

Sustainable Waste Management: Observing the Economic and Environmental Aspects in Solid Waste Recycling by the Poor Migrants in Indonesia

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ABSTRACT

This paper addresses the role of recycling activities among the migrant urban poor based on a recent study conducted in Jakarta, Indonesia. The study involved a survey among solid waste scavengers and field observations particularly on the collection and disposal of recyclable solid waste and the resulting revenue generated from the activities. The study revealed that the average per capita monthly amount of collected solid waste was 60-270 kg of paper, 30-95 kg of metal, 120-180 kg of plastics, 150-200 kg of tyre tube, and 30-90 kg of glass bottles. The study also revealed that the recycling activities could have resulted in the reduction of 390-800 kg of solid waste that would otherwise need to be transported to and disposed of at the designated dump sites. The net benefit to the Government as a result of the participation from the urban migrant poor in solid waste recycling activities was estimated to be US\$ 7,128,666 to US\$ 14,166,666 monthly.

Keywords: *Environmental benefit-cost, scavengers, solid waste management*

Introduction

The management of solid waste continues to be a big challenge in urban life particularly in the cities of developing countries. Solid waste, which is generated from human activities needs to be properly managed to prevent negative impacts on the environment (Lardinois & Van de Klundert, 1994; Vogler, 1984; Van Baukering & Gupta, 2000).

Most cities and municipalities in the developing countries spend between 20 – 50% of their revenues on the collections, transportation and disposal of solid wastes (Anjum & Deshajo, 1996). A study carried out in Dar es Salam, Tanzania indicated that out of 2,000 tons of waste generated daily, only 10% of it was collected and disposed of at dumping sites provided by the government (Kaseva & Gupta, 1996). Most of the efforts to solve solid waste management problems in the developing countries are merely focused on the technical aspects such as disposal and collection (Flintoff et al., 1994). These efforts, in common, give little attention on solid waste recycling which is one component of a more comprehensive waste management strategy (Seik, 1997).

Currently, more sustainable approaches to solid waste management including recycling have become widely recognized. Various studies have reported on the efforts in solid waste recycling and reuse in various countries such as Tanzania (Kaseva & Mbaligwe, 2000); India (Patra et al., 2000); Singapore (Seik, 1997); Taiwan (Lee et al., 1998); Pakistan (Anjum & Deshazo, 1996); and Indonesia (Moore et al., 2006). These studies concluded that solid waste recycling has been regarded as a commendable approach to sustainable solid waste management. It is economically affordable, socially acceptable and environmentally effective (McDougall et al., 2001). Seik (1997) and Kaseva and Gupta (1996) reported that solid waste recycling which is operated by the urban poor has a significant role in reducing environmental destruction, contributing to important substitution of economic activities for the urban poor, saving energy, saving government's waste collection and disposal costs, and conserving resources. In fact, waste recycling is carried out throughout the urban areas of the developing world and it is reported that up to 2% of the

population in Asian and Latin American cities depend on waste-picking for their livelihood (Medina, 2000).

This paper examines the solid waste management activities carried out in Jakarta Selatan area. It observes the daily routine of the urban poor in recycling solid waste and its overall impact on the people, the government and the environment.

Situation in Jakarta

Administrative services in Jakarta are divided into provinces and municipalities. Under the provincial government there are five municipalities: Jakarta Utara, Jakarta Pusat, Jakarta Barat, Jakarta Selatan and Jakarta Timur. A municipal government is further divided into four sub-levels, namely the *kecamatan* (council), *kelurahan* (village), *rukun warga (RW)*, and *rukun tetangga (RT)*. According to the Statistics of Jakarta (2005), the five municipalities comprise 44 councils, 267 villages, 2,728 *RW*, and 29,766 *RT*.

In the last two decades, Jakarta has carried out a number of solid waste management projects in collaboration with external support agencies. Some projects have shown a remarkable success while others have remained unclear. Most of the projects with an 'unclear' or probably 'fail' status could not support or expand themselves further as the external agencies discontinued their assistance (Ogawa, 1996). Technical, financial, institutional, economic, and social factors were blamed to be the failure factors in sustaining such projects. Among other things, the failed projects have an over-reliance on the costly western waste management technology and methods. Supriyadi et al. (2000) argued that the application of the technology and methods has failed due to its characteristics of being centrally-organized, heavily-subsidized, disposal-reliant, and lacking in community cooperation.

In Indonesia, waste recycling is carried out informally by the poor and marginalized communities by way of scavenging or waste-picking for their livelihood. Metropolitan Jakarta, the capital city of Indonesia has a population of 17 million people (BPS, 2007). It serves as the governmental, industrial, commercial, and transportation hub of Indonesia. Out of the population size, it is estimated that there are about 340,000 scavengers or waste-pickers in Jakarta who make their daily living by separating and recycling solid waste.

Data collection

The method adopted in this study was similar to that conducted by Kaseva et al. (2002) in examining the recycling of inorganic domestic solid waste and Andrew et al. (1999) who observed the citizens in separating domestic waste and their perception about the quality of waste collection services.

A field work was undertaken from November to December 2007 in Kelurahan Pondok Pinang, Kecamatan Kebayoran Lama, South Jakarta Municipality (Figure 1). Information was obtained through site visits, observations, interviews, and questionnaire survey. Field operations were determined by the daily activities of scavengers namely *pemulung*. Interviews and questionnaire survey were conducted in order to ascertain how the scavengers sort out waste on the ground and how they identify and segregate different types of waste for sale.

Questionnaires were distributed to sixty respondents with the purpose of generating data on their background, types, amount, and value of solid waste collected, and the middlemen to whom they sell the waste.

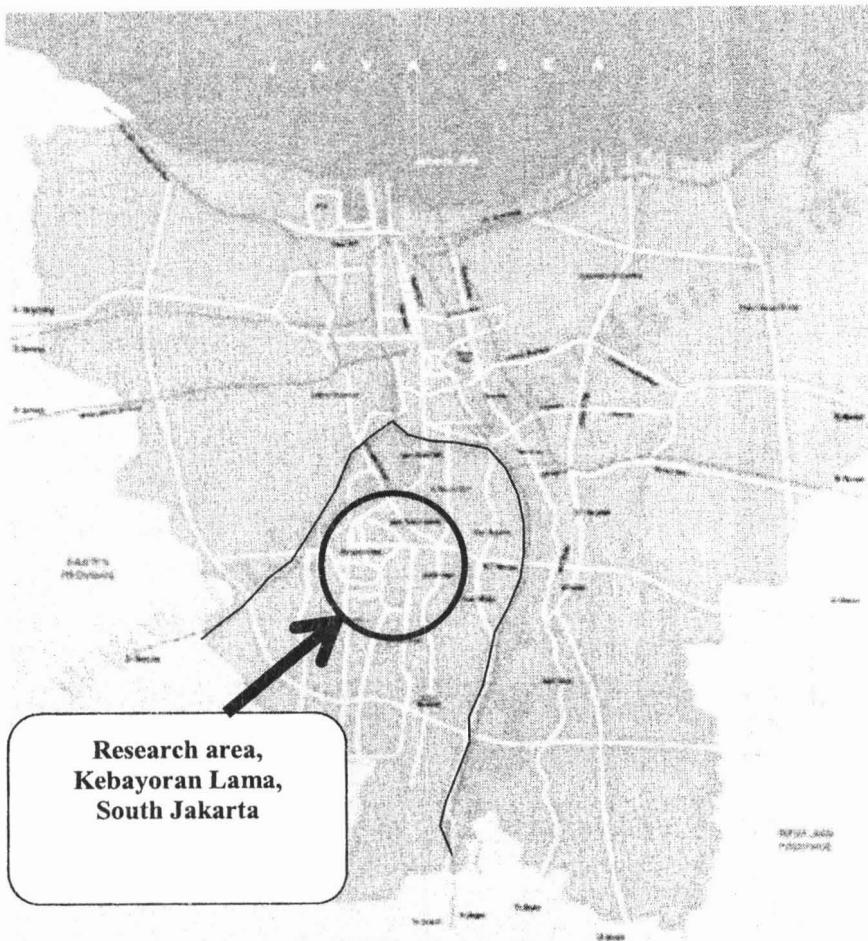


Fig 1: The Study Area

Results and Analysis of Findings

Existing Situation in the Study Area

The scavengers' one-hectare camp is a temporary site rented from a local resident. The community is led by a government pensioner who devotes his time to managing recycled solid waste business. He facilitates the local scavengers who have originally come from villages in Jawa Tengah and migrated to Jakarta with a hope for a better livelihood. He provides the scavengers with shelter, some facilities to do the scavenging job, and loans to those who are interested to work.

The number of scavengers has always been changing from time to time and is likely to grow due to economic deprivation on their original home grounds. In this context, the option of becoming trans-migrants to urban areas is still the 'best among the worst' alternatives for people in most Indonesian provinces.

Existing Solid Waste Operation

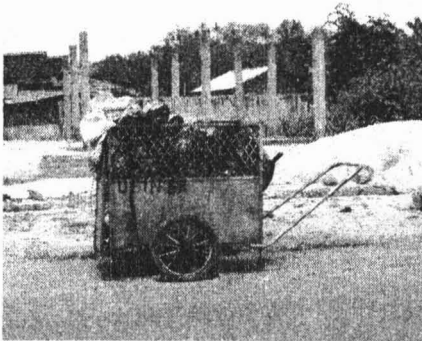
Solid waste collecting activities run for 24 hours per day and are carried out on time shifts (Table 1).

Table 1: Time Schedule for Scavengers

Shift	Time	
1 st shift	04:00 to 08:00	Morning shift
2 nd shift	08:00 to 11:00	Morning shift
Day-break	11:00 to 13:00	Weighing collected materials, day-break, and lunch
3 rd shift	13:00 to 17:00	Afternoon shift
Retreat	18:00 to 23:00	Weighing collected materials, retreat, and dinner
4 th shift	23:00 to 04:00	Night/morning shift

They roam every day over South Jakarta's surrounding areas carrying a stick, a solid waste sack called 'karung', and a two-wheel barrow or wheeler bin called 'gerobak'. At sites which are perceived to have a lot of solid waste, they will stop, leave the gerobak at the road side and carry the sack to find and collect recyclable items.

The South Jakarta is populated by wealthy residents and, thus, it is always considered as a potential area for garbage scavenging due to the high volume of refuse from the high-income area, hotel, and shopping complex. This area is particularly considered to be valuable due to the individual lifestyle and the habit of discarding large amount of recyclables or garbage that can still be re-used and repaired. Scavengers will normally collect recyclables thrown onto the streets such as plastic bottles, soft drink cans or boxes, and snack plastic packages.



Figures 1 and 2: A scavenger using a Wheeler Bin and a Sack for Collecting Solid Waste Items

Recyclable Solid Waste Composition

The survey results are shown in Table 2. The recycling activities allow the scavengers to earn from Rp. 294,000 (US\$ 32.67) to Rp. 591,000 (US\$ 65.67) per month. [Assumption: US\$ 1 to Rp. 9,000.] The total monthly amount of recyclable items from the scavenging activities was estimated to be 60-270 kg of paper, 30-95 kg of metal, 120-180 kg of plastics, 150-200 kg of tyre tube, and 30-90 kg of glass bottles.

Table 2: Solid Waste Composition

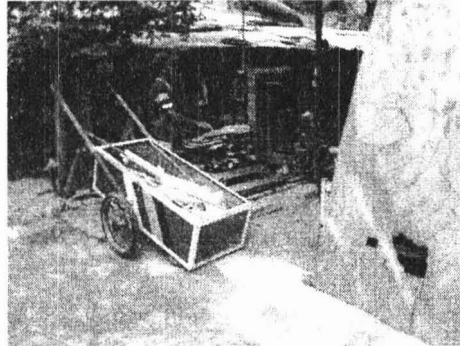
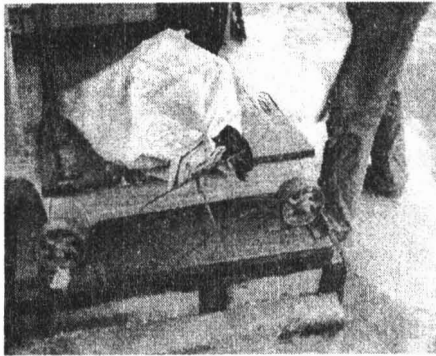
Type of recyclable items	Average collection capacity	Price (Rp./kg)	Average Revenue (Rp./month)	Remarks
Paper	1 - 6 kg/day	400	48,000	
			-	
			72,000	
Kardus paper	1 - 3 kg/day	700	21,000	
			-	
			63,000	
Metal	0.25 kg/day	1,200	9,000	
Roof zinc	0.5-3 kg/day	700	12,000	
			-	
			63,000	
Kuningan metal	1 kg/month	35,000	35,000	
Plastic (mineral water)	0.5 - 1 kg/day	3,000	45,000	After washing
			-	
			90,000	
Plastic (bag etc)	3 - 5 kg/day	500	450,00	Plastic bag carrier, snack food packets
			0 -	
			75,000	
Can	2 - 3 cans	9,000	9,000	1 kg in 60 pieces of tins collected
Tyre tube	5 - 15 kg/day	350	52,500	
			-	
			15,750	
			0	
Glass bottle	1 - 3 kg/day	200	18,000	

Analysis and Findings

There are a number of methods and approaches that can be used to evaluate waste management projects. However, the most common method is the cost benefit which compares the cost involved and the benefit activities.

Environmental Benefit-Cost of the Recycling Activities

From the environmental economics perspective, the recycling activities among the 340,000 urban scavengers in Jakarta can create a 'refuse business' opportunity that promises a monthly revenue of Rp. 99,960,000,000 (US\$ 11,106,666) to Rp. 200,940,000,000 (or US\$ 22,326,666) to these people. This is a huge amount of monetary benefits that would otherwise need to be provided by the Government for the poor and marginalized people in Jakarta, in the form of welfare subsidy. From the environmental perspective, solid waste scavenging activities among the urban poor and marginalized community help reduce environmental refuse that would otherwise be dumped onto Tempat Pembuangan Sampah Akhir (TPA). The amount of solid waste is estimated to be in the range of 390-800 kg per person per month or equals to 132,600-272,000 tons for the whole Jakarta.



Figures 3 and 4: Weighing Recyclable Items Collected by Scavengers in Jakarta.

Besides being transformed into cash money, the scavenged amount of solid waste has saved the Government about US\$ 3,978,000 to US\$ 8,160,000 per month. (Assumption: solid waste management cost is US\$ 30 per ton). The net benefit to the Government as a result of the role of the urban scavengers' recycling activities is as follows:

	With project		Without project		Difference	
	Lower	Upper	Lower	Upper	Lower	Upper
Revenue (US\$)	11,106,666	22,326,666	0	0	11,106,666	22,326,666
Cost (US\$)	0	0	3,978,000	8,160,000	-3,978,000	-8,160,000
Net benefit					7,128,666	14,166,666

The 'with' project option (participation from the urban migrant poor in recycling activities) could have resulted in US\$ 7,128,666 (lower limit) to US\$ 14,166,666 (upper limit) of net benefit to the Government. Indeed, the scavengers' contribution to the environmental economics is noticeable.

Conclusion

This paper discusses the recycling activities which are carried out by the migrant urban poor and marginalized population in the context of sustainable solid waste management. These activities help increase their levels of income and, thus, improve their socioeconomic living conditions while at the same time promote grass root participation in ensuring a sustainable environment. Despite some programs being introduced by the Government to gradually 'eradicate' this community due to their poor appearance and bad megapolitan image attributed to their slump area, solid waste scavenging activities tend to persist. The simple analysis has shown that the scavengers' contribution to the environmental economics is effective and benefit noticeable.

Acknowledgement

The authors wish to thank the Research Management Center, Universiti Teknologi Malaysia, for providing the funding for this paper presentation through Vot 78065.

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