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Identifying the prospects of job creation along the value
chain of plastic recycling

by

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DECLARATION

I declare that “*Identifying the prospects of job creation along the value chain of plastic recycling*” 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.

Siwaphiwe Bala

Signature: 

Date: 16 July 2021



ABSTRACT

South Africa is faced with a triple threat of poor economic growth, poverty and unemployment. Concurrently, the production of waste is increasing predominantly among urban areas. If catered for, the informal recycling sector has the potential to create a notable amount of opportunities for improving livelihoods and generating jobs. Street Waste Pickers (SWPs) are identified as individuals who collect recyclable waste material from households or industrial firms with the aim of selling them to recycling firms. This study aims to identify the barriers and challenges for job creation along the value chain of plastic recycling that SWPs face in the urban regions of Cape Town. In the absence of national database on the informal recycling sector, this study utilises primary data collection methods in the form of semi-structured interviews and questionnaires.

The findings in this study indicate that the informal recycling economy is predominantly male-dominated. This is particularly due to the labour-intensive nature of the activities in this sector. Furthermore, the informal recycling economy possesses little to no barriers of entry. This is substantiated by the slight difference found in the comparison of earnings by race, age and educational attainment. These results reveal that initiatives to absorb these individuals could potentially curb the large amount of unskilled unemployed citizens of South Africa and simultaneously help decrease the level of unemployment in the country.

SWPs face very low earnings for the work they do. This study found that on average, SWPs earn about R154.72 for a day's waste and R631.96 for a week's waste. The econometric results revealed that females are associated with lower income as compared to their male counterparts, albeit the results are statistically insignificant. In addition, the results presented in this study showed that having access to a trolley yields positive and statistically significant results to the income of SWPs. The race variable also revealed statistically significant results for Coloured individuals only. This study suggests that assisting SWPs through the provision of trolleys and protective gear could potentially prove to be an advantage to sustaining the incomes and creating decent employment opportunities for SWPs.

Keywords: Value chain, Plastic recycling, Informal economy, Job creation

JEL Codes: J01, J46

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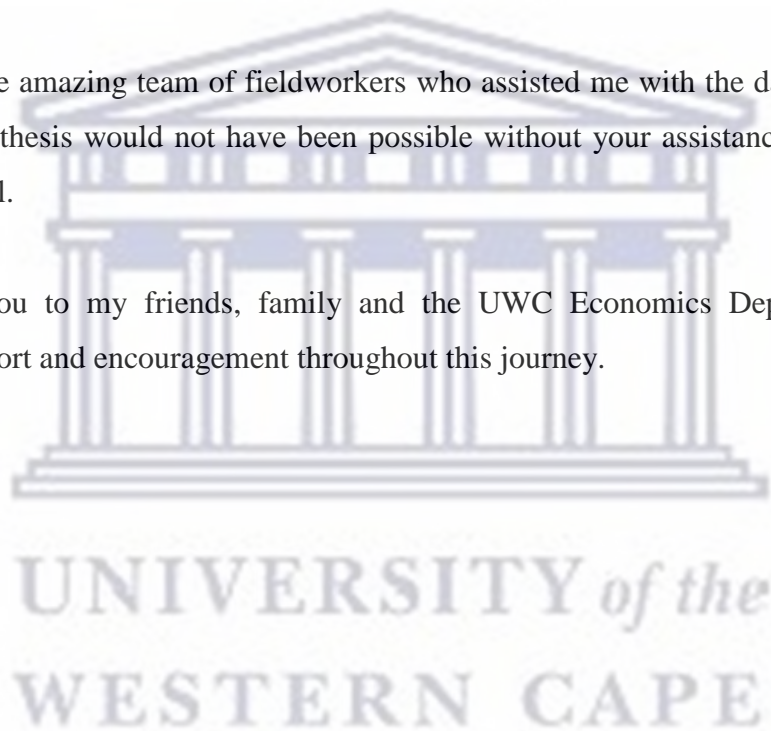


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LIST OF ABBREVIATIONS

ARO	African Reclaimer Organisation
BBC	Buy-Back Centre
DEA	Department of Environmental Affairs
EPR	Extended Producer Responsibility
GDP	Gross Domestic Product
HDI	Human Development Index
HDPE	High-density polyethylene
HRC	High-end Recycling Company
ILO	International Labour Organization
LDPE	Low-density polyethylene
MSWM	Municipal Solid Waste Management
NWMS	National Waste Management Strategy
OLS	Ordinary-Least Squares
PET	Polyethylene Terephthalate
PP	Polypropylene
PS	Polystyrene
PVC	Polyvinyl chloride
QLFS	Quarterly Labour Force Survey
S@S	Separation at Source
SoS	Separation outside Source
SAPS	South African Police Services
SME	Small and Medium-sized Enterprise
SWPs	Street Waste Pickers
VCA	Value Chain Analysis

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CHAPTER ONE: INTRODUCTION

1.1 Background and Problem Statement

The year 2021 marks 27 years since South Africa was declared a democratic state. However, years later, the gap between the rich and poor seems to have grown larger. The lack of employment opportunities has resulted in the increase of the poverty and inequality levels in the country. South Africa's official unemployment rate was 32.6% in the first quarter of 2021, an increase from 32.5% in the last quarter of 2020. This was also the highest unemployment rate recorded since the beginning of the Quarterly Labour Force Survey (QLFS) in 2008. Similarly, the expanded unemployment rate (which includes discouraged work seekers) was 43.2% – an increase of 0.6% from the last quarter of 2020 (StatsSA, 2021). Unemployment in South Africa is most prominent amongst the youth, Black South Africans and the disabled.

The rate of job creation in South Africa has been far less than the rate of growth of the labour force since the advent of democracy. In essence, the number of entrants into the labour force has been greater than the amount of jobs that have been created. As a result, the economy of post-apartheid South Africa continues to be a poor absorber of job seekers, but particularly, a poor creator of low-end jobs (Bhorat, 2003). Furthermore, the slow absorption of job seekers in the formal sector has resulted in people looking for alternatives in the informal sector in order to earn a living and combat poverty (Van Heerden, Blignaut, Mabugu, Gerlagh, Hess, Tol, Horridge, Mabugu, De Wit, & Letsoalo, 2014).

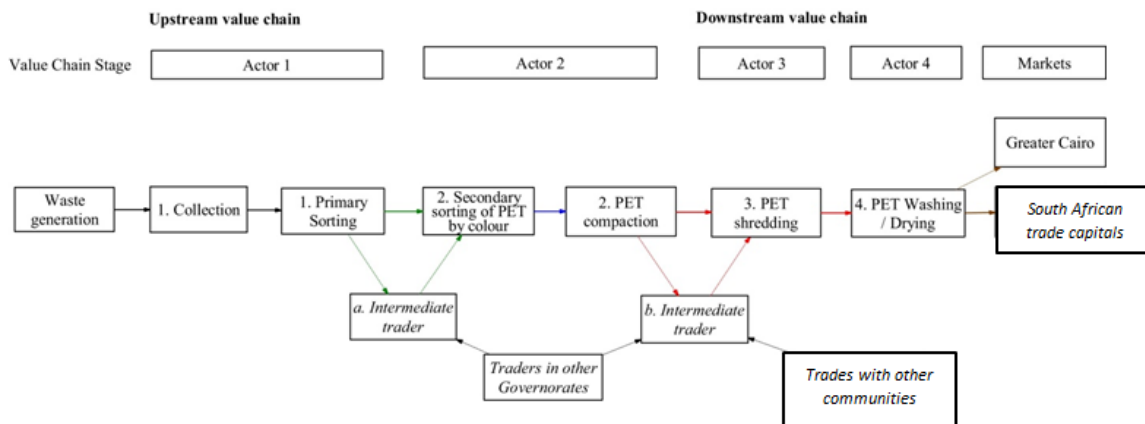
Job opportunities in the informal sector are mostly entrepreneurial. This is because participants in this sector often own or manage profitable businesses that are not acknowledged to the government for taxation purposes and labour laws, but the businesses are legal in all other aspects (Williams, 2014). However, many informal sector participants often evade paying taxes, do not hold any licenses that allow them to trade and are not included in social securities or state indemnity systems (Schenck, Blaauw, & Viljoen, 2012; Wilson, Velis, & Cheeseman, 2006). Several activities take place in the informal sector, with some of these activities also taking place in the recycling industry. In the context of Municipal Solid Waste Management (MSWM), the informal recycling sector refers to the actions of waste pickers who collect recyclable waste from residential areas and landfill sites (Wilson et al., 2006).

Godfrey (2017) outlines that the role of waste pickers in the recycling economy and the challenges they experience are mostly ignored when formulating policy. The waste management hierarchy does not include street waste pickers, even though research shows that they collect the most recyclable items in South Africa (Simatele, Dlamini & Kubanza, 2017). It is noted that the rights of street waste pickers are not protected, and no form of government intervention has been shown in their favour in the form of providing working space and better working equipment. Secondly, street waste pickers are often subjected to unhealthy working conditions in hazardous environments without any form of assistance from both the government and Buy-Back Centres (BBCs). Thirdly, more often than not, SWPs face relatively low market prices for the recyclables that they sell to BBCs. Finally, since their existence in the South African economy, SWPs have not been successfully integrated into the formal recycling sector for improved work opportunities (Godfrey, 2015).

The Department of Environmental Affairs (DEA) designed a National Waste Management Strategy (NWMS), which is a legislative requirement of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008). The NWMS suggests that waste should be controlled in accordance with the waste management hierarchy. Essentially, this means that waste should be avoided, reduced, re-used, recycled and recovered, with the last option being the disposal thereof. All these waste management options are arranged in descending order of priority (DEAT, 2002). However, based on the NWMS, the positive impact street waste pickers play on waste management is not been taken into account by the South African government even though street waste pickers have proven themselves to being the backbone of the recycling economy of South Africa (Ezeah, Fazarkerley & Roberts, 2013).

The availability of an extensive network and a significant amount of manual skills allow the existence of an informal system of recyclers who operate in an entrepreneurial infrastructure based on Small and Medium-sized Enterprises (SMEs), which allows for a profit-making waste management business. Figure 1 below shows that a majority of informal SMEs focus on one or two stages of recycling while maintaining relationships with other informal waste recycling SMEs up or down the recycling chain. Furthermore, value is added at each stage of the value chain of plastic recycling, which helps create employment opportunities at different levels, thereby sustaining the system (Raghupathy et al., 2013).

Figure 1: The value chain of PET waste recycling



Source: Adapted from Jaligot et al. (2016).

It is observed that with the increase in waste materials created within societies, the recycling environment is changing, with more formal recyclers entering the recycling sector. There is also anticipation that these formal recyclers have the ability to manage waste in an environmentally sustainable manner by making use of sophisticated technologies leading to improved environmental management. However, it is unclear whether the increase in the number of formal recyclers will come at the expense of informal recyclers (Raghupathy et al., 2013).

A crucial factor in the economics of recycling is the close networks that exist among street waste pickers in the informal recycling sector. These networks could be utilised as a factor to bring about unity in their line of work. In addition, this enables street waste pickers to work as a collective in order to share their thoughts, iron out any differences and bring about a strong sense of connectedness within their community (Raghupathy et al., 2013).

In light of this background, the purpose of this study is to investigate the impact of the recycling economy on the South African labour market, particularly looking at its potential for creating informal self-employment opportunities for street waste pickers at the lower end of the value chain of plastic recycling in the urban areas of Cape Town. The study makes provisional recommendations on how public policy may be amended to incorporate informal recycling into the formal waste management sector.

1.2 Research question

How can the quality and quantity of work opportunities for informal recyclers at the lower end of the waste recycling chain be improved in urban Cape Town?

1.3 Objectives of the study

The main research objective of the study is to identify opportunities and barriers for decent job creation and enterprise development along the plastic waste value chain in the urban areas of Cape Town. Moreover, the specific objectives are as follows:

1. To explore and describe the existing working conditions of street waste pickers in the informal recycling sector along the value chain of plastic recycling.
2. To determine the main impediments, as well as the facilitating factors, that could improve the working conditions of the informally employed in the waste and secondary resources economy in this value chain.
3. To examine the state's potential role in the promotion of job creation in the recycling or waste sector.

1.4 Relevance of the study

Waste management is a subject that has not been studied as extensively in South Africa as the topic deserves, especially concerning the role that street waste pickers play in the reduction of the amount of waste that is dumped at various landfill sites. This is the case in spite of the fact that waste pickers are estimated to collect about 70%-90% of recyclable materials from households and firms in South Africa (Godfrey, 2015).

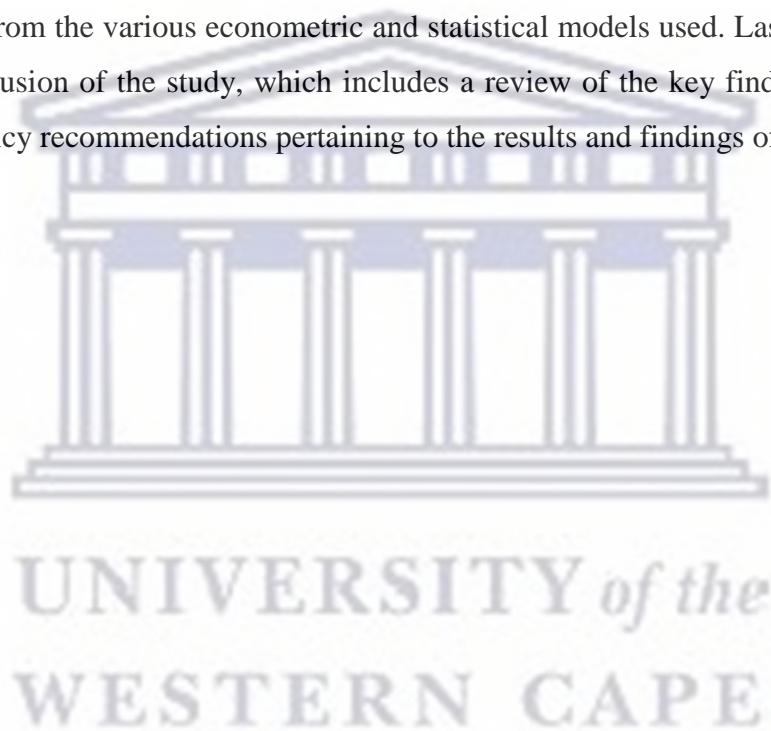
The Department of Environmental Affairs (DEA) has begun to realise that waste in the South African context offers both threats and opportunities. Regarding the latter, waste, if properly managed, can help to address the issues of unemployment, poverty and inequality as well as promote environmental sustainability. This is consistent with the South African government's mandate to protect the rights of all its citizens to an environment that is not harmful to health and well-being (Bob, Padayachee, Gordon, & Moutlana, 2017).

The recycling economy has potential in South Africa in terms of job creation and the reduction of extreme poverty. This study investigates this potential by particularly looking at its possibility of creating employment opportunities for waste pickers in the lower end of the

value chain of plastic recycling while also evaluating the barriers and opportunities for decent job creation in the urban areas of Cape Town.

1.5 Outline of the study

This study consists of five chapters, which aim to give more depth to the study by giving evidence and also attempting to give an answer to the research question identified. Chapter two of this study covers the literature review; it includes the definitions of key concepts, theoretical frameworks that motivate the study, and lastly a review of past empirical studies relevant to this study. Chapter three encompasses the methodology and data used in the study together with the limitations regarding the dataset used. Chapter four covers the empirical findings found from the various econometric and statistical models used. Lastly, Chapter five covers the conclusion of the study, which includes a review of the key findings, concluding remarks and policy recommendations pertaining to the results and findings of the study.



CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter provides a review of both theoretical and empirical literature associated with the prospects of job creation for street waste pickers. Section 2.2 defines key concepts utilised in the study, while Section 2.3 deals with theoretical considerations developed to explain job creation in the lower-end of the plastic recycling value chain. Section 2.4 includes a review of scholarly articles on employment in the lower end of the plastic recycling value chain, before Section 2.5 concludes the chapter.

2.2 Definition of key concepts

Small-scale, labour-intensive, generally unregulated and unregistered low-technology production or service providing are common characteristics of the **informal sector**. In addition, the informal sector can refer to the unofficial nature of economic activities that are done with the aim of avoiding taxes or the effects of labour legislation. Informal sector entrepreneurs or enterprises often do not pay taxes, have no trading license and are not included in social welfare or government insurance schemes (Wilson et al., 2006). Schenck et al. (2012) further explain that activities in the informal sector can be of a survivalist nature, such as day labouring or other casual, temporary or unpaid jobs, street trading, subsistence agriculture, or selling recyclable waste. Informal self-employment in the context of Municipal Solid Waste Management (MSWM), particularly the informal recycling sector, refers to the waste recycling activities of waste pickers on South Africa's streets and landfill sites.

Waste pickers, which form the focus of the investigation in this study, can be defined as informally self-employed individuals who earn a living through the sale and/or personal consumption of goods that people have deemed useless and of no value to them (Samson, 2009; Schenck et al., 2012). They most likely operate in the informal sector. Different forms of terminology exist on how to refer to waste pickers. Some prefer to call them waste salvagers or garbage pickers, whilst others call them waste recyclers or reclaimers.

In addition, Chavtal (2010) sheds light on the differences between the above-mentioned terminologies; the author explains that SWPs are people who collect and sort garbage from dustbins as a means of survival. Furthermore, the author adds that waste picking is a physical,

labour-intensive and dangerous activity that has been and continues to be a way of survival for the multitude of underprivileged and unemployed citizens of South Africa. Samson (2009) argues that the people personally involved in this activity must determine the manner in which they want to be referred. Some prefer to refer to these workers as waste pickers as this job title reflects the individual's actions more precisely (Schenck et al., 2012). This study will refer to these individuals as street waste pickers as this describes the nature of their job, which is to source recyclable items from mixed waste disposed in garbage bins on streets or in dumping sites (WIEGO, 2020).

As per the International Labour Organization (ILO), **decent work** can be identified as employment opportunities that respect the rights of workers in terms of the provision of reasonable remuneration and the promotion of safe working conditions. Furthermore, decent work includes employment opportunities that allow for individuals to voice their concerns, organise and take part in the decisions that have a direct impact on their lives and also advocate for equal opportunities and treatment, for all men and women (ILO, 2020). Decent work applies to both the formal and informal sector of employment. Concerning the above-mentioned definition, street waste picking does not necessarily fit the criteria of decent work. This is mainly because the conditions under which street waste pickers work are not safe, moreover, they are not offered any benefits that offer personal and skills development in their line of work.

Waste may be explained as any substance (whether gaseous, liquid or solid emanating from any residential, commercial or industrial area) that is deemed unnecessary and has no further essential or commercial value (DEAT, 2002). Furthermore, waste can be differentiated in several categories such as domestic and household waste, which comes mainly from residential areas and comprises mostly leftover food, old clothing and packaging material such as plastic, glass, paper and cardboard. Secondly, waste can be categorised as business or commercial waste, which emanates from offices, stores and schools, and consists mainly of packaging materials such as glass, paper, plastics and cans (Samson, 2009). However, this study's main focus is on recyclable plastic waste such as Polyethylene Terephthalate (PET) bottles.

Recycling is formally defined as the process whereby disposed products and materials are reclaimed, reprocessed and converted into new or different products for reuse purposes. This

concept is frequently used in a broader sense to encompass the entire cycle, from collection to manufacturing of new things, or secondary raw materials, derived from salvaged materials. Recycling is one of the ways in which people can minimise the production of waste (Mwanza & Mbohwa, 2017). Lastly, the **value chain** is the process or activities carried out by organisations to bring value to its customers. Inclusive of the value chain is a step-by-step business model that helps transform a product or service from an idea to reality (Jaligot et al., 2016).

2.3 Theoretical framework

2.3.1 Sen's capability theory

The capability theory propounded by Amartya Sen provides the research's theoretical lens for analysing the prospects of job creation along the value chain of plastic recycling in South Africa. Sen defines capabilities as a person's ability to perform valuable acts or achieve meaningful states of being, or the various combinations of things that a person can do or be. Capabilities can also be thought of as opportunities or liberties to attain something that a person values. (Walker & Unterhalter, 2007).

In addition, Sen identified that a country may be wealthy but the residents of the country may not necessarily be happy, do not live very long, may have lives impoverished or suffer lack by some standards (Robeyns, 2006). This essentially means that as much as a country could have a high GDP (Gross Domestic Product) this does not sufficiently indicate the well-being of the people in that country; rich people could be getting richer while poor people become poorer. Therefore, according to Sen, the notion of capability refers to the freedom an individual has in determining the kind of life he/she wishes to lead (Saito, 2003). In this study, capabilities are analysed from the angle of the possibility of fulfilment street waste pickers stand to achieve if they receive all the assistance they require for their daily activities.

Individual welfare measurement is critical for assessing distributive fairness as well as designing and evaluating redistributive social policy. All measures of inequality, poverty, and mobility are based on individual welfare levels. While most economists agree that measuring wellbeing is critical, there is no agreement on how welfare should be defined conceptually or quantified practically. The prevalent approach in economics is to define welfare as utility and to measure it quantitatively using one-dimensional variables like income or expenditure. However, alternative views, which conceptualise welfare, exist within economics; e.g.

standard of living, quality of life or subjective well-being (Kuklys, 2005). This is often done with the aid of the HDI (Human Development Index). This study explores how the welfare of waste collectors in the plastic recycling industry may be promoted through the creation of more and improved employment opportunities.

The aim of both justice and poverty reduction according to the capability approach should be the expansion of freedom that less fortunate people have to enjoy things that they see as valuable or reach valuable states of being. Saito (2003) individuals should have access to the resources they need to be happy, and they should be empowered to make decisions that are most important to them in order to assist them with reaching their full potential in every aspect of their lives. The fundamental benefit of the capabilities approach is that it goes beyond the common criticism of income to suggest a new way of thinking about poverty reduction and justice (Saito, 2003).

Sen's capabilities approach is formulated based on two parts, namely valuable beings and doings (functionings), and freedom. Sen's main contribution to development economics has been to integrate the two concepts (Robeyns, 2006; Saito, 2003).

2.3.1.1 Valuable functionings

Valuable functionings represent various aspects of life that people value. It is seen as an achieved outcome (Robeyns, 2006). Sourcing out various recyclable materials, transporting them and selling them are among examples of valuable functionings in the informal recycling sector, as the case in this research. Capability is a notion of freedom, which is in essence the potential to achieve what an individual values or the real opportunities one has regarding the life they lead (Robeyns, 2006).

The primary distinction between a capability and valuable functioning is that between a potential for achievement and actual success, or between potential and outcome. (Robeyns, 2006). This distinction is very important because evaluating only functionings or outcomes can provide insufficient information about how well people are doing; this is in terms of the distinction between the opportunities presented to street waste pickers and the value they actually bring into their line of work. Some cases may look as though the same functionings have been achieved, i.e. street waste pickers collect recyclable materials successfully. However, behind these equal outcomes may lie very different stories, this is because different

street waste pickers have distinct experiences in their field of work as some may not have access to the relevant equipment. Moreover, it is this difference that is relevant when thinking about justice and equality (Walker & Unterhalter, 2007).

Sen argues that the different things that an individual finds valuable taken together, create a better conceptual space in which to assess social welfare, rather than utility (Saito, 2003). Furthermore, functionings represent beings and doings, such as being nourished, being confident, being able to travel or taking part in political decisions.

2.3.1.2 Freedoms and agency

In the capability approach, freedoms and agency are important. Individuals are considered to be active participants rather than mere observers in the growth process. In this context, agency refers to each individual as a dignified and responsible human being who, rather than being moulded or instructed how to think, shapes his or her own life in light of essential goals. These objectives may or may not make an individual happier or more comfortable, but they are achieved through careful consideration. (Walker & Unterhalter, 2007). With regards to this research, this means that street waste pickers are fully knowledgeable individuals who know the exact needs required in their line of work and have the ability to make decisions that would benefit them best, rather than people who still need to be taught everything about the activities in the informal recycling sector.

Agency is essentially imperative for a person's freedom. Sen claims that it is also instrumental for collective action and democratic participation. People are said to exercise their agency individually and in cooperation with others, and through educational opportunities and appropriate processes, individuals may learn to do both. Agency is also a key dimension of human well-being. Alkire (2007) further argues that agency enables individuals to expand or advance their well-being in ways they believe to be worthwhile (Walker & Unterhalter, 2007). According to this research, it is fundamental that SWPs be given the freedom to conduct their activities the way they see fit, and to bargain for their rights to better working conditions and better opportunities in their field.

Sen established the notion of capability to address the essential and foundational relevance of freedom. In essence, capability refers to a person's or a group's ability to promote or perform important functions. It represents the various combinations of functionings that the person

can achieve. Capability is, therefore, a set of several functionings that reflect a person's freedom to lead one type of life or another, or to choose from possible lifestyles (Robeyns, 2006). Capability may also be seen as a budget set such that it is a set of real opportunities the person could use in one way or another, the paths that lie open before him or her (Saito, 2003). So the capability approach, fully developed, could appreciate all changes in a person's quality of life: from knowledge, to relationships, to employment opportunities and inner peace, to self-confidence (Robeyns, 2006).

Within the scope of this study, the capability approach may be explained in such a way that street waste pickers do not necessarily have the freedom to choose what kind of work they can be involved in due to factors such as low levels of educational attainment, poverty and discrimination. However, according to Sen's capability theory, providing individuals with instruments they need and have the capability to use, results in an improvement in their standards of living (Saito, 2003). Therefore, the provision of better working apparatus and working spaces where SWPs can sort their collectables may be beneficial to them. The assumption is that they can collect more recyclables, which in turn increases the income they receive. A designated sorting space may also help waste pickers add more value to their products by helping them effectively sort and clean all their products before selling them at BBCs. The increased income then gives waste pickers the freedom to improve their livelihood and generally promotes a sense of employment.

2.3.2 Porter's value chain theory

The value chain analysis originates from the work of Michael Porter in his book 'Competitive Advantage' published in 1985. The value chain is used to analyse the flow of value adding activities from the raw material supplier to the end customer. The model also assesses what value a company adds to each link and as a result, reveals the company's competitiveness (Porter, 1985). Porter's value chain theory is useful in this study, as it helps track the value adding process of recyclable plastic waste materials from the collection stage done by street waste pickers to the final stage, whereby the materials have been transformed into new products ready for sale. Activities in the value chain analysis may be broken down into different important activities in order to analyse and understand the role that they play in both the costs and the value of the entrepreneur's activities. Furthermore, different stakeholders in the value chain add a different kind of value to a product in each stage of the value chain, which results in a further increase in the value of the end product. BBCs and High-End

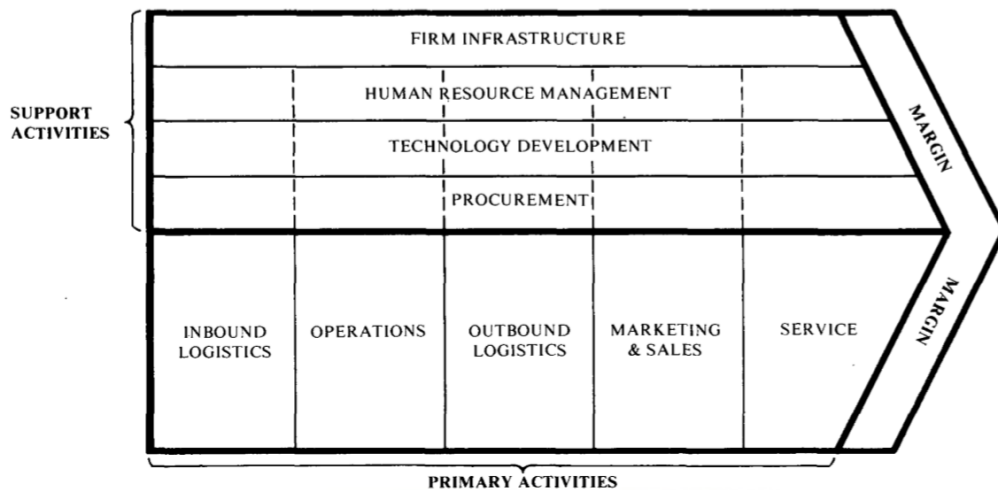
Recycling Companies (HRCs) may be seen as different stakeholders in the recycling industry that add value to plastic recyclable material (Viljoen et al., 2019).

The value chain theory consists of primary and secondary activities, which amount to nine value activities that together create added value, thereby contributing towards the company's margin. Margin may be identified as profit and is the value chain's tenth field; here there is no activity and the field size is dependent on the previous nine fields. In addition, the margin is seen as the difference between the final purchasing price to the customer and the total cost to producing the product in question, all the while taking into account all role players in the value chain (Porter, 1985). In essence, the difference between the amount paid for the recyclable item from street waste pickers, and the amount for which the transformed recyclable item is sold, constitutes the margin.

2.3.2.1 Primary activities of the Value Chain Analysis

Primary activities are listed along the bottom of Figure 2 below. They mainly consist of the activities that are involved in the physical creation of the product, and its sales and transfer to the buyer, as well as after sale assistance. The figure illustrates the generic value chain model used by most companies to evaluate their competitiveness. In the context of this study, this model may be used to section each activity performed by different participants in the formal and informal recycling sector in order to help identify exactly where value is added and to also enhance their competitiveness where needed.

Figure 2: The Generic Value Chain



Source: Porter (1985).

Primary activities in the value chain theory are further divided into five generic categories, namely (Porter, 1985):

- **Inbound logistics:** All actions linked to procuring raw materials, storing raw materials, and timely distribution of raw materials to industrial activities is referred to as inbound logistics. (Viljoen et al., 2019). For BBCs, this includes purchasing recyclable plastic materials from street waste pickers while for HRCs, this includes all activities involved in purchasing cleaned and baled plastic recyclable materials from BBCs until further value can be added.
- **Operations:** These are all actions that take place during the conversion of raw materials into semi-finished or finished goods. The production of value is guided by operational systems. With respect to BBCs and HRCs, operations activities are the core activities that add value; this includes the proper sorting, cleaning and baling of the plastic recyclable materials and pelletising recycled materials respectively (Viljoen et al., 2019).
- **Outbound logistics:** These are all activities related to the successful distribution of products to the respective consumer. Once sorting, cleaning and baling of the recyclables has been completed, BBCs need space to store the recyclables before they are delivered to or collected by the buyers. The same applies to HRCs, as they have to pelletise and store virgin materials until they can be sold to manufacturers. Therefore, outbound logistics include the organisation of the collection or delivery of recyclables to the buyers that pay the best price (Viljoen et al. 2019).

- **Marketing and sales:** Marketing and sales are activities associated with providing customers with information about the product's excellence, which should lead to a sale; marketing and sales are involved in determining the products' distribution channel, pricing, promotion, personal selling, etc. BBCs and HRCs have the responsibility to identify and source the highest paying buyers for their recyclables. In most cases, recycled materials are often kept by the BBCs and HRCs while waiting to reach a large quantity that would guarantee them a reasonable profit or for possible price increases in order to allow them to cover their collection, transportation, processing, packaging and storage costs (Viljoen et al., 2019).
- **Services:** This encompasses any efforts that help clients maintain the value of their products or services after a connection has built based on the purchase of services and products. BBCs do not usually provide after sale support services to the buyers of the recyclables as the responsibility of further recycling is diverted to HRCs for them to pelletise and/or create brand new products.

2.3.2.2 Support activities of the Value Chain Analysis

Porter's Value Chain Analysis comprises of support activities that help the primary operations and form the foundation of every firm. The value chain's support activities are divided into four categories, as indicated in Figure 2, namely human resource management, procurement, technology development and the infrastructure of the firm. The dotted lines in the diagram above depict the connections between a support and a primary activity. According to Porter, a firm's profitability not only depends on its primary activity but the effectiveness of its support activities (Viljoen et al., 2019).

In this study, the value-adding activities of BBCs and HRCs will only be analysed and discussed in terms of the primary activities as per discussion in the framework above.

- **Procurement:** These include all the support activities associated with obtaining raw materials needed to service customers. Examples of procurement activities include purchasing products, maintaining relationships with suppliers and bargaining for the best prices.
- **Technology development:** These activities relate to the development of the products and services of the organisation, both internally and externally. Examples are technological innovations and improvements as well as the development of new

products based on new technologies. These activities create value using innovation and optimisation.

- **Human resource management:** This covers operations such as hiring and keeping employees who will aid in the achievement of the company's objectives. Employing people, training and coaching them, and rewarding them are all examples of such actions.
- **Firm infrastructure:** This refers to the internal support activities that enable the organisation to carry out its day-to-day operations. Line management, administrative handling and financial management are some examples of activities that create value for the organisation.

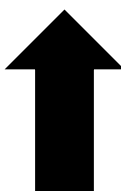
In practice, the model can be used in such a way that if a manufacturer of a product is going to make a profit and survive, the total value of the product for the customer has to be greater than the cost of creating the product. Therefore, one should regularly review the nine activities and analyse whether the individual activities carried out provide more value to the customer than the costs they accumulate, if there are areas or points in which an individual finds difficulty, one should modify or discontinue these activities; this continuously improves a company's competitiveness.

2.3.3 Value chain of informal recycling

The manner in which activities in the informal recycling sector are organised plays an important role in income generation opportunities, working conditions and social status. As a general rule, the less organised the informal recycling sector is, the less the people involved are capable of adding value to the secondary raw materials they collect, and the more vulnerable they are to exploitation from intermediate dealers (Wilson et al, 2006).

Wilson et al. (2006) further identify that the recycling network takes the form of a hierarchy as shown in Table 1. The higher a secondary raw material is traded; the more value it holds. Informal recyclers tend to occupy and are restricted to the lower level of the hierarchy, which tends to significantly reduce their income-generating potential. Waste pickers are most likely to be taken advantage of in terms of the pricing of the recyclables they supply to intermediate dealers, particularly because they do not have any support networks. In addition, they have very limited or even no capacity for the processing or storing of their recyclable materials.

Table 1: The hierarchy of informal sector recycling

	Highest value	Manufacturing industries
		Brokers, wholesalers and other processors
		Craftsmen, middlemen
		Recycling MSE's and scavenger co-operatives
		Family type units involved in waste collection
	Lowest value	Individual waste pickers

Source: Adapted from Wilson et al. (2006).

SWPs are typically quite competent at spotting potentially valuable waste. They gather waste that has been thrown by families or businesses, add value to it by sorting, cleaning, and changing the physical form of the waste so that it can be transported more easily, and bear more weight. (Wilson et al., 2006). Table 2 below describes in detail the manner in which value can be added to recycled waste materials.

Table 2: Ways of extracting value from recycled items

Value adding process	Explanation
Collection	Street waste pickers do this by identifying and picking items or collecting mixed waste that allows them to turn it into a resource and further profit from it. In the case of this study, pickers would focus on collecting different types of plastic items.
Sorting	This is the main process that creates value from recycling items. The more extensive the sorting process, the more the value that is accumulated, e.g. plastics are sorted according to colour.
Accumulation of volume	The more recyclables a picker presents, the more value they receive. The greater the quantity, the better bargaining power the trader has.
Pre-processing	This entails the process where waste pickers clean and alter the shape of recyclables to increase their value.
Small manufacturing craftsmanship	This is the process where waste pickers transform recyclable items that they can sell to community members and other interested

	people.
Market intelligence	This step is solely dependent on the proximity of markets to informal sector recyclers. This enables them to make accurate decisions on where to sell their materials based on the market prices offered.

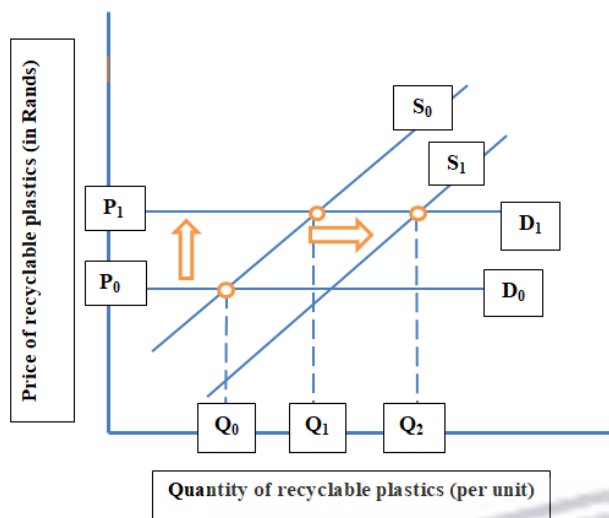
Source: Adapted from Wilson et al. (2006).

2.3.4 *The law of supply and demand*

The law of supply and demand is a theory that helps in explaining the relationship between the sellers of a resource and the buyers of that resource (Pindyck & Rubinfeld, 2015). In the context of this study, the sellers of a resource refers to SWPs who sell recovered plastic material to BBCs and other recycling organisations while the buyers of a resource refer to BBCs and HRCs. In addition, this theory explains the effect the availability of a particular resource and the demand for that product has on the final price of that product.

The supply-demand concept combines two crucial ideas: a supply and demand curve. The supply curve shows the amount of a product that producers are willing and able to sell at a stipulated price, holding all other factors that might influence the quantity of the good supplied constant (Pindyck & Rubinfeld, 2015). The curve labelled *S*, in Figure 3, illustrates this. The vertical axis of the graph, *P*, shows the price of a good (recyclable plastic), measured in South African Rands. The horizontal axis shows the total quantity supplied (recyclable plastic), where *Q*, measures the number of units per period. The supply curve is thus defined as the relationship between the quantity supplied and price. This relationship can also be shown in the form of an equation such that $Q_S = Q_S(P)$. The supply curve observes an upward slope. This means that the higher the price of a product, the greater the quantity that is traded; purely because the greater the price of a product, the more revenue producers receive.

Figure 3: Demand and Supply curve of recyclable plastics



Source: Author's own construct.

In contrast, the demand curve demonstrates how much of a good consumers are prepared to purchase as the price per unit of a particular good changes. The curve labelled D in the figure shows the demand curve and observes a constant slope. This is mainly because each firm's sales have little to no effect on the market price. The relationship between price and the quantity demanded can also be illustrated by means of an equation such that $Q_D = Q_D(P)$ (Pindyck & Rubinfeld, 2015).

With respect to this study, the sellers of the resource are identified as SWPs while the buyers of the resource are BBCs and HRCs. The resource in question is identified as the recyclable plastic waste collected by the SWPs. Owing to the many participants available in the informal recycling sector, each member in this market faces a substantial number of direct competitors. This is because each individual in the sector sells a sufficiently small proportion of total market output; each participant's decision has little to no impact on market price. Thus, each producer in the market takes the price as given; meaning firms in this sector operate in a somewhat perfectly competitive market.

Figure 3 above also illustrates what happens when there is a change in the price and supply of recyclable plastic material in the informal recycling sector. As mentioned above, the demand curve of a perfectly competitive market takes the form of a straight line; this is shown by line D_0 and D_1 and the supply curve is upward sloping shown by lines S_0 and S_1 . In the event of an

increase in the demand for plastic recyclables, this increases the price of each unit from P_0 to P_1 ; quantity supplied also increases from Q_0 to Q_1 . When there is a shift in the supply curve from S_0 to S_1 , this does not change the price per unit of each recyclable plastic but naturally increases quantity supplied from Q_1 to Q_2 .

2.4 Review of past empirical studies

There have been a significant number of local empirical studies focusing on waste pickers and the informal recycling sector in the past, conducted by several authors such as Blaauw, Schenck, Viljoen, Godfrey and Samson, amongst others. These authors have often taken a more general approach in their research by examining the working conditions and remuneration of waste pickers among different regions in South Africa; however, very few of these authors have examined the possible impact the recycling sector could potentially have on creating employment for lowly educated individuals in South Africa. This section will focus on reviewing the very few available local and international studies that focus on job creation in the lower end of the value chain of plastic recycling.

2.4.1 Socioeconomic issues in the waste sector

According to a study by Schenck and Blaauw (2011), the socioeconomic reasons identified for the uptake of street waste picking as a means of earning a living in Pretoria include the low levels of educational attainment that street waste pickers possess. In the study conducted by these authors, 20% of the respondents indicated that they had not received any education, while 36% only had primary education and 32% had completed secondary school. Similar results can also be found in a study conducted by Yu et al. (2020) in Bellville, where 34% of waste pickers only had primary education (Grades 4–7), 50% completed secondary school (Grades 8–11), and 16% had completed matric (Grade 12). None of the respondents had been in possession of any post-matric qualifications.

Furthermore, Yu et al. (2020) also found that poverty (26.19%), the need to financially support their families (21.43%), and social issues such as the addiction to narcotics and teenage pregnancy (19.05%) were among the key reasons for most waste pickers had not completing their matric qualification. With this, the informal recycling sector poses little to no barriers to entry, thus individuals with a low educational attainment often resort to this activity to combat poverty and unemployment.

Secondly, dire poverty conditions and unemployment prove to be another reason for individuals resorting to waste picking (Schenck & Blaauw, 2011). The authors identify that street waste picking is often either an option for individuals who have been retrenched, retired, have never had a job before or who have not been able to enter the labour market before becoming a waste picker. Therefore, the informal recycling sector is a market into which people can enter without having an extensive amount of resources or education, and can be seen as an opportunity to add to their income. In other words, the barriers to enter the recycling value chain, as a waste picker is relatively low in comparison with many other informal sector activities.

Lastly, an individual's household structure has an influence on the employment activities of the head of the household (Schenck, Blaauw & Viljoen, 2012). A number of studies have identified that in a household with no individuals with formal employment, the head of the household is often forced to look for any working opportunities in order to sustain the family (Schenck & Blaauw, 2011). In as much as the informal recycling sector provides a means of employment, the conditions under which they find themselves working are quite hazardous, and pose significant and potentially serious health related risks.

2.4.2 Working conditions in the informal recycling sector

Schenck and Blaauw (2011) identify that street waste picking is a very labour intensive form of work and relies heavily on an individual's physical strength. In this study, SWPs stated that they often have to walk long distances to acquire waste that they sell while pushing inadequate trolleys that have a negative impact on their long-term physical capacity. Street waste pickers interviewed in the study by Schenck and Blaauw (2011), reported that they often suffer body pains from pushing trolleys for long periods, eyesight problems as a result of inadequate protection from the sun and inexplicable coughs that could be caused by the unhygienic/contaminated materials with which they work.

Furthermore, for waste pickers to earn an income they have to sell their materials to BBCs. However, this comes with its own difficulties. Barnes et al. (2021) state that waste pickers mostly pull bulk bags or make use of trolleys to transport their materials and are often limited by the distances they are able to travel. In addition, Yu et al. (2020) also report that due to the long distances, reclaimers are often dependent on one BBC as their only source of income, regardless of the difference in the potential income between BBCs.

Street waste pickers also stated that they need to wake up very early to gain access to the materials; this has been both an advantage and disadvantage to them (Schenck & Blaauw, 2011). It is because waking up very early guarantees them the opportunity to access the waste materials before the municipality refuse truck takes it away or before any other waste picker gets access to it; however, criminal activities are also prevalent in this sector. Waste pickers reported to almost being raped while collecting waste during the dark winter mornings and nights. Street waste pickers also reported to being robbed of the little money they had made (Schenck & Blaauw, 2011).

2.4.3 Remuneration in the informal recycling sector

In its 2007 study, the World Bank identified that about one percent of the world's population earns a living through waste scavenging (Schenck & Blaauw, 2011). The authors further state that street waste pickers can only make a living if there is enough production of recyclable waste in the economy; however, the amount of waste produced differs among developed and developing countries. Schenck & Blaauw (2011) also state that developed countries produce more waste than developing countries.

A study by Viljoen, Schenck & Blaauw (2012) finds that BBCs not only give work opportunities on their sites, but they also indirectly create jobs in the informal sector at both the lower and upper ends of the recycling chain, notably SWPs and large recycling enterprises. Furthermore, the authors identify that the potential that BBCs have in creating employment should not be underestimated but should be stimulated by increasing the amount of waste that is recovered by BBCs through informal sector activities. The authors conclude by stating that the role of BBCs can be strengthened if recycling companies are in closer vicinity to the BBCs and also argue that BBCs can be regarded as an important link in the recycling industry (Viljoen, Schenck & Blaauw, 2012).

As price takers, street waste pickers sell their recyclable material at a given market price, which they have no control over (Dinler, 2016); this could potentially result in exploitation from BBCs. Schenck & Blaauw (2011) stated that on average, waste pickers received about R190-R600 per month at the time of their study; however, Samson (2015) states that waste pickers face the lowest wages in the informal sector. In the 2020 Yu et al. study, the authors discovered that the usual daily income that waste pickers receive for the sale of a typical

day's waste varied between R13 and R400, with a mean of R124. Additionally, when the number of working days are taken into account, waste pickers are said to earn an average of about R2 900 per month.

The price setting of recyclable waste follows a top down approach in which top tier recycling companies are the main setters of prices and further pass them on to BBCs. Furthermore, consumers or end-users of recycled-materials-based products determine demand for recyclables, and the volume of waste products given by BBCs determines supply. The prices that BBCs can give SWPs, on the other hand, are determined by the cost structure of each individual BBC. (Viljoen, Schenck & Blaauw, 2012). Their costs often include transportation and fuel bills, the rent or cost of the premises, workers' salaries, electricity costs and materials and equipment to sort and bale the recyclable waste (Viljoen, Schenck & Blaauw, 2012).

The lowest level of the income hierarchy is occupied by SWPs. This entails two issues that highlight their socioeconomic vulnerability: first, their bodies are subjected to severe physical strains as they come into direct contact with toxic waste elements, either by carrying it on their backs or pushing heavy carts; and second, they are paid the lowest and most irregularly in the recycling sector. (Viljoen, Schenck & Blaauw, 2012).

The BBC's owners do not pay SWPs on a regular basis. Payment is based on the amount of recyclables collected by SWPs and the price per kilogram charged by the BBC per recyclable item; if there is insufficient waste, they pay less, and if prices fall, they may pay less. Furthermore, because the amount of money a SWP makes is directly proportional to the amount of waste they bring in, SWPs have an incentive to bring the maximum amount of waste to increase his/her income, which is also to the benefit of the BBC owner (Dinler, 2016).

2.4.4 Opportunities for reform in the informal recycling sector

Quality data on solid-waste generation and management in Africa has proven to be difficult to attain and this has inhibited the improvement of programmes that have the potential to promote the resourceful use of solid waste in Africa (Simelane & Mohee, 2012). However, recent findings by Godfrey (2015) revealed that in 2012, the South African waste sector was valued at R15,3 billion, which accounted for 0.51% of the country's GDP; about 30 000

people are employed in this sector, 67% of which are employed by the government. However, a double of this number of people (about 60 000-90 000) earn a living through informal channels in the waste sector. The South African waste sector further provides an opportunity to recover valuable materials and return them to the local manufacturing economy, and also helps create job opportunities to low skilled and unemployed citizens.

In addition, Godfrey and Oelofse (2017) state that recycling has been taking place in South Africa for more than three decades and has been primarily motivated by social and economic needs. These authors identify that while the waste management hierarchy can be found in national policy, the extensive legislative framework has made it difficult for the public and private sector to remain compliant and competitive in a local and global market, and still drive waste away from landfills towards reuse, recycling and recovery.

Furthermore, the South African government has actively promoted co-operatives as a manner of formalising the informal sector, by enhancing job creation and enterprise development. However, waste and recycling co-operatives in South Africa have suffered from a very high failure rate of 91.8 percent (Godfrey & Oelofse, 2017). In another study, Godfrey et al. (2017) acknowledge that evidence suggests that the majority of co-operatives in the waste and recycling sector tend to fail within the first few months of operating. This is mainly because co-operatives in South Africa face several challenges in infrastructure, such as the lack of access transport, equipment, and premises for sorting and storing recyclables. In addition, they also face operational challenges such as difficulty in accessing markets or theft of recyclables, and insufficient skills to operate a business; these were found as the reasons that hinder the successful implementation of co-operatives in the waste sector.

Godfrey et al. (2017) argue that in an effort to formalise the informal waste sector, fast-track enterprise development and job creation, the government led a strong top-down approach to the registration of co-operatives. Many of these co-operative members, however, without the requisite support structures, return to informal waste picking, leaving one or two co-operative members with significant financial obligations and liabilities. The authors further identify that while training is important, it is not enough to sustain waste and recycling co-operatives. The success of waste co-operatives largely depends on closer hand-holding, mentorship and incubation in order to develop the business and technical skills needed to run co-operatives as

sustainable businesses, capable of not only creating jobs and enhancing livelihoods, but also making an impact on the diversion of recyclable waste from landfills.

2.4.5 Linkages in the formal and informal recycling sector

In order to sustain both the informal and formal recycling sector, linkages between the two are necessary in order to keep them both functioning (Barnes et al. 2021). In South Africa, BBCs are the key components in providing these linkages. Therefore, BBCs are a key vehicle and intermediary who support the flow from the source to the market, and can be used to increase employment opportunities throughout the value chain, positively influencing the efficiency of the entire recycling industry. Schenck and Blaauw (2011) also point out that as a result of the activities of BBCs, employment is created upstream and downstream.

Hoffman & Schenck (2020) investigated the value chain of polyethylene terephthalate (PET) plastics and how employment opportunities can be mapped in the value chain of PET. The authors stress the importance of acknowledging that entrepreneurship could potentially assist in the decreasing of unemployment given that more opportunities are presented in the waste economy.

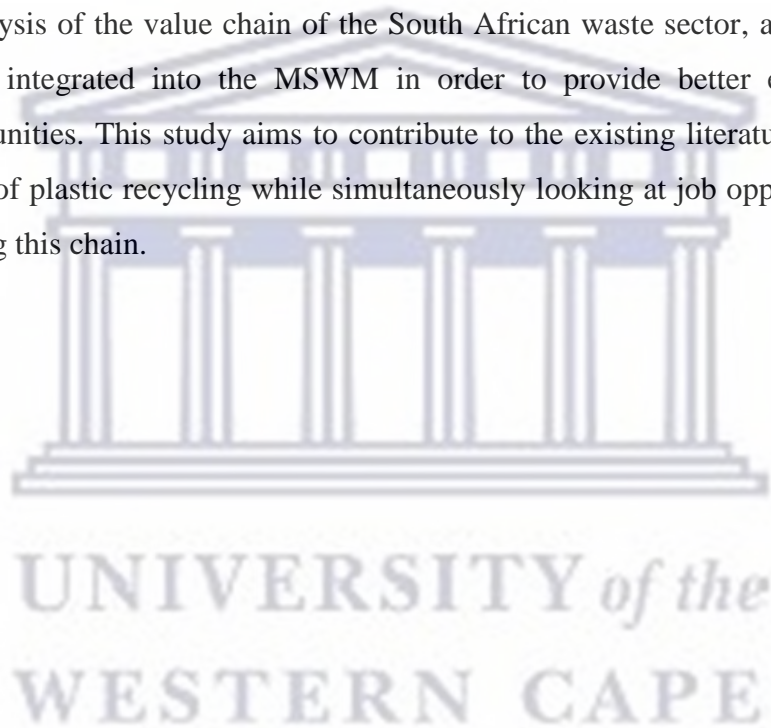
In the year 2018, plastic recycling sustained 7 892 formal jobs in the recycling factories. It is estimated that 58 470 workers received an income through the supply chain. These include waste pickers and employees of smaller entrepreneurial collectors (PlasticsSA, 2019). However, in 2019 PlasticsSA identified that about 58 750 informal income opportunities were sustained through plastic recycling in 2019 (an increase of 280 jobs from 2018). These were all inclusive of waste pickers and employees of the smaller entrepreneurial collectors. At an average of R4.10 per kilogram for polyolefins, a total of R2 065 million was contributed to the informal collection industry by the recycling industry (PlasticsSA, 2019).

The informal economy is long-term in nature (Blaauw, 2017 and Godfrey & Oelofse, 2017). Blaauw (2017) states that between 1951 and 1991, the average period of an informal sector worker held an informal job was 10.5 years. In a study on more than 3000 day labourers searching for informal employment, conducted by Blaauw in 2010, it was found that some South Africans had been performing such type of work their entire lives. The author found that 50.2 percent of day labourers interviewed in his study had previously been employed in the formal sector (Blaauw, 2010) and from a total of 893 street waste pickers interviewed by

Viljoen (2014), 52.4 percent of the interviewees had formerly held a full-time job with benefits. In both studies, dismissals accounted for the overwhelming majority of exits from the formal sector. Blaauw (2017) further adds that participants in the informal economy often have a lower level of educational attainment than those in the formal economy. This makes it difficult for them to move swiftly into the formal economy, which explains why people tend to remain in the informal economy for long periods.

2.5 Conclusion

A large majority of local studies on the informal recycling economy have focussed more on the livelihoods and remuneration of street waste pickers, while very few local studies provide an in-depth analysis of the value chain of the South African waste sector, and how they can be successfully integrated into the MSWM in order to provide better employment and payment opportunities. This study aims to contribute to the existing literature by examining the value chain of plastic recycling while simultaneously looking at job opportunities for the low skilled along this chain.



CHAPTER THREE: METHODOLOGY AND DATA

3.1 Introduction

This chapter presents the data and methodology employed in this study. The remaining sections of this chapter are presented as follows: Section 3.2 explains the research and sampling methods used in the study. Section 3.3 provides an overview of the data collection methods utilised in this study. Section 3.4 explains the data analysis methods that guide the research. Section 3.5 outlines the interview guidelines followed in this research. Section 3.6 explains the limitations that were met, while Section 3.7 provides an outline of ethical values to guide the research, before Section 3.8 concludes the chapter.

3.2 Research design and sampling methods

Owing to the nature of the study, the research adopts a mixed methodology in which quantitative and qualitative techniques will be combined. This study aims to conduct an investigation on Street Waste Pickers (SWPs), Buy-Back Centres (BBCs) and High-end Recycling Companies (HRCs) in order to assess the employment creation opportunities across the value chain.

This study utilises the descriptive case study as the research approach. Descriptive case studies are concerned with how and why things happen, which allows the researcher to discover contextual realities and differences between what was planned and what actually occurred (Noor, 2008). Descriptive case studies are particularly useful where one needs to understand some particular problem or situation in great-depth, and where one can identify cases rich in information (Noor, 2008; Yin, 2003). This research design method is beneficial for this study as it allows for the opportunity to integrate both the quantitative and qualitative data collection methods. Furthermore, it allows for the observation of a subject in its most natural environment.

The sampling methods used in this study contain elements of both probability and non-probability sampling techniques. In a large group of street waste pickers, the simple random sampling technique and snowball technique is utilised. The simple random sampling technique is a form of sampling whereby every individual within a population has an equal chance of being included in the sample (Gideon, 2012). In this study, this sampling technique gives each street waste picker in the study area an equal chance to participate in the research.

Concurrently, the snowball sampling technique is also used. Snowball sampling is described as chain referral sampling. This is a sampling technique whereby each research participant is asked to identify one or more additional people who meet certain characteristics and might be willing to participate in the research study (Gideon, 2012). Over time, each new participant may lead to new potential participants making the total sample size larger and larger. The first element will be identified using purposive sampling by judging whether or not an individual that is spotted fits the criteria of a SWP.

Purposive sampling is also used in this study. The purposive sampling technique is used when a researcher knows the characteristics of the target population and further seeks out specific individuals who have those characteristics to include in the sample (Gideon, 2012). This sampling technique is ideal in this research because it allows the researcher to approach the exact individuals with the information required. This technique is particularly useful because the researcher aimed to work with participants who were involved and knowledgeable about the more formalised side of waste management in the Cape Town areas. This meant interviewing BBCs and HRCs that specifically work with plastic materials amongst other recyclables. Besides in-depth interviewing, the researcher also personally observes the processes involved in each stage of the plastic recycling sector.

For the purpose of this research, 110 SWPs were interviewed. Interviews began on the 2nd of November 2020 up until the 5th of November 2020. However, only 100 interview samples could be used due to errors found upon further inspection of the survey data. Often, non-probability samples make it difficult to justify generalisations of the population. To overcome this problem, a large sample of street waste pickers was needed to be able to make generalisations. Thus, the sample size was important, as it was the determining factor of whether or not statistical and/or analytic generalisations can be made (Viljoen, 2014). Moreover, in most cases, larger samples are most likely to give precise estimates about a population; that is, larger sample sizes produce many narrow confidence intervals (Gideon, 2012). In addition, 5 BBCs' and 4 HRCs' managing members were interviewed. BBCs that specifically purchase and sell recyclable plastic materials were hard to locate, particularly because of the advent of the Covid-19 global pandemic. Most BBCs saw themselves closing their doors completely or rather terminating their partnership with SWPs and trading with malls/shopping centres. Interviews with both BBCs and HRCs took place during the same period according to each prospective interviewee's availability. The first interview took place

on the 26th of October 2020 and the last interview was on the 10th of December 2020. All interviews took place on a personal and face-to-face basis at the location of the respective organisations.

One of the secondary aims of this research is to get an in-depth understanding of the linkages between the formal and informal recycling sectors; therefore, only BBCs that worked closely with SWPs were to be interviewed. Regarding HRCs, the nature of the type of company on its own requires an extensive amount of capital; therefore, there are only a few available around Cape Town, and they were also quite difficult to reach.

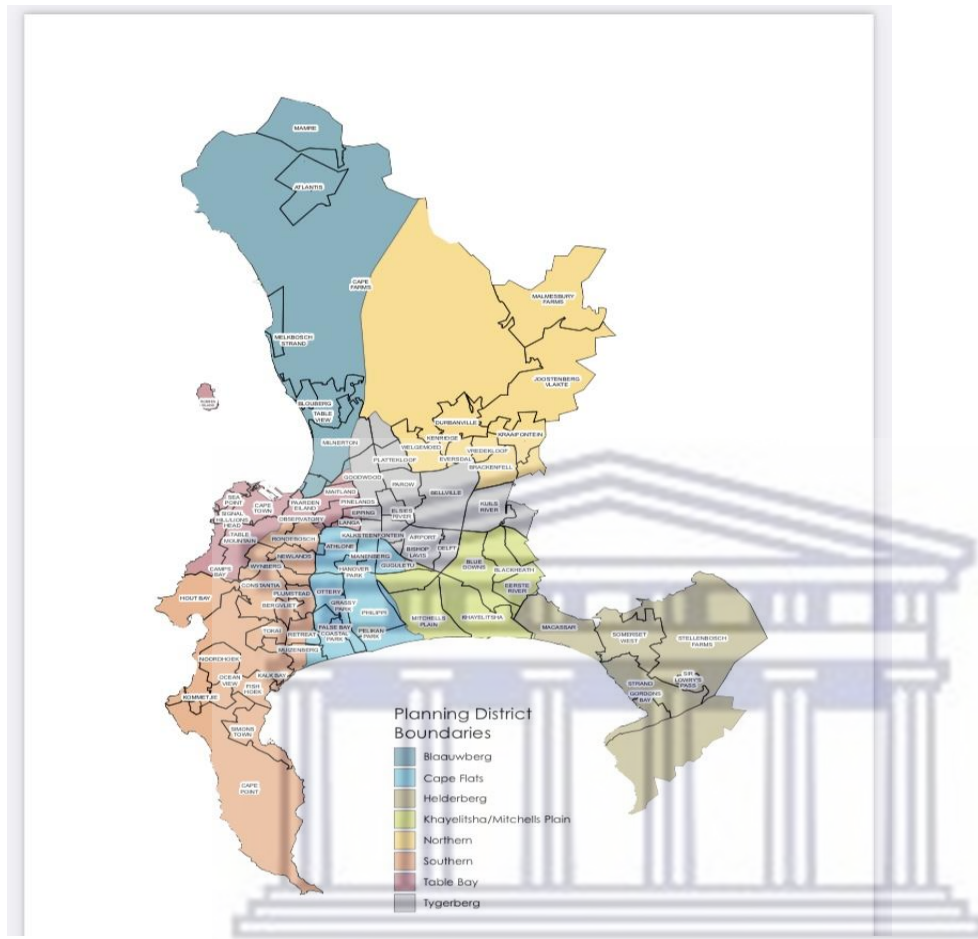
3.3 Data collection methods

SWPs are the target population for this study, as they constitute the main source of information for this research. However, because the research aims to find the prospects of job creation along the value chain of plastic recycling, several BBCs and High-end plastic recycling companies were also interviewed. This research targeted SWPs, BBCs and HRCs from Cape Town and surrounding areas only.

The geographic areas of interest varied across the study. This is mainly due to the large sample size of SWPs for the research and the dispersed geographical locations of the different BBCs and HRCs. The majority of the SWPs were approached at the BBCs (to which they were selling) while they waited in line or after they had sold all their materials for that particular day, this was done in order to not disturb them while they work and to give them a chance to properly engage with us. This approach is also in line with the approach followed by Viljoen (2014) in her country-wide study on SWPs.

However, some SWPs were approached in an open field while they were sorting their materials in preparation of selling them at the nearest BBC. The areas in which most SWPs were located, included Parow Industria (Sub-council 4), Bishop Lavis (Sub-council 5), Woodstock (Sub-council 16), Montague Gardens (Sub-council 3), Kraaifontein (Sub-council 2) and Stellenbosch. Furthermore, the BBCs formally interviewed for the study were situated in Kraaifontein (KWR Recycling), Bishop Lavis (Grace Recycling), Parow Industria (Top Recyclers), Elsie's River (Mixed Steel Dealers) and Stellenbosch (CL Trading). Finally, the HRCs interviewed were located in Bellville South (Supaplas and Myplas), Beaconvale (Atlantic Plastic Recycling) and Elsie's River (Top Plastique).

Figure 4: Map of the different areas covered



Source: City of Cape Town (2017).

Primary data collection for this study involved administering different self-developed (ethics approval: HS19/10/33) questionnaires for SWP, BBCs and HRCs. These all contain items of distinct formats: such as self-assessment, closed and open-ended questions. The questionnaire for SWPs¹ consisted of 39 questions, divided into six sections, namely demographic and education characteristics, employment history, employment factors in the plastic recycling informal sector, remuneration in the plastic recycling informal sector, facilitating factors (opportunities) and impediments (threats).

Secondly, the questionnaire for BBCs consisted of 28 questions, separated by means of seven sections, such as demographic and education characteristics, ownership and operations, waste

¹ Questionnaires may be found in the appendix section.

products and prices, buyers, support to waste pickers, facilitating factors (opportunities) and impediments (threats).

Lastly, the questionnaire for HRCs comprised 19 questions in total with four sections, namely demographic, education and employment characteristics, acknowledgement of street waste pickers, facilitating factors (opportunities) and scope for change. Some questions in all the surveys included open-ended “other” options in order for participants to be able to specify their preferred answer and/or be able to state a reason for their answer of choice. Questions asked in each of the three questionnaires can be seen in Appendix 1.

3.4 Data analysis – Quantitative and Qualitative

Street waste pickers are often considered a population that is difficult to research as they are hard to reach due to the nature of their work (Viljoen, 2014). Therefore, to extract key information regarding the research question and objectives, different techniques of analysis had to be used.

As previously mentioned, this research adopts both quantitative and qualitative research methods. According to Almaki (2016), quantitative research includes dividing a population into smaller, manageable pieces. It is within these reduced divisions that interpretations can be made; hypotheses can be tested and reproduced regarding the relationships among variables. This approach is characterised by the researcher putting forward a theory that is demonstrated within a specific hypothesis, which is then put to the test; conclusions can then be drawn with regard to this hypothesis, following a series of observations and an analysis of data. With this particular study, this can be seen as the examination of the relationship between the incomes of SWPs and various independent variables, such as age, gender, race, educational attainment and the use of a trolley. Additionally, quantitative research also relates to the use of mathematically based methods, which focus on surveys that gather numerical data and generalise it across groups of people, frequencies and relationships between different variables.

In contrast, qualitative research is concerned with collecting non-numerical data to understand concepts, opinions or experiences. It places emphasis upon exploring and understanding the meaning that individuals or groups ascribe to a social or human problem. This approach may also be described as gaining perspective on issues from investigating

them in their own specific context and the meaning that individuals bring to them. It focuses upon drawing meaning from the experiences and opinions of participants.

The qualitative data in this study are analysed by means of a thematic analysis given the small sample size of the qualitative data used in this study. The quantitative data elements are captured and analysed in the STATA software package.

To quantify the prospects of decent job creation for SWPs, it is important to look closely at their income patterns as well. Therefore, the income variable serves as the outcome variable for this study. In addition, the different variables that influence income also need to be analysed to understand whether they have a positive or negative effect on the income patterns of SWPs. These explanatory variables include gender, age, the use of a trolley and educational attainment. These variables were analysed by means of both descriptive statistics and Ordinary-Least Squares (OLS) regressions.

The qualitative analysis of the data of the BBCs and HRCs consisted of themes drawn from the thematic analysis performed on the findings of the qualitative interviews. The main aim was to identify how much of an impact these stakeholders have in the upliftment of SWPs. This was done to recognise the impact that they have in creating decent employment opportunities for SWPs and to what extent they are able to provide assistance to SWPs.

3.5 Interview guidelines

As mentioned above, SWPs were interviewed at the respective BBCs where they were found or open fields in order to not prevent them from doing their activities. All BBCs' and HRCs' executives were interviewed in their offices.

Before the interviews could commence, all participants were asked for their permission and once they had agreed to be interviewed, they were required to sign a consent form to state that they were willing to continue with the interview. Furthermore, permission was also sought from SWPs to take pictures of the different types of trolleys that they used, as there was a vast range of them, which proved to be an interesting source of information. SWPs were assured that they could withdraw from the interview anytime they wished, and that they did not have to answer questions with which they were not comfortable. Lastly, to earn their trust, SWPs were assured that we were not from any government institution and that we had

no intentions of disrupting their means of obtaining a livelihood. Rather, all research data was only to be used for academic purposes and all data collected from them will be distributed to academic professionals only for the purpose of an on-going research; it will in no way be possible to trace the responses back to them.

All safety measurements were adhered to with regards to COVID-19. Fieldworkers were all provided with masks and sanitizers, which they were encouraged to make use of frequently. Furthermore, they were instructed to avoid close contact with an interviewee and rather keep a safe social distance.

3.6 Possible limitations

The interviews took place in predominantly Afrikaans-speaking Coloured communities; hence, there were potential language barriers for the fieldworkers. To combat this, each team of fieldworkers² had at least one Afrikaans speaking individual who could help with translating when needed. However, the majority of the SWPs could understand English and this was the main language of communication.

Interview answer sheets were paper-based and therefore, susceptible to human error. To combat this, training was provided to fieldworkers where all the questions were explained thoroughly. With regards to BBCs and HRCs, the researcher herself was responsible for the administration of these questionnaires. These were conducted using face-to-face interviews with the owners of BBCs and HRCs according to their availability.

3.7 Ethical considerations

This study uses primary data and therefore, requires ethical clearance obtained from the University of the Western Cape (UWC) Humanities and Social Sciences Research Ethics Committee (HSSREC). Ethical clearance was obtained with reference number HS19/10/33. In addition, this research is guided by ethical considerations such as the freedom for each participant to withdraw from participating in the study, guaranteed anonymity of each participant providing insight into the study and also refraining from using deception to get the desired response from the participants. In addition, informed consent was sought before the commencement of interviews. Psychological and physical harm was avoided at all costs.

² 12 fieldworkers were employed for this study and six (50%) were Afrikaans-speaking individuals.

3.8 Conclusion

This chapter presented the research approach and design guiding the researcher, the sample size and sampling techniques employed, the data collection and analysis methods used and also the ethical considerations to be upheld by the researcher in the study. The following chapter provides the empirical findings associated with this study.



CHAPTER FOUR: EMPIRICAL FINDINGS

4.1 Introduction

This chapter provides the empirical findings pertaining to this research. It is structured as follows: Section 4.2 presents the descriptive statistics from the primary data collected in this study, Section 4.3 provides the econometric analysis and Section 4.4 concludes the chapter.

4.2 Descriptive statistics

4.2.1 Demographic characteristics of the participants

Table 3 below shows the demographic characteristics of the study participants. The demographic characteristics of SWPs, BBCs and HRCs are described by gender, ethnic group, age and education.

Table 3: Demographic characteristics of each group of survey participants (%)

	SWPs (n = 100)	BBCs (n = 5)	HRCs (n = 4)
<u>Gender</u>			
Male	75	100	100
Female	25	0	0
	100	100	100
<u>Ethnic group</u>			
African	11	0	0
Coloured	87	40	50
White	0	60	50
Indian/Asian	0	0	0
Other/Unspecified	2	0	0
	100	100	100
<u>Age</u>			
<18 years	0	0	0
18-25 years	5	20	0
26-35 years	37	20	0
36-45 years	28	20	0
46-55 years	23	20	75
>56 years	7	20	25
	100	100	100
<u>Education</u>			

None	3	0	0
Primary (Grade 1-7)	33	0	0
Secondary (Grade 8-11)	52	0	0
Matric (Grade 12)	11	20	75
Matric + Cert/Dip	1	80	25
	100	100	100

Source: Author's own calculations from survey data.

Gender

The results indicate that the recycling sector in the study area is male dominated.

Amongst 100 SWPs interviewed, 75% of the SWPs were men. These results are akin to the findings of Schenck & Blaauw (2011) and Yu et al. (2020), which identified that men are more likely to take up street waste picking than women. Street waste picking involves physical labour such as scratching through numerous dustbins in search of recyclable material and carrying heavy loads of waste materials over long distances. This may be one of the main reasons behind the dominance of men in street waste picking as an informal occupation, because women generally do not have the same physical strength as men. Respondents from BBCs and HRCs were all men (five and four men, respectively).

Ethnic group

An overwhelming majority of the SWPs interviewed were Coloured (87%). Africans made up only 11%, while the rest of the respondents did not specify their ethnic group. Part of the reason for the large prevalence of Coloured respondents is because most of the areas in which SWPs were interviewed were Coloured-dominated areas such as Bishop Lavis, Parow industria, Kraaifontein and Stellenbosch. The results are similar to the findings of Yu et al. (2020) in a study of street waste pickers in the Bellville area where they found 92% of the SWPs to be Coloured. In relation to the owners of BBCs, three of the respondents were White, while two were Coloured. In addition, two of the managing members of the HRCs were Coloured and two were White.

Age

The majority of the SWPs (37 percent) were concentrated between the ages of 26-35 years. The ages of the SWPs ranged from 18 years to 56 years and above. Furthermore, 28 and 23 percent of the respondents were between the ages 36-45 and 46-55 years, respectively.

The high percentage of young people participating in street waste picking is a manifestation of the very high youth unemployment levels in South Africa. The official unemployment rate amongst the youth (ages 15-24 years) in South Africa was 63.3% and 41.3% among the ages of 25-34 years in the first quarter of 2021 (StatsSA, 2021).

It is also important to take note of the age structure of SWPs since there is a lot of evidence that suggests that the older SWPs are, the more difficult it is for them to find formal employment (Viljoen, 2014). Furthermore, Viljoen (2014) also reports that there is a notable increasing trend in discrimination against older job seekers and states that age is a limiting factor in finding employment. This means that the older a candidate, the more difficult it may be for them to secure formal employment regardless of their human capital attainment.

With respect to BBCs, three of the respondents were between 36-45 years and only one of the owners was between 46-55 years. Lastly, the ages of all interviewees of HRCs were spread across all age groups.

Education

The majority (52%) of SWPs completed some secondary schooling (Grade 8-11). 33% of SWPs had completed their primary school education (Grade 1-7), while only 11% of the SWPs had completed matric (Grade 12) and only one SWPs was in possession of a post-Matric qualification. Samson (2009) as well as Schenck & Blaauw (2011) identified that most SWPs have low literacy levels, do not have any formally acquired labour market skills and also have low levels of formal educational attainment. These characteristics have dire effects on an individual's socio-economic circumstances.

The main reasons behind SWPs leaving school before completing Grade 12, as identified by Yu et al. (2020), include poverty, the need to financially support their families and personal reasons such as narcotic addiction and teenage pregnancy. The low levels of educational attainment can also be identified as a barrier that prevents SWPs from finding decent formal employment and is also the reason why most SWPs struggle to improve their socio-economic conditions. However, it also makes the opportunities that waste picking offers to those with low educational attainment levels that more important (Viljoen, 2014).

Lastly, all owners of the BBCs had completed Matric and four (80%) had tertiary qualifications. Similarly, all managing members of HRCs had a matric certificate; however, only one of the respondents had a tertiary qualification.

4.2.2 Key findings from the street waste pickers survey

4.2.2.1 Employment history of street waste pickers

The vast majority (85%) of the interviewed SWP reported that they had previously held a job that involved the receipt of a payslip. Furthermore, 95% of SWPs claimed they would like a full-time job, while five percent showed no interest in obtaining formal employment for reasons including the independence that waste picking affords them. Most SWPs do not enter street waste picking as their employment of choice but rather enter this occupation as a last resort to combat poverty after losing their jobs due to business layoffs and being unable to secure alternative employment (Yu et al., 2020).

4.2.2.2 Income patterns of street waste pickers

The income analysis shows that SWPs earn their income either on the same day in which they had collected their recyclable waste or on a weekly basis. Most of the SWPs reported selling their waste products daily (85 %) and only 15% sold their waste on a weekly basis. The frequency of these sales is a clear indication of how variable and unpredictable their income is. Yu et al. (2020) reported that in order for SWPs to increase their earnings, they occasionally have to sell recyclables more than once a day, depending on its availability.

On average, SWPs earned about R154.72 for a day's waste and R631.96 for a week's waste (Table 4). The last income from SWPs revealed that those who sold daily received about R153.32 from their last sale of waste and R176.09 for those who sold weekly. These findings show that most SWPs earn meagre incomes, especially after considering that the SWPs had at least three dependents reliant on their income. Surprisingly, nearly one quarter of SWPs (23%) reported receiving social grants from the government. The types of social grants received by these interviewees included the Covid-19 Social Relief of Distress (SRD) grant, child support grant, disability grant and the old age grant (See Appendix 2 Table A2.2).

Table 4: Summary earnings of SWPs (Rands)

Income measure	[I]	[II]	[III]	[IV]
Minimum	20	71	12	14
Mean	154.72	631.96	119.37	136.20
Median	120	460	70	80
Maximum	800	4800	850	575
Standard deviation	141.44	667.81	153.32	176.09
Number of responses (n)	93	77	83	15

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

Note:

[I]: Usual income for a day's waste (Rand)

[II]: Usual income for a week's waste (Rand)

[III]: Last income received from the sale of waste daily (Rand)

[IV]: Last income received from the sale of waste weekly (Rand)

The South African national minimum wage set by the Presidency indicates that workers are entitled to nothing less than R21.69 per hour for a job done (DOL, 2021). It is imperative to note that SWPs do not have set working hours under which they operate but instead continue working until they have reached the sufficient amount of waste that they require (Yu et al., 2020). SWPs work between two to 14 hours a day, with 68% of them working longer than nine hours per day. Considering this and the average earnings that SWPs receive on a daily basis, it can be shown that if SWPs were to work for nine hours as stated in the Basic Conditions of Employment Act they would make at least R17.19 per hour³. In addition, the low pay of SWPs is exacerbated by the lack of social protection for times when their work is disrupted, including during the COVID-19 pandemic and the global financial crisis (Barford & Ahmad, 2021).

This is a clear indication that SWPs are mostly subjected to meagre earnings regardless of the important role that they play in diverting approximately 80-90% of postconsumer paper and packaging collected in South Africa for recycling companies. SWPs also assist municipalities by extending the life of landfills thus saving them about R750 million a year in landfill airspace waste (Samson, 2021). Additionally, SWPs also help reduce municipalities' costs related to the collection and transportation of waste. With this, SWPs do not get compensated

³ This amount is derived by using the average daily income of SWPs (R154.72) and dividing it by nine hours of a working day (excluding lunch hour) as stipulated in the Basic Conditions of Employment Act (BCEA, 1997).

for the services that they provide but are often subjected to competition with private waste companies that have more resources than they do, whereas they subsidise both municipalities and industries (Samson, 2021).

The state, together with the municipality, has the potential to change this in the form of forging integration between SWPs and the municipality in order to create employment. According to Samson (2021), this may only be possible if an enabling environment and support from the government is provided to municipalities. SWPs already play an important role in the recycling industry by supplying recyclables to the major players in the recycling industry, thus, simultaneously saving the municipality landfill space. Therefore, it is important that municipalities contribute towards paying them for removing waste from landfills and recycling it, and also improving their access to recyclable waste by opening and servicing landfill sites as this could be one way of making jobs more decent and fair for SWPs.

SWPs who reported to using a trolley earned more (a rise of between 55 and 85 percent) than their counterparts who did not use one (Table 5). In order for SWPs to earn a decent income, they rely heavily on the amount of recyclable material they can collect and sell. This means that the more products a street waste picker can bring to the BBC, the more income he/she may receive. From this research, having a trolley to transport waste proved to be an advantage. Thus, the provision of functional equipment to store and transport waste could be very fruitful in this sector as it could be a driving force to facilitating the creation of decent employment.

Table 5: Mean and Median earnings of SWPs (Rands)

	Mean				Median			
	[I]	[II]	[III]	[IV]	[I]	[II]	[III]	[IV]
Income by use of a trolley								
Uses a trolley	169.67	688.18	133.03	167.90	120	481	75	80
Does not use a trolley	109.22	433.53	74.70	72.80	100	320	65	60
Income by gender								
Male	170.35	697.29	136.50	115.67	120	500	74	72
Female	112.20	417.83	71.86	218.33	90	300	61.5	90
Income by Ethnic group								

African/Black	291.25	975.00	287.50	111.33	225	425	275	120
Coloured	141.31	572.48	96.59	149.91	100	460	70	80
Other	165.00	850.00	260.00	0.00	165	850	260	0
Income by age								
18-25 years	88.20	395.00	68.67	14.00	106	390	70	14
26-35 years	165.22	566.67	115.10	154.17	120	400	70	85
36-45 years	167.60	656.58	139.88	96.25	150	500	100	95
46-55 years	134.29	779.56	106.32	219.67	90	310	60	64
56 years and above	165.00	591.67	126.17	60.00	165	500	66	60
Income by education								
No schooling	250.00	275.00	250.00	64.00	250	275	250	64
Primary	176.61	962.28	142.23	60.00	90	500	70	60
Secondary	142.10	516.46	101.54	85.00	120	400	75	80
Matric	153.50	562.50	141.00	67.00	120	450	55	67
Post-Matric	300.00	1500.0	0.00	575.00	300	1500	0	575

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

Note:

[I]: Usual income for a day's waste

[II]: Usual income for a week's waste

[III]: Last income received from the sale of waste daily

[IV]: Last income received from the sale of waste weekly

Our study found that 37% of SWPs indicated that the provision of trolleys and protective gear was what they needed the most from the government. As mentioned previously, trolleys play a significant role in the income patterns of SWPs; hence, assistance in this regard would be beneficial in the creation and sustenance of decent employment opportunities for SWPs. The government has always seen the recycling industry as having the potential to generate employment (Godfrey et al., 2017). However, the manner in which this can be achieved remains unclear. Nevertheless, the state still has a distinct responsibility in improving the income generating opportunities for SWPs by means of ensuring a safe and healthy working environment.

One of the few barriers to entry for the informal recycling industry may be gender (Table 5). The findings indicate that men make more money than women do. This difference is

statistically significant as shown by means of an Analysis of Variance test (ANOVA)⁴ conducted on the daily income of SWPs. **There is not much difference when comparing the average earnings by race, age and educational attainment.** This is also substantiated by means of an ANOVA test conducted in this study (tested on the daily income of SWPs)⁵. These results reveal that individuals do not need an extensive set of skills to join the activities SWPs do and investment in this sector could potentially assist in absorbing the large amount of unskilled unemployed citizens of South Africa. This would also help decrease the level of unemployment in the country.

SWPs are often excluded from waste management and recycling strategies and plans that government officials propose. This is mostly because they are regarded as people who are in need of assistance rather than self-employed individuals who have the most knowledge on the industry in which they work. Recently, the city of Johannesburg, in partnership with Pikitup, tabled a plan which includes charging residents whose properties were valued at R350 000 a R50 recycling fee, this fee is expected to be paid in addition to existing levies for waste management and disposal. According to Pikitup, residents will receive a separate bag in which they will place recyclable items for collection solely by Pikitup's team (Mafata, 2021).

This plan threatens the work that SWPs do, in the sense that if this plan is implemented it would mean that residents would be paying for a service that will not be delivered by the private companies, but instead by SWPs, as they often arrive before private company collection trucks arrive. Furthermore, this would also mean that even though SWPs would have been the ones to collect the recyclable materials, private companies would still receive payment on a job they have not done. This plan does not improve but rather kills off a system that is highly efficient and needs support.

4.2.2.3 Activities and working conditions of street waste pickers

SWPs need to carefully discern between the types of materials that they collect. This is particularly important because BBCs pay different amounts for each type of plastic. It is also important to note that SWPs do not only collect one type of plastic material but rather collect all recyclable plastic materials that they deem valuable and then sort the plastic materials

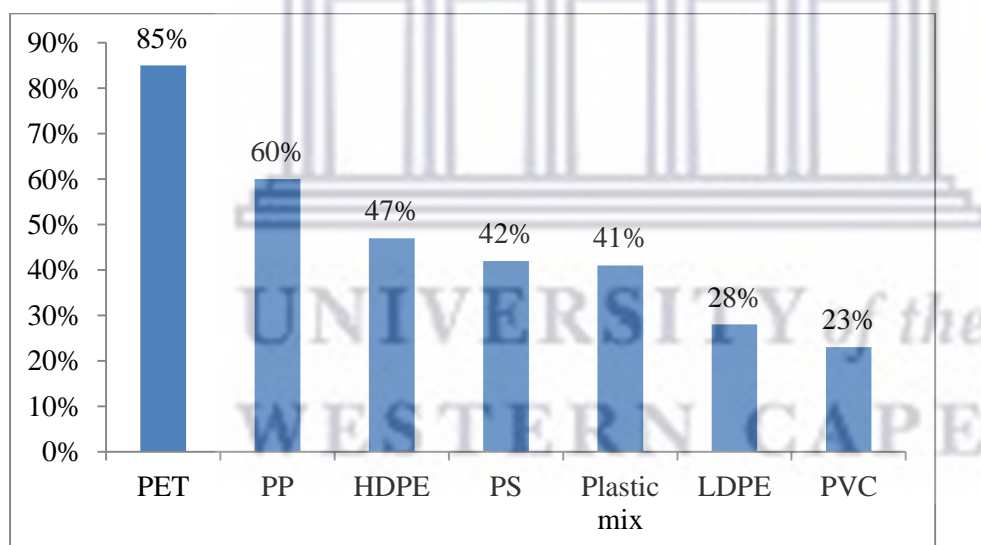
⁴ ANOVA table may be found in Appendix 2, Table A2.5.

⁵ The ANOVA results show that there is significant racial differences (see the 0.0149 probability in the table) at alpha = 1%, significant gender differences (see the 0.0787 probability in the table) only at alpha = 10%, but the age differences are INSIGNIFICANT (see the 0.7472 probability in the table).

according to their respective types before selling them. This also emphasises how labour intensive this job is, as it does not end at the collection and transportation stage, the materials need to be further sorted and cleaned before any sale can take place.

A high proportion of the SWPs in this study collected PET bottles (85%) while Polypropylene (PP) accounted for 60%. Figure 5 below shows the variations of the different types of plastics street waste pickers collect. It is important to note that SWPs have an impeccable knowledge of differentiating between the different types of plastics just through inspection; this enables them to only collect recyclables that hold a lot of value. Interestingly, PET and PP held the most value at the BBCs (averaging at R3.00 and R2.00 per kg, respectively), which was what most SWPs collected. This knowledge could prove to be advantageous in the integration of SWPs into a more formalised structure as a means to create decent employment, as there would not be a lot of training required.

Figure 5: The different types of plastics collected by SWPs



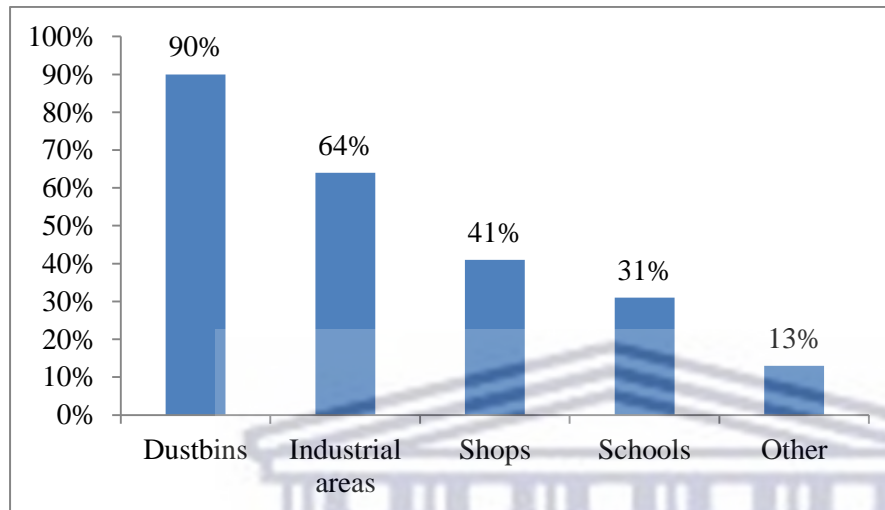
Note: The respondents could choose more than one option

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

An overwhelming 90% of the SWPs found their waste in dustbins outside houses; while 31%, 64% and 41% found the waste at schools, shops and industrial areas, respectively (see Figure 6 below). Recyclable materials are not easily accessible. SWPs often have to go through significant trouble and effort to attain them and are often met with hostility from the

general public while they conduct their jobs. This is mainly because they are assumed to have sinister motives.

Figure 6: Locations in which SWPs source their recyclable waste



The respondents could declare more than one location

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

Additionally, SWPs stated that part of the things that make their jobs difficult is the humiliation they face from residents while collecting waste; they wished that there would be a way to make recyclable waste more accessible. To combat this humiliation, Johannesburg SWPs participated in a multi-stakeholder pilot project (in conjunction with the African Reclaimers Organisation (ARO), PETCO and Unilever), which began in Johannesburg. The aim of this project was to build an understanding relationship between SWPs and residents, to provide income security for SWPs and also improve their working conditions. This project entailed providing residents with clear plastic bags in which they could insert recyclable items, which were to be collected by uniformed SWPs with an identification document (Samson, 2021). This proved to save SWPs a lot of time as they did not have to search bins for recyclable materials and could move quickly between areas. The success of this project is a prime example of what can be done to ensure more dignified access to waste in order to increase the income generating potential of SWPs and further create safer and better working conditions.

Trolleys are identified as the main mode of transportation that SWPs use to move their waste during their collection, and then to the respective BBCs to whom they sell. SWPs

often move across different areas while collecting recyclable plastic materials to collect as much as they can. However, not all SWPs have access to the trolleys for reasons such as them being expensive to acquire, difficult to use, being unavailable to them, theft and being broken (see Table 6 below).

Table 5: Use of trolley by waste pickers (%)

Use of a trolley to collect waste	
Yes	76
No	24
Type of trolley used, if trolley is used	
Normal (Shoprite/Pick n Pay type)	25
Manmade trolley	50
Black refuse bin	1
How to collect waste if trolley is not used	
Black bags	23
Carry by hand	1
Reason for not using a trolley ⁶	
Expensive	7
Difficult to use	1
Unavailable	9
Stolen	7
Broken	3

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

The majority of SWPs who reported to using a trolley created their own trolleys from a collection of materials (see images below). As much as this can be seen as a creative solution, for the work that SWPs do, they deserve more than what is currently presented to them. As mentioned previously, trolleys also serve as a means to help SWPs maximise their income. In order for decent employment opportunities to be presented to SWPs, better trolleys that satisfy their needs (capacity and usability) should to be provided to them.

⁶ Respondents could choose more than one option.

Images of four makeshift trolleys (taken in November 2020 during the data collection fieldwork)



Sixty percent of SWPs stated that they do work with each other while 40% preferred to work alone. The informal recycling sector may be seen as an “each to their own” type of environment. This is mainly because of the lack of organisation present in this sector; each SWP is responsible for his/her own livelihood. Lack of trust and insufficient income levels were identified as the main reason these SWPs preferred to work alone.

From the SWPs who work with each other⁷, 59% reported that they collect together, 37% stated that they sort the materials together, and 21% worked together throughout and further divide the money amongst each other (this occurred mostly among couples). In addition, these SWPs stated that working together provided safety for them and allowed them to collect more materials as they had company and could cover longer distances. This subsequently led them to make more money. The partnership between SWPs may be seen as being advantageous as this shows that there is potential for cooperation and harmony within this sector.

It is important to stress the role of partnership in this sector, especially regarding the meagre prices that are offered for recyclable plastic materials. A strong sense of partnership in this sector stands to be very advantageous for SWPs, as this would mean that waste pickers can collect more and possibly bargain for higher prices. Furthermore, this may result in them being able to climb up the recycling value chain.

When asked whether SWPs were aware of what cooperatives were, an alarming 72% reported to not knowing what they were; however, 55% of them specified that they would be interested in being part of a cooperative simply because it would allow them to work as a collective and hopefully make more money. In a study by (Godfrey et al. 2017) on cooperatives in the informal sector, the author found that cooperatives in the informal recycling industry had a 90% failure rate; however, this could potentially be avoided if proper training and guidance of the participants in the respective cooperatives was provided.

Interestingly, 61% of the SWPs were interested in having a collective organisation in their industry, as this would bring about regulation in their sector. Similarly, when asked whether SWPs belong to any collective organisation that represents their needs and desires, 92% of the respondents were not part of any organisation that represented their interests and only 8 % indicated that they were part of an organisation. It is important to pay careful attention to this statistic; this is partly because of the prevalence of gangsterism in this sector that SWPs may have confused as an official organisation that has the capabilities of protecting them.

⁷ Respondents could choose more than one option on how they assisted each other.

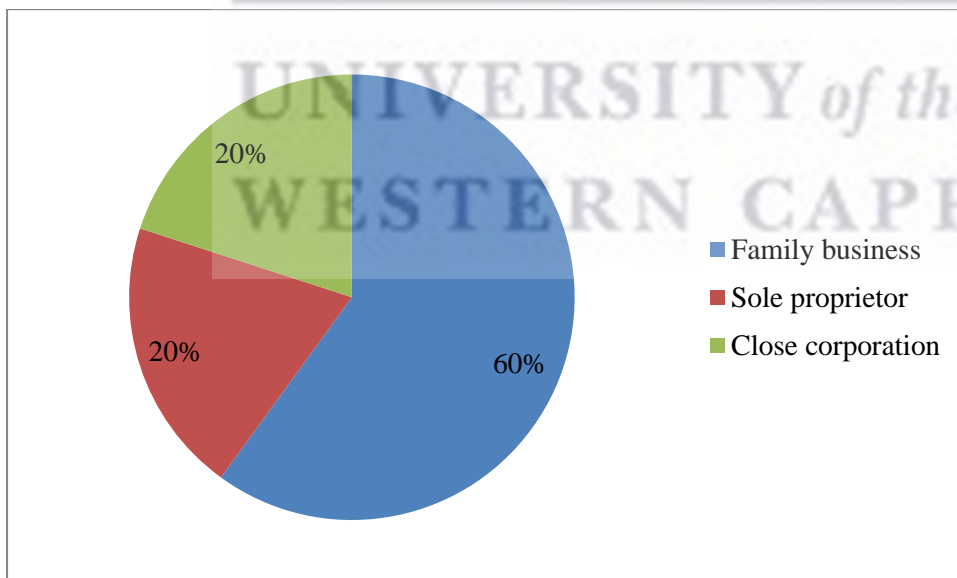
Currently, South Africa does not have many organisations that represent and protect the rights of SWPs; the ones that exist are concentrated in the Johannesburg areas, such as the African Reclaimers Organisation (ARO) and the South African Waste Pickers Association (SAWPA). These organisations are involved in the betterment of the overall lives of SWPs by means of registering SWPs in a database, which allows leaders to identify SWPs and provide them with all the necessary equipment they need to conduct their jobs. These organisations also help ensure the dignity of waste picking by constantly being involved in initiatives that help educate residents on the importance that SWPs have on the environment. However, the reach and resources of these organisations is limited and therefore, there is only so much they can do. Assistance from the government would be beneficial seeing that SWPs indirectly subsidise industries and municipalities without receiving any payment.

4.2.3 Key findings from the buyback centres survey

4.2.3.1 Form of ownership and classification

Most of the BBCs interviewed identified themselves as family businesses (60%), while one was a sole proprietor and one a close corporation (see Figure 7 below). In addition, all the BBCs interviewed were formally registered businesses.

Figure 7: Forms of ownership for the different BBCs



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

According to this study, the BBCs can be established as the main link between the informal and formal recycling sectors. This is mainly because most SWPs interviewed (90%)

identified the BBCs as the main buyers of their recyclable waste. In addition, Yu et al. (2020) found that SWPs are often dependent on one BBC due to the long distances that they travel daily. Similar to this finding, this study found that the main reasons behind SWPs choosing which BBC to sell to, includes the location of the BBC, the closer it was the more likely they were to sell to it, the prices offered (the higher the price a BBC offers the more likely they were to sell to it) and the relationship the owner has with the SWPs. This symbiotic relationship between BBCs and SWPs needs to be taken cognisance of, mainly because through sufficient investments, BBCs may be the direct link to creating decent employment for SWPs as they are mostly in close contact with them and know exactly how they can be adequately assisted to improve their lives.

In addition to purchasing recyclable materials from SWPs, BBCs further sell the said materials to either local or international manufacturers that transform these plastics back into their raw state. From this study, 90% of the BBCs sold their waste within local borders, and only 10% exported their products.

4.2.3.2 Nature of activities that take place in the business

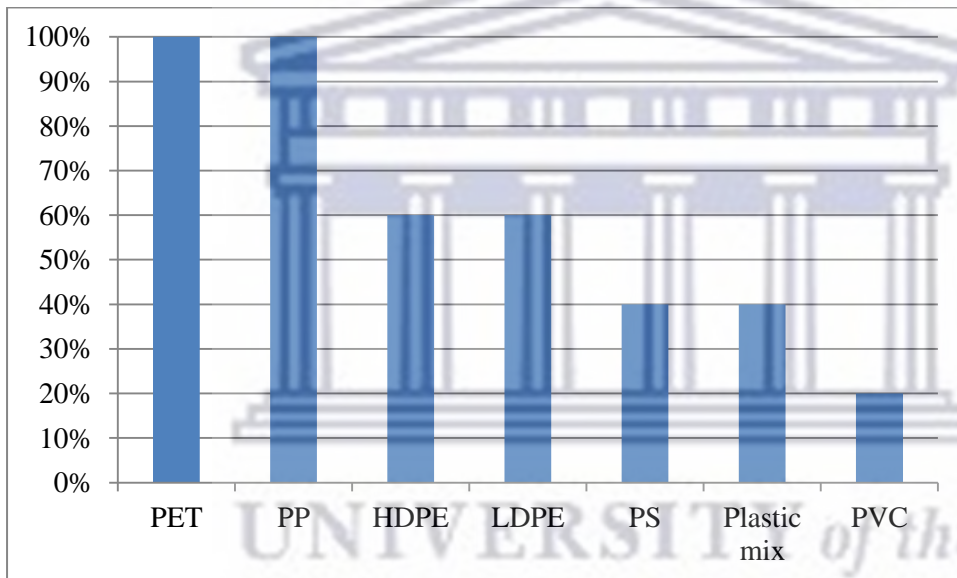
In contrast to the labour-intensive nature of street waste picking, BBCs are relatively capital-intensive. Nevertheless, the nature of activities in the BBCs differs according to the size of the business and the amount of equipment available to them. In this study, the nature of activities in these businesses included receiving materials from SWPs, weighing them and paying waste pickers according to the amount of kilograms that they had brought forward (which all BBCs interviewed did). In addition, BBCs are solely responsible for the further sorting of the materials before selling them to HRCs and also baling the materials before selling them to HRCs for them to maximise the kilograms that they can supply and in turn make more money.

From this study, three BBCs owned a baling machine while the rest did not own one. This further shows that in as much as they have the same business model, the different equipment available at their disposal is the main determinant of the profitability of their businesses. BBCs that have a baling machine and larger workshop areas stand to make much more money than BBCs that do not have these. Lastly, four of the BBCs transported their materials to HRCs and only one BBC required assistance in that regard.

4.2.3.3 Types of plastics and prices offered

The types of plastic materials that BBCs purchase are different according to the respective businesses. This is mostly influenced by the change in demand for the particular type of plastic in the market and also the prices that are offered for them. The Rand/US Dollar exchange rate also plays a vital role in the price setting of these recyclables. Figure 8 below provides an overview of the different plastic materials that BBCs purchase from SWPs. All BBCs interviewed purchased PET and PP plastic material, and only one BBC purchased PVC. Similarly, the price that BBCs offer to SWPs is not the same; however, there is a sense of competition among BBCs, as they would like to attract as many SWPs as possible.

Figure 8: Types of plastics bought by BBCs



SWPs could choose more than one option

Source: Author's own calculations using survey data

4.2.3.4 Employment of SWPs

When asked about the possibility of employing SWPs, owners of the BBCs were hesitant about this idea for reasons including the variable nature of the activities and volumes provided by the SWPs. The owners stated that SWPs are so used to creating and managing their own time that it becomes difficult for them to adhere to the working hours that they would have to set for them. Some BBCs had temporarily employed SWPs before and were not interested in doing it again.

Nevertheless, when the question was phrased differently, of rather being in partnership with SWPs by means of them supplying materials to them alone, the owners seemed a little more open to the idea. This then shows that the manner in which improved and decent employment opportunities for SWPs may be created requires a lot more research. It cannot be merely asked of BBCs to employ the SWPs. Their own cost structures and low margins simply do not allow for it. The needs of both owners of BBCs and SWPs must be considered before possible interventions and strategies are devised and implemented.

Barnes et al. (2021) and Viljoen (2014) found that BBCs often do support informal street waste pickers, with the most frequently offered resource being bulk bags in which to collect material. According to survey data from this study, four out of the five BBCs that were interviewed, stated that they do indeed support SWPs. Occasional meals, refreshments and money donations were the most popular form of assistance provided by the BBCs. It is important to note that the provision of meals and money are not a daily occurrence but rather happen on special days such as Christmas, Eid Mubarak or the last Fridays of the month. Other forms of support provided by the BBCs include clothing items, spaces in which SWPs can sort their waste and bags they can use to transport their waste materials. BBCs are limited in the amount of support they can offer SWPs; this is mainly because they receive recyclable material from hundreds of SWPs daily and have a limited capacity on which SWPs to assist. To combat this, the owners stated that they only help SWPs who supply them with recyclables regularly or on a first come first serve basis.

4.2.4 Key findings from the high-end recycling companies survey

The HRCs interviewed in this study are primarily focussed on transforming recyclable plastic materials back into their raw state in the form of small pellets. The questions administered to participants in this sector sought to identify the linkages that exist between them and informal recyclers in order to establish the extent to which they can potentially improve the livelihoods of SWPs by means of providing them with employment opportunities.

4.2.4.1 Acknowledgement of SWPs

All participants in the HRCs acknowledged that street waste pickers play a pivotal role in their companies. Most described waste pickers as the main source of the materials that they use in their companies for further recycling even though they do not purchase the materials directly from them. Similarly, SWPs were also described as individuals who

provide the general clean-up of the environment. Even though SWPs are the main source of the materials that HRCs use, their relationship is strictly indirect. HRCs do not have any contact with SWPs but rather purchase plastic materials through BBCs who work closely with SWPs – for reasons of volume and other logistics.

As mentioned before, SWPs face numerous challenges. Upon asking HRCs' managing members about their knowledge of the challenges that SWPs face, three (75%) of the various members reported being aware of them. These were stated as being the unavailability of trolleys to make their jobs easier, the unhygienic working conditions under which they work without proper protective equipment, and also the very little money that they make from waste picking that is at times “only enough to buy bread for their families,” as described by one of the managers. In as much as these managers were aware of the challenges that SWPs face, none of the companies assisted SWPs. The reason for this was described as the “inability” to access SWPs as they do not work close enough to them to be able to assist; the most they are in a position to do is purchase materials from BBCs that SWPs provide.

The response to the inability to assist SWPs was rather alarming, as one would expect HRCs to be in full support of SWPs as they are the main source of the materials from which they make a profit. However, this may also be justified, as it is difficult to access SWPs because their jobs require them to constantly move.

4.2.4.2 Employment of SWPs

HRCs are at the top of the value chain and are the key role players in the plastic recycling industry. Therefore, they have the power to influence employment opportunities for SWPs. **From this survey data, three (75%) of the companies were reluctant towards the idea of integrating SWPs into their companies and only one (25%) was willing to incorporate SWPs into his business.**

The reasons for their reluctant to work with SWPs, as stated by the managing members, pertained to the lack of organisation and formalisation among street waste pickers. According to numerous studies, over 3 000 SWPs are operating in the streets of Cape Town. Therefore, accepting plastic materials from each SWP would prove to be difficult for HRCs, especially because SWPs require cash upon sale of waste, whereas HRCs mostly make use of electronic payment methods. Secondly, HRCs work with large quantities (tonnages) of plastic material,

whereas SWPs cannot provide these types of volumes because they do not have the necessary equipment and transport to be able to provide this amount of plastic waste material. Lastly, HRCs work under strict legal regulations (ISO9001), requiring them to train their employees to work under strict regulations. If they may employ SWPs, they would be required to train them, which would cost the companies a lot of money. The one company that showed a willingness to work with SWP required that they organise themselves and provide their service to his company in a formalised fashion.

4.3 Econometric analysis

The literature review and descriptive analyses presented in this study indicate that there are variables that may explain the differences in the incomes that SWPs receive both weekly and daily. To investigate this further, this section provides cross-sectional regression analyses to examine the extent to which these variables influence the incomes of SWPs and also possibly see whether strategies can be devised to improve the decency of their employment. Table 7 and 8 below reports the multivariate regression on the usual daily and weekly income of SWPs.

Table 6: Multivariate regression for the usual income for a day's waste

	Coefficient	Standard Error	T	P> t	95% Confidence Interval	
Female	-43.769	32.545	-1.34	0.182	-108.537	20.999
Coloured	-199.152	57.349	-3.47	0.001***	-313.281	-85.023
Other	-188.473	112.914	-1.67	0.099	-413.178	36.232
Age: 26-35 years	129.384	66.742	1.94	0.056**	-3.437	262.205
Age: 36-45 years	108.281	67.893	1.59	0.115	-26.831	243.392
Age: 46-55 years	38.231	69.209	0.55	0.582	-99.499	175.960
Age: Above55 years	76.926	84.942	0.91	0.368	-92.113	245.965
Does not use a trolley	-74.423	33.678	-2.21	0.030***	-141.445	-7.402
Primary	156.362	148.875	1.05	0.297	-139.908	452.633
Secondary	117.784	147.520	0.80	0.427	-175.791	411.358
Matric	123.675	149.037	0.83	0.409	-172.918	420.267
Diploma/Degree	319.202	204.075	1.56	0.122	-86.921	725.324
Constant	141.719	148.727	0.95	0.344	-154.257	437.695
Prob > F				0.026		
R-squared				0.239		
Adjusted R-squared				0.125		
Sample size				93		

*** Significant at 1%

** Significant at 5%

* Significant at 10%

Table 7: Multivariate regression for the usual income for a week's waste

	Coefficient	Standard Error	T	P> t	95% Confidence Interval	
Female	-262.960	180.339	-1.46	0.150	-623.228	97.308
Coloured	-718.028	267.374	-2.69	0.009***	-1252.169	-183.887
Other	-455.095	553.431	-0.85	0.397	-1520.746	610.556
Age: 26-35 years	430.862	352.128	1.22	0.226	-272.594	1134.318
Age: 36-45 years	447.936	351.338	1.27	0.207	-253.941	1149.814
Age: 46-55 years	477.432	367.062	1.30	0.198	-255.859	1210.724
Age: Above55 years	170.712	424.041	0.40	0.689	-676.408	1017.831
Does not use a trolley	-395.283	184.437	-2.14	0.036***	-763.738	-26.828
Primary	1381.096	531.609	2.60	0.012	319.083	2443.109
Secondary	1127.087	530.272	2.13	0.037	67.748	2186.426
Matric	990.825	541.453	1.83	0.072	-90.852	2072.501
Diploma/Degree	1928.280	837.362	2.30	0.025	255.458	3601.102
Constant	-187.684	564.698	-0.33	0.741	-1315.799	940.430
Prob > F				0.097		
R-squared				0.238		
Adjusted R-squared				0.095		
Sample size				77		

*** Significant at 1%

** Significant at 5%

* Significant at 10%

The results from the two regressions suggest that being female is associated with lower income, albeit the results are statistically insignificant after controlling for differences in other characteristics. The coefficient in the results is negative, which means that the income is R43.77 lower for females than it is for males for a day's waste and R262.96 lower for a week's waste. This may be because men are inherently stronger than women are, which allows them to carry heavier loads across longer distances than what women can. Furthermore, this result also feeds into the narrative that street waste picking is male dominated, as it requires a lot of physicality. The race variable is statistically significant with a negative sign for the Coloured race dummy only; this means that Coloured individuals earn significantly less than the reference category (Africans).

With this study, the age variable had no statistical bearing on the respondents' earnings. However, the age cohort 26-35 years earned significantly more than the reference category (0-18 years). This result is not surprising, as 26-35 year olds are regarded as the youth, and are generally more energetic and can work much longer hours, therefore accumulating more

earnings. The same results in Table 7 can be found in Table 8, except the 26-35 years cohort dummy is insignificant in Table 8 (but significant in Table 7). Additionally, street waste picking is a physically demanding form of informal employment, therefore, the older a person becomes, the less likely they are able to complete tasks in this line of work.

The trolley dummy variable (1: uses a trolley; 0: does not use a trolley) is statistically significant with a negative sign meaning that there is indeed an advantage to using a trolley in a SWP's income. The negative coefficient shows that SWPs who do not use a trolley, earn R74.42 less than SWPs who use a trolley for a day's waste and R395.28 less for a week's waste. The lack of a trolley is clearly a huge impediment that affects the earnings of SWPs; this result aligns with the past studies of Schenck & Blaauw (2011), Viljoen, Blaauw & Schenck (2016) and Schenck, Blaauw & Viljoen (2016). The Gauteng agriculture and rural development department of government has attempted to assist SWPs in this regard; however, this fell through the pitfalls of corruption. This was seen in the employment of a company Enviro Mobi who was employed to provide Gauteng SWPs with 200 three-wheeler tuk-tuks (trolleys), this company never delivered on their promise regardless of the R27 million Rands they were paid (Rose, 2021).

The level of educational attainment has little to no impact on the earnings of SWPs. This is shown by the positive sign and increase in the coefficient as the level of educational attainment increases, but the result is insignificant. This is expected and shows the limited barriers to entry in the informal recycling value chain.

4.4 Conclusion

This chapter provided empirical findings on data collected from street waste pickers, buy-back centres and high-end recycling companies. In light of what has been discussed, it can be stated that SWPs are the main providers of recyclable plastic material in the plastic recycling industry; however, they remain the poorest in the industry as a whole. In addition, SWPs also assist the municipality and industries by diverting plastic waste material from landfill sites by recycling them, which in turn saves municipalities about 750 million each year. SWPs play such a pivotal role in the recycling industry, they work under difficult working conditions and no assistance has been shown in their favour in terms of improving their income generating potential and working conditions. This chapter also identified trolleys as being directly beneficial to the income generation of SWPs. However, not all SWPs have access to one. The

provision of trolleys has been identified as the way in which decent job creation can be amplified in the informal recycling sector.



CHAPTER FIVE: CONCLUSION

5.1 Introduction

This chapter summarises the main results and conclusions realised after answering the research objectives pertaining to this study. It is structured as follows: Section 5.2 provides key findings related to this study, section 5.3 gives policy recommendations and a brief synopsis of the contribution this study has on the field of informal recycling, particularly regarding the creation of decent employment opportunities for SWPs.

5.2 Summary of findings

This study attempted to identify the prospects of decent job creation for SWPs along the value chain of plastic recycling in urban Cape Town. This was done by means of determining the opportunities and barriers present in the recycling sector that deter the creation of decent employment opportunities for SWPs. According to this research, waste picking can be seen as a strategy, which SWPs have developed that creates both economic and environmental value. It has been successfully shown that the activities SWPs are involved in do in fact assist in saving the environment. The collection of recyclable materials helps save municipalities about R750 million in landfill airspace yearly. SWPs are also responsible for the collection of 80-90% of postconsumer paper and packaging, contributing significantly to Extended Producer Responsibility (EPR) (Samson, 2021 & Godfrey, 2017). However, the livelihood of SWPs is often threatened by lawmakers, who purposefully ignore the role that SWPs play in MSWM.

The value chain that guides the recycling sector (including plastic) as a whole was also investigated. It can be stated that once SWPs complete their search for valuable waste material, they sell it to a chosen BBC. After this sale, he/she receives remuneration for this, which is based on the market price for different categories of recyclable plastic material. SWPs sell their recyclable material at a given market price, over which they have no control. Furthermore, they work individually and according to their own time frame, this immediately puts them under the category of self-employed individuals in the informal recycling sector. Street waste pickers have the freedom to choose the BBC to whom they sell, all depending on the price they offer for each recyclable material. A closer look at this may show that SWPs not only sell valuable waste products but also his/her labour power (Dinler, 2016).

The potential role that BBCs and HRCs could have on the creation of decent employment opportunities for SWPs was also examined. The results from this study are in line with the findings from Viljoen (2014) and Barnes et al. (2021). BBCs and HRCs do in fact play an important role in facilitating connection between the formal and informal sector. However, the creation of employment for SWPs in these businesses is rather indirect. This is mainly because the relations formed are informal but are well structured. There are clearly defined roles, which make it difficult for actors to operate outside network rules. Those with greater access to financial and social capital drive the system and exert more influence. This is substantiated by means of a hierarchy present in the recycling sector, which sees SWPs taking the lowest tier, BBCs taking the second tier and HRCs holding the highest position in the hierarchy. In order for this system to remain profitable, the different participants need to work together. One cannot work without input from the other.

Part of the objectives of this study includes exploring and describing the existing working conditions under which SWPs work. The participants in this study indicated that they find most of the waste that they sell as they go, either from house to house, outside shops/industrial areas and schools. As a result of this, SWPs often have to travel long distances and work long hours in order to accumulate as much recyclable materials as they can. From this, it can be stated that waste picking is a very strenuous activity and as a result, the majority of the participants are men. SWPs often do not use any protective equipment while conducting their jobs; this immediately puts them at a risk of being injured. 56% reported to suffering injuries and cuts while on duty. Furthermore, SWPs' line of duty requires them to be outdoors at all times, which makes them vulnerable to the changes in weather conditions. A few SWPs reported to not being able to work on rainy days, which means that he/she does not make any income for the said day.

The availability of functional equipment to store and transport recyclable materials (i.e. trolleys) has been identified as one of the main ways in which SWPs maximise their incomes. However, not all SWPs have access to one for various reasons, such as theft, damages and it being expensive to acquire. According to survey data collected for this study, SWPs who used a trolley earned significantly more than their counterparts who did not use one. In addition, being a man in this line of work proved to be very advantageous as men made more money than women did. The reason for this was identified as being that men possess more strength than women do, and can cover longer distances and more loads of recyclables than

women can. These results are similar to the findings of Schenck & Blaauw (2011) and Schenck, Blaauw & Viljoen (2016). Age, race and educational attainment had little to no impact on the income generation of SWPs in this study.

To improve the creation of decent jobs and sustain the incomes for SWPs, several methods have been investigated throughout the study. Firstly, access to a trolley has been proven to be very beneficial to SWPs. This is because trolleys allow SWPs to conduct their day-to-day job easier. Trolleys allow them to store their recyclable material and transport them in a manner that is less taxing on their bodies. Furthermore, trolleys allow SWPs to load as much recyclable materials as they can, which means that they can accumulate a higher income at the end of the day. Secondly, as mentioned earlier, SWPs gather materials from dustbins, which expose them to different types of health dangers, 21% of SWPs in this study reported to suffering illnesses as a result of their jobs. It is important that SWPs be assisted by means of providing them with protective gear in the form of gloves, reflector jackets (SWPs often work in the early hours of the morning in the dark) and masks. These could potentially have a significant impact in bringing a level of decency and humanity into their jobs. Lastly, as per the work of the ARO organisation, accustoming residents with the work that SWPs do has proven to be beneficial in bringing sustainability to the incomes of SWPs as they have a guaranteed supply of recyclable materials.

The value adding theory explained in this study describes the way in which informal recyclers potentially add value to their recyclable materials before selling them off to BBCs. The findings in this study are consistent with the value adding theory in that, before SWPs sell their material, they have to sort their materials according to their respective types. In addition, SWPs also maximise the income generating potential by cleaning and squeezing the plastic materials in order to optimise space and also for their products to weigh more. In light of this, it is important to mention that SWPs often sort their recyclables on the side of the road, putting them in much more danger. In order to combat this, it is important that SWPs be provided a space in which they can sort and add value to their materials without endangering themselves, as this is important for the creation of their income.

The South African government has identified the potential that the informal recycling economy has on the creation of employment opportunities (Godfrey, 2017); however, they have mostly been oblivious to the plight of SWPs. South Africa has a very high number of

unskilled individuals and in the absence of formal employment, these individuals often find they seek employment in the informal recycling sector as a means to combat poverty. The government has always seen formalisation in the form of cooperatives as the preferred method in which unity and cooperation can be brought in the informal recycling sector (Godfrey, 2015). According to the findings in this study, the provision of basic equipment, such as trolleys and protective equipment that make SWPs jobs easier, has been proven to be beneficial to both increasing the quality of their work and the quantity of the work that they produce. In addition, the state has the ability to influence its citizens through the formation of policies. From this study, it has been stated that the city of Johannesburg municipality has tabled a proposal to charge its residents a recycling fee. The government needs to recognise the value of the duties that SWPs do and should invest in them and empower them.

5.3 Policy recommendations

5.3.1 Provision of protective working gear and sufficient trolleys

As mentioned, trolleys play a significantly positive role in the income generation of SWPs. From this study, it is important to acknowledge that SWPs have been able to find alternatives for themselves by making their own trolleys using a collection of different materials in the absence of assistance from municipalities and other stakeholders. However, there are still SWPs who do not have access to any form of trolley whatsoever. These SWPs find themselves earning less compared to their counterparts who own one. For this reason, it would be beneficial that the government, in partnership with municipalities, provide SWPs with functional trolleys that benefit their jobs by means of allowing them to store and transport more recyclable products. Additionally, it is important that SWPs be included in this initiative and are able to influence measures that directly affect their livelihoods (Samson, 2021). It is only SWPs who are able to articulate their needs better than anyone, as this involves their everyday life experience.

It is important that the trolleys provided be spacious and mobile. Furthermore, it would be even more beneficial if the trolleys were to be branded. This would allow citizens to be more accustomed to SWPs and allow them the respect they deserve. The provision of protective gear would also assist SWPs tremendously. This would bring decency and humanity into the jobs of SWPs.

5.3.2 Engage SWPs in Separation at Source (S@S) programmes

Eighty eight percent (88%) of SWPs interviewed in this study indicated that they would be interested in working with the municipality/formal channels collecting recyclable waste. It is important that SWPs be supported in their initiative. Municipalities are solely responsible for the collection of residents' refuse bins either on a weekly or bi-weekly basis. However, this service is exclusive of separating between recyclable and non-recyclable items. This means that products with value are thrown in landfill sites to decompose. This is where SWPs have managed to find a gap and began to engage in a Separation outside Source (SoS) system through which they salvage recyclable waste and sell them into the recycling economy. The SoS system has been central to the recycling economy and has been sustained for years, so much so, that South Africa has now been able to compete with European recycling standards (Godfrey, 2016).

The government has managed to identify the potential that the waste sector has on the creation of employment opportunities. Recently, the City of Johannesburg municipality, in conjunction with Pikitup, have adopted a Reclaimer Empowerment Plan (REP) to engage unemployed citizens in employment opportunities in the recycling industry (Samson, 2021). While this was an important advancement in the recycling sector, it did not prioritise SWPs but rather displaced them and drove them further down the value chain (Samson, 2019).

In response to this, the development of Separation at Source (S@S) and cooperatives has been identified as key factors in SWP integration. Samson (2021) identifies that in order for integration to be impactful, S@S programmes need to be aligned with the SoS system of SWPs. It is crucial that SWPs be treated as knowledgeable individuals in the recycling economy and that they be treated as equals in the planning and oversight of the system. The integrated S@S can be implemented by recognising SWPs, supporting and paying them to collect recyclables, and promoting resident participation.

SWPs tend to sleep outdoors in parks in order to gain access to the dustbins before municipal trucks arrive. This means that even though private companies hired by the municipalities do not necessarily get recyclable materials as they have been collected by SWPs, they still receive remuneration through the willpower of SWPs. Samson (2021) stresses this by stating that SWP integration highlights that the recycling economy is an integrated whole, and that

unless we adopt integrated S@S and integrated approaches to all recycling initiatives, new official programmes will result in large-scale reclaimer dis-integration and dispossession.

In addition, it is crucial that the government adopts the initiative adopted by the ARO organisation in conjunction with Unilever and PETCO. This initiative needs to be supported on a national scale as a means to legitimise the work that SWPs do. Furthermore, the provision of uniforms and protective gear will allow SWPs to work in a much healthier and safer way and also simultaneously increase their productivity levels. This initiative not only assists the quality and decency of SWPs jobs but also introduces the importance of recycling to South African citizens as a whole.

5.3.3 Pay SWPs for the service that they provide

The South African government has recently attempted to take strides to shift the responsibility of the certain waste stream management towards their respective producers (this is inclusive of plastic industry). Research by Godfrey et al. (2016) and Samson (2021) indicates that SWPs are responsible for the collection of about 80%-90% of post-consumer paper and plastic packaging in South Africa.

The evolution of an Extended Producer Responsibility (EPR) system in South Africa has the potential to displace SWPs in a system they have built and sustained for decades. This is because policies such as the traditional EPR tend to always prioritise the formalisation process such as the formation of cooperatives over building on what currently exists. This has the potential to cause friction between the formal and informal recycling sector and potentially compromise the livelihoods of SWPs.

It is important that SWPs be included at the base of every EPR initiative. This is because the inclusion of SWPs in EPR plans could drive the system in a much more beneficial way as they are already long-standing active participants in the recycling industry. Companies that make use of plastic in their products could potentially form a joint-initiative that mirrors the Collect-a-can program. The Collect-a-can initiative aims at promoting the recovery of used beverage cans and steel products by means of purchasing used cans from the general public (ArcelorMittal, no date).

The creation of such an initiative for the plastic industry would help provide a sense of income security for SWPs who collect plastic material. This initiative may possibly be done in such a way that companies who make use of plastic products would create accessible depots where SWPs can drop the recycled plastic products and immediately receive payment directly from the companies. This form of initiative would be much more beneficial than employing private companies, as this manner would completely distort the already functional recycling systems that work in South Africa.

5.3.4 Create waste sheds

SWPs are often forced to sell their recyclable products before they are ready to do so (e.g. when they have not collected enough to make a decent amount of sales). This results in them making much less money than they have anticipated. In addition to this, BBCs often do not operate during the weekend; this means SWPs have to store their recyclable materials at their places of residence; being in possession of these leaves them vulnerable to crime. SWPs often collect different kinds of recyclable items and some BBCs do not accept certain recyclable materials. It is of the utmost importance that SWPs be able to have a place where they can store their materials until they are ready to sell them as selling their recyclable waste materials prematurely affects their incomes.

The creation of waste sheds where SWPs can store and sort their materials safely would be highly advantageous. This would allow them to store their materials and only sell their materials once they are ready and have accumulated enough to sustain themselves.

Similarly, these waste sheds could be used as a mechanism to integrate the business model structure of Pikitup with SWPs. The municipality would collect waste from residents and dispose them at the waste sheds where SWPs would separate the materials and the municipality would further collect the unrecyclable materials from the waste sheds. This would strengthen and legitimise the contribution that SWPs have on the environment and the city's waste management system.

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APPENDIX 1: THE THREE QUESTIONNAIRES



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

Research title: Identifying the prospects of job creation along the value chain of plastic recycling

SURVEY DETAILS

(Can be completed after the interview)

Interviewer: Complete the following questions after the interview.

Date of interview: (yyyy/mm/dd).....

Time of interview: [hh:mm].....

Fieldworker name:

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

Not Completed

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	
Somalia	9	
Other	10	
If other please specify:		

4. How old are you _____?

Age Group		
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
EMPLOYMENT HISTORY**

This set of questions relates to the respondent's employment history.

6. Have you ever worked where you received a payslip? ”

Yes	1	
No	2	

7. “Would you like to have a full time job if one was available?”

Yes (please go to Question 9)	1	
No (please go to Question 8)	2	

8. If your answer is “No” in Question 7, please explain why.

.....

.....

.....

SECTION C
EMPLOYMENT FACTORS IN THE PLASTIC RECYCLING INFORMAL SECTOR

This section relates to factors of employment in the recycling informal sector

9. How long have you been collecting waste?

Year: Months:

10. Where do you find the waste? Mark all applicable. (add suburbs/areas also)

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

11. 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	

12. Do you use a trolley to collect the waste products?

Yes (please go to Question 13)	1	
No (please go to Question 14 & 15)	2	

13. What type of trolley do you use?”

Normal trolley	1	
Man-made trolley	2	

Black rubbish bin	3	
Other, please specify	4	

.....

14. Is there a particular reason why you do not use a trolley?

Expensive	1	
Difficult to use	2	
Unavailability	3	
Other, please specify	4	

.....

15. If you do not use a trolley to collect waste, please tell us what you use to collect the waste.

.....

16. To whom do you sell the waste? Mark all applicable.

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

17. Why do you sell to this person/BBC/s?

.....

18. Do you store your waste somewhere?

Yes (Go to Question 19)	1	
No (Go to Question 20)	2	

19. If your answer in Question 18 is yes, please explain where you store the waste.

.....

SECTION D REMUNERATION IN THE PLASTIC RECYCLING INFORMAL SECTOR
--

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

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

Daily	1	
Weekly	2	
If other, explain:		

21. How much income do you usually earn for a day's / week's waste that you collect?

Usual income for a day's waste	Usual income for a week's waste
Rand	Rand

22. How much money did you earn the last time you sold waste that you have collected?

Rand.....

23. What are the other sources of income available to you? (Mark all applicable)

Sources of income			
1	Another job	1	
2	Child support grant?	2	
3	Disability grant?	3	
4	Old age grant?	4	
5	Pension from a previous job?	5	
6	Other, please specify:	6	

24. How many people (excluding yourself) depend on your income?

Number of people

**SECTION F
FACILITATING FACTORS (OPPORTUNITIES)**

This section relates to the facilitating factors in the recycling informal sector

25. Do you work together with other waste pickers to help one another?

Yes (Go to Question 26)	1	
No (Go to Question 27)	2	

26. If your answer is yes in Question 25, in what way do you help each other?

.....

.....

27. Are you aware of the term "Co-operatives"?

Yes	1	
No	2	

28. Would you be interested in being part of a co-operative? Please explain

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

29. Do you belong to a collective organisation representing your interests with a leader amongst each other?

Yes (Go to Question 31)	1	
No (Go to Question 30)	2	

30. If your answer is No in Question 29, do you think there is a need for such an organisation?

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

31. What do you think the government should do to assist street waste pickers?

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

32. Would you be willing to work as a full-time street waste picker earning a salary for the municipality / big corporations?

Yes	1	
No	2	

Please state the reason for your answer above.

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

33. If you were to be integrated into the Municipal Solid Waste Management (MSWMM) what would your terms be?

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

34. How do you get the most value from your recyclable waste?

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

**SECTION F
IMPEDIMENTS (THREATS)**

This set of questions relates to work related injuries and health risks.

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

.....

.....
.....
36. Has anyone stolen your recyclable materials before?

Yes	1	
No	2	

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

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

38. What is your relationship like with law enforcement?

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

39. 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.

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HIGH-END VALUE CHAIN PARTICIPANTS INTERVIEW IN CAPE TOWN
Department of Economics: University of the Western Cape

Research title: Identifying the prospects of job creation along the value chain of plastic recycling in Cape Town

Date of interview: **Time of interview:**

Researcher name:

Geographical details of the site where interview took place:

Name of the Company/Department:

Street Address:

City/Town and suburb:

Postal code:

Section A: Demographic, education and employment characteristics

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	
If other, please specify:		
.....		

3. How old are you?

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

4. What is the **highest** school you have **passed**?

or tertiary qualification

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:												
.....												

5. What is your current position in your place of employment?

.....

.....

.....

Section B: Acknowledgement of street waste pickers

6. Are you aware of street waste pickers and the role that they play in the plastic recycling value chain?

Yes	1	
No	2	

7. Refer to Question 6, what is your view on the role that street waste pickers play in the plastic recycling value chain?

.....

.....

.....

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

.....

.....

.....

9. Are you aware of the challenges that street waste pickers face?

Yes (Go to Question 10 & 11)	1	
No (Go to Question 12)	2	

10. If your answer in Question 9 is yes, please describe the challenges that you are aware of.

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

11. If your answer in Question 9 is yes, what have you been able to do to assist them? Please explain.

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

Section C: Facilitating factors (Opportunities)

12. What do you think can be done to bridge the gap between street waste pickers, Buy Back Centres and large corporations?

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

13. Would you consider integrating street waste pickers into your company/department?

Yes (Go to Question 14)	1	
No (Go to Question 16)	2	
I don't know (Go to Question 16)	3	

14. If your answer in Question 13 is yes, do you currently have an implementable plan or ideas on how to achieve this?

Yes (Go to Question 15)	1	
No	2	
Maybe	3	

15. If your answer in Question 14 above is 'Yes', please explain

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

16. Refer to Question 13, please elaborate your answer.

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

17. How do you think street waste pickers could be integrated into Buy Back Centres and large corporations?

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

Section D: Scope for change

18. How do you think the government should intervene with regard to the issue of street waste pickers?

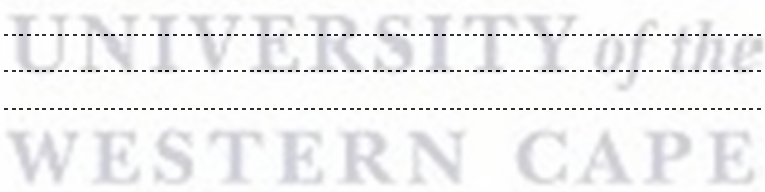
Invest in the waste picking industry	1	
Incentivise Buy Back Centres	2	
Provide proper equipment and space for waste pickers	3	
Change laws against waste picking	4	
Create awareness	5	

Other, please state:

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

19. Do you have any other comments?

.....
.....



Thank you for your time



RECYCLING BUY-BACK CENTRE SURVEY IN CAPE TOWN
Department of Economics – University of the Western Cape
Research title: Identifying the prospects of job creation along the value chain of plastic recycling

SURVEY DETAILS

(Can be completed after the interview)

Interviewer: Complete the following questions after the interview.

Date of interview: Fieldworker's name:

City/town: Time of interview:

Questionnaire

Completed		Not Completed	
-----------	--	---------------	--

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:		

4. How old are you?

Age Group		
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:
OWNERSHIP AND OPERATIONS**

This set of questions relates to the ownership, employees 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? Please explain

Receiving waste material from street waste pickers	1	<input type="checkbox"/>
Weighing materials from street waste pickers	2	<input type="checkbox"/>
Paying street waste pickers	3	<input type="checkbox"/>
Sorting of materials	4	<input type="checkbox"/>
Transportation of materials	5	<input type="checkbox"/>
Other (specify)		<input type="checkbox"/>

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.....

9. How many employees are working on this site?

Permanent	Full-time	<input type="checkbox"/>	<input type="checkbox"/>
	Part-time	<input type="checkbox"/>	<input type="checkbox"/>
Temporary	Full-time	<input type="checkbox"/>	<input type="checkbox"/>
	Part-time	<input type="checkbox"/>	<input type="checkbox"/>

**SECTION C
WASTE PRODUCTS AND PRICES**

This next set of questions deal with the different waste products and their prices.

10. What type of waste do you buy from waste pickers? (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	

11. What is the current price you pay them per kilogram of each product? (Mark all applicable)

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

Product		Price 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	

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

Yes (Go to Question 13)	1	
No (Go to Question 14)	2	

13. If your answer is yes in Question 12, please elaborate.

.....

14. Please rate the 3 biggest cost items and the percentage it makes out of your total cost. Starting with the biggest cost item as number 1 and your second most expensive item as number 2 etc.

	Cost item	% of total cost
1		
2		
3		

**SECTION E
BUYERS**

This next set of questions deals with the buy-back centre's buyers.

15. To whom do you sell your waste products?

.....

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

.....

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

.....

18. Do the recycling companies collect the waste products from you?

Yes	1	
No	2	

**SECTION D
SUPPORT TO WASTE PICKERS**

This next set of questions deals with support to waste pickers.

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

Yes (Go to Question 20)	1	
No (Go to Question 21)	2	

20. If YES, 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	
Trolleys	7	
Safe-keeping of money	8	
Other	9	

If other, please specify:	
.....	
.....	

21. What do you think waste pickers need that you are not able to provide?

.....

.....

.....

**SECTION E:
FACILITATING FACTORS (OPPORTUNITIES)**

This section relates to the facilitating factors in the Buy Back Centre (BBC)

22. Do you formally employ street waste pickers?

Yes (Go to Question 23)	1	
No (Go to Question 24)	2	
Occasionally (Go to Question 24)	3	

23. How has your experience been with employing street waste pickers?

.....

.....

.....

24. Please elaborate your answer in Question 22.

.....

.....

.....

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

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

If the answer is 'support from municipality', go to Question 26; otherwise go to Question 27

26. What kind of support do you require from the municipality?

.....

.....

.....

27. What do you think the government should do to assist BBC owners and employees?

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

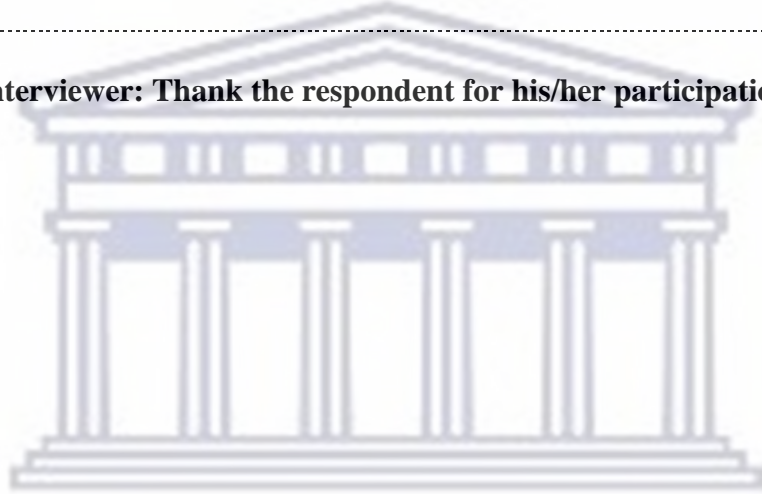
**SECTION F:
IMPEDIMENTS (THREATS)**

This section relates to the challenges faced in the Buy Back Centre (BBC)

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

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

Interviewer: Thank the respondent for his/her participation.



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APPENDIX 2: SUPPLEMENTARY FINDINGS FROM THE STREET WASTE PICKERS SURVEY

Table A2.1: Types of buyers SWPs sell to

Type of waste buyer	Percentage
Private individuals	15
Buy-Back Centres (BBC)	98
Other sellers	2
Reasons for selling to chosen BBCs	
Offers the best prices	69
Closer to place of residence	45
Good relationship with the owner	10

Table A2.2: Sources of income available to respondent

Source of income	Percentage
Another job	14
Child support grant	9
Disability grant	4
Old age grant	4
Pension from previous job	0
None	63
SRD grant	6

Table A2.3: Health and injury risks experienced by SWPs

	Percentage
None	26%
Cuts and bruises	56%
Contamination	6%
Allergic reactions	21%
Violent crime related injuries	10%

Table A2.4: Theft in the informal recycling industry

	Percentage
Yes	61%
No	39%

Note: A surprising revelation in this study was the presence of theft in the informal recycling sector. 61% of the SWPs indicated that their materials have been stolen before by other SWPs or gangsters

Table A2.5: ANOVA test for gender, race, age and educational attainment by daily income of SWPs

Source	SS	df	MS	F	Prob > F
By Gender					
Between groups	61 817.202	1	61 817.202	3.16	0.0787
Within groups	1 778 791.53	91	19 547.159		
Total	1 840 608.73	92	20 006.617		
By Ethnic group					
Between groups	164 253.376	2	82 126.688	4.41	0.0149
Within groups	1 676 355.36	90	18 626.171		
Total	1 840 608.73	92	20 006.617		
By Age					
Between groups	39 645.423	4	9 911.356	0.48	0.7472
Within groups	1 800 963.31	88	20 465.492		
Total	1 840 608.73	92	20 006.617		
By Education					
Between groups	35 030.143	4	8 757.536	0.43	0.7889
Within groups	1 805 578.59	88	20 517.939		
Total	1 840 608.73	92	20 006.617		