

# The opportunities and value-adding activities of buy-back centres in South Africa's recycling industry: A value chain analysis

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## Abstract

This paper investigates the entrepreneurial opportunities and value-adding activities of buy-back centres in the recycling industry. Using Porter's firm-level value chain framework as theoretical framework for this analysis, a concurrent mixed method design was used to collect information from 67 buy-back centres across South Africa by means of face-to-face interviews, accompanied with a questionnaire with open-ended and close-ended questions. Buy-back centres' competitive advantage is that they have the facilities to add value to the recyclables according to the recycling industry's standards and specifications. To be viable, they need to attract large and sustainable volumes of recyclables, which often poses a challenge. Increased volumes of recyclables can translate into more jobs and income earning opportunities at all hierarchical levels in the recycling industry. A recycling model that increases the volumes of recyclables recovered by buy-back centres through informal sector activities is proposed. Such a model should facilitate changing citizen behaviour and implementation of, among others, responsible separation at source programmes to increase the volumes of cleaner recyclables. Increased supplies of recyclables should, however, be accompanied by an increase in the demand for products made from recyclables, to absorb the increased supply.

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## Keywords

buy-back centres, entrepreneurship, informal recyclers, recycling, value chain

## Introduction

South Africa generates an estimated 23.21 million tonnes of municipal solid waste per annum (UNEP, 2018). The local recycling economy is growing (UNEP, 2018) due to an emerging culture of recycling and can affect poverty alleviation, enterprise development and economic growth positively (Mpact, 2015). However, only approximately 10% of the waste are recycled, leaving room for further expansion (DEA, 2012). In 2014, recycling ‘... unlocked R8.2 billion/year worth of resources into the South African economy’ (DST, 2014). Results from a study by the Department of Science and Technology (DST) show that the economy is still losing R17.4 billion (US\$1.5 billion) per year due to valuable resources that are landfilled instead of recovered (UNEP, 2018). There is, therefore, ample room for the recycling industry to expand (Glass Recycling Company, 2018; Mogotsi, 2008).

Buy-back centres (BBCs) play a key role in diverting recyclables away from the landfills by connecting the informal economy waste collection activities of waste pickers and hawkers with the formal economy activities of the recycling companies, importers and manufacturers (Chi et al., 2010; Viljoen et al., 2012). BBCs are small, medium and micro-enterprises at the entrepreneurial level, which have formal and informal economy attributes. BBCs are defined as ‘...central waste collecting points; paying cash to hawkers and other individuals for waste paper – and, in some cases, other types of waste such as glass, scrap metal and plastic’ (Coetzer, 2010).

Entrepreneurs are people who engage in a process to add value and create wealth; not only for themselves, but also for society, through their innovative ideas, resource utilisation and ability (Tan, 2007). The Business Dictionary defines entrepreneurship as the ‘capacity and willingness to develop, organize and manage a business venture along with any of its risks in order to make a profit’ (BUSD, 2018). BBC entrepreneurs drive the process to add value to recyclables by sorting, cleaning and baling the recyclables before selling it at higher prices to larger recycling companies/manufacturers/importers (Viljoen et al., 2012). Large recycling companies only buy properly sorted, baled and large volumes of recyclables (Coetzer, 2010).

The large volume of pre- and post-consumer waste generated by factories, businesses and households each year (Langenhoven and Dyssel, 2007) provides opportunities for entrepreneurs to start SMMEs to increase the recycling rate in South Africa. This, in turn, creates more opportunities for informal survivalist street and landfill waste pickers at the lowest level of the recycling industry hierarchy, hawkers (owner drivers) or middlemen and co-operatives at pre-entrepreneurial level, small and medium enterprises such as (BBCs) at the entrepreneurial level, and medium to large recycling companies and manufacturers, at the top level (Mpact, 2014).

SMMEs in South Africa drive innovation and job creation and contribute significantly to the GDP (SEDA, 2016). The more than 5.6 million SMMEs in South Africa constitute between 70% and 80% of the employed population and, according

to the latest Global Entrepreneurship Monitor Report, SMMEs contribute 36% to South Africa's GDP (Smit, 2017).

Small businesses in South Africa have a greater capacity to absorb labour than other sized businesses and the average capital cost to create a job in SMMEs is lower than in larger sized businesses (Nieman, 2006). SMMEs also enhance social and economic stability in South Africa, providing income-earning opportunities for the unemployed, under-employed or retrenched entrepreneurs (Nieman in Topperforming, 2017). The National Development Plan (Groepe, 2015; Smit, 2017) projects that '...by 2030, no less than 90% of new jobs will be created in small and expanding firms'. SMMEs, and specifically BBCs, in the recycling industry have an important role to play in the economy and job creation.

To promote BBCs, within the context of the importance of SMMEs in the South African economy, it is important to identify their contribution and opportunities in the recycling industry. This is important as studies on the role and activities of BBCs in South Africa are limited. Existing studies concentrate on waste pickers, merely mentioning BBCs in passing (Langenhoven and Dyssel, 2007; Schenck and Blaauw, 2011; Sentime, 2011). A study by Mogotsi (2008) investigated the viability of establishing solid-waste BBCs in the City of Johannesburg, whereas a study by Viljoen et al. (2012) outlines the role and linkages of BBCs in the recycling industry in Pretoria and Bloemfontein.

This paper aims to describe and analyse the opportunities for BBCs and their contribution in terms of their value-adding activities in the recycling industry. The first objective is to outline the importance and contribution of BBCs in the recycling industry within the context of South Africa's approach to encourage small business development in the recycling industry.

The second objective is to analyse the value-adding activities of BBCs in the recycling industry using Porter's supply chain framework. The results of the study will broaden the knowledge on the contribution, opportunities and activities of BBCs and help identify ways in which BBCs can be promoted to help achieve the envisaged goals of the NDP.

### *Importance of BBCs in the recycling industry*

Jobs created through recycling and recovering activities are usually higher paying jobs than the jobs created by landfilling or incinerating activities (EEA, 2011). The higher up the recyclables move in the recycling hierarchy, the more 'higher paying' and 'decent' jobs can be created (DST, 2014). In the late 1990s, entrepreneurs, with the help of the National Recycling Forum (NRF), were encouraged to establish BBCs and drop-off points in the various centres to reap the benefits that the recycling industry can offer (DEA, undated). The NRF networked with national and provincial governments, and recycling organisations such as Waste Aware, the Fairest Cape Association and Pikitup participated in the NRF's activities to encourage recycling. The benefits include the potential to create job opportunities for those working for them as well as creating income-earning opportunities for people who informally collect and sell recyclables (DEA, undated). An increase in the recycling rates by BBCs also has spillover effects in terms of more job opportunities further up in the recycling hierarchy. Although the recycling industry's contribution to GDP in South Africa is only around 0.51% (DST, 2014), it has the potential to increase, as only 10% of the waste are currently recycled (DEA, 2012). Australia's recycling industry, for example, contributes 1.2% to the country's GDP (DST, 2014).

More scope exists for more and larger BBCs, not only to increase their contribution towards the country's GDP, but also in terms of job creation and diverting recyclables from landfills.

The manufacturers' demand for recyclable plastic is, for example, expected to increase over the next few years (Plastics SA, 2012). Manufacturers should be encouraged to use recyclables instead of virgin products in cases where it is more cost effective. The recycling of PET (polyethylene terephthalate) increased from 38% (37,361 tons) in 2010 to 58% (90,749 tons) in 2016, with an expected 70% (170,000 tons) recycling rate in 2022 (PETCO, 2018a). Of the 3.39 million tonnes packaging materials consumed, in 2014, 52.6% was diverted away from landfills (Godfrey et al., 2016; UNEP, 2018), leaving room for the remaining 47% to be recovered. There are also opportunities for more glass waste collection. In South Africa, around 280,000 tonnes of glass bottles were recycled in 2014/2015, which constitute a recycling rate of 41%, compared to 18% in 2005/2006 (Allix, 2017). In 2016/2017, approximately 82% glass was diverted from landfills and 41.5% was recycled (Glass Recycling Company, 2018). Although the diversion rate is high, there are also still opportunities to increase the diversion rate of glass.

Recycling in South Africa provides approximately 100,000 jobs (Mpact, 2014, 2015). Paper collection for recycling alone provides income to an estimated 38,000 people and it is estimated that a 1% increase in the recycling of paper and packaging can create between 600 and 1200 more jobs (Allix, 2017). From the post-consumer paper and packaging waste that was recycled in South Africa in 2014, 82.2% were collected and recovered by informal waste pickers (Godfrey et al., 2016). All these were therefore most likely sold to BBCs. BBCs, as the link between waste

generators, waste collectors, and the recycling companies, therefore play a key role in increasing job opportunities and can have positive effects on the efficiency of the recycling industry as a whole (Ahmed and Ali, 2004).

Rapidly increasing levels of recyclables generated and the importance placed on SMMEs in South Africa provide scope for more and growing BBCs. However, for BBCs to be sustainable and to survive, they need to make a profit from their activities. The survival rate of new small enterprises in South Africa is low and around 80% of all new small enterprises do not survive longer than a year (SEDA, 2016). This high failure rate is not unique to South African SMMEs. Kenya, where SMEs generated more than 50% of new jobs in 2005, has a failure rate of almost 60% within the first few months (Bowen et al., 2009). When SMMEs fail, many jobs are lost, but the potential for creating new jobs is also lost (SEDA, 2016).

To analyse the value-adding activities of BBCs in the recycling industry, Porter's value chain framework for SMMEs is used as the theoretical framework in this paper.

### *Small medium and micro enterprise's value chain*

An industry's value chain is generally defined as all the activities by all stakeholders from the conception of a product, production, delivery to end-users, and disposal after use (Kaplinsky and Morris, 2001). Porter's (1985) value chain framework can be used for '... representing and analysing the logic of firm-level value creation' (Stabell and Fjeldstad, 1998: 417). With the value chain analysis, the firms' activities can be decomposed into strategically important activities to analyse and understand their impact on the costs and value of the entrepreneur's activities. According to

Porter (1985), these activities can fit into generic categories that give logic to value creation along a value chain in all industries. ‘What activities are vital to a given firm’s competitive advantage, however, is seen as industry dependent’ (Stabell and Fjeldstad, 1998: 413).

Different stakeholders add value to a product in each stage of a value chain, which increases the value of the end-product (Reddy, 2013). BBCs are one stakeholder in the recycling industry that adds value to the recyclables.

The activities of every firm, according to Porter, consist of primary and support activities. Primary activities include the inbound logistics, operations, outbound logistics, marketing and sales and service that should translate into a profit margin. In order to survive, any firm needs to make a profit and has to survive its competition (Porter, 1985). See Figure 1.

Inbound logistics operations include all activities related to obtaining the raw materials, the storing of raw materials and the timely distribution of raw materials to the manufacturing activities (Stabell and Fjeldstad, 1998). For BBCs, it includes all

activities to buy or collect the recyclables and to store the recyclables until value can be added.

The operations activities encompass the processes in which inputs are transformed into outputs or finished products and services (Stabell and Fjeldstad, 1998). BBCs’ operations activities are the value-adding activities, namely the proper sorting, cleaning and baling of the recyclables. Proper sorting is an important aspect as there is no market for poor quality processed recyclables that might be contaminated (e.g. plastic extrusion where PET and other plastics are mixed) (Godfrey et al., 2017).

Outbound logistics entail all activities from the warehouse to the distribution of the finished goods (Stabell and Fjeldstad, 1998). After sorting, cleaning and baling the recyclables, BBCs need space to store the recyclables before it is delivered to or collected by the buyers. Outbound logistics include arranging for the collection or delivery of recyclables to the buyers that pay the best price.

Marketing and sales activities involve ‘... the identification of customer needs and the generation of sales’ (Stabell and

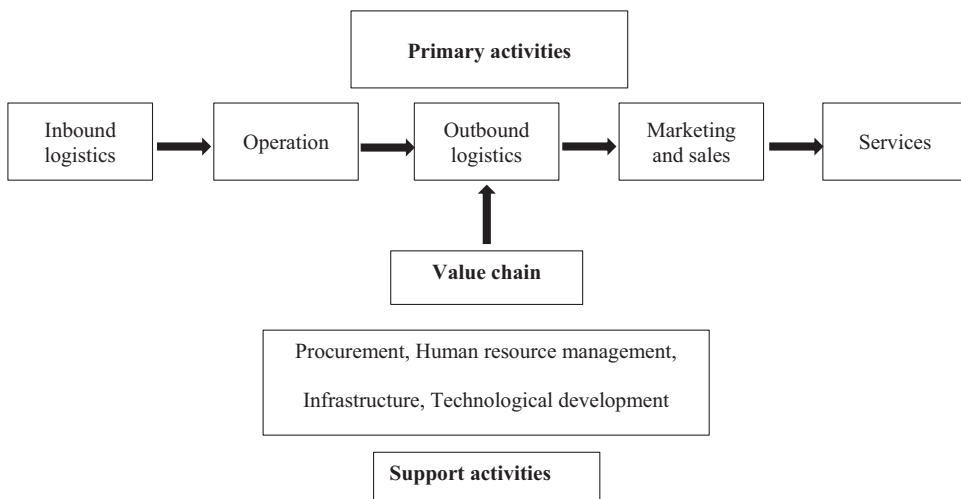


Figure 1. Porter’s value chain. Source: IFM Management Technology Policy (2016).

Fjeldstad, 1998:417). BBCs need to identify and find the highest paying buyers for their recyclables. Recyclables are sometimes stored by the BBCs while waiting to reach a saleable quantity or for prices to rise to allow them to cover their collection, transportation, processing, packaging, and storage costs while also allowing for a reasonable profit (Biddle, 1993).

Service activities include all activities related to after-sale support services to customers (Stabell and Fjeldstad, 1998). BBCs generally do not provide after sale support services to the buyers of the recyclables.

An enterprise's profit also depends on its effectiveness in performing not only the primary activities, but also the support activities that, according to Porter (Stabell and Fjeldstad, 1998), include the infrastructure of the firm, human resource management, technology development and procurement.

The value-adding activities of BBCs will be analysed and discussed in terms of the primary activities as discussed in the framework above. This is preceded by a summary of the research methodology.

## Materials and methods

Due to the lack of studies on BBCs in the South African recycling industry, this study is exploratory in nature. Exploratory research is useful in obtaining an understanding of a problem or seeking new information on a research population. It also provides researchers with the flexibility and adaptability to change when new data become available and new insights are gained as the research progresses (Le, 2016; Saunders et al., 2009). This study is unique and uses new information to analyse the opportunities and activities of BBCs within the context of SMME development in the recycling industry in South Africa according to Porter's value chain framework.

The data used for the analysis form part of a database collected in a national study

among 930 street waste pickers and 67 BBCs in the capital cities and large metros of nine provinces in South Africa. The cities include Johannesburg, Bloemfontein, Cape Town, Durban, East London, Kimberley, Mafikeng, Nelspruit, Pietermaritzburg, Polokwane, Port Elizabeth, Pretoria and Upington. The data were collected between 19 April 2011 and 28 June 2012.

A concurrent mixed-method design is used in this study. A mixed-method design includes '...at least one quantitative method (designed to collect numbers) and one qualitative method (designed to collect words)' (Greene et al., 1989). This design was used to collect as much information as possible from BBCs to obtain a thorough understanding of the activities at the BBCs.

Face-to-face interviews, accompanied by a questionnaire with open-ended and close-ended questions, were used concurrently to obtain qualitative and quantitative data from the owners/representatives of BBCs. The questionnaire gathered information on the ownership, number of employees, and activities of the BBCs. The interviews and questionnaires were primarily administered by the research team (authors). Fewer than 10% of the interviews were administered by fieldworkers where BBCs were only traced during the street waste picker data collection phase. These fieldworkers were well informed about the objective of the study, and the questionnaire was discussed with them in detail.

A non-probability sampling technique, namely snowball sampling, was used to collect the data as the location of the BBCs was unknown and limited databases and information on BBCs existed.<sup>1</sup> The research team relied on referrals from BBCs to direct them to other BBCs in an area. Because of the referrals, the research team was well received by all BBC owners. In certain areas, the research team depended on street waste pickers to direct them to the BBCs to which the waste pickers sell their



waste. Notwithstanding all these referrals, some BBCs may have been missed, especially in the larger cities. Only formal BBCs that buy a range of recyclables (paper, plastic etc.) were included. Dealers that only buy scrap metals were excluded from the study, as the aim is to focus on the broader recycling industry in South Africa.

The results of the opportunities for and activities at BBCs will now be discussed within Porter's value chain framework, after a brief overview of the enterprise size, job creation and ownership structure of the BBCs in the population sample.

## Results and discussion

### Enterprise size

SMMEs<sup>2</sup> can be classified according to the number of employees employed by the entrepreneur. Table 1 summarises this classification for the 58 BBCs that revealed the number of employees working for them, using the classification by the National Small Business Amendment Acts of 2003 and 2004 (DTI, 2008; Groepe, 2015).

### Job creation

Formal job opportunities created by BBCs include the entrepreneur who starts,

operates and manages the BBC as well as sorters, balers and drivers who work for the entrepreneur at the BBC site (DEA, undated). The BBCs also have forward spillover effects. Their efforts in collecting and buying recyclables also translate into the demand for more jobs at the upper end of the recycling chain, namely at formal recycling companies. Informal income-generating opportunities are also created for informal waste collectors and hawkers. According to Mogotsi (2008), there is a positive relationship between job creation and the volumes of recyclables received. More jobs are created by BBCs receiving large volumes (more than 40 tons per month) of recyclables. Table 2 shows statistics on the number of on-site workers employed by the 58 respondent BBCs.

The total number of jobs created by the 58 BBCs amounts to 1084 on-site jobs, giving an average of 19 jobs per BBC. The highest mean number of on-site employees was found in Durban and Port Elizabeth, with means of 33 and 30, respectively. Most activities at the BBCs are labour intensive, as is the case with most SMMEs (NCR, 2011), which makes the absorption of some of the oversupplied low-skilled workers in South Africa possible (Mpact, 2015).

### Ownership structure

In general, the management of SMMEs are usually proprietor entrepreneurs and the staff are usually not highly educated, but have 'all-round knowledge' (NCR, 2011). The activities of proprietor entrepreneurs are usually labour intensive (NCR, 2011), allowing them to have a positive impact on unemployment. Such enterprises usually have highly personalised contacts and their competitive position in the market is not defined, but uncertain (NCR, 2011). Proprietor entrepreneurs usually have unstable relationships with the buyers of

**Table 1.** Enterprise size of buy-back centres according to number of employees (2012).

Size of the BBC	n	%
Micro-enterprises (5 or fewer employees)	18	31.0
Very small enterprises (6 to 20 employees)	29	50.0
Small enterprises (21 to 50 employees)	6	10.3
Medium enterprise (more than 50 but fewer than 200 employees)	5	8.6
Total	58	100

Source: Survey data.

**Table 2.** Total, minimum and maximum number of employees per area (2012).

City	Buy-back centres (number)	Employees (total)	Employees		Mean
			Minimum	Maximum	
Bloemfontein	7	140	12	30	20
Cape Town	13	190	5	50	15
Durban	8	265	2	200	33
East London	2	7	1	6	4
Johannesburg	4	40	1	20	10
Kimberley	2	13	4	9	7
Mafikeng	2	38	18	20	19
Polokwane	1	6	6	6	6
Port Elizabeth	5	148	3	76	30
Pretoria	10	184	2	89	18
Upington	4	53	5	19	13
Total	58	1084	1	200	19

Source: Survey data.

their products and follow the market in terms of research development (NCR, 2011). Nearly half (30, or 46.9%) of the 64 BBCs who revealed their ownership status are sole proprietors, followed by 21 (32.8%) partnerships, 10 (15.6%) family businesses, one co-op, one company and one trust. Although many BBCs are proprietor entrepreneurs, all BBCs have recycling companies as guaranteed buyers of their recyclables, provided that the recyclables are prepared according to the required specifications (Viljoen et al., 2012).

## Inbound logistics

### *Collection and buying of recyclables*

BBCs collect and buy recyclables from various sources and then add value to the recyclables by sorting, cleaning and baling it (Viljoen et al., 2012). BBCs depend on the recyclables recovered by the informal street and landfill waste pickers (Figure 2). In 2010, there was an estimated 12,000 waste pickers collecting paper, cardboard, newspapers and magazines in South Africa (WBCSD, 2010). The total number of informal waste pickers in 2018, collecting all

types of recyclables, is estimated at between 120,000 and 125,000 people (Mbata, 2018). BBCs also buy recyclables from hawkers who collect waste from the street and landfill waste pickers, store it and when they have sufficient volumes, sell it to the BBCs (Ullah, 2008). BBCs further also buy recyclables collected by other people or institutions including schools and churches. This creates another layer, which must be kept in mind, in the value chain analysis of the recycling industry. BBCs also negotiate contracts to deliver waste collection services at a charge to private institutions such as businesses and shopping centres. These contracts provide BBCs with a sustainable supply of recyclables and are very much the same as the services offered in Bangladesh by micro-enterprises that exploit opportunities where recyclables are not frequently collected by the municipalities (Ahmed and Ali, 2004).

To be sustainable, BBCs need to source sufficient volumes of recyclables to sell in bulk to the large recycling companies, as the larger recycling companies do not buy recyclables in small quantities (Gutberlet, 2008). Small BBCs, which do not source sufficient volumes of recyclables to sell





**Figure 2.** Waste picker on her way to the buy-back centre and space where the waste is stored before adding value. Photos: Janine Viljoen.

directly to recycling companies/manufacturers or exporters, have to sell their recyclables to larger BBCs (Viljoen et al., 2012). BBCs in areas far away from the recycling companies also sell to bigger neighbouring BBCs who then sell it in large volumes to the recycling companies. The larger BBCs can therefore benefit from economies of scale. Mogotsi (2008) found that BBCs operate optimally if they receive and sell more than 40 tons of recyclables per month.

### *Recyclables collected by BBCs*

Price differences of recyclable products encourage waste pickers around the world to be selective and to only collect waste for which a market exists (Gutberlet and Baeder, 2008; Nzeadibe, 2009a, 2009b; Schenck and Blaauw, 2011), supplying the BBCs with the higher valued recyclables.

The mostly collected recyclables sold to BBCs are paper, cardboard, plastic bottles, and scrap metal (McLean, 2000a; Schenck and Blaauw, 2011). The value of recyclables is determined by the forces of supply and demand in that particular commodity market. This causes some recyclables to be more valuable in certain areas than in other areas. In the Johannesburg metropolitan area, the demand for paper and plastic is highest (Mamphitha, 2011; Sentime, 2011) and, in Durban, almost all waste pickers

collect cardboard, whereas fewer than 50% of the street waste pickers collect other forms of paper.

BBCs are also selective in terms of the recyclables they buy from waste collectors. Paper in all forms is the recyclable product bought by most BBCs covered in the national study. White paper is bought by 82.1% of BBCs, followed by newspapers (79%), magazines and books (70.1%), mixed paper (70.1%), and cardboard (71.6%). Cans are bought by 56.7% BBCs with glass (46.3%), globes (26.9%) and batteries (32.8%). Recyclables least bought by BBCs are PS (polystyrene) and tetrapak. Only 49.3% of BBCs indicated that they buy PET, although it is regarded as the most recycled packaging polymer (PETCO, 2018b). The use of PET is also growing by 8% per year. The production of PET increased from 140,000 tonnes in 2010, to 241,000 tonnes in 2016 (PETCO, 2018b). One reason why not all BBCs buys PET might be that there is an oversupply of PET on the market and not a large enough market for recycled PET in their area to make it economically efficient to buy. Another reason might be that they do not have enough space to store large quantities of PET, especially if they do not have a baler. This is also true for tetrapak and polystyrene. High costs associated with the

transportation of PET over long distances, if the recycling companies to whom the BBCs sell are far away, and the selling of small volumes of plastics makes recycling non-economical and non-beneficial (PETCO, 2018a).

To be able to supply recycling companies with sustainable volumes, BBCs compete for certain recyclables. Some waste collectors sell all their recyclables to one BBC, while others sell each recyclable to the BBC that offers the highest price (Hayami et al., 2006; Viljoen et al., 2012) if they are close enough to each other. This is an indication that there is competition among the BBCs to attract larger and sustainable volumes of certain recyclables. This is especially the case where BBCs are in close proximity to one another. For some BBCs, especially those in areas where there are no other BBCs in close proximity, it is a challenge having to buy all recyclables from waste pickers to keep their loyalty even if some recyclable products are not profitable.

BBCs also provide other services and support to waste pickers to ensure their

loyalty. At one BBC, the waste pickers receive loyalty cards that can generate a bonus at the end of each month. By treating waste collectors well and by supporting them, a BBC can obtain a competitive advantage over other BBCs (Viljoen et al., 2012). The types of support provided to the waste pickers in order to win their loyalty range from work-related to social support as summarised in Table 3.

Social support includes providing waste pickers with meals, shelter, money donations, loans and financial support, clothing and blankets, and ‘safe-keeping’ of money. Loans are usually interest-free and ensure future loyalty. The loans help waste pickers who experience a crisis not to fall into unsuitable levels of debt (Ullah, 2008). Only one BBC in Pretoria and one in Johannesburg provide shelter for waste pickers.

BBCs in Durban, Pietermaritzburg, Port Elizabeth and Upington are least involved in the social support of waste pickers. In Durban, this is expected as the waste pickers are not allowed at the BBCs.<sup>3</sup> BBCs that

**Table 3.** Support provided to waste pickers (percentage of buy-back centres in each area and total percentage) (2012).

City	Meals	Loans	Money donations	Clothing	Bags	Trolleys	Safekeeping of money
Bloemfontein (n=7)	28.6			14.3	57.1	14.3	14.3
Cape Town (n=13)	38.5	4.5	38.5	23.1	46.2	7.7	23.1
Durban (n=8)							
East London (n=3)	33.3	1.5	66.7		33.3		33.3
Johannesburg (n=6)		6		16.7	50.0	16.7	25.0
Kimberley (n=4)	25			25	25		
Mafikeng (n=2)	50		50	50	50		
Nelspruit (n=2)		1.5	50	50	50	50	
Pietermaritzburg (n=2)		1.5				50	
Polokwane (n=1)		0		100	100		
Port Elizabeth (n=5)		0			20		
Pretoria (n=10)	20	0	20	10	40	60	70
Upington (n=4)		10.4			25		
South Africa (total n=67)	17.9	1.5	16.4	14.9	35.8	16.4	23.9

Source: Survey data.

provide social support claim that the social involvement with waste pickers gives them a competitive advantage over other BBCs as the waste pickers are more loyal to them. Only a few BBCs provide waste pickers with basic facilities such as restrooms, kitchen facilities, drinking water and washing facilities.

Work-related support includes providing waste pickers with bags, trolleys and transport (if they have large and heavy volumes of recyclables) (Schenck et al., 2012). Most BBCs offer this transport free of charge, while eight BBCs charge a collection fee. The collection fee differs. In some cases, the fee is based on the weight of the recyclables, e.g. R0.10 per kilogram, while other BBCs charge a fixed amount per load ranging between R20 and R30 per load. Some BBCs base the fee on the distance from the BBC. If waste collectors contact the BBCs with a 'please call me', they pay R50 for the trip. Other BBCs only charge for long distances. Few BBCs have storage space and storage facilities for use by waste pickers to store their waste.

One of the major activities of most BBCs is to collect the recyclables from the various sources, which entails high costs. Many BBCs named transport and fuel costs as their major costs. The transportation costs are also variable and depend on fuel price fluctuations. Fuel price increases affect the operating costs and have a negative impact on the financial position of BBCs and can result in cashflow problems (Demir et al., 2006). Table 4 summarises the monthly transport costs of 25 BBCs that revealed this information.

The results show that the mean transport cost is R36,198.00, with a much lower median of R3500 per month. The transport costs are influenced by how often BBCs have to collect the recyclables from their suppliers. In some areas, as observed in Durban, BBCs collect the waste from the waste pickers along specified routes so that waste pickers do not have to walk long distances to the BBCs, increasing the costs to the BBCs. The trucks are equipped with scales with which the recyclables are weighed. Most BBCs also make frequent trips to the landfills to buy recyclables from the waste pickers on the landfills. These trips increase the BBCs' transport costs and eventually affect their profitability and sustainability.

Another major cost associated with BBCs' inbound activities is the costs involved in buying the recyclables. As suggested by basic economic principles, the supply and demand of each recyclable product affect the price that BBCs receive and pay for the different recyclables (Langenhoven and Dyssel, 2007; Viljoen et al., 2012). When there is a shortage of a particular recyclable in the market, the price of such a recyclable will increase (Langenhoven and Dyssel, 2007). The BBCs will receive and offer higher prices for that recyclable to encourage waste pickers and hawkers to collect more of that recyclable. The price of recyclables therefore reflects the scarcity thereof.

Each BBC further has its own cost structure that also affects the prices they offer for the recyclables (Viljoen et al., 2012). Apart from the transport and fuel costs, these costs include the rent or cost of the

**Table 4.** Monthly transport cost statistics (2012).

	n	Median	Mean	Std. dev.	Min	Max
Transport costs (pm)	25	3,500.00	36,198.00	53,541.74	500.00	200,000.00

Source: Survey data.

premises, workers' salaries, electricity costs and materials and equipment to sort and bale the recyclables.

Table 5 provides the mean prices that BBCs offer for the different recyclables in the different cities. The results show significant variances in the mean prices between cities. One reason for the differences in prices can be ascribed to the distances between the BBCs and the recycling companies to which they sell. The highest and lowest mean price for white paper is paid by the BBCs in Pretoria and Upington, respectively. Pretoria is very close to the paper recycling companies, whereas Upington is very far away from them, making transportation between Upington and the paper recycling companies expensive. The higher costs associated with the distance hampers the economic viability of recycling in certain areas. To survive, the price paid by the BBCs in Upington is lower than in Pretoria. The highest mean price paid for PET was at the BBCs in Johannesburg, and the lowest mean price for PET was paid in Nelspruit. BBCs also indicated that there is a poor market for plastic in the Free State.

The price for glass is low and ranges between R0.15 and R0.33 per kilogram. The low price for glass is a result of the heavy weight of glass and the associated higher cost to transport it to the buyers. BBCs reported that glass recycling is putting a strain on their profits in terms of the weight and the high transport costs involved in delivering glass to the recycling companies. The glass recycling companies do not collect glass from the BBCs. The mean price for cardboard is highest in Pretoria, Durban, Johannesburg and Pietermaritzburg. The price for cardboard in the other cities ranges between R0.15 and R0.40 per kilogram.

Price differences cause some people to think that BBCs exploit the waste collectors. This view is held by Rogerson (2001)

and Benson and Vanqa-Mgijima (2010), who refer to the relationship between waste pickers and BBCs as highly exploitative. In the national study on street waste pickers, it was found that more than 90% of the street waste pickers are happy with the treatment from the BBCs. Only a minority of street waste pickers had negative experiences at the BBCs (Viljoen, 2014). This negative perception is inherent in the nature of the recycling industry, but can harm the sustainability of BBCs.

The prices for recyclables in South Africa are, however, higher than in many other African countries due to the maturity of the recycling market and the relatively high demand for recyclables (UNEP, 2018). The BBCs also say they buy some recyclables from the waste pickers that provide little or no profit and try to keep the prices paid for the recyclables consistent to keep the waste pickers going.

### *Operations*

The on-site activities of BBCs are the basic tasks of receiving, weighing, paying, sorting, packing and baling of recyclables before it is sold to the large recycling companies/manufacturers/importers. Most BBCs indicated that they bale the recyclables on-site. Smaller BBCs without baling machines sell to larger BBCs that have baling facilities.

Although most on-site activities are labour intensive, BBCs still need expensive machines and technology to transform the recyclables according to strict specifications of the recycling companies/manufacturers/importers (Gutberlet, 2008). The baling machines are either bought by the owner of the BBC or provided by recycling companies to those BBCs that supply them with sufficient quantities of recyclables to justify the expense. These machines are costly and staff need training in how to operate and maintain the machines. This not only

**Table 5.** Mean prices offered by buy-back centres in different cities, 2012 (n = 67).

Type of recyclable <sup>4</sup>	Cape			East			Port						
	Bloemfontein	Town	Durban	London	Johannesburg	Kimberley	Mafikeng	Nelspruit	Pietermaritzburg	Polokwane	Elizabeth	Pretoria	Uppington
Mean price (rand per kilogram)													
White paper	0.91	0.66	1.14	0.35	1.26	0.93	1.00	0.48	1.08	0.50	0.50	1.85	0.20
Coloured paper	0.43	0.40	0.31	0.40	0.50	0.80	1.00	0.18	0.68	0.10	0.65	-	0.20
Magazines and books	0.18	0.24	0.25	0.23	0.34	0.20	0.20	0.18	0.30	0.10	0.35	0.24	0.20
Newspaper	0.18	0.24	0.25	0.23	0.25	0.20	-	0.18	0.33	0.10	0.27	0.17	0.20
Mixed paper	0.20	0.28	0.35	0.23	0.25	0.60	1.00	0.18	0.23	0.10	0.40	0.13	0.20
Cardboard	0.24	0.28	0.51	0.30	0.50	0.20	0.40	0.28	0.50	0.15	0.28	0.52	0.20
PET	1.48	0.78	0.93	-	2.80	1.33	1.50	0.33	1.80	-	0.70	1.17	-
HDPE	0.75	0.50	0.73	0.35	1.08	0.60	0.50	0.33	1.20	-	0.55	0.77	-
PVC	0.60	5.00	0.70	-	0.95	0.45	0.50	0.15	0.80	-	0.60	1.60	-
LDPE	0.75	0.60	1.07	0.50	1.20	0.50	0.50	0.33	1.20	-	1.20	1.38	-
PP	0.83	0.50	1.00	-	1.63	-	0.50	0.15	1.20	-	1.50	0.40	-
PS	-	-	-	-	-	-	-	0.15	-	-	-	0.60	-
Plastic mix	0.83	0.32	0.70	-	0.75	0.55	0.50	0.28	-	-	-	0.42	-
Cans	0.36	1.04	1.00	0.40	0.58	0.70	0.50	0.18	1.00	0.50	0.40	0.43	0.63
Glass	0.22	0.21	0.18	-	0.28	0.15	0.33	0.25	-	0.20	0.23	0.25	-
Tetrapak	-	-	-	-	0.30	-	0.40	-	1.00	-	0.40	-	-
Other metal	-	2.00	0.75	-	1.17	-	1.40	-	2.00	-	1.50	-	1.43

Source: Survey data.



increases the operating costs of the BBCs, but also enables BBCs to process and sell larger volumes (Figure 3).

The operating costs of BBCs include the cost of the premises that should have off-loading space, space where waste collectors can sell their recyclables to the BBC, sorting, baling and storage space (Demir et al., 2006). BBC owners can either buy or rent the premises and can be funded by the recycling company, the municipality or the entrepreneur/owner of the BBC. Other operational expenses are the staff expenses, bond or rental costs, trucks, machines and equipment expenditures and costs associated with the reception and office area. Not all BBCs have these basic facilities.

From the 53 responding BBCs, only 30.1% own the property on which they operate, while 67.9% rent it. One BBC operates on an open erf for which he does not pay. The on-site facilities differ between the BBCs. The larger BBCs have more and better facilities, which improve their working environment. The smaller BBCs do not always have the basic equipment and facilities for the proper functioning of a business.

Very few BBCs add more value to the recyclables by, for example, melting and re-extruding plastics into pellets and supplying these pellets to plastic product

manufacturers. Adding additional value to the recyclables costs more in terms of machinery, staff and space, but the more value that is added, the more valuable the recyclable becomes and the higher prices the BBC receives for the recyclables. This represents an opportunity cost analysis that each BBC owner must conduct, given the particular circumstances facing the business.

An entrepreneur who wants to start a BBC needs moderate start-up capital to cover all its costs. The start-up capital required for a BBC that operates optimally was approximately R1.5 million in 2008 (Mogotsi, 2008).

### *Outbound logistics*

The outbound logistics include the activities to sell the recyclables to the recycling companies/manufacturers/importers. These activities include arranging for the collection or delivery of the recyclables to the buyers. The timing of these arrangements is crucial, as the storage space at BBCs is usually limited (Figure 4). BBCs can also not afford to arrange for collection if the trucks would not be full. Staff should be available to load the trucks, whether the BBCs use their own trucks or whether the buyers collect the recyclables. BBCs who



**Figure 3.** Worker at buy-back centre busy sorting the paper, and paper fed into a baling machine. Photos: David Viljoen.





**Figure 4.** Clean baled paper moved to storage space ready for collection or delivery. Photos: David Viljoen.

deliver the recyclables need their own trucks to do the deliveries. This affects their transport and fuel bill.

More than two-thirds of the 64 responding BBCs' main recyclables are collected from them by the large recycling companies. The other BBCs have to deliver the recyclables to the recycling companies. The frequency of collection or delivery of recyclables ranges from once to twice a day at some BBCs to once every six months at another BBC, depending on the volumes and the transport distances. Many BBCs deliver or contact the buyers to collect once they have a truck-full of recyclables.

### *Marketing and sales*

Most BBCs have guaranteed buyers (large recycling companies) for their recyclables. According to John Hunt, managing director of Mpact Recycling, they, for example, '... provide a guaranteed market for all grades of waste paper' (Mpact, 2015). Despite this, the entrepreneur still has to market his products and find buyers offering the highest prices. The results show that BBCs in South Africa sell to many recycling companies, including Collect-a-can, Mpact, Nampak, Nelka, PETCO, Pikitup, The Glass Recycling Company, Consol Glass

and Uncross, to name a few. Some BBCs also export some of their recyclables if the prices are better than that offered by local buyers. The extent of exports is not known and probes further investigation. According to the CSIR (2017) in UNEP (2018), the exports of paper and packaging recyclables to foreign markets only amounts to 4.6%.

To be a profitable and sustainable enterprise, the unit price paid by BBCs for each recyclable product should be lower than the unit prices received from the recycling companies. Factors affecting the prices that BBCs receive from buyers include:

- Distance of BBCs from buyers. The further the BBCs are from the buyers, the lower the price received for the recyclables as the transport costs increase.
- Volumes that BBCs sell and whether these volumes are sustainable. The larger the volumes and the higher the frequencies of sales, the more negotiating power the BBCs have to bargain for higher prices from buyers (Schenk et al., 2012; Viljoen, 2014; Viljoen et al., 2012). A study by Mogotsi (2008) found that the co-ordination of efforts from all stakeholders involved could increase recycling rates and assist BBCs to receive larger quantities of recyclables.

- Whether or not the buyers have to collect the recyclables. If the BBC delivers the recyclables, they receive higher prices, but if the recyclables have to be collected, the BBCs receive lower prices.
- Contamination levels and quality of the sorting and preparation of the recyclable waste products. Large volumes and high quality recyclables earn BBCs better prices (Schenck et al., 2012; Viljoen et al., 2012).
- Exchange rate changes affect the prices of recyclables sold to importers (DEA, 2008; Langenhoven and Dyssel, 2007; Muller and Scheinberg, 2003; Viljoen et al., 2012) and create uncertainty and exchange rate risks for BBCs.
- Highly cyclical nature of the market for recyclables, which affects the income and profitability of BBCs (Langenhoven and Dyssel, 2007; McLean, 2000b; Tangri, 2010). During recessions, the prices of recyclable products tend to decrease (CHINTAN, 2009; Tangri, 2010).

These factors that influence the prices received by BBCs cause some recyclables bought by the BBCs to be unprofitable and such recyclables can be seen as ‘loss leaders’. The more profitable recyclables, however, usually make up for these losses.

The recyclables ranked as the most profitable for BBCs are white paper, metals, steel and copper, and cardboard (Figure 5).

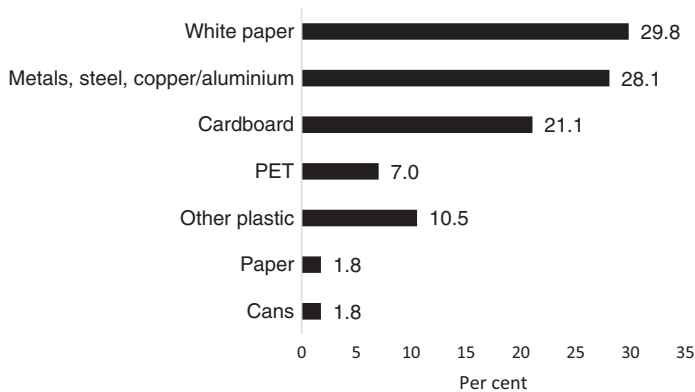
The high profitability of these products might reflect the high demand for these products and/or the scarcity thereof.

**Service**

As mentioned previously, BBCs do not provide support or aftercare services for the recyclables they sell to the recycling companies, but need to make sure that the recyclables meet their quality standards and baling specifications. If the recyclables do not meet these requirements, the recycling companies do not buy it.

**Competitive advantage and economies of scale**

Individual waste pickers and hawkers cannot sell recyclables directly to recycling companies, as they cannot supply the volume of recyclables required by the large recycling companies (Gutberlet, 2008), nor do they have storing, sorting and baling facilities to transform the recyclables according to the recycling companies’ standards and specifications. Volumes give BBCs a competitive advantage over the individual waste collectors



**Figure 5.** Most profitable recyclables for buy-back centres, 2012 (n = 57). Source: Survey data.

and small BBCs. For BBCs to be economically viable, they need to get large and sustained volumes of recyclables (Mogotsi, 2008). Small BBCs, who do not have access to enough recyclables and lack volumes, also cannot sell directly to the recycling companies, but sell their recyclables to the larger BBCs that benefit from economies of scale. To sustain the large volumes of recyclables is a challenge and, as rightly pointed out by Demir et al. (2006), driving volume growth is difficult due to the seasonality of waste generation at business and household level. There is a positive relationship between profits and the volumes of recyclables received. The more recyclables received by a BBC, the more profitable they become (Mogotsi, 2008).

### **Conclusions, recommendations and policy considerations**

It is clear that there are opportunities for future growth of SMMEs in the recycling industry in terms of the potential volumes of recyclables not yet recovered. BBCs have and can still play a critical role in increasing the recycling of recyclables that otherwise would have been disposed of at the landfills. BBCs further play an important role in creating formal jobs as well as informal income generating opportunities for the unemployed. The employment creation potential of BBCs and their role in alleviating poverty should not be underestimated and should be stimulated.

To further increase the BBCs' contribution in the recycling industry and local economy, and to increase the number of jobs they create, policymakers should create an enabling environment for these entrepreneurs to thrive. A recycling model that increases the volumes of recyclables that are recovered by BBCs through informal sector activities is needed. Such a model

can include the facilitation of changing waste behaviour, the implementation of, among others, separation at source programmes to increase the volumes of recovered recyclables going to the BBCs instead of the landfills. This will provide more opportunities and a growing market for BBCs and waste picking entrepreneurs (Mogotsi, 2008). The separation of waste at source will ensure maximum recovery of recyclables (UNEP, 2018) and may make more and cleaner recyclables more readily available to informal waste pickers who feed the BBCs with recyclables. This will ensure greater and more sustainable volumes of recyclables, which is a requirement for BBCs to be profitable. However, if contracts for such an initiative are almost exclusively given to private companies, it may still provide the volumes to BBCs, but at the cost of lower income to informal recyclers (Mbata, 2018).

The sales margins of BBCs are volatile and change with changes in the demand and supply of recyclables (Mogotsi, 2008). For BBCs to be sustainable, the demand for products made from recyclables should also be stimulated if the supply of recyclables is increased, otherwise, in the words of Biddle (1993: 1), '... recycling is a victim of its own success'. According to the BBCs, there are also still some recyclables that are not collected that could have an impact on the economy, including tyres, mixed plastics, tetrapak, polystyrene, window glass, wind-screens, torch batteries, cling wrap and ink cartridges.

BBCs should also be encouraged to (where possible) add more value to the recyclables before selling it. This can increase the value of the recyclables and make the BBCs more profitable. National governments also have a role to play in fostering the development of markets for recyclables by providing subsidies and incentives where necessary (UNEP, 2013).

Although the BBCs play a critical role in the value chain of the recycling industry, they are mostly overlooked and excluded from decision- and policymaking discussions and negotiations. There is also a stigma attached to BBCs despite their valued contribution not only in the recycling industry, but also in terms of their contribution toward the socio-economic challenges of poverty and unemployment. The role that BBCs play should be acknowledged and BBCs should be included in policy deliberation negotiations of local and national government. South Africa's unemployment is too grave and the amount of waste generated too voluminous to miss out on the opportunity to create value where otherwise there would have been only direct and indirect cost for society.

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### Notes

1. Lack of reliable and updated information on BBCs and their location required an extensive search for them. In spite of internet searches, telephone directories, referral by other BBCs, and the researchers' own observations, some BBCs may have been missed. The researchers

are, however, positive that all identified BBCs that were willing to participate in the study did so, ensuring a response rate of more than 90%.

2. The National Small Business Amendment Acts of 2003 and 2004 divide SMMEs into five categories, the survivalist, micro-, very small, small and medium enterprises (National Credit Regulator (NCR), 2011). Survivalist enterprises have minimal assets with incomes lower than the minimum income or below the poverty line (DTI, 2008; NCR, 2011). The threshold for micro-enterprises is 5 employees and 20 employees for very small enterprises except for the agricultural sector where the threshold is 10 employees. Small enterprises have up to 50 employees and medium enterprises up to 200 employees except for the agricultural sector with a maximum of 100 employees for a medium enterprise (DTI, 2008). Micro-enterprises usually operate in the informal economy, have limited capital, do not have business licences and do not pay taxes (NCR, 2011). Small enterprises usually operate from business areas or industrial premises, are tax-registered (Groepe, 2015) are generally more established and have more complex business practices (NCR, 2011).
3. In Durban, many BBCs do not allow waste pickers to visit the BBCs to sell their recyclables due to security reasons. BBCs send a truck equipped with a scale to drive along a certain route where street waste pickers can sell their recyclables.
4. PET – Plastic – usually clear or green, sinks in water, rigid, glossy, e.g. cool drink bottle, vegetable oil bottles; HDPE (high-density polyethylene) – milky coloured/dyed, e.g. milk/juice jugs, bleach bottles; LDPE (low-density polyethylene) – (clear and mixed) flexible not crinkly, e.g. bread and sandwich bags, shrink-wrap; PVC (polyvinyl chloride) – semi-rigid, glossy, sinks in water, e.g. detergent, cleansing bottles, pipe, copper cable stripping; PS (polystyrene) – often brittle glossy, e.g. Styrofoam, packing peanuts, egg-cartons, foam cups; PP (polypropylene) – semi-rigid, low gloss, e.g. margarine tubs, straws, screw-on lids.

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