

Constraints to promoting people centred approaches in recycling

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Abstract

Public participation is considered the touchstone for the success of recycling schemes. In recognition of this, the trend in recycling policy and legislation is geared towards promoting people centred approaches in recycling with public education as the main driver towards increasing public participation. Most of the time, these initiatives do not take into consideration the perceptions and attitudes of the key stakeholders of municipal officials and the public towards waste recycling schemes. These perceptions and attitudes appear equivocal. This paper highlights the potential constraints to promoting people centred approaches in recycling and recommends some strategies that could mitigate them. The paper is based on a case of Gaborone and used household and key-informant interviews. The study found that, even though municipal officials in Gaborone are aware of the potential benefits of recycling, they appear not to embrace waste management reforms such as municipally organised recycling schemes amid their limited knowledge in organising such schemes. In addition, the study found that even though the public are aware of recycling, this does not necessarily translate into participation in recycling initiatives. Other factors such as limited economic direct economic incentives and absence of 'visible' recycling centres were found to limit participation in recycling initiatives. Further, the public are biased towards separating materials for recycling that have known markets and are of significant financial value. The paper concludes that while public education is important to raise awareness and enhance public participation in recycling, in Gaborone, such education must be complemented by direct incentives targeted to the participating public. To this end, the paper proposes a multi-stakeholder approach to recycling initiatives that involve NGOs, households, the private and public sectors to mitigate some of the above constraints.

Keywords: Constraints; Municipal attitudes; Public participation; Recycling; Incentives; Public awareness

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Introduction

Recycling is generally accepted as a sustainable municipal waste management (MSW) strategy. Several reasons are often advanced for participating and/or promoting recycling in both developed and developing countries. The general consensus among professionals and researchers is that recycling reduces the total amount of waste that is disposed of, and conserves natural resources (Muttamara, 1996; Noehammer & Byer, 1997; Van Beukering, Sehker, Gerlagh, & Kumar, 1999; White, Franke, & Hindle, 1995). Two systems of recycling, formal and informal, often form the basis of discussion on the benefits of recycling. The main stakeholders in the two systems of recycling and their linkages are shown in Fig. 1. The figure shows that households, as waste generators, are at the centre of both formal and informal recycling. This means that the majority of these systems are people (generators) centred. However, the emerging trend is that municipal authorities are a key stakeholder in formal recycling, with the expectation that they will initiate and implement recycling schemes. This implies that people centred approaches to recycling could be realised by municipal involvement of the public (generators) in recycling initiatives.



Fig. 1 Key stakeholders in formal and informal recycling.

The emphasis on recycling as a sustainable waste management strategy has represented a shift in paradigm from conventional collection and disposal. The shift in paradigm is demonstrated by that, with an effort to enhance recycling, many municipalities in developed countries have resorted to setting up source separation schemes that require households to separate their waste prior to collection (Dennison, Whyte, & Dodd, 1992; Simmonite, 1990). Many of these source separation initiatives are intended to fulfil the recycling targets set by national or state legislation (O'Brien, 1992; Parkes & Proctor, 1992). These recycling initiatives are centred on public participation in source separating household waste and doing separation correctly according to the required components. This development of source separation schemes in developed countries has not gone unnoticed in developing countries. Some national governments, municipalities, and NGOs in developing countries are embracing source separation as a viable strategy for sustainable waste management.

However, there is continued debate over the appropriateness of household waste source separation schemes in developing countries (Furedy, 1993; UNEP, 2000). Opponents of source separation in developing countries are of the view that they may lack wider public and municipal support (Furedy, 1990;

Chung & Poon, 1994; UNCHS, 1994; UNEP, 2000). Documented case studies in developing countries show that public and municipal support for people centred approaches in recycling is equivocal (Anschutz, 1996; El Hawi, Hamilton, & Tarshawi, 2002; Furedy, 1993; Noor, 1996). This paper discusses the perceptions and attitudes of the key stakeholders of households and municipal official to people centred approaches in recycling. The paper highlights potential constraints to promoting these approaches and recommends some strategies that could mitigate them.

The study is based on a case study approach and therefore has the accompanying limitations associated with generalising from the findings. The study findings are specific to Gaborone and in some aspects urban Botswana. Thus, they are not necessarily applicable countrywide or in developing countries as a whole. However, the findings of the study might be applicable to other cities in developing countries with similar characteristics to Gaborone.

Methodology

Questionnaire-based surveys were used to elicit information from 284 households in Gaborone. The size of the sample was determined by using the formula applicable to estimating proportions (Burt & Barber, 1996). Stratified random sampling was used as a means for conducting the survey. The basis for stratification was household income. It was assumed that low-income households live in self-help housing areas (SHHA), medium-income households live in Botswana Housing Corporation (BHC) low-cost houses and high-income households live in BHC medium and high cost houses. This assumption was cross-checked by directly requesting information on household-income and was found to be reasonably accurate. The key variables of awareness and attitudes towards source separation schemes for recycling were investigated.

Key informant interviews were conducted with three senior officials of the municipal authority constituting 50 percent of waste management department staff complement. The interviews were tailored to investigate the key variables, municipal officials' awareness and attitudes towards municipally organised recycling schemes.

The data from household surveys was analysed using the statistical package for social sciences (SPSS). Since most variables were nominal, the Pearson Chi-square statistic (χ^2) was used to measure relationships between variables with a value of less than 0.05 considered significant. Key informant interviews were tape recorded to obtain verbatim transcripts. Transcripts of interviews were coded into key categories of investigation.

Municipal officials' perceptions and attitudes

In most countries, the municipality is the designated waste management authority. This has resulted in national policy and legislation designating municipal authorities as the implementers of national recycling strategies, either by formulating local ones or setting up organised recycling schemes. Municipal officials' perceptions and attitudes as stakeholders are critical to fulfilling this role. For municipal officials to involve the general public in recycling initiatives, there are some pertinent questions that need to be answered. For

example; do municipal authorities understand the benefits of municipal organised recycling? If they do, are they in a position to implement them? Do they have the technical know-how to implement them? Answers to these questions can help us understand the feasibility of people centred approaches in recycling initiated by municipalities.

A summary of the key categories as they emerged from the key informant interviews is provided in [Table 1](#). It emerges from [Table 1](#) that municipal officials were generally aware of organised recycling and its potential benefits. The awareness of the potential benefits of organised recycling schemes was created by

- study tours by some municipal officials in Europe (in particular Sweden) where they saw fully fledged source separation schemes in operation and
- experience gained through a pilot source separation programme in Gaborone.

Table 1.

Summary of key categories from key informant interviews

Category	Nature	Benefits or dis-benefits[®]
Perception	Municipal officers' views on recycling	Potential to reduce quantity of waste disposed
		Potential to reduce quantity of waste collected
		Potential to create jobs for the low-income groups
Attitudes	Maintain the status quo	Shortage of manpower
		Shortage of transport
		Lack of funds
		Lack of markets for recyclables
		Local authority has a social responsibility to collect waste and dispose
	Should be a private initiative	Polluter pays principle, thorough commercial buy back centres
Other	Institutional	No budget for recycling
		No officers assigned for recycling
		No current incentives for recycling

The main potential benefit of organised recycling schemes was seen to be the reduction of the quantity of waste to be disposed, which was referred to six times by the key informants. The second benefit of reduction of quantity of waste for collection prior to disposal was referred to three times by the key informants. The envisaged benefits, primarily those related to collection costs, were seen as only possible if private sector recyclers carry out collection of the recyclables. However, despite these potential benefits the attitude of the municipal authority officials was to maintain the status quo, where the local authority only collected and disposed of waste as a social responsibility and left recycling initiatives to the private sector. This attitude could further be reinforced by their experience with political interference in previous waste management reforms that involved private sector. For example, municipal officials made reference to a waste collection contract with a private company that was terminated by politicians even though the technical and economic evaluation showed that it was a successful undertaking. Maintenance of the status quo was further demonstrated by the keenness of municipal officials to only play a facilitation role in recycling that would ensure maintenance of their primary role of collection and disposal of waste. The facilitation role of the municipality was seen in the context of two scenarios:

- Contracting out source separation schemes

The municipality has previous experience of contracting-out waste management services to the private sector. They previously had a contract with a private company to collect waste from certain area(s) of the city. In this contracting-out scenario, it is envisaged private sector recyclers would approach the municipality with proposals to organise source separation schemes in certain area(s) of the city. The municipality could then enter into a contract with the respective private enterprise to execute the programme. This arrangement is also provided for under Section 33 of the Botswana Waste Management Act.

- Producer responsibility

Municipal officials strongly felt that the commercial sector should take back the waste they generate by virtue of their distribution of goods to the final consumer. They envisaged a situation whereby there is a linkage between licensing commercial operations in the city and recovery of post-consumer materials. Commercial enterprises applying to operate within the jurisdiction of the municipality should present, along with their application for operation, a recycling plan. The recycling plan should contain a detailed process of how they intend to recover post-consumer materials, with appropriate incentives for households to return the materials. The respective commercial enterprises would then identify end-user markets for recovered materials. This proposal is couched within the polluter pays principle, which is one of the guiding principles of the Botswana National Waste Management Strategy.

Evaluation of the pilot source separation scheme and the lessons learnt thereof further reinforced the belief of municipal officials to maintain the status quo. Some of the lessons learnt were that:

- A fully-fledged source separation scheme would require more manpower, transport and financial resources than they currently have. The municipal officials were adamant that lack of these resources would make it difficult for the municipality to organise source separation schemes. Lack of manpower and transport

resources cited by municipal officials appeared to be true. For example, at the time of the interviews, there were six officials involved in planning and operational activities in solid waste management for the whole city, with two of them also involved in issues of environmental health other than waste management. There was no official specifically assigned to oversee recycling. The waste management operational budget has remained relatively constant in real terms over three financial years at US\$1,539,953; US\$1,409,695 and US\$1,514,843 respectively for financial years 2000/01; 2001/02 and 2002/2003 (GCC, 2003). In the same period, the annual rate of inflation stood at 6.6%, 8.0% and 11.2% respectively (CSO, 2000). This relatively high rate of inflation could have an impact on the real monetary budget. In addition, the Gaborone City Council waste collection fleet consisted of 20 compactor trucks with an average age of 7 years, of which, on average 10 were operational. This was due to frequent breakdowns and excessive delays in the repairs to the trucks (Liebenberg and Stander, 2002).

- Source separation would not be able to be self-financing. The total costs of the pilot source separation scheme were estimated to be US\$2,065, while the total benefits were estimated to be US\$357 (Somarelang Tikologo, 2001). This represented a total loss by the scheme of 83%. The cost benefit analysis did not include hidden social costs and benefits. However, the inability of the source separation scheme to be self-financing indicated that it might require subsidisation by the municipality. The attitude of municipal officials was that offering incentives for recycling was equivalent to supporting private sector profit-making by public resources.

- When the source-separated recyclables were not collected in time and the bins got full and started overflowing, as happened at times during the piloting period, the participants got angry and stopped source separating their materials. This reinforced the local officials' view that since they were already struggling with collection of waste, an attempt to collect recyclables could place them on a further collision course with participating households.

The views of municipal officials should be seen in the same light with the findings of previous research of an inclination to maintain the status quo (Ali, 1997; Furedy, 1993; Scheinberg, 1999). Ali (1997) and Furedy (1993) found that municipal attitudes tended to support the status quo, instead of embracing waste management reforms that involved working with the informal sector. Scheinberg (1999) observed that municipal officials' attitude to maintain the status quo appears to be a factor where public resources are limited. This was found to be a barrier in embracing waste related reforms in Central and Eastern Europe. These officials' attitudes resulted in poorly designed pilot projects that often conveyed negative information about source separation projects that involved the general public.

4. Municipal officials' practical experience in people centred recycling

One of the lessons learnt by municipal officials from the pilot source separation scheme was that they had limited practical knowledge in organising such schemes. A comparison of the pilot source separation scheme in Gaborone, with the pilot schemes in Dublin (Dennison et al., 1992), Bradford (Barton, Perrin, & Barton, 2001) and Petaling Jaya (Noor, 1996) as shown in Table 2 reinforces the limited practical knowledge in organising a recycling scheme as acknowledged by municipal officials.

Table 2.

Comparison of pilot source separation scheme in Gaborone, Dublin and Petaling Jaya

Variables	Place		
	Gaborone	Bradford	Dublin
Number of households	45	143	2100
Distribution of households	Scattered across the city	Housing street blocks	Housing street blocks
Publicity	Letters written to selected households	Informational leaflet for target households	Promotional leaflets

First, the sample of 45 households for the pilot scheme in Gaborone was relatively small to enable a proper evaluation of the key parameters such as costs and quantity of potential recyclables, and the operational information yielded may not be easily generalised. Secondly, the participating households were scattered across the city. This presented logistical problems in collecting the materials with collectors not being able to locate some of the participating households. This led to recyclables not being collected and undermined continued participation as some of the participants of the scheme refused to be interviewed by the author citing inconvenience they suffered through their participation in the pilot scheme. These participants alleged that even though they agreed to participate in the scheme, their source-separated materials were never collected and hence they stopped continuing to participate. Besides, one of the objectives of the pilot project was to raise environmental awareness. However, scattering the participating households across the city, limited the 'visibility' of the scheme that could have developed wider community interest. There was also no wider publicity of the schemes that could have aroused wider public interest. Because of the lack of information leaflets the fieldworkers had to spend more time explaining the separation process. The lack of knowledge and practical experience in involving the public in recycling schemes could lead to implementation of ill-conceived schemes that will eventually fail. This was observed in Central and Eastern Europe where lack of practical knowledge and experience led to importing and dropping recycling banks in housing estates without even changing labels to the local language, which led to lower participation rates, insignificant revenues and ultimate closure of the projects (Scheinberg, 1999).

5. Public perceptions and attitudes towards recycling

In the context used in this paper, perception and attitude of recycling refers to awareness of recycling initiatives and the feeling about such initiatives that could influence one to participate or not to participate. In this study, awareness was established using two distinct questions of:

- Have you heard or read about recycling before?
- Segwana LTD currently has a scheme where you can return your beverage bottles to the store from which you bought them for a fee. Are you aware of the scheme?

The second question was chosen mainly because the deposit refund scheme operated by Segwana LTD was the most visible reuse/recycling activity in Gaborone, with most stores accepting empty beverage bottles from consumers to refund their deposit.

The survey found that 97.1% of the sampled general households had heard or read about recycling. This could be attributed to the fact that Somarelang Tikologo (A local environmental NGO) and Department of Sanitation and Waste Management (DSWM) have been actively raising awareness on recycling through print media and the radio. Apart from that, since the Rio Declaration of 1992 environmental issues such as recycling have been part of the school curriculum. It was also found that 98.1% of the sampled general households were aware of the deposit refund scheme operated by Segwana LTD for beverage bottles. This could be attributed to the monetary incentives of returning the beverage bottles. These results showed that households were generally aware of recycling and some recycling initiatives. However the following discussion shows that this awareness does not necessarily translate into practising recycling.

Practising recycling was established by asking households who were aware of recycling and the deposit refund scheme three questions of:

- Do you usually set aside materials from your waste for reuse and recycling?

- What materials do you usually set aside?

- Do you usually return your beverage bottles?

Of the 97.1% respondents who were aware of recycling, 47% set aside some materials for recycling while 53% did not. There were also 2.1% of households who have not heard about recycling but set aside some materials. There is a possibility that this group do not associate setting aside materials with recycling. Within those who set aside materials for recycling, the majority of them (51%) set aside glass bottles because of the deposit paid for returning the bottles. A cross-tabulation of heard/read about recycling by setting aside materials for recycling, as shown in [Table 3](#), showed that the relationship between awareness and practising of recycling was weak with a continuity correlation of 0.806 (computed for 2x2 table to compensate for overestimation of the Pearson χ^2). The weak relationship between the two variables means that few people who have heard/read about recycling set aside materials for recycling. This could indicate that there are other factors in addition to awareness that contribute to practising recycling.

Table 3

Cross-tabulation of heard/read about recycling by setting materials for recycling

Heard/read about recycling	Setting aside materials for recycling		
	Yes (row%, column%)	No (row%, column%)	Row total (%)

Heard/read about recycling	Setting aside materials for recycling		
	Yes (row%, column%)	No (row%, column%)	Row total (%)
Yes	94 (47.0, 97.9)	106 (53.0, 96.4)	200 (97.1)
No	2 (33.3, 2.1)	4 (66.7, 3.6)	6 (2.9)
Column total (%)	96 (46.6)	110 (53.4)	206 (100)
χ^2	Value	df	Significance
Continuity correlation	0.060	1	0.806

The relatively low level of setting aside some materials for recycling compared to awareness could be explained by the general lack of 'visible' recycling centres. For example, 51% of households set aside glass bottles because they had 'visible' collection system provided by the deposit refund scheme through a network of beverage distributors such as stores. Apart from the deposit refund scheme, the other recycling systems include:

- Buy back scheme for beverage steel cans, which operates from a single depot not centrally located in the city.
- The 'bring' site operated by Somarelang Tikologo, which has four material banks for glass, paper, metal cans and plastics. The site is located within the NGOs small fenced office premises, which are not centrally located. In addition, the 'bring' site was only accessible for use from 8 a.m. until and 5 p.m.

In addition to lack of 'visible' recycling centres the low level of setting some materials aside compared to awareness could be explained by lack of financial incentives. For example, 51% of households set aside glass bottles primarily because of the deposit paid back on returning them. Furthermore, of the 98.1% households respondents who were aware of the deposit refund scheme, 76.3% returned their bottles to obtain the deposit. This high level of participation could be a result of the monetary gain attached to returning the beverage bottles. In the absence of the monetary gain, the level of participation could be reduced. A cross-tabulation of the awareness of the deposit refund scheme and the returning of beverage bottles, as shown in [Table 4](#), shows that there is a significant relationship between the two variables with a Continuity Correlation of 0.001 (computed for 2x2 table to compensate for overestimation of the Pearson χ^2). The strong relationship means that most people who are aware of the deposit-refund schemes do return the bottles to be refunded the deposit.

Table 4.

Cross-tabulation of awareness of deposit refund scheme by returning beverage bottles

Awareness of deposit refund scheme	Returning beverage bottles		
	Yes (row%, column%)	No (row%, column%)	Row total (%)
Yes	193 (76.3, 100.0)	60 (23.7, 92.3)	253 (98.1)
No	0 (0.0, 0.0)	5 (100.0, 7.7)	5 (1.9)
Column total (%)	193 (74.8)	65 (25.2)	258 (100)
χ^2	Value	df	Significance
Continuity correlation	11.362	1	0.001

The importance of 'visible' and accessible recycling centres as well as financial incentives to encourage participation in recycling is supported by some studies from other areas. For example, [Noor \(1996\)](#) found that in Petaling Jaya, Malaysia, the absence of any obvious and direct benefits to residents and absence of recycling programmes in their area often resulted in poor response by residents to source separation initiatives. The results of a study conducted in Durban found that public education programmes as well as provision of accessible collection centres helped the general public to participate in recycling ([Waste Response, 1999](#)). An evaluation of Mexican projects showed that economic benefits had more influence on source separation behaviour than environmental education, which accounted for 10–30% change in user habits ([Anschutz, 1996](#)).

The majority of households who were willing to participate in future source separation projects wanted to separate materials that have known collection system as well as direct financial incentives. For example, it was found that 30% and 25% of the households were willing to separate glass bottles and metal cans respectively. In addition, 25% and 24% of specific households were willing to separate glass bottles and metal cans, respectively. The results support the previous findings that generally people were willing to separate materials that have financial incentives and are easy to separate ([Chung & Poon \(1994\)](#) and [Chung & Poon \(1999\)](#)).

Similar research in some cities in developed countries has shown that the propensity to recycle is mainly motivated by environmental values ([Barton et al., 2001](#); [Folz, 1991](#); [Vencatasawmy, Ohman, & Brannstrom, 2000](#); [Vining & Ebreo, 1990](#)), which were developed overtime by public education programmes. However, it appears that in Gaborone and other developing countries' cities, even though public education is central in getting the general public to appreciate recycling and its potential benefits, the awareness it creates appears not to necessarily translate into practising recycling. This could indicate that there are other factors that hinder public participation in recycling, such as absence of 'visible' recycling centres or lack of incentives to do so. Failure to translate awareness into practising recycling could limit the success of public awareness programmes intended to promote recycling. Apart from that, the general attitude of households was that they would be more inclined to practise recycling if they could benefit financially from separating and returning the

materials. The interest of households to separate materials that attract a monetary value could limit source separation of the materials that do not produce financial rewards.

6. Conclusions and recommendations

Households are central to promoting people centred approaches in recycling. They are expected to participate in source separation schemes and do separation correctly according to the required categories. However, the emphasis all over the world seems to be on the involvement of households (generators) by the municipalities in recycling initiatives. This scenario is premised on that municipal officials and the general public have a common objective of initiating and participating in recycling initiatives respectively. It is however important that in order to better appreciate the possible constraints of people centred approaches in recycling, we must understand the perceptions and attitudes of the key stakeholders of municipal officials and households towards municipally organised recycling.

From the data collected, it can be concluded that even though municipal officials are aware of the potential benefits of recycling, their general attitudes is not to embrace waste management reforms such as recycling but to maintain the status quo of conventional waste collection and disposal, and leave waste recycling to private sector initiatives. This attitude is further reinforced by limited human, transport and financial resources as well as the realisation that organised recycling is unlikely to be self-financing. It can also be concluded that municipal officials have limited knowledge and practical experience of organising recycling schemes. These limitations could hinder the ability of the municipality to plan and implement viable recycling schemes. Unless there is a change in attitude, knowledge and practical experience of municipal officials and, the municipality is unlikely to promote people centred approaches on its own volition.

On the side of households, it can be concluded that even though they were generally aware of recycling, this awareness appears not to necessarily translate into practising recycling. This could indicate that there were other factors that hinder public participation in recycling, such as absence of 'visible' recycling centres and/or lack of incentives to do so. Failure to translate awareness into practising recycling could limit the success of public awareness programmes intended to promote organised recycling. Apart from that, the general attitude of households was that they would be more inclined to practise recycling if they could benefit financially from separating and returning the materials. The interest of households to separate materials that attract a monetary value could limit source separation of the materials that do not produce financial rewards.

Failure of municipal officials to embrace waste management reforms such as recycling appears to be a result of limited resources at their exposure. In order to enable them to take onboard these reforms, it is important that the municipality should be relieved of the financial and administrative burden of recycling through encouraging a multiple stakeholder approach that involves the municipality, households, commerce, NGOs and recyclers. In the proposed set up, the role of the municipality could be to provide an enabling environment for recycling to prosper such as providing access to land for recycling enterprises. A recycling fund could be set up with commerce and government as the main contributors to such a fund. The fund could be used to set up buy-back centres at which households could sell their recovered materials. The proposal of a buy-back centre is based on the realization that it has been established that, economic

benefits are central to public participation in recycling. This means that, in Gaborone, recycling initiatives that depend on public participation should have financial incentives built into them. To this end, deposit refund and buy-back schemes will be the most appealing methods of collecting recyclables. But the challenge of the methods is to improve their convenience to the participating public by making them readily and easily accessible. The role of NGOs could be to carry out public education programmes that would support the buy-back centres. These public education programmes could also be funded through the recycling fund. Instead of assuming that municipal officials would readily embrace recycling as a viable strategy for waste management, it is important to educate these officials on the possible benefits of recycling and create practical knowledge and experience in organising recycling schemes. These could change municipal attitudes towards recycling and avert the possibility of initiating schemes that will eventually fail.

References

[Ali \(1997\)](#) S.M. Ali, Separation at source—A case study of Karachi, Pakistan, UWEP, Amsterdam, Waste (1997).

[Anschutz \(1996\)](#) J. Anschutz, Community-based solid waste management and water supply projects: Problems and solutions compared, a literature survey, Urban Waste Expertise Programme: Community Participation in Waste Management, Amsterdam (1996).

[Barton, Perrin, & Barton \(2001\)](#) J. Barton, D. Perrin and J. Barton, The millennium recycling scheme, The University of Leeds, Leeds (2001).

[Burt & Barber \(1996\)](#) J.E. Burt and G.M. Barber, Elementary statistics for geographers, Guilford Press, New York (1996).

[Central Statistics Office \(CSO\) Botswana \(2000\)](#) Central Statistics Office (CSO) Botswana. (2000). Economic Statistics, <http://www.cso.gov.bw/cso>.

[Chung & Poon \(1994\)](#) S.S. Chung and C.S. Poon, Hong Kong citizen's attitude towards waste recycling and waste minimisation measures, *Resources, Conservation and Recycling* **10** (1994), pp. 377–400.

[Chung & Poon \(1999\)](#) S.S. Chung and C.S. Poon, The attitudinal differences in source separation and waste reduction between the general public and the housewives in Hong Kong, *Journal of Environmental Management* **48** (1999), pp. 215–227.

[Dennison, Whyte, & Dodd \(1992\)](#) G.J. Dennison, P.B. Whyte and V.A. Dodd, Recent experience of Kerbside recycling in Dublin, *Proceedings of the Institution of Civil Engineers-Municipal Engineer* **93** (1992), pp. 143–150.

[El Hawi, Hamilton, & Tarshawi \(2002\)](#) M. El Hawi, A. Hamilton and A. Tarshawi, Recycling of municipal solid waste in Gaza Strip. Sustainable environmental sanitation and water services, WEDC, Calcutta (2002).

[Folz \(1991\)](#) D.H. Folz, Recycling program design, management and participation: A national survey of municipal experience, *Public Administration Review* **51** (1991) (3), pp. 222–231.

[Furedy \(1990\)](#) C. Furedy, Social aspects of solid waste recovery in Asian Cities, *Environmental Sanitation Review* **30** (1990).

[Furedy \(1993\)](#) Furedy, C. (1993). One World of Waste: Should countries like India deal with solid waste problems through source separation? Enriched by South Asia: Celebrating 25 years of South Asian Studies in Canada, Ottawa, South Asian Horizons.

[Gaborone City Council \(GCC\) \(2003\)](#) Gaborone City Council (GCC). (2003). Waste Management Budget. Gaborone City Council Annual Budget and Estimates. Gaborone.

[Muttamara \(1996\)](#) S. Muttamara, Solid waste recycling and reuse in Bangalore. Recycling in Asia: Partnerships for Responsive Solid Waste Management (pp. 33–57), UNCRD, Nagoya (1996).

[Noehammer & Byer \(1997\)](#) H.C. Noehammer and P.H. Byer, Effect of design variables on participation in curbside recycling programs, *Waste Management and Research* **15** (1997), pp. 407–427.

[Noor \(1996\)](#) K.M. Noor, Lessons learned from recycling project in Malaysia. Recycling in Asia: Partnerships for Responsive Solid Waste Management (pp. 59–82), UNCRD, Nagoya (1996).

[O'Brien \(1992\)](#) C. O'Brien, A bigger target is a better aim, *Wastes Management* **LXXXII** (1992) (1), pp. 33–35.

[Parkes & Proctor \(1992\)](#) E.M. Parkes and P.J. Proctor, Recycling—A practical 10%?, *Proceedings of the Institution of Civil Engineers-Municipal Engineer* **93** (1992), pp. 137–142.

[Scheinberg \(1999\)](#) A. Scheinberg, Worse before it gets better—Sustainable waste management in Central and Eastern Europe, *Warmer Bulletin Number* **68** (1999), pp. 18–20.

[Simmonite \(1990\)](#) Simmonite, K. (1990). *Sheffield—The First Recycling Centre* (pp. 987–998). Wastes Management December.

[Somarelang Tikologo \(2001\)](#) Somarelang Tikologo (2001). Household Waste Separation Study for Gaborone. Somarelang Tikologo and Gaborone City Council, Gaborone.

[UNCHS \(1994\)](#) UNCHS, A reference handbook for trainers on promotion of solid waste recycling and reuse in developing countries of Asia, UNCHS, Nairobi (1994).

UNEP (2000) UNEP. (2000). Solid Waste Management Source Book, <http://www.unep.or.jp/ietc>.

Van Beukering, Sehker, Gerlagh, & Kumar (1999) Van Beukering, P., Sehker, M., Gerlagh, R., & Kumar V. (1999). *Analysing urban solid waste in developing countries: A perspective of Bangalore, India*. CREED Working Paper No. 24. Amsterdam.

Vencatasawmy, Ohman, & Brannstrom (2000) C.P. Vencatasawmy, M. Ohman and T. Brannstrom, A survey of recycling behaviour in households in Kiruna, Sweden, *Waste Management and Research* **18** (2000), pp. 545–556.

Vining & Ebreo (1990) J. Vining and A. Ebreo, What makes a recycler? A comparison of recyclers and nonrecyclers, *Environment and Behaviour* **22** (1990) (1), pp. 55–73.

Waste Response (1999) Waste Response (1999). Recycling Initiatives in Durban Metropolitan Area, <http://www.ceroi.net/reports/durban/issues/waste>.

White, Franke, & Hindle (1995) P.R. White, M. Franke and P. Hindle, *Integrated Solid Waste Management: A lifecycle inventory*, Blackie Academic Publishers and Professional, London (1995).