



UNIVERSITY OF THE WESTERN CAPE

DEPARTMENT OF ECONOMICS

Investigating the economic relationship between buy-back centres and  
plastic waste recycling entrepreneurs

by

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of Commerce in the Department of Economics, University of the Western Cape.

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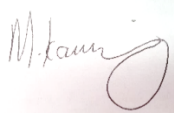
2022 October

## DECLARATION

I declare that *investigating the economic relationship between buy-back centres and plastic waste recycling entrepreneurs* is my own work, that it has not been submitted for any degree or examination in any university, and that all the sources that I have used or quoted have been indicated and acknowledged by complete references.

Mwajuma Kamanzi

Signature:



Date: 06 October 2022



## ABSTRACT

Persistently high unemployment level and rate remains as one of South Africa's most serious social and economic problems. Over the years, entrepreneurship has been identified as one of the main vehicles to create jobs and alleviate poverty. South Africa is one of the finest plastic recyclers in the world with almost 50% of plastics used as inputs come from recycled plastics (Plastics SA, 2019). This presents an opportunity: Buy-back centres (BBCs) in the waste management industry have proven to be economically feasible with many of these centres employing people and profiting from selling recyclable materials to recyclers. Focusing on the Western Cape, in 2019, the province generated about 150 000 tonnes of plastics with the market value estimated at between R474 and R632 million per year.

This study analysed the economic implications of the relationship between various participants in the plastic recycling value chain, namely Street Waste Pickers (SWPs), bakkie brigades and BBCs, by using a mixed methods approach. With BBCs as the focal point, the study described and analysed the downstream relationship between BBCs, plastic waste pickers and small informal bakkie brigade operators across the plastic recycling value chain in Cape Town. Primary data was collected by means of survey questionnaires and structured interviews on relevant variables for SWPs, bakkie brigades and BBCs. Primary individuals were selected using a purposive sampling technique to gain a deeper insight into the daily operations of entrepreneurs within the plastic recycling value chain.

The empirical findings showed that many individuals in the plastic value chain depend on the reclamation of plastics in order to make a living. For some, in the case of SWPs it is mainly done for survival reasons while many others, such as BBCs entrepreneurs and bakkie brigade operators, join the industry for profit-seeking opportunities. Furthermore, BBCs rely heavily on SWPs and bakkie brigades to supply them with sufficient waste in order to maximise profits. In return, the BBCs provide informal income generating opportunities to SWPs and bakkie brigades, thereby creating a symbiotic relationship between the key role players in the Polyethylene Terephthalate (PET) value chain.

**KEYWORDS:** Buy-back centre, Bakkie brigade, Plastics, Recycling, Entrepreneurship, Economic growth.

**JEL:** Q00, Q50, Q53

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## LIST OF ABBREVIATIONS

|          |                                     |
|----------|-------------------------------------|
| BBC      | Buy-Back Centre                     |
| DEA      | Department of Environmental Affairs |
| GDP      | Gross Domestic Product              |
| HDPE     | High-density polyethylene           |
| ILO      | International Labour Organization   |
| LDPE     | Low-density polyethylene            |
| NDP      | National Development Plan           |
| NWMS     | National Waste Management Strategy  |
| OLS      | Ordinary Least Squares              |
| PET      | Polyethylene Terephthalate          |
| PP       | Polypropylene                       |
| PS       | Polystyrene                         |
| PPE      | Personal Protective Equipment       |
| QLFS     | Quarterly Labour Force Survey       |
| SME      | Small and Medium-sized Enterprise   |
| Stats SA | Statistics South Africa             |
| SWPs     | Street Waste Pickers                |



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## CHAPTER ONE: INTRODUCTION

### 1.1 Background and problem statement

South Africa has implemented several policies aimed at redressing the inequalities effectuated during the Apartheid regime (World Bank, 2018). Despite some positive changes in the political, social and economic environment over the last 28 years, the legacy of Apartheid and the negative influence it had on people's lives (especially the Black majority) remain. The country still faces extreme inequality, poverty and structural labour market issues; the policies that have been developed by the democratic government to overcome these issues are well intentioned, but the implementation and monitoring thereof has been inadequate. This government failure contributes to a reality where unemployment and inequality continue to rise, and economic growth remains sluggish (World Bank, 2021). To add, The National Development Plan (NDP), introduced in 2012, has set out its targets to be achieved by 2030. To achieve the NDP target, an annual economic growth of 5.4% is needed which implies that at least 11 million jobs need to be created and unemployment rate will drop to 6% by 2030 (NDP, 2013:95). Structural labour market issues, low business confidence and investment, and a sluggish economy with declining real GDP per capita since 2011 (Falconer & Herrington, 2020) have, however, made achieving the NDP target increasingly difficult to obtain.

As noted by Herrington, Kew & Kew (2010), the unemployment rate in South Africa continues to rise and remains an important macroeconomic problem facing the country. Unemployment has been on an upward trend from 25.2% in the fourth quarter of 2013 to 31.3% in the fourth quarter of 2019 (StatsSA, 2021). The situation in the country has been worsened by the COVID-19 pandemic where it reached 35.2% by the fourth quarter of 2021, the highest rate since the introduction of the 2008 Quarterly Labour Force Survey (QLFS) (StatsSA, 2022).

The South African government is aware of some of the solutions required to accelerate progress and build a more inclusive society, one of which is to encourage entrepreneurship across all sectors in the economy (Herrington et al., 2010). Recycling Buy-back centres (BBCs) play a key role in not only assisting in addressing the challenges of dealing with the increased generation of waste and the scarcity of land for disposal but also by reducing the challenges of unemployment through promoting entrepreneurs to operate waste recycling businesses (Mogotsi, 2009 and Viljoen, Schenck & Blaauw, 2019). Moreover, BBCs create

entrepreneurship opportunities for bakkie brigades and waste pickers within the value chain by setting up and running recycling depots whereby waste collectors can sell their waste and in turn generate incomes for themselves (Mogotsi, 2009 and Viljoen, Schenck & Blaauw, 2012).

According to Sobuce (2012:5) for the most part, entrepreneurial activities take place within the Small, Medium and Micro Enterprises (SMMEs) sector. A culture of entrepreneurship can create and unleash the economic potential of all South Africans, as entrepreneurial activity is considered to be an imperative driving force for economic development through job creation, innovation and growth (Herrington et al., 2010). Expanding on this concept of entrepreneurship, the South African government recognises that setting up (BBC) businesses have helped alleviate many impoverished communities since 1998, for this reason the government continues to encourage entrepreneurs to open and operate BBCs (Viljoen et al., 2012:4).

Many benefits come with recycling Polyethylene Terephthalate (PET) plastic waste; one of the benefits is the prevention of environmental pollution and waste from ending up in a landfill. According to PETCO (2021) those who collect recognize the value in retrieving used PET bottles, as they help keep about 90 000 tonnes of PET plastic bottles out of landfill annually . Once gathered, these recycled bottles are used to make new bottles and a variety of other items, boosting South Africa's GDP and reducing the likelihood that they will pollute the environment (PETCO, 2021). In his study, Mogotsi (2008:4) claims that the establishment of a BBC is economically viable because 60 percent of recyclable solid waste goes through the BBCs instead of being disposed at landfill sites. Additionally, the diversion of recyclables away from the landfills connects all key role players within the value chain through waste collection activities by waste pickers, bakkie brigade operators as well as BBC's (Viljoen et al., 2012).

Plastic waste has become one of the most recycled materials in the recycling value chain adding both economic and environmental value in the country's waste management strategy (Ncube et al., 2021). This is done through the process whereby plastics are sorted, cleansed and shredded into pieces then melted in the form of pellets which can then be made into high-quality, reusable materials. According to a PlasticsSA (2019) report, recycling plastic directly increased South Africa's GDP by 2.3% and contributed 18.5% to the Manufacturing sector's output in 2019. The report further states that the purchase of recyclable plastics contributed

R2 065 billion to the informal economy. As a result, 58 750 new employment opportunities were consequently created, including waste pickers and workers at smaller independent collectors PlasticsSA (2019). Likewise, According to Greencape (2020), the Western Cape generated about 150 000 tonnes of plastics in 2019. Additionally, PETCO (2021) states that in 2020 79 078 tonnes of post-consumer bottles were collected for recycling by PETCO members. Further, the recycling of 1.9 billion bottles alone creates 54 176 income opportunities for small and micro-collectors (PETCO, 2021).

BBCs are operated by entrepreneurs who create jobs and provide income-earning opportunities to waste pickers and bakkie brigades who supply the BBCs with plastic waste materials. This implies a mutually beneficial relationship between entrepreneurs within the plastic value chain activities through demand and supply for PET waste. Keeping the above in mind, the main focus of this study is to **investigate the economic relationship between BBCs, Street Waste Pickers (SWPs), and bakkie brigades within the plastic waste value chain**. The study will identify the level of engagement and dependency shared among the key role players. Further, the study seeks to analyze how income is generated through quantities of plastics exchanged between SWPs, bakkie brigade, and BBC. Also, it considers how the BBC's regular operations give both SWPs and bakkie brigades the chance to engage in entrepreneurship.

Lastly, previous studies highlight the lives and working conditions of waste pickers in South Africa (Schenck et al., 2012; Langenhoven & Dyssel, 2007; Ralfe, 2007; Benson, & Vanqa-Mgijima, 2010), with a small quantity of that research dedicated to BBCs, and even fewer research aiming at the relationship amongst key role players within the recycling value chain in Cape Town (Hoffman & Schenck, 2020; Barnes, Blaauw, Schenck & Pretorius, 2021; Bala, 2021). Hence, this paper will add to literature on the entrepreneurial relationship that may exist among the key role players within the Cape Town recycling sector.

## **1.2 Research questions**

This study is guided by the following set of questions:

1. What entrepreneurship opportunities exist for BBCs, bakkie brigades and waste pickers within the PET value chain?
2. What motivates SWPs, bakkie brigades, and BBCs to pursue entrepreneurship opportunities in the plastic waste industry?

3. What kind of economic relationship exists between BBCs and their plastic waste suppliers?

### **1.3 Objectives of the study**

The primary objective of the research is to identify the economic relationship between BBCs, bakkie brigades and waste pickers within the plastics value chain. The specific objectives of the study include the following:

1. To describe the operational activities that BBCs and bakkie brigades conduct within the PET value chain to identify entrepreneurship gaps at the lower end of the value chain.
2. To determine the daily amounts of plastic waste received by plastic BBCs, bakkie brigade, and waste pickers.
3. To look into the profitability and non-profitability of BBCs, bakkie brigades, and waste pickers in the plastic waste industry.

### **1.4 Outline of the study**

This study is made up of five chapters in the following manner. Chapter One presents the background and problem statement, poses the research questions as well as the objectives of the study. Chapter Two introduces the literature review. Thereafter, Chapter Three outlines the methods employed as well as the data used in the study. Chapter Four presents the empirical findings. Lastly, Chapter Five concludes the discussions and provides some policy recommendations.

## CHAPTER TWO: LITERATURE REVIEW

### 2.1 Introduction

This chapter presents a review of both theoretical and empirical literature associated with the entrepreneurship opportunities within the plastic value chain for BBCs, bakkie brigades as well as waste pickers. Past work on recycling and waste management has studied waste pickers intensely (Schenck & Blaauw 2011; Mothiba, 2016; Mclean, 2000; Hayami et al., 2006 & Medina, 2007), but not much analysis has been looked into the economic relationship between the entrepreneurs working as waste pickers and bakkie brigades as well as those operating BBCs within the plastics value chain (Hoffman & Schenck, 2020).

This chapter consists of numerous sections. Section 2.2 lays out the main concepts used in the study, while section 2.3 deals with the theoretical framework successes in explaining the plastic recycling value chain. Section 2.4 will review past empirical studies conducted in the plastic recycling value chain, with entrepreneurship being the main focus, lastly, section 2.5 will provide a conclusion of the chapter.

### 2.2 Definition of key concepts

#### 2.2.1 Entrepreneurship

According to Hoffman (2019), it was the ancient Greeks who practiced the first custom of entrepreneurship as they introduced tax farming, which involved bidding for rights for the collection and payment of tax to the ruling monarch. The word ‘entrepreneur’ is a French word dating back to the 1700s derived from the French term “Entreprendre” which means *to undertake*, or defined as someone who ‘undertakes a venture’ (Herrington et al., 2010). Moreover, the American Peoples Encyclopaedia (1970: 260) describes an entrepreneur as a responsible leader of a business venture who accepts profits as a reward. Entrepreneurs are individuals who also introduce new ideas; they decide on what and how to produce, they are risk-takers in the decisions that they make (Parkin 2008:06). According to The Global Entrepreneurship Monitor (GEM) report of 2021, entrepreneurship is a social and economic phenomenon, and attitudes and perceptions are important influences on the nature and level of entrepreneurship.

Okpara (2007) defines an entrepreneur as someone who is able to realize his/her innate potentials and develop an independent character. She/He is that person who takes on the voyage of creating value by pulling together a unique set of resources in order to exploit an

opportunity. Okpara (2007) further states that he/she has the aptitude and competency to build something from practically nothing – initiating, brave, exploit, achieving and building an enterprise. They have confidence in that they have something new and special to offer, either a product or a service. Lastly, entrepreneurs have been described as individuals who have the ability to see and evaluate business opportunities, gather the required resources to take advantage of them and initiate appropriate action to guarantee success (Okpara, 2007).

Gerdes & Gunsilius (2010) as well as Myplas (2017) argue that waste pickers are too, regarded as entrepreneurs operating in the informal low-end position of the recycling chain. More to the point, informal activities that waste pickers are engaged in allow them the flexibility and they are thus able to respond easily to demand-driven forces. Therefore, waste pickers can be viewed as survivalist entrepreneurs. According to Peters (2010:14), a survivalist enterprise is one that earns an income that is less than the minimum poverty line and by which there is no paid employment. Entrepreneurship is well related with creativity and innovative capabilities of individuals and the reward that comes with this is the comfort and progression in the standard of living of entrepreneurs and others when employment is extended to benefiting the community and ultimately boosting the economy resulting in a decrease in unemployment (Mahmud, 2014).

Several studies have identified two motives for entrepreneurship (Williams & Nadin, 2010; Harding et al., 2006; Williams, 2009; Reynolds et al., 2002). It is common to differentiate between ‘necessity’ entrepreneurs who are pushed into entrepreneurship because other choices are unavailable, such as employment while ‘opportunity’ entrepreneurs tend to do so by choice (Eijdenberg & Masurel, 2013; Harding et al., 2006). Fairlie & Fossen (2018) provide a slightly different definition of entrepreneurship motivation, defining individuals who are originally without a job before starting a business as ‘necessity’ entrepreneurs, and also defines those who are not unemployed (i.e. wage/salary workers, enrolled in school or college, or are not actively seeking a job) before starting businesses as ‘opportunity’ entrepreneurs.

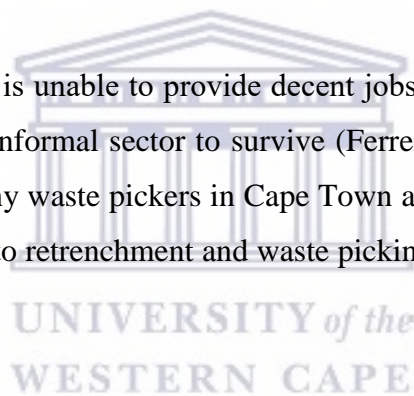
#### 2.2.1.1 Necessity-based entrepreneurs

According to Reynolds et al. (2002), Necessity entrepreneurs are motivated by economic needs, this is when people are pushed into entrepreneurship due to unemployment, and entrepreneurship becomes their last resort. These people are primarily survivalist entrepreneurs until they find work; South Africa’s high unemployment rate can thus be

attributed to the high number of survivalist entrepreneurs (Hoffman, 2018). Reynolds et al. (2002) further state that necessity entrepreneurs are predominately found in developing countries where financial support, education and training and physical infrastructure is absent.

Mclean (2000) and Viljoen (2014) both identify that waste picking in South Africa is done as a survival strategy and most pickers are not even aware of the positive impact it has on the environment. Poverty and unemployment are seen as two major drivers of informal waste picking (Ferreira, 2016). Informal work, particularly at the bottom of waste recycling value-chains, represents a position of extreme vulnerability and hardships. Moreover, since waste picking happens within cities, it is linked with urban poverty rather than rural poverty. Hence, it is this rapid urbanisation in the search of employment that presents a huge challenge to cities and governance. There are simply not enough jobs to absorb the rapid migration into cities and this leads to a large number of urban poor scavenging for waste in cities as a means of survival through waste collection (Ferreira, 2016).

It is when the formal economy is unable to provide decent jobs that forces or rather ‘pushes’ many South Africans into the informal sector to survive (Ferreira, 2016). Likewise, Schenck & Blaauw (2011) note that many waste pickers in Cape Town and Pretoria specified that they had lost their employment due to retrenchment and waste picking became a means for them to earn an income when needed.



### 2.2.1.2 Opportunity-based entrepreneurs

Individuals who are said to be “pushed” into entrepreneurship do so by choice, they feel the need to become entrepreneurs and they have a desire to exploit business opportunities (Reynolds et al. 2002; Harding et al. 2005; Williams, 2007). Bhola et al. (2006) mention that entrepreneurial activity stems from different motives that drive the decision to start a business and opportunity-based entrepreneurs tend to have a greater preference for self-employment because of family encouragement.

According to a GEM (2021) report, entrepreneurs need be able to spot opportunities, they perceive themselves as having the expertise and competence to start a business and play a role in bringing jobs, incomes and value added to societies. Viljoen, Schenck & Blaauw (2012) describe BBC’s knack to create employment prospects on three different levels: entrepreneurs, who start, manage and run the BBC; those who sort and bale, while also receiving recyclables from waste pickers; and finally, the waste collectors, who collect and



sell waste material to recycling centres. In the case of Pretoria and Bloemfontein, Viljoen et al. (2012) further found that the majority of the owners of BBCs were sole owners, while there were also examples of partnerships and a family-run enterprise.

### 2.2.2 Buy-back centres (BBCs)

Buy-back centres (BBCs) are generally described as small, medium and micro-enterprises (SMMEs) at the entrepreneurial level, which possess both formal and informal economy attributes (Viljoen et al., 2019). Likewise, BBCs are essentially identified as central collection sites or depots for one or more types of recyclable materials (like plastics) where individuals can drop off and receive a fee for recyclables that they have collected (DEAT, undated). According to Schenck, Blaauw & Viljoen (2012:35), the value of the BBCs materialized in the survival of waste pickers as BBCs are the connection between the waste pickers and formal economy. Also, for both to continue to exist and make a living through earning an income; one needs the other in the waste management structure. Coetzer (2010) and Mogotsi (2008) support the above claim by stating that BBCs operate as collecting points, paying waste pickers for waste collected such as glass and plastics.

BBCs are identified differently in European countries, as they are called ‘sorting facilities’ (Miliotis et al., 2018). Activities performed are similar value adding ones as those performed locally. Additionally, Miliotis et al. (2018:185) state that plastics are generally sorted between polymers at sorting facilities and during this process some are kept and others are discarded. Plastic waste that are discarded could be due to the fact that it consists of more than one type of plastic or is too dirty to be further recycled.

The middleman operating BBCs are SMMEs at the entrepreneurial level, which have formal and informal economy attributes by connecting with both waste pickers and bakkie brigades who provide them with recyclables and selling them to formal recycling companies at the higher-end of the chain (Viljoen, Blaauw & Schenck, 2019).

### 2.2.3 Waste pickers

In South Africa, mixtures of names are given to individuals who are involved in informal waste activities. According to Timm (2015) and Scheck et al. (2012), several terms are used throughout the world to refer to individuals who engage in the recovery of waste. Also, many studies conducted locally on the recycling industry refer to waste collectors as reclaimers or

waste pickers (Samson, 2010; Benson and Vanqa-Mgijima, 2010; Schenck and Blaauw, 2011).

Sobuce (2012) states that there is no common understanding of what those involved in recycling should be called and how they should be treated. In some instances, waste pickers are referred to as ‘scavengers’, ‘vultures’ and ‘parasites’ (Chvatal, 2010). According to Benson & Vanqa-Mgijima (2010), people who reclaim waste in the street are labelled by various names in the recycling sector. Examples of these are terms like “minza” used by waste pickers meaning “trying to survive”, “ukuzizamela” trying for yourself, “grab-grab”, and work. The authors also state that the most common term used is “skarrelling”, an Afrikaans slang word meaning “always on the look-out for something”, “scrounging around” or “struggling but doing something about it” (Benson & Vanqa-Mgijima 2010).

Samson (2010) describes waste pickers as people who salvage reusable and recyclable materials from what others have cast aside or thrown away as waste. They supply BBCs and bakkie brigade with materials that they have collected in exchange for payment. Samson (2010) further explains the ways in which waste pickers were first seen in society but that now recently the demand to be recognized as self-sufficient individuals who do contribute to the environment as well as the economy. Their role in the waste management system must be valued (Samson, 2010: 10). They perform essential services and save municipalities money when it comes to waste that would have otherwise land up ad landfills.

Birkbeck (1978) defines waste pickers as self-employed working-class people who are identified as garbage pickers. They set their own hours or work and are known to be more than just ordinary casual workers; they are self-employed individuals who collect recyclable materials for an income (Birkbeck, 1978). Ullah (2008) found that waste pickers in Dhaka city were at times referred to as slum dwellers or homeless who live on the street. These individuals collect anything that can be sold to dealers in the recycling market and it is relatively easy to enter as waste pickers in the city because no capital is needed and not much knowledge and skills is required either.

In South Africa, waste pickers have different identities in different communities depending on which city the pickers are collecting waste. Waste pickers’ primary function is as reclaimers who collect recyclables from all over the city, including landfills, to make a living for themselves (Theron, 2010). Gerdes & Gunsilius (2010) further explain that waste pickers are

those who make a living from collecting and selling their waste, and act as entrepreneurs who add value to the recycling system. Myplas (2017:121) makes use of the term ‘trolleypreneurs’ and ‘trolley brigades’ for waste pickers as those who collect valuable waste from the streets and sell the waste off to local BBCs.

#### 2.2.4 Bakkie brigade

According to Goeiman (2020), the term ‘bakkie brigade’ is an informal term used by actors in Cape Town’s waste economy to describe intermediaries found within the recycling value chain between processing businesses and waste pickers working at the bottom level. Timm (2015: 128), however, defines the bakkie brigade as self-made individuals with motorized transport who collect waste materials using their bakkies or pick-up trucks from clients.

Moreover, bakkie brigade operators identify themselves as entrepreneurs, with some of them collecting directly from client daily while others function as mobile BBCs from their backyards (Timm, 2015). Similarly, as stated by Goeiman (2020) a bakkie brigade is someone who uses a motorized form of transportation (bakkie) in order to collect, transport and sell their recyclable waste. This individual acts as a mobile BBC and has the capacity to sell their waste directly to recyclers. In other words, a bakkie brigade tends to operate on a smaller scale when compared to big BBCs and bigger than the typical waste picker because they can store and transport larger quantities of materials.

### **2.3 Theoretical framework**

#### 2.3.1 Porter’s value chain theory

Michael Porter’s Value Chain Analysis is identified as a business management model that was first introduced in the author’s book ‘Competitive Advantage’ (1985); Porter explains value chain analysis by adding onto the fact that a value chain is a collection of activities that are performed by a business in order to create value for its customers. The process of value creation generates additional value which leads to competitive advantage. Eventually, the added value also creates a higher profitability for the business. Throughout the plastic recycling relationship between waste pickers, bakkie brigade, BBCs to the recycler, value is added from the moment that a bakkie brigade or BBC receives the plastic waste from waste pickers. Waste pickers get paid by preparing the waste according to the standards stipulated by the bakkie brigades and BBCs at the very beginning of the value chain. Hence, the Porter theory on value chain viewed the term “value” in terms of prices that a buyer is willing to pay firms for the products or services that the firms may be providing.

Hoffman & Schenck (2020) state that each role player involved in the plastic recycling value chain, from a bakkie brigade to recycler, contributes to one or more of the seven value adding activities identified. The authors also mention that at times it is found that more than one value adding activity could be taking place within example a BBC or recycling centre.

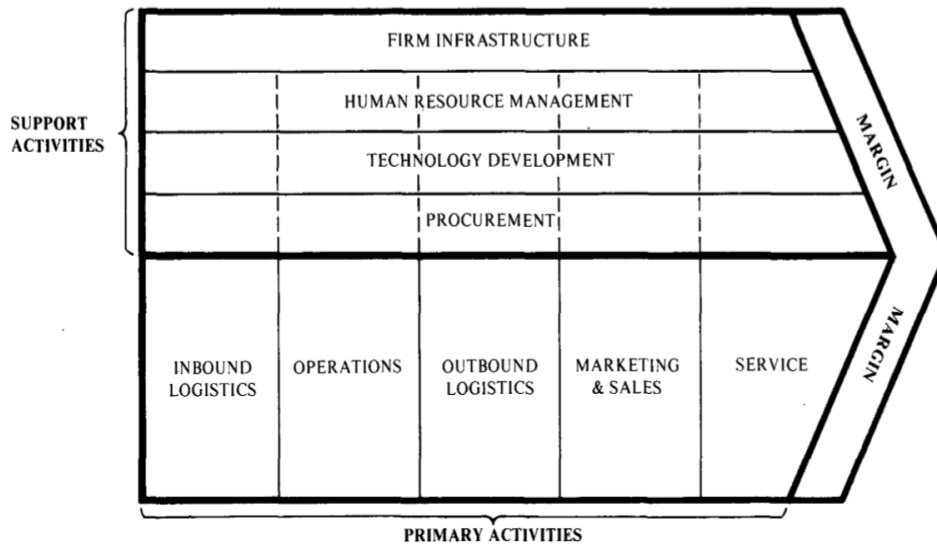
### 2.3.1.1 Primary activities from the value chain framework

The value chain framework encompasses all the value activities and margins. According to Kumar & Rajeev (2016), in order for firms to set off and remain profitable, they need to be able to manage the activities in the value chain in the most productive manner possible, the price that consumers are prepared to pay for the firm's products and services must exceed the cost of the firms in terms of its value chain activities (Kumar & Rajeev, 2016).

Figure 2 shows the key components of the value chain as follows:

- Inbound Logistics: the primary handling of a product starts with how the raw materials are being taken care of. For BBCs, these activities comprise of buying in the waste from the waste picker and bakkie brigade. This is the first point of contact where the recyclables are weighted and payment is then made out to the supplier.
- Operations: These activities consist mainly of the transformation process from converting input products into output final products. BBCs' operations at this point would consist of the correct sorting, cleaning, bulking and baling of recyclable materials.
- Outbound Logistics: Once operational activities have been taken care of, the BBC, at this stage prepares the recyclables for delivery or drop off to the highest paying recycling company. Bales are prepared and/or either stored until they are ready to be sold.

**Figure 1: Porter's Value Chain**



Source: (Porter, 1985).

2.3.1.2 Support activities of the Value Chain framework

The support activities are listed vertically in Figure 2 above. These activities are everything else on the side that is not physically related to the product itself but more on the running operations of the firm. The four support activities contribute to the successful operations of the business whilst it is in the process of performing its primary activities as mentioned above (Porter, 1985).

- Procurement: this function provides support in terms of making purchases for raw materials and any other needed materials that may involve costs in the production process of a product. The purchasing of quality raw materials is one of the stated competitive advantages that a firm might have.
- Technology Development: it consists of various activities put together for there to be a free flow and ongoing improvements to the production process. One of many ways for firms to remain competitive is by investing in technology; technological development contributes to efficiency operations within a firm's activities.
- Human Resource Management: no business can function without capable employees. This function seeks at finding the right people who contribute towards the primary and provide support activities to the value chain of the business. It involves the process of hiring, training, recruiting and continuously developing the right staff for the firm.
- Firm Infrastructure: the infrastructure here refers to the overall construction of the firm. This includes all the senior and line managers, legal dealing and financial

administration and management of the firm. A business that thrives is one that has a smooth operational team to work with.

In the context of this study, the activities performed by waste pickers, bakkie brigades as well as BBCs within the PET waste value chain are best understood using the theoretical framework of Porter's Value Chain. Waste pickers who prepare, clean, and sort their plastics are able to sell their materials for more because they would have added value to their recyclables before sending them off to be sold at the BBC. The process continues once the plastics arrive at the BBC by means of sorting, cleaning and baling the plastics so that in turn they can sell to the high-end recyclers and manufacturers.

### 2.3.2 The theory of demand and supply

Porter (1985: 10) states that another prerequisite for a firm's profitability is that profits should be viewed as a function of the balance between demand and supply. The author further emphasises on the idea that if demand is greater than supply for a particular good or services than the profitability for that good or service would be high and the opposite is true as well (Porter, 1985). Basic economic principles suggest that the price that BBCs receive and pay for PET plastic is affected by the demand and supply of plastic products and that each product's price is subject to its own demand and supply function (Viljoen et al., 2012). The demand for plastic waste is therefore dictated by the consumer who demands the plastic for final use, whereas the supply is subjected to the volume of plastic waste that is offered by BBCs (Langenhoven & Dyssel, 2007).

#### 2.3.2.1 Demand

The quantity demanded of goods and services is defined as the amount that consumers are prepared to pay at a given market prices during a specific period of time. Even if a plastic waste item can be recycled, the likelihood of that plastic being sold depends on the demand for it. To add, for the recycling industry to function, there must be a demand for the materials collected; studies have proven that as much as recycling benefits the environment the collection of waste is mainly motivated by economic gains (PETCO, 2018; Sadan & De Kock, 2020). Reasons given for the changes in waste product prices are the demand factors that are seasonally driven, recycling companies and other buyers demand for a particular material, exchange rates as well as fuel hikes (Chisango, 2017 & Viljoen et al., 2012). Viljoen, Blaauw & Schenck (2019) state that in any product market, it is the value of recyclables that determines the forces of supply and demand for that market itself.

Sadan & De Kock (2020) makes mention in their WWF report that an added influence that controls the amount paid for post-consumer PET bottles is when recyclers have a surplus over the December holiday period and do not buy bottles for recycling. This is by no means an unusual circumstance and can occur with any material type if the end-use consumer market is limited or failing.

Another factor causing a change in the demand for recycled plastics is the price of crude oil. As stated by Issifu et al. (2021), the price of oil has a great effect on the prices of recycled plastics, crude oil prices are main driving force of prices of recycled plastics. Sadan & De Kock (2020) further support this by noting that throughout the world and South Africa, the demand for recycled waste reduces when the crude oil rate, and therefore the rate of virgin raw material, falls. Manufacturing items from virgin plastic is then cheaper than using the recycled material. Even in South Africa, where a high percentage of plastics are produced from coal by Sasol, the coal price competes with the crude oil price. That is all owing to the fact that plastic is made from a by-product of oil and therefore, oil prices tend to increase the cost of recycling (Issifu et al., 2021).

### 2.3.2.2 Supply

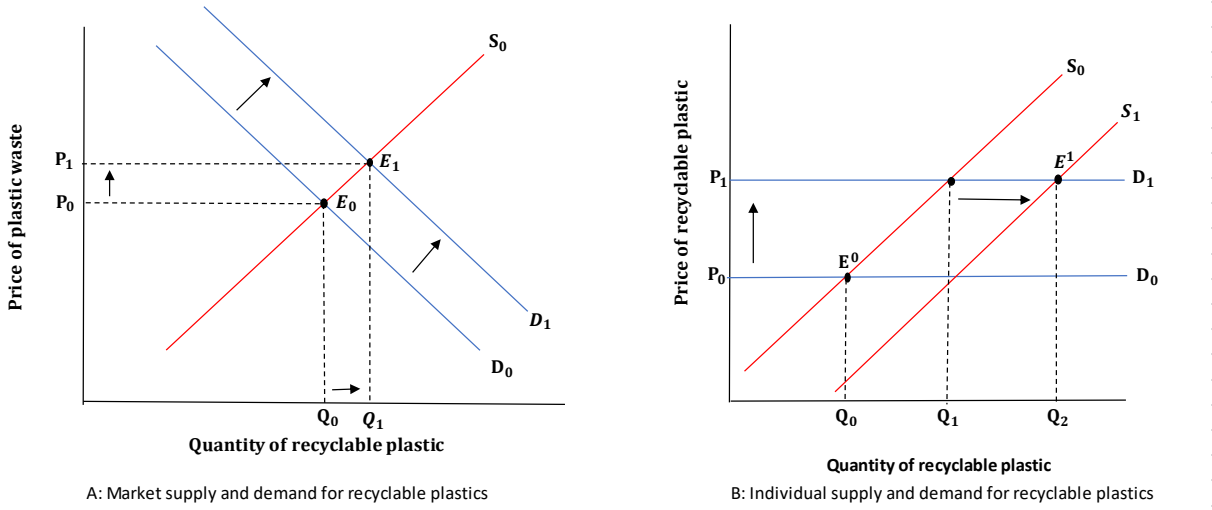
Whelan & Msefer (1996: 8) define supply as the seller's willingness and ability to supply goods. Supply is simply a term used to define the relationship between the quantity supplied and price for a market good or service. The prices set in the recycling industry are set by recyclers and they pass those prices down to BBCs and bakkie brigade owners (Langenhoven & Dyssel, 2007). Therefore, it is found that within the plastic recycling, BBCs rely on supply from waste pickers and bakkie brigade operators.

### 2.3.2.3 Equilibrium market condition

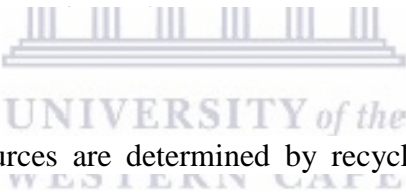
Figure 3 depicts the interaction of demand and supply given the equilibrium conditions. The recycling industry is viewed as a competitive business where prices paid for recyclables are subject to the changeability of market forces including demand and supply. The key to viable recycling is identifying the balance between securing the supply of recyclable materials and promoting the demand for goods that are manufactured from these materials (DEAT, 2020). The supply of plastic waste will be the amount that waste pickers are willing to sell at a given time, place, and price and the demand for plastic waste is the weight of plastic that BBCs are willing to purchase the waste for at a particular point in time for a given price.

The demand for PET plastic waste is derived from recyclers of plastic who use it as a resource in manufacturing new plastic products as well as the quality of the plastics material. The greater the demand for plastic products, the greater is the demand for PET plastic waste. As a result, the demand curve for recyclable plastic slopes downward which means that the demand for recyclable plastic increases as its price falls.

**Figure 2: Market for plastic waste recycling**



Source: Author’s Own diagram.



The price paid for waste resources are determined by recycling companies to the bakkie brigade, is frequently quite unpredictable, with prices fluctuating at the drop of a hat depending on both local and international demand for recyclable goods. Global capital communicates through processing companies, making the bakkie brigade vulnerable to market volatility. Also, processing businesses operate as the critical border between the bakkie brigade and global capital (Goeiman, 2020 & Schenck et al., 2012).

With regards to the above diagram, when there is an increase demand for recyclable plastics, the market demand curve in figure A will shift to the right from  $Q_0$  to  $Q_1$  at every price level. This increased demand shifts the demand curve to the right along the supply curve to new equilibrium from  $E_0$  to  $E_1$  causing a market price to increase from  $P_0$  to  $P_1$ . As a result of this new market price increase in A, the new demand curve for the individual firm will shifts upwards from  $D_0$  to  $D_1$  in order to keep up with the overall market demand for plastics recyclables. The individual firm’s supply curve shifts rightwards and a new equilibrium is established at  $E_1$ .



## **2.4 Review of past empirical studies**

### 2.4.1 Introduction

The relationship between role players within the recycling value chain is vital for understanding how entrepreneurship opportunities are created by their interactions. The section below will discuss the profile/characteristics, working conditions as well as costs and remuneration of waste pickers, bakkie brigades and BBC operators. The success of all three operators is ultimately defined by having sufficient supply of plastic waste throughout the value chain of recycling, hence it is said that volume plays an important role in the price negotiating powers. Additionally, BBCs play a crucial role in facilitating the recycling potential of both waste pickers and bakkie brigades (Viljoen et al., 2012).

### 2.4.2 Waste pickers' contribution to the value chain

Due to high unemployment rates globally, there are countless individuals entering the informal sector, in this case as plastic waste pickers (McLean, 2000), picking waste is seen as a means of survival regardless of the risks and circumstances they work in (Mothiba, 2016). Their activities include collecting recyclable leftover from dustbins, landfill sites and selling it to BBCs in exchange for a small income. Waste pickers add value to the waste by separating cleaning and sorting materials before selling them off to the various BBCs for further value adding (Schenck et al., 2012). Although under-valued, waste pickers bring significant socio-economic benefits to countries around the globe, through employment and improved livelihoods (Mamphotha, 2011).

### 2.4.3 Demographics and education

According to McLean (2000b), most of the waste pickers interviewed in Durban were between the ages of 31 and 60 years of age. Benson & Vanqa-Mgijima (2010) found that in Cape Town, the majority of waste pickers were between the ages of 23 and 80 years. Yet, in another Cape Town study (Mitchells Plain), Langenhoven & Dyssel (2007), found that nearly half of the waste pickers were aged 50-65 years. The waste collectors in Braamfontein were all fairly young, and there were only a few older people (Sentime, 2011). To add, Ferreira (2016) notes that the waste pickers were between the ages of 26 and 50 years, and reasons that this is the age when people are expected to provide for their families.

Furthermore, nearly all studies, both locally and internationally, reveal that education levels are low amongst waste pickers (Samson, 2010; Ullah, 2008; Medina, 2007, Mamphitha, 2011

& Schenck et al., 2016). Rouse (2006) notes that most are uneducated and do not have, and may not be able to afford to gain, skills necessary for other jobs. These findings are also supported by studies done by Tevera (1994) & Medina (1998). Bjerki (2005), however, found that most waste pickers in Ethiopia's plastic recycling industry have completed their primary school education with even have had secondary school qualification.

#### 2.4.4 Health and working conditions of waste pickers

Waste-pickers are primarily exposed to work-related health risks due to a lack of protective clothing and the working conditions. Wilson et al., (2006) explain that waste-pickers come into direct contact with severe, harmful objects as well as medical waste putting their lives in danger. Additionally, they every so often eat food found in garbage cans, making them susceptible to food and bacteria related illnesses (Schenck & Blaauw, 2011).

The daily activities performed by waste pickers are extremely labour intensive. According to Mamphitha (2011:72), waste pickers travel long distances by foot, carrying heavy loads usually on vehicles such as trolleys to transport their waste back and forth. Hence, it is the combination of the long distance travelling with heavy loads that makes the daily lives of waste pickers physically difficult (Mamphitha, 2011 & Schenck, 2012). Additionally, on the issue of the hours worked, McLean (2000b) also found that the majority of the waste pickers who she interviewed spent either five, six or seven weekdays collecting, and earnings increased according to days worked. This implies that the more days worked results in more income due to the increased collection that they are able to sell off to buyers. Furthermore, Viljoen et al., (2012) in their study, revealed that waste pickers tend to move between different BBCs and deliver in different areas on different days of the week. Pickers have no stipulated time, no deadlines, they operate as they please and while some are loyal to a particular BBC, the majority supplies the BBCs that will pay them more for their recyclable waste.

#### 2.4.5 Income levels

Previous studies have proved that the income most waste pickers earn are insufficient to even cover their basic needs for food and shelter which is a clear indication on just how low the amounts that they earn is (Benson and Vanqa-Mgijima, 2010:15; Samson, 2010; Schenck, Blaauw & Viljoen, 2012 & Mclean, 2000). Medina (2005:19) as well as Schenck et al. (2012:55) note that street waste pickers tend to earn less than waste pickers who collect on landfills and although the income of both is still viewed as relatively low, street waste pickers

remain as the lowest income recipients in the recycling value chain and the most unprotected individuals in the informal economy in terms of poverty and uncertain earnings (Schenck et al., 2012:52). To add, McLean (2000b) found that many waste pickers lived in informal shelters, and earned barely enough to cover their food and accommodation. In view of the above, it can be said that just because waste pickers are earning a low income and the activities performed is better than if they were unemployed, this does not solve the problem of poverty, they still continue to struggle to make ends meet and pay for shelter.

#### 2.4.6 The role of Bakkie brigade operators in South Africa

In his doctoral dissertation, Timm (2015) defined a bakkie brigade as an independent entity with motorized transport (bakkies) that collect waste from business and manufacturing outlets. Timm's (2015) thesis explored the role of the bakkie as a 'non-human' regulator of recycling activities Cape Town's informal economy. Also, the bakkie operator can be viewed as middlemen in Cape Town's urban waste sector (Goeiman, 2020). Goeiman (2020) further states that the bakkie brigade symbolizes actors that have greater flexibility and capital because they use motorized transport to collect, transport, and sell recyclable materials to formal processing enterprises. This allows them to collect much more waste and earn relatively more in terms of volumes when supplying BBCs or recycling companies. Expanding on the same logic, Goeiman (2020) also state that the bakkie brigade operator differs from waste pickers because they are able to store waste in larger quantities and able to collect and drop-off long distance due to transport availability.

As the only two studies found on bakkie brigade operators in South Africa at the time both Timm (2015) and later (Goeiman, 2020) notes the importance of owning a bakkie for bakkie brigade operators, they rely heavily on their bakkies for collection of recyclable materials and agreements with clients for pickups which in turn makes their work more profitable. Besides the bakkie itself, it is also found that the other key mediating technologies needed for them to operate successfully are BBC depots and baling machines (Goeiman, 2020).

Lastly, the basic activities performed by bakkie brigade operators includes receiving, weighing, arranging and packing materials, with this, materials are weighted and prices are paid based on the volumes sold (Timm, 2005).

#### 2.4.7 The costs and benefits of buy-back centres

As mentioned before, studies on the role and activities of BBC's are limited in South Africa, with very little research available on their characteristics and recycling abilities within the value chain (Hoffman & Schenck, 2019). Not only do BBCs divert recyclables from landfill, they also contribute towards job creation and GDP growth of a country (Viljoen, Blaauw & Schenck, 2019; Okpara, 2007 & Reynolds et al., 2002).

As stated by Cant (2013), SMMEs contributes remarkably in almost all economies but predominantly in a developing country like South Africa where there are high numbers of unemployed individuals and income inequality challenges. The size and operating capacity also matters for the sustainability of a BBC. At times it is not only the waste pickers and Bakkie brigades that supply the BBC with plastic waste but rather smaller BBCs who do not have the volume required to supply recycling companies or exporters. According to Viljoen et al., (2019) small BBCs, which do not source sufficient volumes of recyclables have to sell their recyclables to larger BBCs who then sell it in large volumes to the recycling companies the larger BBCs can therefore benefit from economies of scale.

Owing to the fact that that this study only focuses on the buying and selling of plastic materials, only activities concerning plastics within the value chain is analysed. One of the key activities of nearly all BBCs, aside from having buyers coming to their centres, is the collection of recyclables from various sources (Viljoen et al., 2019). Collecting plastic waste is the first step in the process of adding value for the BBC; they further add value to recyclables by sorting, cleaning and baling (Viljoen et al., 2012). Moreover, the activities that takes place on site also includes weighing the plastics received daily, paying the suppliers for dropping off on site and packing them together according to the requirements of the buyer.

They earn their profits through selling their plastic waste to either bigger BBCs or formal recycling companies hence for the business to survive, they need to make sufficient profits from their recycling activities (Viljoen et al., 2019). Therefore, Viljoen et al. (2012, 4) state that BBCs sustainability is achieved through the entrepreneur who ensures that there is always a sufficient amount of recycled waste from waste collectors. BBCs' competitive advantage is that they have facilities that add value to recyclables according to the recycling industry's standards and specifications (Viljoen, Blaauw & Schenck, 2019).

## 2.5 Conclusion

The bulk of both local and international studies on the waste economy have been mainly fixated on the socio-economic, remuneration and experiences with challenges of street waste pickers, while very little research, especially in the South African case, on other key role players within the recycling value chain. Bakkie brigades and BBCs are entrepreneurs within the value chain who play important roles in informal job creation and income earning opportunities for their employees and importantly, waste pickers. Hence this research intends to contribute to the existing literature by investigating all three role players' interactions with one another within the value chain of plastic recycling.



## CHAPTER THREE: METHODOLOGY AND DATA

### 3.1 Introduction

In general, this chapter reports details on how this study was conducted. Furthermore, the chapter also discusses the steps that were taken during the data collection period, how the data was collected and why it was done in that particular way. Lastly, methods and data collection techniques that were employed during the fieldwork will be discussed. The focus remains on understanding various characteristics of waste pickers, bakkie brigades, and BBCs in their everyday environment. Therefore, the mixed methods approach that analyses qualitative and quantitative data on the above-mentioned entrepreneurs in the plastic recycling value chain. Data collection will be restricted to the geographical urban area of the Cape Town district.

### 3.2 Research design

This study used a mixed methodology design. Structured questionnaires were used to interview waste pickers, bakkie brigades as well as BBC owners on and off sites. The overall purpose for using a mixed-method design in combining both qualitative with quantitative data is to support the study's conclusion.

According to Leedy & Ormrod (2010), mixed-methods design means the use of more than one technique to the research problem to strengthen confidence in ensuing findings. A mixed method approach was identified as the most appropriate methodology for research of this nature. Bergman (2008:1) defines mixed methods research as the combination of at least one qualitative and incorporating at least one quantitative component in a particular research task. Moreover, the mixed method approach allows for the reliability for the use of more than one data collecting method so as to allow the researcher to fully explore the available information from participants that will be identified as a sample for this study. Creswell and Plano Clark (2011) point out the advantages to combining qualitative and quantitative research approaches some of them are listed as:

- The mixture of qualitative and quantitative data can improve an analysis by ensuring that the limitations of one type of data are balanced by the strengths of another.
- Using the combination of the two methods can provide a more comprehensive and credible support, considering that this study will gather data on the experience on people's daily operations.
- Mixed design research is realistic and useful in that it allows the usage of multiple methods and approaches that best deal with a specific research question.

### **3.3 Data**

#### 3.3.1 Study setting

The study included areas within the Cape Town region (Bonteheuwel, Athlone, Wallacedene, Retreat, Stellenbosch and Khayelitsha), using waste pickers, bakkie brigades and BBCs as primary informants. Waste pickers were targeted at the BBC depot and sometimes on the side of the road while they were collecting or sorting out their plastic waste. Bakkie brigade operators were identified at the BBCs as well, while BBCs were interviewed on site. Three different surveys were drawn up for the entrepreneurs mentioned in the study. Additionally, the study makes use of a purposive data collection method to gain first-hand experience on individuals' daily operations. Waste pickers and bakkie operators were interviewed as they approached or/and exited the BBCs in the areas while owners operating the BBCs were interviewed on-site.

#### 3.3.2 Samples and sampling technique

Sampling refers to the process of selecting a portion of the population that conforms to a designated set of specifications to be studied. For this research, a sample of waste pickers, bakkie brigades and BBCs were selected using the purposive sampling technique. Bernard (2002) defines purposive sampling as a nonrandom technique that does not need a set number of informants and the researcher selects what needs to be known and seeks individuals who can provide the information needed by virtue of knowledge and experience. Purposive sampling, according to Creswell (2003), refers to a selection of sites or participants that will best help the researcher understand the problem and the research question; however, they must be willing to reflect on and share this knowledge. Therefore, for this research, waste pickers, bakkie brigades and BBCs who have been operating in the plastic waste industry and were willing to impart their knowledge and experience were interviewed. In addition, data collection for this research took place in urban areas within the Cape Town province employing a purposive sampling method. Four BBCs, 10 bakkie brigades and 100 waste pickers were approached to obtain the necessary information relevant to the study.

#### 3.3.3 Data collection methods

Semi-structured interviews are usually conducted in a face-to face setting, permitting the researcher to ask valid questions, while at the same time, allows the researcher to gain in-depth knowledge on the working environment that is being researched (Sileyew, 2019). The waste picker's questionnaire consisted of 32 questions, which were organized into seven

sections (see Appendix A). The first section of the survey asked questions relating to demographic and educational characteristics. The second and third section asked questions relating to operations and livelihood. This section gives clarity to the activities performed by waste pickers daily, and answered the questions with regards to whom they supply their waste, and why they choose to sell their waste to a particular buyer. The fourth section focused on respondent's daily earnings and market prices of plastic waste. The fifth section focused on asking questions relating to the relationship that pickers share with bakkie brigades and BBCs. Lastly, the sixth section is centered on external factors affecting waste pickers, questions on health, injuries, and assistance were asked.

The questionnaire on bakkie brigade operators consisted of 39 questions organized in six sections (see Appendix B). The first section once again, focused on demographic and educational characteristics, only this time including questions on whether the respondent was the owner or employee of the bakkie brigade operations. Section two is concentrated on daily buying and selling operations. Section three and four is on the relationship that BBs have with waste pickers and BBCs. Section five asked questions regarding the business' profitability, while the last section asked questions relating to the effects of the COVID-19 pandemic as well as business improvements.

The third questionnaire was on BBCs. This questionnaire consisted of 33 questions prepared in five sections (see Appendix C). Section one, as with the other two questionnaires, asked questions regarding demographic and educational characteristics. Section two focused on operations and ownership. Section three and four focused on plastic waste materials that BBCs buy in and sell as well as profitability margins. Section five asks questions regarding any business challenges and ways of improving the BBCs.

#### 3.3.4 Fieldwork process

The fieldwork was completed in three phases. Waste pickers were interviewed between 2 March and 19 March 2021. Initially the total of 121 waste pickers were interviewed, but after checking for errors and cleaning the data on excel, only 100 waste pickers were taken in as part of this study. The second interview took place on 22 March 2021. Lastly, the BBC owners/managers were interviewed within three days on 29-31 March 2021.

The researcher was assisted by six other experienced fieldworkers. During the course of the day, fieldworkers were spilt into groups due to language issues amongst the waste pickers. It



was found that the majority had limited English capability, hence the advantage the researcher had was that of the six fieldworkers four were fluent in Afrikaans while two understood Afrikaans but were fluent in IsiXhosa. The few respondents from Congo were able to understand and reply in English.

Waste pickers were more than willing to share not only information regarding the activities they were engaging in, but also deep personal information regarding their lifestyle and struggles in general. Fieldworkers had a lot of empathy for the waste pickers and on occasion brought extra bottles of water with to offer those who were collecting with children and some even made sandwiches and bought bread on odd days.

The owners of the BBC depot in Retreat invited fieldworkers into their office space, and offered refreshments. The owner provided information that went beyond the questions asked from the interview. Her exact words were “I am an open book you can ask me anything about my recycling business”.

Additionally, these interviews with key role layers allowed for the understanding of the everyday decision making of entrepreneurs. The research questions aimed to gather data on daily economic operations and decisions faced by entrepreneurs in those establishments. Questions on the educational attainment levels and employment history of informants were also asked, the study seeks to identify the different types of plastics that are collected by waste pickers and bakkie brigades, with that, the acceptable amount that are then bought by the BBCs and lastly, the earning potentials, daily PET waste supplied by waste pickers and bakkie brigades and prices paid by BBCs to the suppliers of PET, and the costs associated with running the BBCs. Interviews were conducted in English and translated verbally to informants in their preferred languages whether it was in Afrikaans or isiXhosa.

### **3.4 Data analysis – Quantitative and Qualitative**

As previously mentioned, to get a holistic picture of the social and economic daily operations of those working within the plastic recycling value chain, it is important to examine them from different perspectives. Hence it becomes necessary to gather different types of data using different methods. Therefore, this study adopts both qualitative and quantitative methods, which seek to explore not only the working environment, but also the entrepreneurship opportunities explored within the value chain.

The use of quantitative method for this research applies on gathering numerical and statistical data collected through the questionnaires used for this study. The main difference between quantitative and qualitative research is that quantitative research points towards understanding individual's social and human problems and experiences. Qualitative methods seek to interpret and understand the beliefs, rationales and logics behind the decisions and actions taken by research respondents (Makina, 2020). This is crucial for this study, which aimed to understand the reasons behind the involvement with plastics recycling and opportunities, if any, for growth within the value chain. To understand this, the researcher asked a series of qualitative questions. These questions helped to acknowledge the daily operating activities of not only the waste pickers but bakkie brigades and BBCs.

Manual data coding was done on an excel spread sheet to check for any incomplete information before proceeding to the analyses component. The quantitative data for this study was analysed using the Stata software program, while the qualitative information was examined by employing thematic analysis.

To identify whether or not there are indeed any entrepreneurship opportunities for the three key role players mentioned in this study, daily income earned and prices set had to be determined and analysed. That being the case, the daily income variable serves as the outcome variable. Additionally, the different explanatory variables that influence income also need to be analysed to determine whether they have a positive or negative effect on the income patterns of waste pickers, bakkie brigades and BBCs. These explanatory variables include gender, age, educational attainment levels as well as the physical resources that would allow the respondents to transport their plastic waste. For waste pickers, the use of a trolley was vital for their earnings while the bakkie brigades rely heavy on their bakkies. These variables were analysed by means of both descriptive statistics and Ordinary-Least Squares (OLS) regressions.

Owing to the fact that daily earnings, as the main incentive for work performed by SWPs, determine their operational activities in the value chain, a multivariate regressions on daily earnings as the outcome variable, will be run in order to support the descriptive analysis. The Ordinary Least Square regression will be used to examine the relationship between the daily earnings of SWPs, and various explanatory variables such as gender, race, age and educational attainment levels as reflected in the equation below:

$$y(\text{earnings}) = b_0 + b_1(\text{gender}) + b_2(\text{race}) + b_3(\text{age}) + b_4(\text{educat attainment}) + e$$

Where:

- Daily earnings is the  $y$  variable as obtained from the waste pickers' questionnaire (See Question 14 of Appendix A)
- $b_0$  is the constant term: daily earnings when all other explanatory variables equal to zero.
- $b_1$  to  $b_4$  are the coefficients: the unit change in daily earnings when the dummy variables equals to 1 or 0.
- Gender (Reference category: male)
- Race (Reference category: African)
- Age (Reference category: 18-25 years)
- Educational attainment (Reference category: no schooling)
- $e$  is the error term

The data collected from the qualitative interviews is analysed through thematic data analysis by means of examining and recording themes within data. A theme represents some level of patterned response or meaning within the data set and captures something important about the data and research question (Braun & Clarke 2006). Also, the open-ended questions of the surveys captured qualitative information with the focus on gaining as much information as possible on the experiences and emotions of the respondents. In addition, Swart (2019) states that open-ended questions provides participants the opportunity to express their viewpoint using their own language, and expressions hence giving them the freedom to share their personal experiences. Therefore, the objective was to draw meaningful explanations on the relevant subject from the responses of the waste pickers, bakkie brigades and, BBCs. These responses point out entrepreneurship opportunities that are visible through operational activities within the value chain.

### **3.5 Ethical statement**

Ethical matters were addressed throughout the study in compliance with the regulations of the University of Western Cape. Permission to interview, observe and take pictures of the participants was granted during each phase of the fieldwork and data collection process. It should be noted that it was also explained to participants what the study is about and that it is within their right if they did not want to participate and that they could withdraw at any time during the interview process. The confidentiality of participants was respected by all fieldworkers and when taking pictures of the participants their permission was once again required. All study data, including the interview recordings, pictures and transcripts, was only

used for academic purposes and in no way will it be possible to trace responses to individuals who took place in the study.

### **3.6 Conclusion**

This chapter emphasized the research methodology used in this study. It covers the research design, data collection procedures as well as the ethical statement for conducting the field work. The methodology adopted by the researcher for this study is a combination of a qualitative study that combines quantitative data to obtain an in-depth understanding of the daily activities that respondents for the study engage in. Data was collected by conducting formal and informal interviews with waste pickers, BBs, and BBCs at the various drop-off centres, while some waste pickers were stopped and asked to answer questions on the side of the road. Chapter four that follows represents the finding of this study and discusses how it relates to existing literature on the operations of plastic recycling along the value chain.



## CHAPTER FOUR: EMPIRICAL FINDINGS

### 4.1 Introduction

The aim of this chapter is to present the results. It is structured as follows: Section 4.2 describes the demographic profile (gender, ethnic group, etc.) of waste pickers, bakkie brigades and BBCs. Sections 4.3 to 4.5 presents the key findings of the questionnaires on waste pickers, bakkie brigade operators and BBCs. Section 4.6 provides the econometric analysis and Section 4.7 concludes the chapter.

### 4.2 Descriptive statistics

#### 4.2.1 Demographic characteristics of the participants

Table 1 below shows the demographic characteristics of the study participants. The demographic characteristics of SWPs, BBs and BBCs include gender, ethnic group, age, and education.

#### Gender

The gender distribution among SWPs reveals a strong male dominance: **75% were men and the remaining 25% were women** (shown in Table 1). One main reason that could explain this male dominance is the physically demanding nature of waste picking. This finding is supported by research by Bala (2021), which showed that men outnumbered women by a large margin due to the nature of recycling coupled with carrying heavy loads over long distances. In contrast, Ferreira (2016) found that women in the eThekweni Municipality dominated waste picking (61%) because woman are often household-heads in South Africa and many take up informal work in order to support their families. Table 1 also presents the gender distribution for those operating as bakkie brigades and BBCs, and the results indicate male overrepresentation in both operations, with 80% of bakkie brigade operators being male and 75% of BBCs owned by men.

#### Race

**Of the 100 SWPs interviewed, nearly the entire sample was Coloured (89%), with the remaining 11% was African.** The few African respondents were mostly found in Khayelitsha and Wallacedene, while the majority lived in and around predominately Coloured areas such as Bonteheuwel, Athlone and Retreat. Concerning the bakkie brigades, out of the ten, only one was white, operating in the Bellville and Parow area, while six were black – the majority - and only three were Coloured. Furthermore, as stated by Benson & Vanqa-Mgijima

(2010), the percentage by race varies by province. For example, the majority of waste pickers in Gauteng are black (Schenck & Blaauw, 2011), whereas the majority of waste pickers in the Western Cape are Coloured). Additionally, three of the four BBC owners were Coloured and one was African (originally from Congo).

**Table 1: Demographic characteristics of each group of survey participants (%)**

|                        | SWPs (n = 100) | BB (n = 10) | BBCs (n = 4) |
|------------------------|----------------|-------------|--------------|
| <u>Gender</u>          |                |             |              |
| Male                   | 75             | 80          | 75           |
| Female                 | 25             | 20          | 25           |
|                        | 100            | 100         | 100          |
| <u>Ethnic group</u>    |                |             |              |
| African                | 11             | 60          | 25           |
| Coloured               | 89             | 30          | 75           |
| Indian/Asian           | 0              | 0           | 0            |
| White                  | 0              | 10          | 0            |
|                        | 100            | 100         | 100          |
| <u>Age</u>             |                |             |              |
| Below 18 years         | 1              | 0           | 0            |
| 18-25 years            | 6              | 0           | 0            |
| 26-35 years            | 39             | 10          | 0            |
| 36-45 years            | 26             | 50          | 75           |
| 46-55 years            | 22             | 40          | 25           |
| Above 55 years         | 5              | 0           | 0            |
|                        | 100            | 100         | 100          |
| <u>Education</u>       |                |             |              |
| None                   | 3              | 0           | 0            |
| Primary (Grade 1-7)    | 32             | 10          | 0            |
| Secondary (Grade 8-11) | 50             | 30          | 25           |
| Matric (Grade 12)      | 12             | 40          | 50           |
| Matric + Cert/Dip      | 2              | 20          | 25           |
|                        | 100            | 100         | 100          |

Source: Author's own calculations from survey data.

### Age

The ages of the SWPs range from age 18 to 55 years and above, with the majority falling in the age group of 26-35 years. Further, almost 40% of the respondents in the survey were younger than 35 years of age, as shown in Table 1. Ralfe (2007) & Bala (2021) argue that

young people resort to waste picking in South Africa as a last option due to the high level of unemployment and lack of job opportunities. In South Africa, 32.8% of young people aged 15-24 years and 44.7% aged 15-34 were not in employment, education, or training (NEET) in the last quarter of 2021 StatsSA (2021). These figures indicate the continuous struggle of young people finding decent work in the South African labour market.

With regards to bakkie brigades, only one respondent fell into the 26-35 years bracket. He also happened to be the son of one of the BBC owners. The other nine interviewees were between the ages 36-45 and 46-55 years respectively with no one operating over the age of 56 years. Lastly, three of the BBCs respondents were between 36-45 years and only one of the owners was between 46-55 years.

### Education

Overall, three of the SWPs indicated that they had never been to school, while the majority (50%) reported that they had completed some secondary school education. As few as 12% indicated that they have completed their Matric qualification and only 2% hold post-Matric certificates. According to Muller (2015), street waste pickers' low level of education limits their competitiveness in the formal job market, but it allows them to enter waste picking because it does not require any qualifications.

It is clear to see from Table 1 that the owners of the bakkie brigades as well as BBCs have some form of education, although not many possess post-matric qualification. The majority (40%) of bakkie brigades have completed Matric while only two owners of the BBCs hold a Matric certificate with one having a tertiary qualification.

## **4.3 Key findings from the waste picker survey**

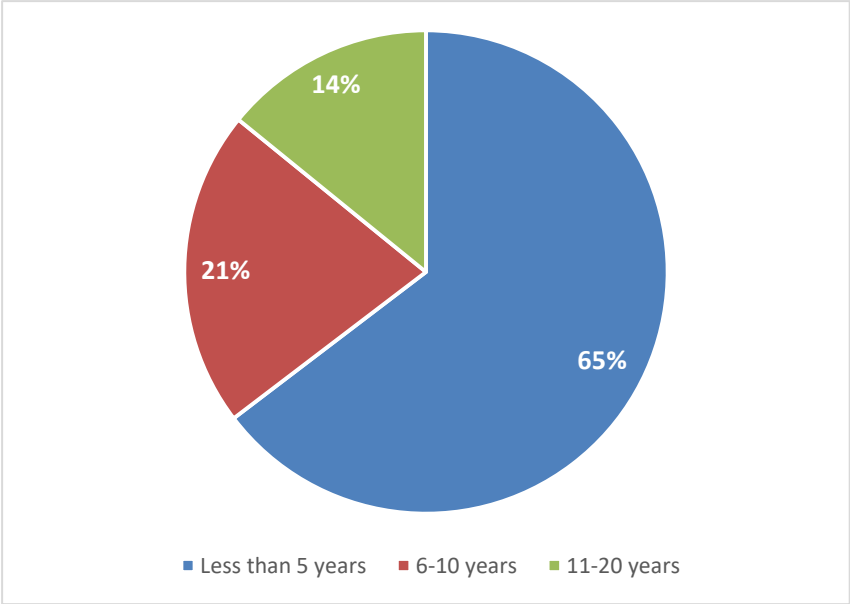
### 4.3.1 Period of employment and working conditions of street waste pickers

**The majority of SWPs (65%) reported joining the industry less than five years ago.** Furthermore, 21% have been operating as pickers for no longer than ten years, with only 14% having worked for more than 20 years.

Working as a SWP is physically demanding, coupled with long working hours and travelling long distances by foot to sell. As reported by Viljoen (2014), waste pickers on the streets have to cover long distances looking for recyclables and carry heavy loads of waste. Working days also vary as SWPs are all independent and self-employed. Almost all SWPs interviewed

chose waste picking because of unemployment and a way out of poverty. This indicates the motivation behind their entrepreneurship - “pushed” into entrepreneurship for survival.

**Figure 3: Years spent collecting recycling waste**

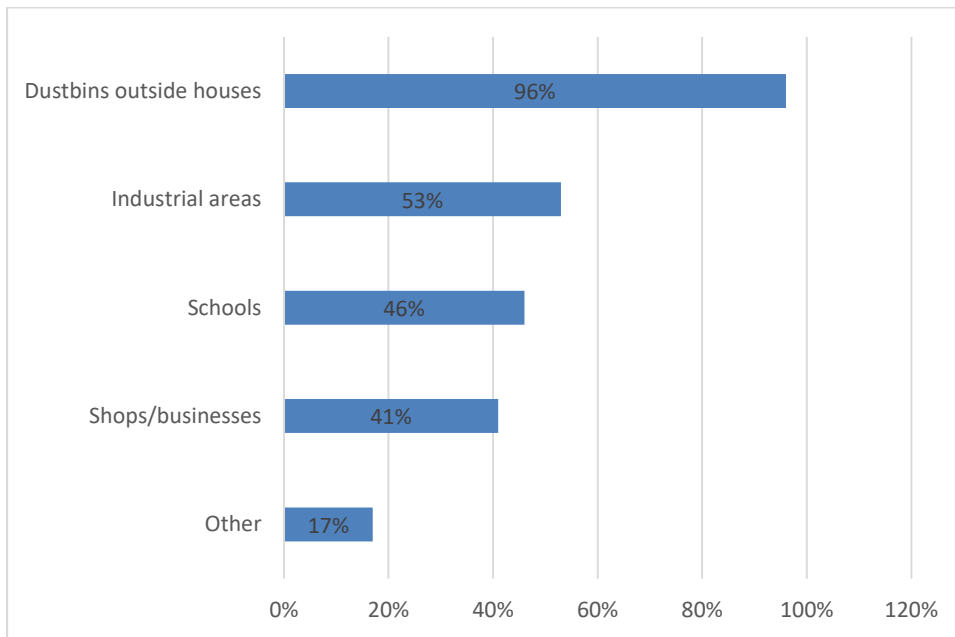


Source: Author’s own calculations using the survey data.

Figure 4 below shows the different locations where SWPs find their recyclable materials. The majority (96%) found their plastics when searching in dustbins outside houses; while 46%, 53%, 41 and 17% found plastics waste at schools, industrial areas, businesses and other random locations along the road, respectively. Many SWPs collect from residential areas on refuse collection days. This means that they would have to get to the dustbins hours before they are collected by the city’s garbage collectors.



**Figure 4: Location where recycling waste is found**

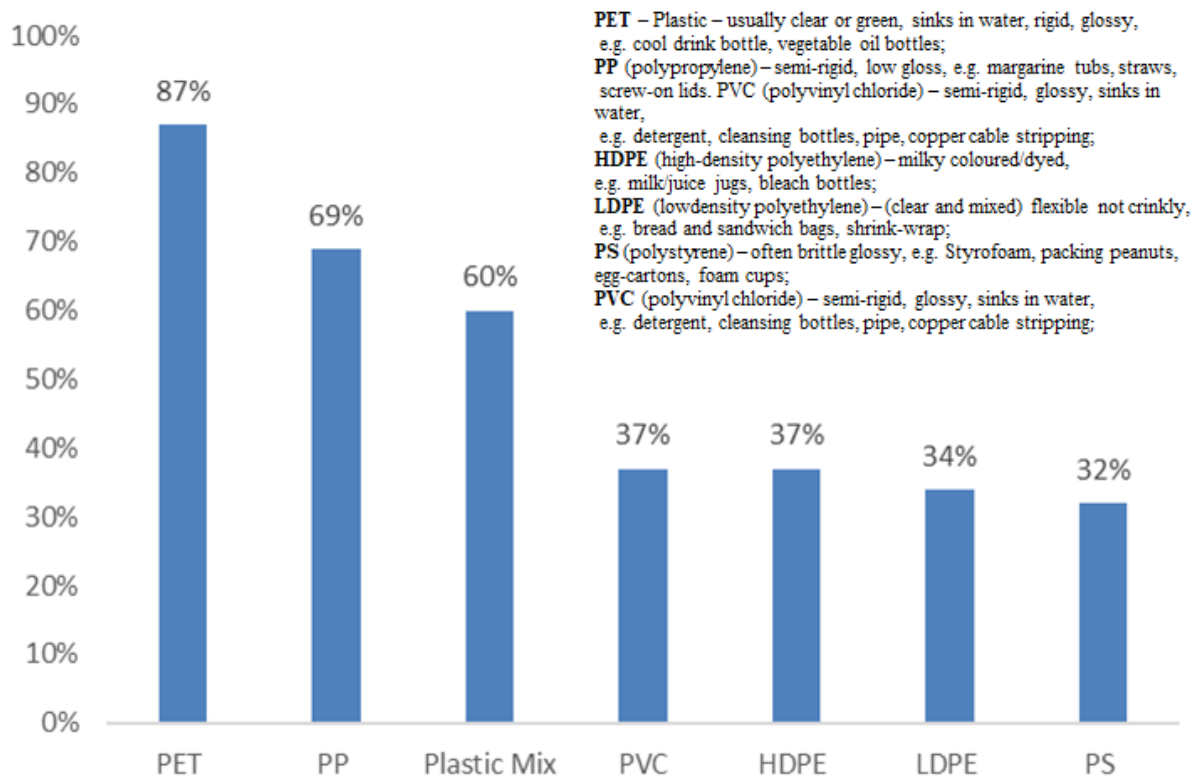


Note: The respondents could choose more than one option.

Source: Author's own calculations using the survey data.

Aside from knowing exactly where to find and collect waste, it is crucial for SWPs to be able to identify and recognize the materials that hold value and are demanded by buyers. From the study (as shown in Figure 6), 87% of the respondents indicated that they collected Polyethylene terephthalate (PET) bottles while 69% collected Polypropylene (PP), with Polystyrene (PS) as the least collected plastic (32%). The various types of plastic collected by SWPs is informed by international, local, and seasonal demand patterns.

**Figure 5: Different plastic types collected by SWPs**



Note: The respondents could choose more than one option.

Source: Author’s own calculations using the survey data.

#### 4.3.2 Street waste picker’s income analysis

The income data for this study is shown in 2021 (March) prices in Table 2. When asked how often SWPs sell their waste, an overwhelming 80% stated that they sell daily due to a lack of storage space. Those who do not sell daily, collect once a week (10%), while the remainder (10%) only sell when it was necessary or out of desperation. **The daily income for the sale of a day’s plastic waste ranged between a minimum of R10 and maximum R500 (see Appendix D); with a mean of R127 (standard deviation was R87).** SWPs were asked whether or not they set daily income targets for themselves: 41% set targets, while the majority (59%) did not because they believed that it did not matter how much they would end up earning for the day and that price setting was out of their control.

**Table 2: Mean and Median daily earnings of SWPs (Rands) by socio-demographic characteristics**

|               | Mean | Median |
|---------------|------|--------|
| All           |      |        |
| All           | 127  | 100    |
| Gender        |      |        |
| Male          | 123  | 100    |
| Female        | 139  | 146    |
| Ethnic group  |      |        |
| African/Black | 155  | 150    |
| Coloured      | 124  | 100    |
| Education     |      |        |
| No schooling  | 140  | 160    |
| Primary       | 127  | 100    |
| Secondary     | 109  | 100    |
| Matric        | 173  | 150    |
| Post-Matric   | 300  | 300    |

Source: Author's own calculations using the survey data.

The income by gender results indicate that on average female waste pickers earn higher incomes than male waste pickers (R139 versus R123). However, the majority of studies including studies by Viljoen, Blaauw & Schenck (2018) and Bala (2021) on SWPs may differ from this result. Both studies found that on average male SWPs earn more income than their female counterparts, given the physical strength that is needed to source and transport materials (Viljoen et al., 2018). Hence, it would appear logical for the male pickers to earn more than the female pickers. This is indeed true; however, there has also been a shift in female participation rates in recycling (Godfrey et al., 2018). Additionally, this study focuses on the collection of plastic materials; therefore, given the lightweight of PET waste, it wouldn't seem impossible for the female respondents to have earned more per volumes collected.

It appears that African SWPs earn higher median incomes than Coloured SWPs. The Coloured SPWs' mean (R124) and median income (R100) is less than that of the African SWPs' mean (R155) and median income (R150). This finding is similar to findings by Bala (2021) whereby Coloured SWPs earned significantly less than the African SWPs.

In terms of income by education, SWPs who completed post-Matric qualification earn the highest mean income (R300) and median income (R300), followed by those with no education with a mean of R140, when compared to those who had primary and secondary schooling, with mean incomes of R127 and R 109 and with the exact same median of R100 and R100, respectively. Those with primary schooling also earned the overall average mean of R127.

#### 4.3.2 SWP engagement with bakkie brigade and BBCs

As with any business transaction, SWPs would prefer selling their collected waste to the buyer who would offer them the best price. Therefore, it was unsurprising to find that all the respondents (100%) would rather sell to BBCs. The reasons provided included (i) BBCs paying better when compared to bakkie brigades, (ii) being unfamiliar with bakkie brigades and (iii) no valid reason aside from following the majority sold at BBCs.

Based on the answers provided by the respondents, it would appear that there is no visible relationship between the waste pickers interviewed and the bakkie brigade. Although all SWPs indicated a preference for selling to BBCs, it was unexpected to find that 65% were unhappy with the rates offered by BBCs. While the remaining 35% agreed pricing to be fair, the majority complained that prices offered for plastic could and should be increased because of their hard labour.



#### 4.3.3 Factors affecting SWPs

**Although SWPs operate in hostile environment, they continue working on the streets due to family responsibilities (20%), living in poor conditions (18%), and being desperate for a daily income (35%).** Factors that create challenges include bad weather conditions. SWPs collect throughout the year during harsh weather conditions, travelling long distances while risking their health when sorting through dirt without any form of personal protective equipment (PPE).

Given the low literacy levels mentioned earlier, it was difficult to obtain clear answers on the topic of entrepreneurship and what it meant to SWPs. A third (33%) of respondents agreed that they could foresee entrepreneurship opportunities for waste pickers in terms of growth and increasing their income if given the necessary resources and assistance to do so; 42% said that they did not see any opportunities for themselves and that they only wanted to continue

doing their daily work; while the remaining 25% chose not to answer because the question simply because they did not understand what was being asked of them.

#### **4.4 Key findings from bakkie brigade survey**

##### 4.4.1 The characteristics of bakkie brigades

Bakkie brigades are slightly unique in terms of collection when compared to SWPs, they consider themselves as entrepreneurs with many of them operating as micro BBCs. **Seven out of the 10 bakkie brigades interviewed were sole owners of their small operations while the remainder three worked as full-time employees.** While some of them operate informally, the majority (60%) are formally registered small businesses.

The daily business of bakkie brigade entrepreneurs is predominately service-based. They enter into service-based contracts with various clients to remove recyclable materials (Timm, 2015). Clients pay a small fee for collection of waste materials, or operators weigh recyclables on-site and pay clients per kilogram for the amount of waste collected. Recyclable materials are typically pre-sorted, and materials are taken elsewhere for further sorting, cleaning after collection.

##### 4.4.2 Income patterns of bakkie brigades

The income earned by bakkie brigades is considerably more than that of SWPs because of the nature of their activities: they are able to store in bulk and transport large amounts of materials. Hence, according to Timm (2015) owning a bakkie is an important resource or asset in terms of accumulating sufficient volumes, improving working conditions and access to business opportunities for operators. **When asked whether they owned or rented the bakkies they were using at the time of the interview, nine out of 10 owned more than one bakkie for their daily operations.**

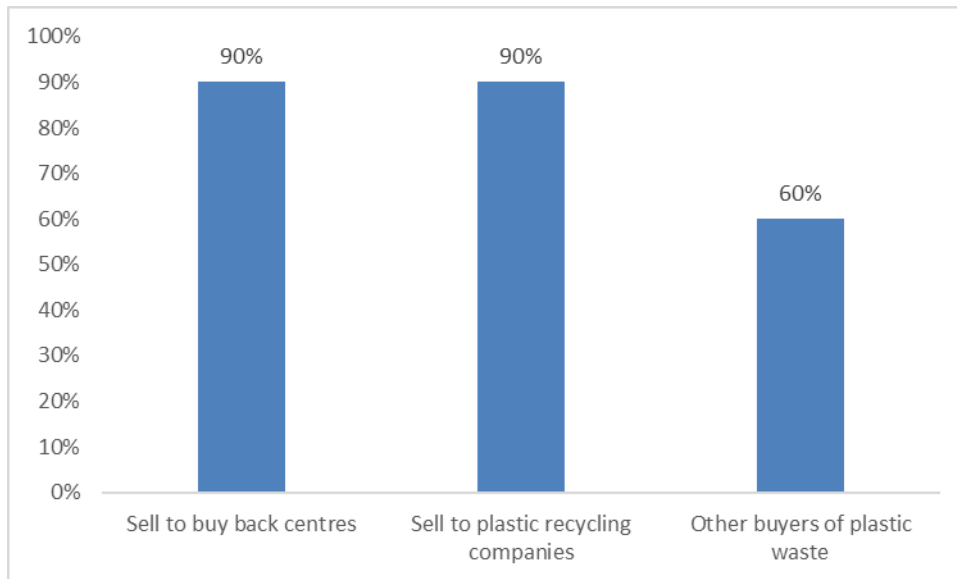
**Table 3: Summary weekly earnings of BB (Rands)**

|                         |        |
|-------------------------|--------|
| Minimum                 | 0      |
| Mean                    | 14 100 |
| Median                  | 10 500 |
| Maximum                 | 30 000 |
| Standard deviation      | 9 146  |
| Number of responses (n) | 10     |

Source: Author's own calculations using the survey data.

The maximum weekly earnings of R30 000 (Table 3 above) does not necessarily give a complete picture of the profitability of the business. With added information in terms of expenses and costs draws a better conclusion on how or why bakkie brigades make a living from buying and selling recyclable waste. The expenses taken into consideration are things like salaries and wages, buying in waste from SWPs and, fuel. According to this study, the maximum weekly salaries and wages were R7 500 and the average weekly pay-out of R3 020.

**Figure 6: Buyers of plastics waste**



SWPs could choose more than one option.

Source: Author's own calculations using survey data.

**When asked about who they sell to, there was an equal share on those who supply BBCs (90%) and plastic recycling companies (90%) and only (60%) who sell to random buyers.** Unlike SWPs, bakkie brigades are able to travel far longer distances and transport large volumes to buyers of their choice just by having access to a bakkie. It was also found that an overwhelming majority of bakkies in the areas in which the data was collected supplied Myplas plastic manufacturing in the Bellville area as they are one of the biggest receivers of PET plastics within the Cape Town region.

#### 4.4.3 Engagement between SWPs and BBs

**Only three out of the 10 bakkie brigades bought waste from SWPs.** As mentioned previously, SWPs would rather sell to BBCs than directly to a bakkie operator. Also, out of the ten bakkie brigades interviewed, only two mentioned that they employ SWP when demand is high or when they are in need of staff.

## **4.5 Key findings from the BBC survey**

The BBCs interviewed in this study play the role of the ‘middlemen’ who are buyers of plastic waste from both the SPWs and bakkie brigades. Thus questions asked were predominately open-ended so as to allow the owners of the BBCs to clearly state the role that they play in providing income generating opportunities for SWPs and bakkie brigades as well as factors concerning their own profitability and business operation strategies.

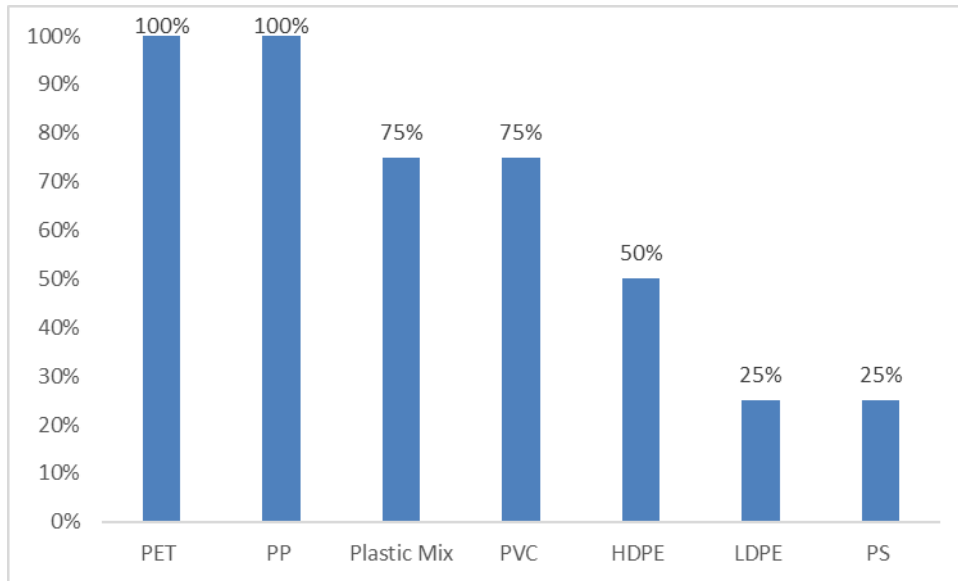
### 4.5.1 Business profile

All four BBCs interviewed identified themselves as cooperatives, with two who were formally registered and the rest operating as informal businesses. All four owners have had their businesses for more than five years and each with different reasons for starting. These reasons range from identifying untapped opportunities in the plastic recycling sector to the desire to become entrepreneurs. Earlier in the study, it was stated that many individuals have the desire to enter into business and are ‘pulled’ into the idea of entrepreneurship. Also, Viljoen et al. (2012) state that BBCs can create job opportunities on three different levels: entrepreneurs, who initiate, manage and operate recycling centres; sorters and balers, who receive waste from various waste pickers; and finally, waste pickers, who collect and sell recyclable material to the BBC. Lastly, it was found that only one out of the four BBCs was female owned, findings by Viljoen et al. (2012) posit the male dominance in BBCs ownership in the recycling sector.

### 4.5.2 Activities of the BBCs

BBCs rely heavily on SWPs who provide them with waste which they can sell to either other bigger BBCs or recycling companies (Viljoen et al., 2012). The daily operational activities of BBCs ranges from receiving the plastic waste to compressing them into bales before sending them off to manufacturing and recycling companies. Viljoen et al. (2019) also identified the basic on-site activities of BBCs consisting of receiving, weighing, paying, sorting, packing and baling of recyclables before it is sold to recycling companies or exporters. Further, Out of the four BBCs interviewed, only one of the owners didn’t use a baling machine. Figure 8 below shows the different plastics bought by the four BBCs. At the time of this data collection, PET and PP plastics were the most demanded materials by plastic recycling companies and manufacturers, hence it was highly demanded by BBCs.

**Figure 7: The different plastics bought by BBCs**



BBCs could choose more than one option.

Source: Author's own calculations using survey data

Table 4 presents the summary earnings for daily waste sold by the BBCs. On average BBCs earn R2 450 from waste sold. BBCs accumulate enough volume of waste before sending it of to be sold, they also don't sell every day, the minimum earnings is R0 for a day when no waste is sold with maximum R4 500.

**Table 4: Summary earnings of BBC (Rands)**

|                         |       |
|-------------------------|-------|
| Minimum                 | 0     |
| Mean                    | 2 450 |
| Median                  | 2 650 |
| Maximum                 | 4 500 |
| Standard deviation      | 1 977 |
| Number of responses (n) | 4     |

Source: Author's own calculations using the survey data.

#### 4.5.3 BBC engagement with SWPs and bakkie brigades

The relationship between BBCs and those who supply the waste materials is mutually beneficial to all within the value chain: it exists due to the demand and supply for recyclable goods. BBCs do not have employment contracts with street waste pickers or bakkie brigades. They are paid solely on the basis of recyclables collected. Waste pickers and bakkie brigades sell recyclables to the BBCs and are paid based on the amount of recyclables sold. Although



one of the BBCs in this study acknowledged employing waste pickers on a casual basis in times of high demand, this is normally not the case. BBCs do have employees on permanent, contract and casual basis.

SWP and BBCs do not have an employee-employer relationship in general. Relationship between the SMME and waste picker are not governed by the Basic Conditions of Employment Act (1997) or the Labour Relations Act (1995). As a result, there are no employment contracts governing waste pickers' interactions with the SMMEs for which they purport to work (Sobuce, 2012). For this reason, SWPs opt to sell to those who pay higher prices and are close by (Langenhoven & Dyssel, 2007).

Furthermore, Benson & Vanqa-Mgijima (2010) found that in many townships in Cape Town, BBCs buy the bulk of their recyclables from bakkie brigades and only a small portion from SWPs. Lastly, it is important to note that when volumes collected by SPWs and bakkie brigades still does not provide sufficient volumes for BBCs; they rather sell those small volumes collected to bigger BBCs inside of selling them to recycling companies or manufacturer.

Viljoen et al. (2012) state that smaller BBCs which do not source sufficient volumes of recyclables cannot sell directly to recycling companies hence they opt to sell their small volumes to larger BBCs. As a result, Out of the four BBCs mentioned in this study, the one in the Athlone area mentioned this to be a problem and owner usually does not accumulate enough recyclables to the rather supplies the BBCs in the Retreat area because they are larger in terms of capacity and volumes collected on a regular basis.

#### 4.5.4 BBC support to SWPs

Earlier studies, including the study by Viljoen et al. (2019), on the interactions between BBCs and SWPs have highlighted the support provided by BBCs to waste pickers. All four BBCs interviewed in this study provided support to SWPs who supplied them with plastic waste on a regular basis. This support is seen as a strategic manner to ensure SWPs loyalty towards the BBCs. For example, the BBC in Bonteheuwel provides SWPs with monetary bonuses on their birthdays should they appear with their birth certificate or by producing their Identity Document. The BBCs in Retreat, on the other hand, distributes food on an irregular basis and provides extra cash in terms of bonuses during the festive season to waste pickers who have been supplying them during the year. Moreover, the wife of the BBC owner in Kraaifontein

hosts a soup kitchen right next to her husband's BBC where together they cook and provide meals to not only the waste pickers who support them regularly but the community at large.

It is worth mentioning that it was observed by the researcher and fieldworkers that the owners of the four BBCs had such close relationship with their waste pickers, they could almost give you a complete biological and social status of certain pickers who have been supplying them with waste for years. Therefore, by treating waste pickers well and by supporting them, a BBC can obtain a competitive advantage over other BBCs (Viljoen et al., 2012). These are all means and ways that BBCs ensure current and future support from SWPs.

#### 4.5.5 Challenges and opportunities for BBCs

This study contradicts<sup>1</sup> the findings by Sobuce (2012) where two directors running BBCs expressed unemployment as a motive for them deciding to open and run BBCs: They found themselves without work and hence decided to take up recycling as a means for survival. This is not the case with the owners who were interviewed for this study. BBC owners interviewed took up ownership in their current business because there are economic opportunities in recycling plastic waste. Moreover, the owners were not unemployed or in a desperate financial position, in fact they resigned from their previous employment to start up their businesses this is an indication of what was mentioned earlier as a being 'pulled' into entrepreneurship. As mentioned previously, the decision to become entrepreneurs can be brought about by their identifying that there is an opportunity to run a business or by doing so for survival reasons. Although for the BBCs included in this study, the reasons provided in Table 5 serves as the main motivations to start operating a BBCs was rather to seek out opportunities in the recycling industry and with the potential to grow.

**Table 5: Motives for operating a BBC**

| BBC             | Motive                                                                                                                                               |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Londa recycling | Was not happy in his former job and wanted to run his own business.                                                                                  |
| BF recycling    | He felt that he was underpaid and could make more running a BBC.                                                                                     |
| Liviwe Kopona   | Her brother already had a BBC and was successful hence she could foresee an opportunity operating alongside her brother in establishing her own BBC. |
| MK recycling    | An opportunity to do good work and earn an income.                                                                                                   |

<sup>1</sup> Owing to the small sample size of BBCs in this study, findings to this study need to be interpreted with great caution.

**Lack of capital, equipment and machinery were cited as the main problems by the entrepreneurs operating BBCs.** Entrepreneurs complained that a lack of adequate equipment and machinery slowed their progress. Sobuce (2012) concurs with these sentiments expressed by the directors of SMMEs, stating that, aside from training, proper recycling equipment and machinery are critical because your business will never grow without them. To maximize profits from recyclables, proper machines for compressing and baling are required. Volume of recyclables is what determines the profit potential earning of BBCs, and although baling machines are highly costly and staff training is important it is only through maximising volumes of recyclables that allows profits in the long-run in terms of selling larger volumes. Larger volumes and high-quality recyclables earn BBCs better prices (Schenck et al., 2012).

#### 4.6 Econometric analysis

To further elaborate on the descriptive results discussed earlier in this chapter, the analysis below explores the correlation of daily earning earned in Rands by SWPs and their gender, race, age, and educational attainment. The results of the OLS regression on SWPs daily earnings are summarised in Table 6. The value of the coefficient of determination (R-squared) of 0.1982 indicates that 19.82% of the variation in income is explained by the independent variables.

While the result is statistically insignificant, the gender coefficient is positive implying that on average, with this study, daily earnings is R25.918 more for females than for males for a day's waste. To add, recent studies have also seen an increase in female participation within the recycling industry (Cruvinel et al., 2019 & Marques et al., 2020). This rise in waste picking done by women is further explained by women's need to survive as many are too poorly-educated to obtain formal employment (Marques et al., 2020).

Furthermore, when looking at the coefficient of the race variable, the results show that being Coloured has a positive effect on daily earnings (although the result is not statistically significant). Hence for this study, the coefficient indicates that Coloured individuals earn relatively more than Africans.

**Table 6: OLS regression for SWPs daily earning (in Rands) for a day's waste**

| Variable | Coefficient | Standard Error |
|----------|-------------|----------------|
| Female   | 25.918      | 20.033         |
| Coloured | 0.996       | 30.151         |

|                     |          |        |
|---------------------|----------|--------|
| Age: 26-35 years    | -14.559  | 35.114 |
| Age: 36-45 years    | -27.727  | 36.726 |
| Age: 46-55 years    | -23.750  | 37.522 |
| Age: Above 55 years | -83.646  | 50.370 |
| Primary             | -21.047  | 52.037 |
| Secondary           | -47.248  | 51.745 |
| Matric              | 33.994   | 55.100 |
| Post-Matric         | 155.405* | 79.697 |
| Constant            | 165.737  | 63.931 |
|                     |          |        |
| Prob > F            | 0.048    |        |
| R-squared           | 0.182    |        |
| Adjusted R-squared  | 0.089    |        |
| Sample size         | 99       |        |

\*\*\* Significant at 1%

\*\* Significant at 5%

\* Significant at 10%

Note: reference (omitted) categories are African males aged 18-25 with no educational attainment.

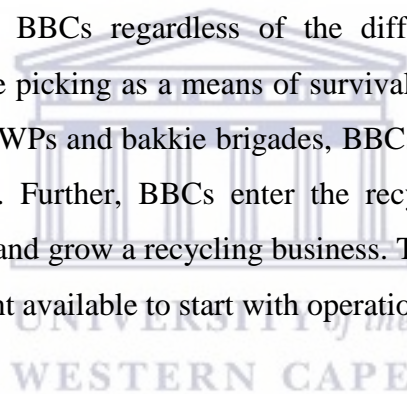
While age has no statistical bearing on the respondents' earnings, the results show that individuals between the ages of 26-35 years earn more than any other age group, on average. This result is not surprising, as 26–35 year-olds are relatively young and are generally more energetic and can work much longer hours, therefore accumulating more earnings (Bala, 2021). Also, it is worth noting that SWPs in the older age category (above 55 years) earn the lowest incomes. This supports findings by many previous studies that have noted that waste picking is physically demanding, therefore, the older a person becomes, the less likely they are able to complete tasks in this line of work (Bala, 2021).

The level of educational attainment has no significant impact on earnings of SWPs, apart from those individuals with post-Matric dummy. It is noteworthy that while earnings generally become more positive as education level increases; this is not the case when comparing primary and secondary education. The results are more negative for those with a secondary education than for those with primary education, in comparison to the base category of having no education. The one statistically significant result highlighted from this study is that attaining a post-Matric qualification greatly increases daily earnings. Those who have attained a post-Matric qualification tend to earn more than those without it. The results are positive and statistically significant, indicating an increase in the coefficient as the level of educational attainment increases. As seen on table 6 above, those with post-Matric qualification earned R155 significantly more than the reference category (no educational

attainment) per day. Even though this is the case, waste picking requires no qualification and it is evident in literature that most waste picker have very low levels of education (Schenck et al., 2012) hence their involvement in recycling (Mamphitha, 2011). To add, attaining a post-Matric qualification could be advantageous to those wanting to run their own small business somewhere in the value chain (Schenck et al., 2012 & Sobuce, 2012). Finally, Viljoen et al. (2018) found that one of the respondents from their study holding a post-Matric qualification still earned less than those who had only completed matric.

#### **4.7 Conclusion**

This chapter presented the findings from data collected on street waste pickers, bakkie brigades, and buy-back centres. The daily functions and income-generating opportunities for the three key role players within the value chain were discussed and the relationship, if any exists between the three. Considering the operational capabilities of each in the different levels of the recycling value chain, SWPs remain vulnerable at the very bottom, to provide sufficient recyclable waste to BBCs regardless of the difficulties they face. Many are unemployed and resort to waste picking as a means of survival. On the other hand, BBCs, as seen as the midpoint for both SWPs and bakkie brigades, BBCs provide a depot for drop-offs and income to their suppliers. Further, BBCs enter the recycling value chain once they identify an opportunity to start and grow a recycling business. To add, they usually have some amount of capital and equipment available to start with operations.



## CHAPTER FIVE: CONCLUSION

### 5.1 Introduction

This chapter summarizes the key findings and conclusions reached after answering the study's research objectives. It is arranged as follows: Section 5.2 discusses key findings, while Section 5.3 gives policy recommendations and a summary of the contribution to the field of informal recycling, particularly the economic relationship between key players within the plastic value chain.

### 5.2 Review of Findings

The main aim of this study was to explore the economic relationship between buy-back centres and plastic waste recycling entrepreneurs, particularly those at the bottom of the value chain. To do so, this study analysed role players' interaction with each other in terms of seeking out opportunities within the value chain of recycling. The results of the various phases of the research were presented in Chapter Four. The findings of this study are consistent with the findings of the study done by Schenck & Blaauw (2011) who concluded that most waste pickers collect waste merely as a means of survival. They are 'pushed' into waste picking as a last resort after struggling to find employment. The findings also highlight the strong linkages and interaction that exist between the SWPs, bakkie brigade operators with BBCs; the study further highlights the inter-dependence between the BBCs and SWPs as well as bakkie operators and BBCs. Additionally, the study shows that there is little or no interaction between bakkie brigades and SWPs found in this study.

By now, the important role that is played by SWPs within the recycling value chain should be recognised and appreciated. Waste pickers in many cities throughout the globe, are important contributors to the economic value chain of recycling although their contributions often go unrecognised (Ferreira, 2016). They collect recyclable materials which they sell to generate income though their activities are mainly outside the formal waste management sector, thus implying that they are generally unregulated, here lies an opportunity for them to be a part of how waste is managed as they offer benefits to both the public and private sector.

Hence when considering the above, the economic relationship between the three roles players identified in this study is only made possible due to the demand and supply of plastic waste. All SWPs in this study prefer selling their plastic to BBCs instead of bakkie brigades as BBCs pay more in terms of quantities brought in. The concern to SWPs however, are the low rates

that they received for waste sold to BBCs. The majority were not happy and felt that they could pay more. Moreover, SWPs also pointed out that volume determines how much you earn for a day's plastic collection. As stated by Langenhoven & Dyssel (2007) the success of any BBC is determined by the volume of waste supplied to them for instance, by bakkie brigades and SWPs. Profits are ultimately also affected by supply, the less the BBC has to sell, the less they earn in profits. Hence, most of them collect from dustbins standing outside peoples' homes on garbage collection days, industrial areas, and schools amongst other locations. Waste picking is not an easy job and requires much physical strength. It was found that 75% of the participants were male; this finding is no different to previous studies on the domination of men in the recycling industry. In addition to this, unfavourable weather conditions, constant harassment from law enforcements and travelling long distances whilst carrying heavy loads are some of the negative external factors associated with waste picking. The researcher also observed that respondents did not wear any form of personal protective equipment (PPE) nor did they have access to nearby lavatories putting them at health risk for all sorts of diseases and injuries.

The waste pickers in this study were found to earn very little, of the sample collected, data shows that SWPs earned a minimum daily income of R10 and a maximum of R500 with an average income of R127. Further, the results of this study suggest that, on average, the women interviewed earned more than men.

The findings on bakkie brigades revealed that operators of bakkies identify themselves as entrepreneurs. Seven Out of the ten respondents were found to be owners of micro-operations and owned their own bakkies for daily activities. Further, bakkie brigades carry out similar informal waste work as the SWPs, the major difference is the resource that they use, having access to a bakkie allows for more volume collection. Moreover, the incomes earned by bakkie brigades are slightly higher because of being able to supply BBCs with large quantity of PET waste. Additionally, high quantity accumulation also allows the bakkie brigade to sell directly to plastic recycling companies. Therefore, the data shows that bakkie brigades' supply equally to BBCs (90%) and plastic recycling companies (90%).

Lastly, for the plastic recycling value chain to work, the role and functions of BBCs needs to be known and identified. This study falls in line with earlier studies by Viljoen et al., (2012); Mogotsi (2019) & Chisango (2017) that BBCs are the link between informal sector activities, BBCs not only buy from SWPs and bakkie brigades but also provide informal employment

opportunities. Findings from this study support the above: besides creating informal work, BBCs also create entrepreneurship opportunities for the bakkie brigades and SWPs in this study. In addition, the best way for SWPs to generate an income is by selling their waste to BBCs since they are unable to sell directly to recycling companies due to insufficient volumes and standard requirements set by larger firms. Moreover, the BBCs interviewed stated that they can maximize value to their recyclable waste through baling the waste together according to the standards set by recycling companies. To add, the highest price is than paid for baled recyclables and this in turn maximises profits for BBC owners. However, when asked about the challenges that owners face whilst operating their businesses, all indicated the desperate need for proper, functioning machinery and lack of finance as impediments into their operations. Sobuce (2012) also finds that SMMEs struggle to get the necessary equipment and machinery that they require to improve their businesses and further states that the equipment and machines are costly and small SMMEs are unable to afford them without subsidies.

### **5.3 Conclusion and Recommendations**

#### **5.3.1 Provision of resources for SWPs**

This study agrees with many other studies on the positive contributions that SWPs have on, not only the environment but by creating opportunities for themselves regardless their socioeconomic challenges. Many other studies including Hayami et al. (2004) and Sobuce (2012) who both agree that providing support infrastructure for waste pickers can further strengthen the positive role they have on the economy, society, and environment, while simultaneously helping to combat poverty.

The simple provision of protective clothing and better functioning trolleys could encourage more people to collect waste. In addition, during the fieldwork, it was observed that SWPs did not have access to toilets and running water which is a source of concern for the health and well-being of waste pickers. Viljoen et al., (2019) found that only a few BBCs provide waste pickers with basic facilities such as restrooms, kitchen facilities, drinking water and washing facilities. Hence, perhaps certain areas could be provided by the city council where these facilities would be accessible to waste pickers as they move around from collecting and selling of recyclables.

SWPs also expressed their discomfort with the treatment from the police. Therefore, another recommendation is to stop police harassment. The lives of SPWs are just as important as any other ordinary citizen and should be treated as such regardless their economic circumstances.



For the above reason, the author advocates for public awareness programs and police retraining needs to be implemented by the municipalities. These programs can take place in a form of a workshop that explain the valuable contributions of waste pickers in the recycling industry and this in turn will assist in dealing with the social stigma faced generally.

Inclusion of waste pickers within co-existent or integrated waste management strategies are needed, this is supported by Wilson et al., (2006) who stated that the best and most effective way to enable waste pickers to operate is through integration of their operations into the formal solid waste management systems in developing countries.

### 5.3.2 Finance and equipment for Bakkie brigades

With the work of bakkie brigades being mainly service-based, the reliability on bakkies for operations is what determines profitability for owners. The ten bakkie owners interviewed in this study indicated that owning a bakkie for recycling allows them the opportunity to accumulate enough volume of waste and that without one, it would be impossible for them to earn decent incomes. Bakkie owners already consider themselves as entrepreneurs and operate on a very small scale; they have potential for growth within the waste recycling value chain (Goeiman, 2020). Hence, with proper training and support in terms of setting up structure and finance to own their own bakkies for operations, they could increase profits and reinvest in their operations and mobile BBCs to potentially operate a BBCs for themselves.

### 5.3.3 Supportive infrastructure, finance, and equipment for BBCs

An earlier study by Mogotsi (2008) identified four benefits of having a well-established BBC as follows: providing income to the entrepreneurs running them; providing income for waste collectors; assisting collectors in saving municipal costs; and finally, reducing environmental problems associated with waste disposal to landfill (Mogotsi, 2008). The BBCs owners interviewed for this study indicated that it would be impossible for them to remain in business without baling machines. As stated earlier, the baling machines add value, especially to PET plastics by compressing waste according to the standards set by processing companies.

Lastly, education and awareness programs can influence recycling behaviour and treatment. These programs could explain what recycling is, why it is important, and how it can be improved (Sobuce, 2012). The relationship between SWPs, bakkie brigades and BBCs within the recycling value chain is symbiotic and provides income generating opportunities for the entrepreneurs involved in recycling activities. As mentioned in this study, volume is what

determines income for SWPs and profits for bakkie brigades and BBC owners. Further, demand and supply factors determine prices set for the different plastics because without a demand for the waste by recycling companies, it would be impossible for any of the mentioned key role players to benefit from recycling. Additionally, bakkie brigades have the advantage to collect larger volumes of PET waste due to their bakkie operations. Although their activities remain informal due to the nature of their work, their earnings are slightly higher compared to SWPs but lack of finance hinders their potential to grow. Furthermore, the competitive advantage that BBCs have is that they have resources that add value to recyclables according to the industry's criteria and specifications.



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**Appendix A: Waste pickers Questionnaires**



**STREET WASTE PICKERS SURVEY IN CAPE TOWN**  
**Department of Economics: University of the Western Cape**

**Research title: Investigating the economic relationship between buy-back centres and plastic waste recycling entrepreneurs**

**WASTE PICKER SURVEY DETAILS**

(Can be completed after the interview)

**Interviewer: Complete the following questions after the interview.**

Date of interview: (yyyy/mm/dd) ..... Fieldworker's code: .....

City/town: ..... Time of interview: [hh:mm].....

**Geographical details of the site where the interview took place:**

Name of the Buy-back Centre/Depot/Business (if applicable): .....

Street Address (of site): .....

City/Town and suburb: .....

Postal code: .....

Questionnaire

|           |                          |               |                          |
|-----------|--------------------------|---------------|--------------------------|
| Completed | <input type="checkbox"/> | Not Completed | <input type="checkbox"/> |
|-----------|--------------------------|---------------|--------------------------|

**SECTION A**  
**DEMOGRAPHIC AND EDUCATION CHARACTERISTICS**

**This set of questions relates to the personal background of the respondent you are interviewing.**

1. Respondent's gender:

|        |   |  |
|--------|---|--|
| Male   | 1 |  |
| Female | 2 |  |
| Other  | 3 |  |

2. With which cultural group do you associate yourself with?

|               |   |  |
|---------------|---|--|
| African/Black | 1 |  |
| Coloured      | 2 |  |
| White         | 3 |  |
| Indian/Asian  | 4 |  |
| Other         | 5 |  |

3. Which country do you originate from?

|                                |    |  |
|--------------------------------|----|--|
| South Africa                   | 1  |  |
| Zimbabwe                       | 2  |  |
| Namibia                        | 3  |  |
| Swaziland                      | 4  |  |
| Mozambique                     | 5  |  |
| Botswana                       | 6  |  |
| Lesotho                        | 7  |  |
| Nigeria                        | 8  |  |
| Malawi                         | 9  |  |
| Other                          | 10 |  |
| If other please specify: ..... |    |  |

4. How old are you \_\_\_?

| (Age Group in years) |   |  |
|----------------------|---|--|
| 18 and below         | 1 |  |
| 18-25                | 2 |  |
| 26-35                | 3 |  |
| 36-45                | 4 |  |
| 46-55                | 5 |  |
| 55 and above         | 6 |  |

5. What is the **highest** school or tertiary qualification you have **passed**?

Grade

|                                                             |   |   |   |   |   |   |   |   |   |    |    |    |
|-------------------------------------------------------------|---|---|---|---|---|---|---|---|---|----|----|----|
| 0                                                           | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Post School Qualification                                   |   |   |   |   |   |   |   |   |   |    |    | 13 |
| Post School Qualification. Please mention the qualification |   |   |   |   |   |   |   |   |   |    |    |    |
| .....                                                       |   |   |   |   |   |   |   |   |   |    |    |    |

## SECTION B

### OPERATING AS A WASTE PICKER

**This set of questions relates to the respondent's collecting activities.**

6. How long have you been collecting waste?

Years: .....

Months: .....

7. Why did you start collecting waste? (Provide more than one reason).

.....

.....

.....

8. Did you need any form of capital before you could start operating as waste picker?

|     |   |  |
|-----|---|--|
| Yes | 1 |  |
| No  | 2 |  |

**SECTION C**

**FACTORS AFFECTING THE LIVELIHOOD OF WASTE PICKERS**

9. What type of recyclable plastics do you collect? (Mark all applicable)

|         |                                  |   |  |
|---------|----------------------------------|---|--|
| Plastic | PET – polyethylene terephthalate | 1 |  |
|         | HDPE – High-density polyethylene | 2 |  |
|         | PVC – Polyvinyl chloride         | 3 |  |
|         | LDPE – Low-density polyethylene  | 4 |  |
|         | PP – Polypropylene               | 5 |  |
|         | PS – Polystyrene                 | 6 |  |
|         | Plastic mix                      | 7 |  |

10. Where do you find the waste? (Mark all applicable).

| Source for the waste           | Area |  |
|--------------------------------|------|--|
| Dustbins outside houses        | 1    |  |
| Schools                        | 2    |  |
| Industrial areas               | 3    |  |
| Shops/businesses               | 4    |  |
| Other                          | 5    |  |
| If other please specify: ..... |      |  |

11. To whom do you sell the waste? (Mark all applicable).

| Type of buyer of waste                 | Name of the waste buyer |   |
|----------------------------------------|-------------------------|---|
| Private individuals                    |                         | 1 |
| Bakkie brigades                        |                         | 2 |
| Buy-back centres (BBCs)/depots         |                         | 3 |
| Other sellers                          |                         | 4 |
| If other buyers, please specify: ..... |                         |   |
| .....                                  |                         |   |

12. Why do you choose to sell to this person/company? (May state more than one reason).

.....

.....

.....

**SECTION D**

**REMUNERATION IN THE PLASTIC RECYCLING INDUSTRY**

**This set of questions relates to the income patterns of the respondents.**

13. How often do you sell the waste you have collected?

|                          |   |                          |
|--------------------------|---|--------------------------|
| Daily                    | 1 | <input type="checkbox"/> |
| Weekly                   | 2 | <input type="checkbox"/> |
| If other, explain: ..... | 3 | <input type="checkbox"/> |

14. How much do you usually earn per day for the waste that you collected?

Rand.....

15. Are you aware of prices offered by other buyers of plastics waste material?

|     |   |                          |
|-----|---|--------------------------|
| Yes | 1 | <input type="checkbox"/> |
| No  | 2 | <input type="checkbox"/> |

16. Do you engage in one of the following activities? (Mark all applicable)

|                                  |   |                          |
|----------------------------------|---|--------------------------|
| collection                       | 1 | <input type="checkbox"/> |
| Washing/cleaning waste materials | 2 | <input type="checkbox"/> |
| Sorting of waste                 | 3 | <input type="checkbox"/> |
| Other                            | 4 | <input type="checkbox"/> |
| If other, explain: .....         |   | <input type="checkbox"/> |
| .....                            |   |                          |

**SECTION E**  
**RELATIONSHIP WITH OTHER KEY ROLE PLAYERS**

17. Do you prefer selling your waste to bakkie brigade operators or directly to buy-back centres?

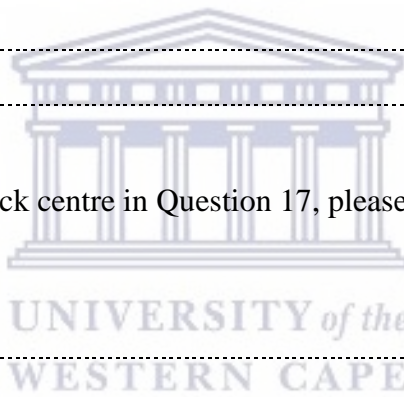
|                                                      |   |  |
|------------------------------------------------------|---|--|
| If the answer is Bakkie brigade (Go to Question 18)  | 1 |  |
| If the answer is Buy-back centre (Go to Question 19) | 2 |  |

18. If your answer is bakkie brigade in Question 16, please explain your preferred relationship with them?

.....

.....

19. If your answer is buy-back centre in Question 17, please explain your preferred relationship with them?



.....

.....

20. Do you believe the prices paid to waste pickers from either bakkie brigades or buy-back centres to be fair and reasonable?

|     |   |  |
|-----|---|--|
| Yes | 1 |  |
| No  | 2 |  |

21. Please explain why you either stated yes or no in the previous question?

.....

.....

.....



**SECTION F**  
**ENTREPRENEURIAL OPPORTUNITIES FOR WASTE PICKERS**

22. Did you initially determine what your daily income target would be when you started out as a waste picker?

|                                          |   |  |
|------------------------------------------|---|--|
| If the answer is Yes (Go to Question 23) | 1 |  |
| If the answer is No (Go to Question 24)  | 2 |  |

23. How much do you hope to make daily?

.....

.....

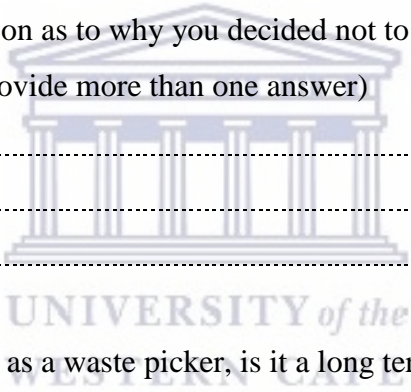
.....

24. Please explain your reason as to why you decided not to set income targets for your daily operations (may provide more than one answer)

.....

.....

.....



25. Your decision to operate as a waste picker, is it a long term-, medium- or short-term goal? Mark all applicable

|                 |   |  |
|-----------------|---|--|
| Long term       | 1 |  |
| Medium term     | 2 |  |
| Short term      | 3 |  |
| Did not specify | 4 |  |

26. In your opinion, what entrepreneurship opportunities, if any, exists for waste pickers within the recycling value chain? (More than one answer)

.....

.....

.....

27. From your experience, what would you say are the factors that encourage waste pickers to pursue opportunities in the plastic recycling sector?

.....  
 .....

28. From your experience, what would you say are the factors that discourage waste pickers to pursue opportunities in the plastic recycling sector?

.....  
 .....

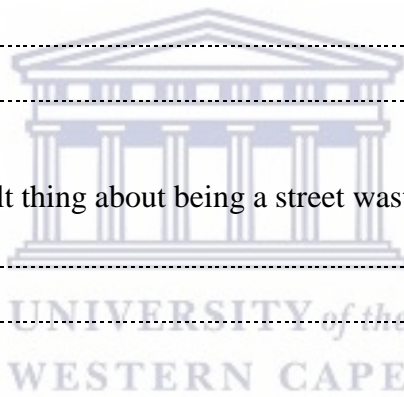
**SECTION G**  
**EXTERNAL FACTORS**

29. What are the health and injury risks when collecting recyclable goods?

.....  
 .....

30. What is the most difficult thing about being a street waste picker?

.....  
 .....



31. What do you think is needed to assist street waste pickers? (More than one reason)

.....  
 .....

32. Would you like to tell us anything else that concerns you or that you think we should know?

|                            |   |  |
|----------------------------|---|--|
| Yes: Please specify: ..... | 1 |  |
| .....                      |   |  |
| .....                      |   |  |
| .....                      |   |  |
| No                         | 2 |  |

**Interviewer: Thank the respondent for his/her participation.**

**Appendix B: Bakkie brigade Questionnaires**



**BAKKIE BRIGADES INTERVIEW IN CAPE TOWN**

**Department of Economics: University of the Western Cape**

**Research title: Investigating the economic relationship between buy-back centres and plastic waste recycling entrepreneurs**

**BAKKIE BRIGADE SURVEY DETAILS**

**(Can be completed after the interview)**

**Interviewer: Complete the following questions after the interview.**

Date of interview: (yyyy/mm/dd)..... Fieldworker's code: .....

City/town: ..... Time of interview: [hh:mm].....

**Geographical details of the site where interview took place:**

Name of the Buy-back Centre/Depot/Business (if applicable): .....

Street Address: .....

City/Town and suburb: .....

Postal code: .....

|               |           |  |               |  |
|---------------|-----------|--|---------------|--|
| Questionnaire | Completed |  | Not Completed |  |
|---------------|-----------|--|---------------|--|

**Section A: Demographic, education and employment characteristics**

1. Are you the owner of the bakkie-business or an employee?

|          |   |
|----------|---|
| Owner    | 1 |
| Employee | 2 |

2. Respondent's gender:

|        |   |  |
|--------|---|--|
| Male   | 1 |  |
| Female | 2 |  |
| Other  | 3 |  |

3. With which cultural group do you associate yourself with?

|                                 |   |  |
|---------------------------------|---|--|
| African/Black                   | 1 |  |
| Coloured                        | 2 |  |
| White                           | 3 |  |
| Indian/Asian                    | 4 |  |
| Other                           | 5 |  |
| If other, please specify: ..... |   |  |
| .....                           |   |  |

4. Which country do you originate from?

|                                |    |  |
|--------------------------------|----|--|
| South Africa                   | 1  |  |
| Zimbabwe                       | 2  |  |
| Namibia                        | 3  |  |
| Swaziland                      | 4  |  |
| Mozambique                     | 5  |  |
| Botswana                       | 6  |  |
| Lesotho                        | 7  |  |
| Nigeria                        | 8  |  |
| Somalia                        | 9  |  |
| Other                          | 10 |  |
| If other please specify: ..... |    |  |

5. How old are you?

| (Age Group In years) |   |  |
|----------------------|---|--|
| 18 and below         | 1 |  |
| 18-25                | 2 |  |
| 26-35                | 3 |  |
| 36-45                | 4 |  |
| 46-55                | 5 |  |
| 55 and above         | 6 |  |

6. What is the **highest** school or tertiary qualification you have **passed**?

Grade

|                                                                    |   |   |   |   |   |   |   |   |   |    |    |    |
|--------------------------------------------------------------------|---|---|---|---|---|---|---|---|---|----|----|----|
| 0                                                                  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Post School Qualification                                          |   |   |   |   |   |   |   |   |   |    |    | 13 |
| Post School Qualification. Please mention the qualification: ..... |   |   |   |   |   |   |   |   |   |    |    |    |
| .....                                                              |   |   |   |   |   |   |   |   |   |    |    |    |

7. How many people work for this business?

| Nature of employment     | Number of employees |
|--------------------------|---------------------|
| Permanent                |                     |
| contract                 |                     |
| Casual                   |                     |
| Other                    |                     |
| If other, please specify |                     |

### Section B: operational activities

8. How many bakkies do you have for your plastic waste collections?

9. Do you own or rent your bakkie(s)?

|                          |   |  |
|--------------------------|---|--|
| Own(Go to Question 10)   | 1 |  |
| Rent (Go to Question 11) | 2 |  |

10. When did you buy your bakkie?

Year: .....

Month: .....

11. If you indicated that you rent your bakkie(s), what is the rental monthly cost?

Rand.....

12. From whom do you collect plastic waste? (Mark all applicable)

|                                                                      |   |  |
|----------------------------------------------------------------------|---|--|
| <b>Types of waste pickers</b>                                        |   |  |
| Street waste pickers                                                 | 1 |  |
| Dustbins outside houses                                              | 2 |  |
| Shops/businesses                                                     | 3 |  |
| Schools or other institutions who collects waste as source of income | 4 |  |
| Other                                                                | 5 |  |
| If other, please specify<br>.....                                    | 6 |  |

13. Do waste pickers bring their waste to you?

|           |   |  |
|-----------|---|--|
| Yes       | 1 |  |
| No        | 2 |  |
| Sometimes | 3 |  |

14. Is your business buying waste informally or are you registered?

|                     |   |  |
|---------------------|---|--|
| Informally          | 1 |  |
| Registered business | 2 |  |

15. Can you briefly describe your relationship with street waste pickers?

.....

.....

.....

16. How long have you been buying plastic waste from waste pickers?

Years: .....

Months: .....

17. Which of the following recyclables does the business buy from waste pickers? (Mark all applicable)

\*\*\*Interviewer: Ask for a price list if willing to give one

|                                | Product                                        |    |  |
|--------------------------------|------------------------------------------------|----|--|
| Plastic                        | Blue/clear PET – polyethylene terephthalate    | 1  |  |
|                                | Brown PET – polyethylene terephthalate         | 2  |  |
|                                | Green PET – polyethylene terephthalate         | 3  |  |
|                                | Other colours PET – polyethylene terephthalate | 4  |  |
|                                | HDPE- High-density polyethylene                | 5  |  |
|                                | PVC-Polyvinyl chloride                         | 6  |  |
|                                | LDPE - Low-density polyethylene                | 7  |  |
|                                | PP – Polypropylene                             | 8  |  |
|                                | PS- Polystyrene                                | 9  |  |
|                                | Plastic mix                                    | 10 |  |
| Other.....                     | .....                                          | 11 |  |
| .....                          | .....                                          |    |  |
| .....                          | .....                                          |    |  |
| .....                          | .....                                          |    |  |
| Refused to answer the question |                                                | 12 |  |

18. How much plastic waste in kg did you buy last week?

Kg

19. How much plastic waste in kg did you buy last month?

Kg

20. Do prices of plastic waste products change often?

|                                |   |  |
|--------------------------------|---|--|
| Yes (please go to Question 21) | 1 |  |
| No (please go to Question 22)  | 2 |  |

21. If you answered yes to question 20, how often do prices change?

|                    |   |  |
|--------------------|---|--|
| Daily              | 1 |  |
| weekly             | 2 |  |
| monthly            | 3 |  |
| If other, explain: | 4 |  |

22. What is the reason(s) for the price changes?

.....

.....

23. How much waste did you sell in Rand value last week?

Rand.....

24. What are your average pay-outs in salaries and wages if any?

|         | Average (Rand) |
|---------|----------------|
| Daily   |                |
| Weekly  |                |
| Monthly |                |

25. Do you know the prices offered by other plastic waste buyers?

|     |   |  |
|-----|---|--|
| Yes | 1 |  |
| No  | 2 |  |

**Section C: Relationship with waste pickers**

**This next set of questions deals with engaging with waste pickers.**

26. Do you regularly buy waste materials from the same waste pickers?

|     |   |  |
|-----|---|--|
| Yes | 1 |  |
| No  | 2 |  |



27. Do you provide any form of support to the waste pickers?

|                         |   |  |
|-------------------------|---|--|
| Yes (Go to Question 28) | 1 |  |
| No (Go to Question 29)  | 2 |  |

28. If yes to question 27, please answer the following question

What kind of support do you provide to waste pickers? (Mark all applicable)

|                                 |   |  |
|---------------------------------|---|--|
| Meals                           | 1 |  |
| Shelter                         | 2 |  |
| Money donations                 | 3 |  |
| Money loans                     | 4 |  |
| Clothing                        | 5 |  |
| Bags                            | 6 |  |
| Safe-keeping of money           | 7 |  |
| Other                           | 8 |  |
| If other, please specify: ..... |   |  |
| .....                           |   |  |

**Section D: Relationship Buy-back centres**

29. To whom do you sell your plastic waste?

|                                      |   |  |
|--------------------------------------|---|--|
| <b>Types of plastic buyers</b>       |   |  |
| Surrounding plastic buy-back centres | 1 |  |
| Plastic recycling companies          | 2 |  |
| Other                                | 3 |  |
| If other, please specify             | 4 |  |
| .....                                |   |  |

30. What do you think can be done to bridge the gap between Bakkie brigade operators and Buy Back Centres?

.....

.....

.....

31. Can you describe your relationship with buy-back centres?

.....  
.....  
.....

32. How do you think bakkie brigades could be integrated into Buy-back Centres?

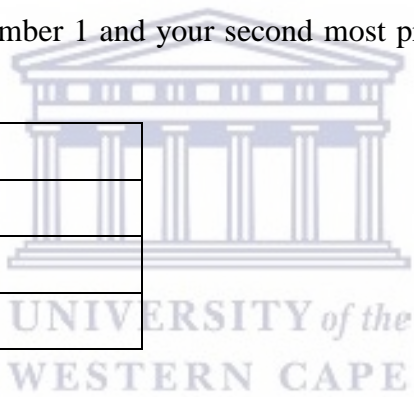
.....  
.....  
.....

Section E: Business profitability

**This next set of questions deals with the business.**

33. Rate the 3 most profitable plastic products that you collect. Start with your most profitable product as number 1 and your second most profitable product as number 2 etc.

|   | <b>Products</b> |
|---|-----------------|
| 1 |                 |
| 2 |                 |
| 3 |                 |



34. Rate the 3 plastic products that are mostly demanded by buyers from 1-3. Start with the most demanded plastics as number 1 and your second demanded as number 2 etc.

|   | <b>Products</b> |
|---|-----------------|
| 1 |                 |
| 2 |                 |
| 3 |                 |

35. What is the business' 3 biggest cost items?

|   | <b>Cost item</b> |
|---|------------------|
| 1 |                  |
| 2 |                  |
| 3 |                  |

36. What is the business' weekly transport cost?

|           |
|-----------|
| Rand..... |
|-----------|

37. Does the business have a place where they store the waste before selling it?

|     |   |  |
|-----|---|--|
| Yes | 1 |  |
| No  | 2 |  |

38. Does your business add value to the recyclables (e.g. make pellets from the plastics or make other products from the recyclables?) If yes, please explain what they make.

.....

.....

.....

39. How do you keep record of your operational sales and how often do you record sales or purchases?

.....

.....

.....



**Section F: Scope for change**

WESTERN CAPE

40. In what way would you like to improve your business? (complete table)

| Requirement    | Usage(what for) | specify |
|----------------|-----------------|---------|
| Finance        |                 |         |
| Space          |                 |         |
| Machinery      |                 |         |
| Infrastructure |                 |         |
| Other...       |                 |         |

.....

.....

.....

41. Do you plan to stay in the industry as a bakkie brigade operator?

|     |   |  |
|-----|---|--|
| Yes | 1 |  |
| No  | 2 |  |

42. How has the current Covid-19 pandemic affected your business operations?

.....

.....

.....

43. What do you think is needed to assist bakkie brigade operators?

|                                                      |   |  |
|------------------------------------------------------|---|--|
| Incentivise bakkie brigade operators                 | 1 |  |
| Incentivise Buy Back Centres                         | 2 |  |
| Provide proper equipment and space for waste pickers | 3 |  |
| Change laws against plastic waste recycling          | 4 |  |
| Create awareness                                     | 5 |  |

Other, please state:

.....

.....

.....

44. Do you have any other comments?

.....

.....

.....

**Thank you for your time**

## Appendix C: Buy-Back Centres Questionnaires



### RECYCLING BUY-BACK CENTRE SURVEY IN CAPE TOWN

Department of Economics – University of the Western Cape

**Research title: Investigating the economic relationship between buy-back centres and plastic waste recycling entrepreneurs**

#### BUY BACK CENTRE SURVEY DETAILS

(Can be completed after the interview)

**Interviewer: Complete the following questions after the interview.**

Date of interview: (yyyy/mm/dd) ..... Fieldworker's code: .....

City/town: ..... Time of interview: [hh:mm].....

Questionnaire

|           |                          |               |                          |
|-----------|--------------------------|---------------|--------------------------|
| Completed | <input type="checkbox"/> | Not Completed | <input type="checkbox"/> |
|-----------|--------------------------|---------------|--------------------------|

**Geographical details of the BUY-BACK CENTRE where interview took place:**

Name of the Buy-back Centre: .....

Street Address: .....

Suburb: .....

Postal code: .....

**SECTION A**  
**DEMOGRAPHIC AND EDUCATION CHARACTERISTICS**

**This set of questions relates to the personal background of the respondent you are interviewing.**

1. Respondent's gender:

|        |   |  |
|--------|---|--|
| Male   | 1 |  |
| Female | 2 |  |
| Other  | 3 |  |

2. With which cultural group do you associate yourself with?

|                                |   |  |
|--------------------------------|---|--|
| African/Black                  | 1 |  |
| Coloured                       | 2 |  |
| White                          | 3 |  |
| Indian/Asian                   | 4 |  |
| If other please specify: ..... | 5 |  |

3. From which country do you originate from?

|                                |    |  |
|--------------------------------|----|--|
| South Africa                   | 1  |  |
| Zimbabwe                       | 2  |  |
| Namibia                        | 3  |  |
| Swaziland                      | 4  |  |
| Mozambique                     | 5  |  |
| Botswana                       | 6  |  |
| Lesotho                        | 7  |  |
| Nigeria                        | 8  |  |
| Somalia                        | 9  |  |
| Other                          | 10 |  |
| If other please specify: ..... |    |  |

|                      |   |  |
|----------------------|---|--|
| (Age Group In years) |   |  |
| 18 and below         | 1 |  |

4. How old are you?

|              |   |                          |
|--------------|---|--------------------------|
| 18-25        | 2 | <input type="checkbox"/> |
| 26-35        | 3 | <input type="checkbox"/> |
| 36-45        | 4 | <input type="checkbox"/> |
| 46-55        | 5 | <input type="checkbox"/> |
| 55 and above | 6 | <input type="checkbox"/> |

5. What is the **highest** school or tertiary qualification you have **passed**?

Grade

|                                                             |   |   |   |   |   |   |   |   |   |    |    |    |
|-------------------------------------------------------------|---|---|---|---|---|---|---|---|---|----|----|----|
| 0                                                           | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Post School Qualification                                   |   |   |   |   |   |   |   |   |   |    |    | 13 |
| Post School Qualification. Please mention the qualification |   |   |   |   |   |   |   |   |   |    |    |    |
| .....                                                       |   |   |   |   |   |   |   |   |   |    |    |    |

**SECTION B:  
OWNERSHIP AND OPERATIONAL ACTIVITIES**

**This set of questions relates to the ownership and activities of the buy-back centre.**

6. Under what form of ownership is this business? Please tick the applicable box

|                        |   |                          |
|------------------------|---|--------------------------|
| Sole proprietor        | 1 | <input type="checkbox"/> |
| Partnership            | 2 | <input type="checkbox"/> |
| Family business        | 3 | <input type="checkbox"/> |
| Cooperative            | 4 | <input type="checkbox"/> |
| Other                  | 5 | <input type="checkbox"/> |
| If other, specify..... |   | <input type="checkbox"/> |

7. Please indicate the business classification of the BBC

|                              |   |                          |
|------------------------------|---|--------------------------|
| Formally registered business | 1 | <input type="checkbox"/> |
| Informal business            | 2 | <input type="checkbox"/> |
| Other (specify)              | 3 | <input type="checkbox"/> |

.....

.....

.....

8. What is the nature of activities that take place on this site? You may select more than one option from the list below.

|                                                    |   |  |
|----------------------------------------------------|---|--|
| Receiving waste material from street waste pickers | 1 |  |
| Weighing materials from street waste pickers       | 2 |  |
| Paying street waste pickers                        | 3 |  |
| Sorting of waste materials                         | 4 |  |
| Receiving waste materials from bakkie brigades     | 5 |  |
| Paying bakkie brigade operators                    | 6 |  |
| Transportation of materials                        | 7 |  |
| Baling                                             | 8 |  |
| Other (specify)                                    | 9 |  |

.....  
 .....

9. When did this particular buy-back centre start operating?

.....  
 .....

10. Why did you decide to start a buy-back recycling business? (Please provide more than one reason)

.....  
 .....

11. How long have you been operating as the owner/manager of this buy-back centre?

Years: .....

Months: .....

12. How much capital in rand terms did it take to start this business?

.....  
 .....

13. How many employees are currently working on this site?

|           |   |  |
|-----------|---|--|
| Permanent | 1 |  |
| Contract  | 2 |  |
| Temporary | 3 |  |



**SECTION C:  
PLASTIC WASTE MATERIALS AND PRICES**

**This next set of questions deal with the different plastic waste materials and their prices.**

14. What type of waste do you buy from bakkie brigade operators? (Mark all applicable)

|                                |                                  |   |  |
|--------------------------------|----------------------------------|---|--|
| Plastic                        | PET – polyethylene terephthalate | 1 |  |
|                                | HDPE- High-density polyethylene  | 2 |  |
|                                | PVC-Polyvinyl chloride           | 3 |  |
|                                | LDPE - Low-density polyethylene  | 4 |  |
|                                | PP - Polypropylene               | 5 |  |
|                                | PS- Polystyrene                  | 6 |  |
|                                | Plastic mix                      | 7 |  |
| Refused to answer the question |                                  | 8 |  |

15. What is the current price you pay bakkie brigades per kilogram of each product?

(Mark all applicable)

(Interviewer: Ask for a price list if BBC is willing to give one)

| Product                        |                                  | Price<br>Per kg |   |  |
|--------------------------------|----------------------------------|-----------------|---|--|
| Plastic                        | PET – polyethylene terephthalate |                 | 1 |  |
|                                | HDPE- High-density polyethylene  |                 | 2 |  |
|                                | PVC-Polyvinyl chloride           |                 | 3 |  |
|                                | LDPE - Low-density polyethylene  |                 | 4 |  |
|                                | PP - Polypropylene               |                 | 5 |  |
|                                | PS- Polystyrene                  |                 | 6 |  |
|                                | Plastic mix                      |                 | 7 |  |
| Refused to answer the question |                                  |                 | 8 |  |

16. Have you observed any patterns in your business activities? E.g. busier days/months?

|                         |   |  |
|-------------------------|---|--|
| Yes (Go to Question 17) | 1 |  |
| No (Go to Question 18)  | 2 |  |

17. If you answer is yes in Question 16, please elaborate.

.....

.....

.....

18. Please rate the 3 biggest plastic cost items. Starting with the biggest cost item as number 1 and your second most expensive item as number 2 etc.

|   | <b>product</b> | <b>cost</b> |
|---|----------------|-------------|
| 1 |                |             |
| 2 |                |             |
| 3 |                |             |

19. Why do street waste pickers prefer selling to your business?

.....

.....

.....

20. To whom do you sell your plastic waste products?

|                              |   |  |
|------------------------------|---|--|
| Plastics recycling companies | 1 |  |
| Manufacturing industries     | 2 |  |
| Processors                   | 3 |  |
| Other buy-back centres       | 4 |  |
| Other, please specify: ..... | 5 |  |

21. How do you determine who to sell your recycled plastic waste products to? Please explain

.....

.....

22. How do you maximise the value of your recyclable products before selling them? Please explain

.....

.....

**SECTION D:  
SUSTAINABILITY FACTORS (PROFITABILITY)**

**This section relates to the sustainability factors relating to the Buy Back Centre (BBC)**

23. How has your experience been with operating a buy-back recycling business?

.....  
 .....

24. Which system do you use in order to keep record of your income and expenditures?

.....  
 .....

25. How has the business been affected by the current Covid-19 pandemic?

.....  
 .....

26. Which of the following do you think can help to grow your business?

|                                   |   |  |
|-----------------------------------|---|--|
| Space/land                        | 1 |  |
| finance                           | 2 |  |
| Additional buildings              | 3 |  |
| Equipment (e.g., baler, forklift) | 4 |  |
| Bakkie                            | 5 |  |
| Training in entrepreneurship      | 6 |  |
| Support from municipality         | 7 |  |
| Other, please specify: .....      | 8 |  |

27. Do you frequently compare prices with other buy-back centres in the surrounding areas?

.....  
 .....

28. How much do you earn (profits) on average weekly from your daily operations?

.....  
 .....

**SECTION E:  
BUSINESS DIFFICULTIES**

**This section relates to some difficulties faced in the Buy Back Centre (BBC)**

29. What are pressing issues that you face in your business? Please explain

.....  
 .....

30. In what way would you like to improve your business? (Complete table)

| Requirements   | Usage (what for) | Specify |
|----------------|------------------|---------|
| Finance        |                  |         |
| space          |                  |         |
| machinery      |                  |         |
| Infrastructure |                  |         |
| Other...       |                  |         |

31. Do you consider this business profitable in the long run?

|                         |   |                          |
|-------------------------|---|--------------------------|
| Yes (Go to Question 33) | 1 | <input type="checkbox"/> |
| No (Go to Question 34)  | 2 | <input type="checkbox"/> |

32. If answered yes in question 31, please elaborate

.....  
 .....

33. What do you think should and can be done to assist BBC owners and employees?

.....  
 .....

**Interviewer: Thank the respondent for his/her participation.**

## Appendix D: Summary weekly earnings of SWPs (Rands)

**Table D1: Summary weekly earnings of SWPs (Rands)**

|                         |     |
|-------------------------|-----|
| Minimum                 | 10  |
| Mean                    | 127 |
| Median                  | 100 |
| Maximum                 | 500 |
| Standard deviation      | 87  |
| Number of responses (n) | 99  |

Source: Author's own calculations using the survey data.

