the rubbish heap*, ABC, viewed 5 december 2015, <<http://www.abc.net.au/lateline/content/2013/s3775671>>.
- Robeyns, I 2003, 'Sen's capability approach and gender inequality: selecting relevant capabilities', *Feminist economics*, vol. 9, no. 2-3, pp. 61-92.
- 2005, 'The capability approach: a theoretical survey', *Journal of human development*, vol. 6, no. 1, pp. 93-117.
- Roger, J, Karp, A, Nicholls, R, Sukarma, R, Bimo, D & M, PA 2009, *Support on Water and Sanitation Sector Analysis and Program Final 2009-2014*, Jakarta.
- Safrial 2014, 'Distributed generation pembangkit tenaga listrik tenaga sampah kota (PLTSa) type incinerator solusi listrik alternatif kota Medan' (Distributed generation waste power plan (PLTSa) incinerator type as a alternative electricity source in Medan), *SNATIF, Universitas Muria*, vol. 1.
- Sahwan, FL 2011, 'Sistem Pengelolaan Limbah Plastik di Indonesia' (Recycling plastic management in Indonesia), *Jurnal Teknologi Lingkungan*, vol. 6, no. 1.
- Santos, ALRdM, Luna, MCCS, Cancado, POM & Vieira, SC 2012, *Solid Waste Management. From unrulred to legally sustainable management but how to address the social consequences? A case study.*, Universidade de Itaúna, viewed 3 June 2016, <http://tokyo2013.earthsystemgovernance.org/wp-content/uploads/2013/01/VIEIRA_ET-AL.pdf>.
- Santos, M 1979, *The shared space: the two circuits of the urban economy in developing countries*, London: Methuen.
- Sarjono 2013, *Mensos serahkan bantuan perumahan bagi pemulung Kendari* (Ministry of social affairs distribute the government housing to the waste pickers in Kendari) , *Antarasultra.com*, viewed 2 June 2016, <<http://www.antarasultra.com/berita/267708/mensos-serahkan-bantuan-perumahan-bagi-pemulung-kendari>>.

- Sarwani, M 2011, *IPI dirikan koperasi memperkuat organisasi pemulung* (IPI develop cooperative to strengthen the waste picker organisation), *kabar24.com*, viewed 1 June 2016, <<http://kabar24.bisnis.com/read/20110504/186/31304/ipi-dirikan-koperasi-memperkuat-organisasi-pemulung>>.
- Sasaki, S & Araki, T 2013, 'Employer–employee and buyer–seller relationships among waste pickers at final disposal site in informal recycling: The case of Bantar Gebang in Indonesia', *Habitat international*, vol. 40, pp. 51-7.
- Sasaki, S, Araki, T, Tambunan, AH & Prasadja, H 2014, 'Household income, living and working conditions of dumpsite waste pickers in Bantar Gebang: Toward integrated waste management in Indonesia', *Resources, Conservation and Recycling*, vol. 89, pp. 11-21.
- Scheinberg, A & Mitrovic, P 2008, 'A bird in the hand: solid waste modernisation, recycling and the informal sector', in *Paper Delivered at Solid Waste Planning in the Real World CWG-Green Partners Workshop, Cluj, Romania*, pp. 22-3.
- Scheinberg, A 2007, 'Privatisation and the informal sector: Thinking Locally, Acting Globally?', viewed September 1, 2015, <http://www.iswa.org/uploads/tx_iswaknowledgebase/620431_Paper.pdf>.
- Scheinberg, A 2012, 'Informal sector integration and high performance recycling: evidence from 20 cities', *Women in Informal Employment Globalizing and Organizing (WIEGO), Manchester*, vol. 23.
- Scheinberg, A, Simpson, M, Gupt, Y, Anschütz, J, Haenen, I, Tasheva, E, Hecke, J, Soos, R, Chaturvedi, B & Garcia-Cortes, S 2010, 'Economic aspects of the informal sector in solid waste management', *GTZ (German Technical Cooperation), Eschborn, Germany*.
- Scheinberg, A, Wilson, DC & Rodic, L 2010, 'Solid waste management in the world's cities', *UN-Habitat's State of Water and Sanitation in the World's Cities Series, Earthscan for UN-Habitat, London and Washington DC*, pp. 1-228.
- Sembiring, E & Nitivattananon, V 2010, 'Sustainable solid waste management toward an inclusive society: Integration of the informal sector', *Resources, Conservation and Recycling*, vol. 54, no. 11, pp. 802-9.

- Sen, A 1990, 'Justice: means versus freedoms', *Philosophy & Public Affairs*, pp. 111-21.
- 1994, 'Capability and wellbeing', in DM Hausman (ed.), *The philosophy of economic: an anthology*, Cambridge University Press.
- Setkab, Indonesia 2016, *President Jokowi hopes waste becomes energy sources for electricity*, <http://www.setkab.go.id>, viewed 20 April 2016, <<http://setkab.go.id/en/president-jokowi-hopes-waste-becomes-energy-source-for-electricity/>>.
- Sicular, DT 1991, 'Pockets of peasants in Indonesian cities: the case of scavengers', *World development*, vol. 19, no. 2-3, pp. 137-61.
- 1992, *Waste pickers, recyclers, and solutions for solid waste management in Indonesia*, Center for Southeast Asia Studies, University of California at Berkeley.
- Sidik, US 2010, 'Implementation of SMM in Indonesia perspective', paper presented to The OECD Global Forum on SMM, Mechelen, Belgium, <<http://www.oecd.org/environment/waste/46326168.pdf>>.
- Simpson-Hebert, M, Mitrovic, A, Zajic, G & Petrovic, M 2005, *A paper life: Belgrade's Roma in the underworld of waste scavenging and recycling*, WEDC, Loughborough University, Leicestershire, <http://wedc.lboro.ac.uk/resources/books/A_Paper_Life_-_Complete.pdf>.
- Siwi, WAID 2009, 'Karakteristik Demografi Sosial Ekonomi Pemulung Berdasarkan Daerah Asal (Studi Kasus di Kecamatan Banyumanik Kota Semarang)', Universitas Negeri Semarang.
- SMEC & Australian Aid 2011, *Scoping solid waste management in Indonesia*, SMEC IndII Australian Aid, Jakarta.
- SMECDA 2008, *Kajian model pengembangan usaha di kalangan pemulung (Assessment model of enterprenurship among waste picker)*, SMECDA, Jakarta. <<http://smecda.com/wp-content/uploads/2015/12/Kajian-Model-Pengembangan-Usaha-di-Kalanga-Pemulung.compressed.pdf>>
- Sujanarko, B 2014, 'Pengembangan teknologi dan manajemen pengelolaan limbah untuk energi terbarukan di Indonesia' (The development and management of waste for renewable energy in Indonesia), paper

presented to Seminar Nasional HImpunan Mahasiswa Kimia FMIPA Universitas Jember, Jember, February 2014.

Sukarna, D 2012, 'Energy efficiency and renewable energy in Indonesia', paper presented to Japan-Indonesia 3rd Energy Policy Dialogue, Fukuoka.

Supriyadi, S, Kriwoken, LK & Birley, I 2000, 'Solid waste management solutions for Semarang, Indonesia', *Waste management and Research*, vol. 18, no. 6, pp. 557-66.

Surjadi, C 1993, 'Respiratory diseases of mothers and children and environmental factors among households in Jakarta', *Environment and Urbanization*, vol. 5, no. 2, pp. 78-86.

Sustaining Partnership 2011, 'Grand funds for local sanitation projects', *Sustaining Partnership*, no. November 2011, November 2011.

Suwarto, T 2014, *300-an pemulung "putri Cempo" dilarang beroperasi (about 300 waste pickers in Putri Cempo landfill is banned)*, Pikiran Rakyat, viewed 16 January 2016, <<http://www.pikiran-rakyat.com/nasional/2014/02/10/269486/300-pemulung-putri-cempo-dilarang-beroperasi>>

Tandon, N 2012, 'Empowerment of women in a green economy in the context of sustainable development and poverty eradication: the case for community-based, gender-equitable and humanrights-based economic development', *Background paper commissioned by UN Women for Rio*, vol. 20.

Tangri, N 2003, 'Waste incineration: a dying technology', in *Waste incineration: a dying technology*, Gaia.

TCF 2014, 'Indonesia waste to energy', in TCF (ed.), *Indonesia waste to energy week*, Jakarta
The Rockefeller Foundation/TRF 2013, *Informal city dialogues*, The Rockefeller Foundation.

The World Bank, 2001, *The Indonesia national clean development mechanism strategy study*, The World Bank, Washington DC.

— 2012, *Transmigration in Indonesia*, World Bank, viewed 7 June 2016, <<http://lnweb90.worldbank.org/oed/oeddoclib.nsf/DocUNIDViewF orJavaSearch/4B8B0E01445D8351852567F5005D87B8>>.

- Tirado-Soto, MM & Zamberlan, FL 2013, 'Networks of recyclable material waste-picker's cooperatives: An alternative for the solid waste management in the city of Rio de Janeiro', *Waste management*, vol. 33, no. 4, pp. 1004-12.
- Tito, F 2015, *Dibubarkan Walikota, paguyuban pasukan kuning dan pemulung lapor ombudsmen Surabaya (disbanded by city major the waste picker cooperation make a report to the ombudsmen)*, beritajatim.com, viewed 1 june 2016, <http://www.beritajatim.com/politik_pemerintahan/239831/dibubarkan_walikota,_paguyuban_pasukan_kuning_dan_pemulung_lapor_ombudsmen_surabaya.html>
- Tokman, VE 1989, 'Policies for a heterogeneous informal sector in Latin America', *World development*, vol. 17, no. 7, pp. 1067-76.
- 2011, *Towards a green economy: Pathways to sustainable development and poverty eradication*, UNEP.
- The Rockefeller Foundation/TRF 2013, *Informal city dialogues*, The Rockefeller Foundation.
<<https://www.forumforthefuture.org/sites/default/files/project/downloads/icd-briefing-paperfeb2013final.pdf>>
- Twikromo, A 1999, *Pemulung Jalanan Yogyakarta: Konstruksi Marginalitas dan Perjuangan Hidup dalam Bayang-bayang Budaya Dominan (The street waste picker in Yogyakarta: the construction of marginality and life struggle under the shadow of dominant culture)*, Media Pressindo, Yogyakarta.
- UNEP 2011, *Towards a green economy: Pathways to sustainable development and poverty eradication*, UNEP.
- UNEP (2009). Developing integrated solid waste management plan training manual ISWM plan. Osaka, UNEP. 4.
- Van Beukering, P 2001, *Recycling, International Trade and the Environment*, Springer Science & Business Media.
- Van de Klundert, A & Anschutz, J 1999, 'Integrated Sustainable Waste Management: the selection of appropriate technologies and the design of sustainable systems is not (only) a technical issue', in *CEDARE/IETC inter-regional workshop on technologies for sustainable waste management*.

- Van de Klundert, A & Anshütz, J 2001, 'Integrated sustainable waste management-the concept Tools for decision makers Experience from the urban waste expertise programme (1995-2001), Waste, the Netherlands.
- Van de Klundert, A & Anshutz, J 2000, *The sustainability of alliances between stakeholders in waste management*, Working paper for UWEP/CWG, 30 May 2000–Draft. Available online:[<http://www.gdrc.org/uem/waste/ISWM.pdf>].
- Velis, C. (2014). "Global recycling markets-plastic waste: A story for one player–China." Report prepared by FueLogy and formatted by D-waste on behalf of International Solid Waste Association–Globalisation and Waste Management Task Force ISWA, Vienna.
- Velis, CA, Wilson, DC, Rocca, O, Smith, SR, Mavropoulos, A & Cheeseman, CR 2012, 'An analytical framework and tool ('InteRa') for integrating the informal recycling sector in waste and resource management systems in developing countries', *Waste management & research*, vol. 30, no. 9 suppl, pp. 43-66.
- Veritas, DN 2007, *Validation report PT Navigat Organic Energy Indonesia integrated solid waste management (GALFAD) project in Bali, Indonesia*, Det Norske Veritas, London.
- Wasono, HT 2010, *Pengusaha kewalahan penuhi ekspor biji plastik*, Tempo.co, viewed 30 May 2016, <<https://m.tempo.co/read/news/2010/01/13/090218992/pengusaha-kewalahan-penuhi-ekspor-biji-plastik>>.
- Wetherill, TD 2005, *Integrated solid waste management scoreboard – A tool to measure performance in municipal solid waste management*, UNEP.
- Whiteman, A, Smith, P, Wilson, DC, Whiteman, A, Smith, P & Wilson, D 2001, 'Waste management: an indicator of urban governance', in *Proceedings of UN-Habitat Global Conference on Urban Development*.
- White, S 2009, 'Culture ', in S Deneulin & L Shahani (eds), *An introduction to the human development and capability approach: Freedom and agency*, IDRC, UK.
- Wibowo, E 2014, 'Indonesia's Biogas programme: opportunities and challenges', paper presented to Biogas Indonesia forum 2014, Jakarta, <<http://www.kadin->

indonesia.or.id/biogasindonesiaforum/02.%20Edi%20Wibowo%20-%20ESDM.pdf>.

Widodo, J 2015, *Banyak benda berbahaya, pemulung dilarang masuk Putri Cempo*, Antara Jateng, viewed Januari 16 2016, <<http://www.antarajateng.com/detail/banyak-benda-berbahaya-pemulung-dilarang-masuk-putri-cempo.html>>

WIEGO 2015, *Informal economy debates: dominant schools of thought*, WIEGO, viewed 1 December 2015, <<http://wiego.org/informal-economy/informal-economy-debates-dominant-schools-thought>>.

Wilson, DC 2007, 'Development drivers for waste management', *Waste management & research*, vol. 25, no. 3, pp. 198-207.

Wilson, DC, Araba, AO, Chinwah, K & Cheeseman, CR 2009, 'Building recycling rates through the informal sector', *Waste management*, vol. 29, no. 2, pp. 629-35.

Wilson, DC, Velis, C & Cheeseman, C 2006, 'Role of informal sector recycling in waste management in developing countries', *Habitat international*, vol. 30, no. 4, pp. 797-808.

World Energy Council, 2013, *World Energy Council: Waste to energy*, World Energy Council, London.

Wrap 2010, *Recovered paper market: Indonesia*, <http://www.wrap.org.uk>, viewed 30 May 2016 2016, <[http://www.wrap.org.uk/sites/files/wrap/Indonesia Market Snapshot - FINAL.pdf](http://www.wrap.org.uk/sites/files/wrap/Indonesia%20Market%20Snapshot%20-%20FINAL.pdf)>

Wratten, E 1995, 'Conceptualizing urban poverty', *Environment and Urbanization*, vol. 7, no. 1, pp. 11-38.

Yachiyo Engineering Co., L 2009, *Study for integrated environmental improvement of Leuwigajah disposal site in west Java, Republic of Indonesia*, Engineering and Consulting Firms Association, Japan (ECFA), Tokyo.