



School of Geography, Archaeology and Environmental
Studies

Assessment of waste separation at source by residential households as a tool for sustainable waste practices: a case study of the City of Johannesburg

**Research report presented in partial fulfillment of the requirements
for the degree of Master of Science in Environmental Science at the
University of the Witwatersrand**

Prepared by: Grace A R Kadyamadare 1470100

Supervisor: Dr. Melanie Samson

Date: August 2017

Declaration

I declare that this research report is my own, unaided original work. It is being submitted for the Master's degree in Environmental Science at the University of the Witwatersrand, Johannesburg. It has not been submitted before any degree or examination at any other university. I have acknowledged within the text and references list any work taken from other authors.

Signature: _____ Date: _____

Acknowledgements

Firstly, I would like to thank my supervisor Dr. Melanie Samson for her unwavering support during the entire duration of this Master report. Her assistance with reading, editing and critical analysis of the many drafts I did, helped me to complete this journey. Her passion for this waste management was infectious and enhanced my intellectual thinking. Furthermore, I would like to thank her for facilitating the sponsorship for this research study through her project of the broader DST-CSIR funded “Lessons from waste picker integration initiatives-development of evidence based guidelines to integrate waste pickers into South African municipal waste management”. My explicit thanks also go to DST and CSIR, Pikitup, the residents, the waste pickers and, to Kabelo for assistance with translations.

To my husband Tendai and family, thank you for your continued encouragement, understating and patience as I spent time of this project. Thank you for always encouraging me and motivating me to work hard.

Table of Contents

Declaration	ii
Acknowledgements	iii
List of Figures	vi
List of Tables	vii
Abbreviations.....	viii
Abstract	ix
CHAPTER 1 INTRODUCTION	1
1.1 Introduction to the study	1
1.2 Rationale for the Study	2
1.3 Research Question	4
1.4 Research sub-questions	5
1.5 Background to Solid Waste Management in a South Africa context.....	5
1.6 Structure of the Research Report	7
CHAPTER 2 LITERATURE REVIEW	9
2.1 Introduction.....	9
2.2 Municipal Solid Waste Management (MSWM)	9
2.3 What is Waste?	11
2.4 Separation at Source.....	14
2.5 Informal separation by waste pickers.....	15
2.6 Societal Participation in Waste Separation and Recycling.....	16
2.7 The effect of relationships between waste pickers and residents on waste practices.....	19
2.8 Conclusion	21
CHAPTER 3 CONCEPTUAL FRAMEWORK.....	22
CHAPTER 4 RESEARCH METHODOLOGY	24
4.1 Introduction.....	24
4.2 Area under study	24
4.2.1 Newlands.....	26
4.2.2 Franklin Roosevelt Park.....	26
4.3 Research design	27
4.4 Access	28
4.5 Data collection methods	29
4.5.1 Sampling.....	29
4.5.2 Semi-structured interviews.....	32
4.5.3 Focus Groups with residential households	33
4.5.4 Personal Observations.....	34
4.6 Data analysis.....	35
4.7 Ethical consideration	35
4.8 Limitations.....	36
4.9 Conclusion.....	36
CHAPTER 5 PIKITUP SEPARATION AT SOURCE (S@S) PROGRAMME	37
5.1 Introduction.....	37

5.2	Background to the S@S in the Waterval Area in the City of Johannesburg.....	37
5.3	Waterval S@S Feedback in CoJ and Pikitup annual reports.	40
CHAPTER 6: RESULTS AND FINDINGS IN NEWLANDS		45
6.1	Introduction.....	45
6.2	Theorizing Waste in Newlands	45
6.3	Recycling practices in Newlands	47
6.4	Waste Separation at Source and Recycling Practices.....	48
6.5	Factors affecting wasting practices by residents	50
6.5.1	Provision of more bins.....	51
6.5.3	Time constraints	52
6.5.4	Knowledge and awareness.....	52
6.6	Participation in informal recycling by waste pickers.....	53
6.6.1	Waste pickers and Separation at Source	56
6.7	Conclusion.....	57
CHAPTER 7:..... RESULTS AND FINDINGS IN FRANKLIN ROOSEVELT PARK		59
7.1	Introduction.....	59
7.2	Recycling practices in Franklin Roosevelt Park.....	59
7.3	Theorizing Waste in Franklin Roosevelt Park.....	61
7.3.1	Defining waste	61
7.3.2	Viewing waste as positive or negative	62
7.4	Waste Separation at Source in Franklin Roosevelt Park.....	63
7.5	Factors affecting wasting practices in Franklin Roosevelt Park	66
7.5.1	Willingness to participate in Pikitup S@S.....	66
7.5.2	Provision of more bags.....	67
7.5.3	Time constraints or lack of interest.....	68
7.6	Relationship between waste pickers and residents in Franklin Roosevelt Park	68
7.6.1	Residents' views of waste pickers' impact on recycling.....	68
7.6.2	The residents, waste pickers and Separation at Source	71
7.7	Conclusion	72
CHAPTER 8 DISCUSSION and ANALYSIS of FINDINGS		74
8.1	Conceptualisation of Waste.....	74
8.1.1	Defining waste	74
8.1.2	Viewing waste as positive or negative	75
8.2	Residents' participation in Separation at Source and wasting practices	76
8.2.1	Residents' knowledge and awareness of S@S.....	78
8.2.2	Willingness to Recycle.....	79
8.2.3	Factors hindering participation in Separation at Source	80
8.3	Residents' perceptions of waste pickers and the implications for Separation at Source	81

8.4 Conclusion	87
CHAPTER 9: CONCLUSION.....	89
References	91
Appendix 1	99

List of Figures

Figure 1: Regions of the CoJ.....	25
Figure 2: Map of Newlands Roosevelt Park	26
Figure 3: Map of Franklin Roosevelt Park	26
Figure 4: Trucks used for collecting separated (left) and non-separated waste from CoJ residents. (Source: Taken by the researcher)	41
Figure 5: Graph showing participation rates of S@S in the CoJ since its inception (based on the CoJ annual reports)	43
Figure 6: Definition of waste given by Newlands residents	46
Figure 7: Photographs of Newlands residents' black bins with unseparated waste (Source: Photo taken by the researcher)	48
Figure 8: Pie chart showing participation rates of 20 Newlands residents	49
Figure 9: Photograph of recyclable bags outside two residential households in Newlands.....	50
Figure 10: Residents S@S recyclable bags residents collected by buy-back centres (Source: Photo taken by the researcher)	54
Figure 11: Recyclable collected by waste pickers from households' black bins by waste pickers. (Source: Taken by the researcher)	55
Figure 12: Types of recyclables separated by residents in FRP	60
Figure 13: Defining of waste by 20 FRP residents	62
Figure 14: Garden trimmings and lawn shavings separated for garden centre disposal.....	63
Figure 15: Resident 18 recycling bag and sack. (Source: Photo taken by the researcher).....	65
Figure 16: Recycling bags outside the FRP residents' gates. (Source: Photo taken by the researcher).....	65
Figure 17: Material collected by waste picker 3 in FRP (Source: Photo taken by the researcher)	69

Figure 18: Waste picker trolleys in FRP (Source: Photo taken by the researcher).....	70
Figure 19: Comparison of views on waste in Newlands and Franklin Roosevelt Park	75
Figure 20: The waste cycle (Adapted from Schenk & Blaauw, 2011)	86

List of Tables

Table 1: Landfill Lifespans in the CoJ	4
Table 2: The South Africa Waste Legislation Framework	6
Table 3: Methods Table.....	31
Table 4: Table showing the actual participation rates of S@S since inception against set targets	42
Table 5: Newlands households' reasons for none participation in S@S.....	51
Table 6: Separation at source by 20 Franklin Roosevelt Park residents	64

Abbreviations

CoJ	City of Johannesburg
IDPs	Integrated Development Plans
FRP	Franklin Roosevelt Park
MSW	Municipal Solid Waste
MSWM	Municipal Solid Waste Management
RCR	Round Collection Refusal
SWM	Solid Waste Management
S@S	Separation at Source
TMA	Thematic Content Analysis

Abstract

In Johannesburg, as in many cities of developing countries, municipal solid waste management poses a key challenge to local city governments. The amount of municipal solid waste generated has been noted to be growing in tandem with increasing city populations. This Masters Research Report focuses on the factors shaping participation in the separation at source (S@S) programme run by Johannesburg's Pikitup waste management utility, with a particular focus on the role of residents' conceptualization of waste. The research employed a qualitative comparative case study of two suburbs that were part of Pikitup's first pilot S@S programme, which was conducted by the Waterval depot: the low income area of Newlands, and the high income area of Franklin Roosevelt Park. Twenty semi-structured interviews and one focus group interview were conducted in each of the suburbs, as well as three semi-structured interviews with key informants. Findings were analyzed using thematic content analysis. The results indicate several differences between the two suburbs – including participation rates, conceptualization of waste and other factors shaping wasting practices. The research showed that conceptualization of waste is an important factor, but not the only one and affirmed other studies showing the importance of time, convenience and positive attitude towards recycling. The research found that in addition to their conceptualization of waste, the ways in which residents conceptualized recyclables affected their participation rates, and that their separation practices were aligned to their conceptualizations. In addition, the research found that residents' conceptualization of recyclables and the recycling system played an important role in their decision to participate in Pikitup's S@S programme. In Newlands, whilst some separated but due to their low incomes they sold it for themselves versus giving it to Pikitup, and others would not separate as they felt Pikitup should pay them or it was time consuming for them. In both suburbs those that understood the role of waste pickers chose to separate their waste for the waste pickers versus Pikitup. In conclusion, when we understand that residents participating in separating materials for different pathways, and waste pickers play an important role in separating at source when residents fail to do so then a better understanding of how much waste is being separated and diverted from landfills is obtained in addition to what motivates participation in separation.

Keywords: municipal solid waste (MSW), resident households, conceptualization of waste, separation at source, wasting practices, waste picker

CHAPTER 1 INTRODUCTION

1.1 Introduction to the study

Municipal solid waste management (MSWM) is a key challenge to local governments of developing countries in the 21st century (Emelumadu *et al.*, 2016; Gallardo *et al.*, 2015). Municipal solid waste (MSW) is generally considered to encompass household solid waste that is produced by normal residential households' activities (Zhang *et al.*, 2012). The amount of municipal solid waste generated has been noted to grow in tandem with increasing urban populations. The problems associated with increasing volumes of municipal solid waste (MSW) are primarily concerned with the environment, public health and the preservation of natural resources (Ojeda-Benitez *et al.*, 2003). The Integrated Development Plan (IDP) 2012/16 plans indicate that South Africa produces approximately 1,8 million tonnes of waste each year of which 1 779 tonnes is collected from the streets (City of Johannesburg, 2012/16). In this light, the implementation of municipal solid waste management sectors has become faced with numerous challenges as urban populations are growing whilst the land required for waste disposal and landfill lifespans are diminishing (Pikitup, 2013-14). It has been suggested that one of the ways to overcome these challenges is through minimizing and recycling of waste by residential households. Some studies have recommended that the practice of recycling by residential households is an untapped approach that local municipalities could focus on exploiting in order to minimise waste production, resource recovery and reuse; and rapid filling of landfills (Guerrero *et al.*, 2013; Miezah *et al.*, 2015). Separation at source (S@S) of MSW by residential households has being identified as an important pre-requisite for recycling provided local governments/municipalities motivate and encourage high levels of public participation.

In South Africa, the 2008 National Environmental Management: Waste Act (NEM: Waste Act- Act 59 of 2008) represents a shift in waste management policy, as it prioritizes separation at source and recycling by households. Although South African municipalities are responsible for MSW management, in the City of Johannesburg (CoJ) the Council does not directly provide these services. Instead, the CoJ transformed its waste management departments into an independent utility called

Pikitup, which is wholly owned by the City of Johannesburg (CoJ, 2011). The functions of Pikitup encompass the collection and disposal of waste from residential households, public spaces (for example litter bins and street cleaning) and commercial sectors. It is also responsible for addressing illegally dumped waste and management of landfills, garden centres and depots. Against this backdrop, Pikitup initiated a waste separation at source programme for residential households in selected areas as a means of reducing waste generation for collection for landfill disposal in line with the waste hierarchy enacted in the National Environmental Management: Waste Act (Act 59 of 2008) as written in the (CoJ, 2011) annual report.

It is in this light that some studies have sought to theorise the definition of waste and its influence on recycling in different cities (Pongracz *et al.*, 2004; Banga, 2011; Ogola *et al.*, 2012; Matter *et al.*, 2013; Pakpour *et al.*, 2014). This is because when a positive definition is given to 'waste', the potential for formal recycling by residential households can be used as a tool for sustainable waste practices. These sustainable waste practices aim to add value to reclaimable and recyclable material (Matter, 2013; Oteng-Ababio, 2014), promote segregation of waste at source; reduce non-waste sent to landfills (Pongracz *et al.*, 2004) and create employment opportunities for the urban informal reclaimers. Therefore, this research sought to examine how the theorisation of the definition of waste influences residents' wasting practices and their participation in the Pikitup separation at source and identification of factors that would improve residents' participation as they are the greatest contributors to municipal solid waste (NWSM, 2011; Nyugen *et al.*, 2015).

1.2 Rationale for the Study

The rationale for the research hinges on the fact that everyone produces waste which, if not managed, would directly or indirectly impact their health and the environment. Regarding waste as a social dilemma demonstrates that residential participation cannot be disputed in terms of the need to involve them in integrated approaches that can solve the problem, although it can also be said that they alone should not be regarded as the only stakeholders. The last two decades have seen waste management practices transitioning from the traditional "end-of-pipe" approach towards more sustainable options in order to ensure sustainability and natural resources conservation. Various legislation has been enacted on waste

management to ensure that waste management is sustainably managed; environmentally and financially. The effective management of municipal solid waste is associated with societal behaviours and perceptions of the definition of waste (Guerrero *et al.*, 2013; Oteng-Ababio, 2014; Nguyen *et al.*, 2015).

Some of the environmental problems that are facing South Africa emanate from the increasing volumes of municipal solid waste (MSW) generated by its residents (Ogola *et al.*, 2012; Mangizvo & Wiseman, 2012; CoJ, 2014). The 2014/15 annual report by the CoJ (2014) also highlights that South Africa will continue to experience increased generation of waste in urban cities where there are increasing numbers in human population as they seek economic emancipation. The MSW collected in urban areas is noted to be of a heterogeneous nature which is cognizant of the lifestyle and the standard of living of the areas' inhabitants (Beall, 1997; Samah *et al.*, 2013). However, residential households are considered to be the greatest contributors to the amount of waste that is ultimately sent to the landfills for disposal (CoJ, 2011; NWSM, 2011). Therefore, an integrated approach to solid waste management is required to come to the fore as it will ensure an effective and sustainable use of available municipal funds. The success of these sustainable management practices needs to be a focus of local government as it does about its duties and hinges on the active participation of municipal citizens as they are the main contributors to waste generation of MSW (Miezah *et al.*, 2015; CoJ, 2016).

In addition, from a Johannesburg context the research was motivated by the diminishing landfill space at the four main landfills that service the City of Johannesburg, with some such as Robinson Deep and Marie Louise being left with less than ten years' lifespan (Pikitup, 2015/16). As such it has become imperative for Pikitup to turn from its traditional 'cradle-to-grave' towards a 'cradle-to-cradle' approach (Table 1 below). The 'cradle-to-cradle' approach involves effecting the concept of integrated sustainable waste management (ISWM) whose premise is vested on the involvement of all key stakeholders in the integrated planning of waste system elements. Whilst it is noted that landfills constitute part of every solid waste management system through the provision of disposal space for waste, it is important to ensure that this waste doesn't have recyclable potential. The important

aspect of ISWM systems which ensures that landfill lifespans are enhanced involve the implementation or recycling programmes that will divert waste sent to landfills.

Table 1: Landfill Lifespans in the CoJ¹

Name of landfill site	Available airspace (in cubic metres)	Lifespan (in years)	Estimated date of closure
Robinson Deep	22 968 866	5.6	Nov 2021
Goudkoppies	9 691 222	13.9	Feb 2030
Marie Louise	6 796 717	4.11	April 2021
Ennerdale	2 223 209	10.4	Sept 2026

Moreover, the continued presence of waste pickers at the CoJ landfills indicates that waste collected and disposed at landfills from the City of Johannesburg still contains recyclable material with potential for resource recovery. This necessitates the need to explore research that links between recycled waste that households separate based on their understanding of waste and the role of informal waste reclaimers in the S@S programme as an untapped potential approach towards more sustainable waste practices using waste hierarchy approach (CoJ, 2011; NWSM, 2011; Oteng-Ababio, 2014). This research was to aid the formulation of guidelines of national integration of all waste stakeholders as part of the broader CSIR-DST funded “Lessons from waste picker integration initiatives-development of evidence based guidelines to integrate waste pickers into South African municipal waste management”.

1.3 Research Question

The overarching research question for this research sought to address: **How do the residents’ understandings of waste, their wasting practices and their participation in Pikitup separation at source programme in Johannesburg shape each other?**

¹ (Source: Pikitup 2015/16 report)

1.4 Research sub-questions

The following sub-questions were used to elaborate the main question.

The sub-questions were developed as follows:

1. What materials are disposed as waste by the residents?
2. How do the residents' understandings of the definition of waste influence their waste practices and participation in separation at source programmes?
3. How has participation in the separation at programme changed how residents understand waste and their waste practices?
4. What socio-economic and cultural factors inhibit and influence residents' participation in separation at source?
5. How do residents' understanding of the role of reclaimers and their relationships with waste reclaimers affect their participation in waste separation at source?

1.5 Background to Solid Waste Management in a South Africa context

Prior to 1994, environmental concerns were the least on South Africa's agenda. However, the last couple of decades in South Africa have seen an elevation of environmental affairs. Section 24 of the Constitution of South Africa (Act 108 of 1996) here in referred to as The Constitution is the cornerstone of changes in environmental law in South Africa. It integrates international environmental laws. It provides that 'everyone has the right to an environment that is not harmful to the health or the well-being; and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation; promote conservation and secure ecologically sustainable development and the use of natural resources while promoting economic and social development' (The Constitution, 1996).

Furthermore, South Africa has sought to address the significant environmental and social impacts of waste management by enacting various legislation on waste management in line with international and local standards which seeks to improve

waste management in the country. The South Africa key legal framework on waste management that been enacted is summarized below:

Table 2: The South Africa Waste Legislation Framework²

Year	Name of Legislation	Main area pertaining to waste addressed.
1989	Environmental Conservation Act, Act 73 of 1989	Protection of the Environment.
1996	The Constitution of South Africa, Act 108 of 1996	Mandates that waste removal is a function of local government
1998	National Environmental Management Act, (NEMA) Act 107 of 1998	• Framework for protection of the environment • Governs Environmental Impact Assessments (EIA)
1999	National Waste Minimization Strategy	Waste minimization and protection
2000	White Paper on Integrated Pollution and Waste Management in South Africa	Pollution prevention, waste minimization and consideration of other alternatives
2001	National Waste Summit-The Polokwane Declaration	First national summit on Waste Management
2003	National Health Act, Act 61 of 2003	Highlights municipal services that encompass waste management.
2007	National Waste Management Bill	Overarching national legislation on waste management.
2007	Waste Tyre Regulations (DEAT)	Main focus on safe handling, storage and disposal of used tyres.
2008	National Environmental Management: Waste Act (NEMWA), Act 59 (2008)	Overarching legislation on waste management.

There are two pieces of legislation that constitute the environmental legislative framework in South Africa; namely the Environment Conservation Act 73 of 1989 (ECA) and the National Environmental Management Act (ACT 107 of 1998) (NEMA). They provide the framework for environmental management in the sense that their application extends to all environmental aspects and provide for the general principles which strengthen environmental management in South Africa. The NEMA Act serves as the main framework legislation for environmental management in South Africa because it provides for the overarching generic principles that form South Africa environmental governance. NEMA also regulates the system of

² Source: Engledow, 2005

environmental assessments and management related tools that ensure integrated environmental management mainly through the South African National Department of Environmental Affairs and Tourism (DEAT) as the main agent in collaboration with other relevant competent authorities. Waste management is governed by the National Environmental Management: Waste Act 59 of 2008 (Waste Act) hereafter referred to as NEMWA. The Waste Act repealed certain sections of the ECA that pertained to waste management and adopted new procedures to improve the compliance of concerned parties in terms of waste management. The NEMWA fundamentally provides a coherent and integrative law that regulates waste management by addressing all the steps in the waste hierarchy system in order to protect the environment and human health.

The National Waste Management Strategy (NWMS) is a legislative requirement of NEMWA whose main purpose was to facilitate its aims and objectives. The structural framework of NWMS was based on eight goals which include promotion of waste minimization, re-use, recycling of recovery of waste; ensuring effective and efficient delivery of waste services; facilitating a growth of the contribution of the waste sector to the green economy, ensuring environmental education and awareness of people is implemented whilst ensuring that sound budgetary and financial resources are allocated for waste service management (NWMS, accessed from <http://www.environmenta.gov.za> on 27 February 2017).

1.6 Structure of the Research Report

This first chapter of this research report provided an introduction to the study which highlights the challenges that are associated with municipal solid waste generated by residential households in urban areas of developing countries together with the need for implementation of measures that will minimise solid waste generation, promote sorting and separation at source at source of generation and divert disposal of waste at landfills. The rationale and importance for doing the study will be given as well as the main research question and sub-questions. The area under study will also be described.

Chapter 2 presents the literature review. It provides conceptual definitions of the different aspects of SWM and discuss the applicable legislation and regulations in

the South African context. A detailed literature review will be provided on some global municipal solid waste experiences of best practices on programmes that involve residential participation in sustainable wasting practices. Factors that promote or hinder residents' participation will be discussed and a conceptual framework will be developed for the City of Johannesburg context. The third chapter focuses on the research design and methodology used in this study. The research design is purely qualitative as this approach offers the opportunity to explore how residents in the City of Johannesburg define waste and how perceptions and relationships with waste pickers shapes their wasting practices and participation in the Pikitup S@S. This chapter outlines the various research methods used to obtain residents' definition of waste and wasting practices as well as the Pikitup approach to the waste separation at source in terms of policy and implementation.

Chapter 4 and 5 present the findings of the research study in Newlands and Franklin Roosevelt Park respectively. For each suburb, the residential households' responses are presented before being comparatively analysed using a qualitative approach and discussed in Chapter 6 of this study. Chapter 7 presents the conclusions.

CHAPTER 2 LITERATURE REVIEW

2.1 Introduction

The literature review focuses on theoretically engaging with academic debates in order to derive the major themes that this research study explores (Mouton, 2012). This chapter reviews literature surrounding the management of municipal solid waste by local governments; the conceptualisation of waste by residents and how their wasting and recycling behaviours influence their participation in separation at source programmes. In addition, residential households' perceptions and relations with waste pickers will be explored. The literature review provides an overview of process of municipal solid waste management, conceptualization of waste and legislation of waste. This chapter also discusses the factors that affect residential households' participation in sustainable waste practices such as source separation.

A lot of past research indicates that residential households are the larger producers of MSW, which includes papers and cartons, plastics, glass, leftover food and cans (Ogola *et al.*, 2012; Zhang & Wen, 2014). Moreover, a number of recent studies have shed light on how waste separation by residential households is a pre-requisite element that facilitates recycling (Pakpour *et al.*, 2014; Zhang & Wen, 2014; Nguyen *et al.*, 2015; Zeng *et al.*, 2016). From another perspective, other previous literature indicates that besides residential households, waste pickers are also valuable stakeholders in urban sustainable waste management plans (Mbiba, 2014; McKay *et al.*, 2015; Dias, 2016). Even as municipalities introduce integrated waste management programmes, waste picking is growing particularly in urban cities of developing countries (Dias, 2016). Developing countries are compounded by the lack of recycling infrastructure and culture of source separation and recycling thereby creating a need and opportunity for waste pickers to retrieve and reclaim recyclable materials before collecting of waste for landfill disposal.

2.2 Municipal Solid Waste Management (MSWM)

Municipal solid waste is defined as waste generated by residential households among other generators (Pakpour *et al.*, 2014) which is collected by Pikitup, some of

which should be disposed at the landfills if it cannot be separated at source for recycling and re-use. Municipal solid waste management in developed countries differs from MSWM of developing countries as they have a much wealthier income, promoting not only the successful implementation of MSWM plans but resource recovery programs as well. Developed countries are better able to keep mature databases which pertain to municipal solid waste generation rates, composition and recovery rates than developing countries (Miezah *et al.*, 2015). There are different types of waste that are produced: municipal solid waste and hazardous waste. Municipal solid waste is waste that is mostly generated by residential households. Local municipalities have a responsibility for collection and removal of municipal solid waste in their areas of jurisdiction. This responsibility brings with it an associated budgetary cost which has to be catered for as with the other municipality responsibilities. The management of MSW is mostly concerned with the collection (pre-collection and collection) and disposal of the generated waste, which ultimately ends in landfills (Nyugen *et al.*, 2015). This municipal solid waste is generated by various stakeholders such as residential households, commercial stakeholders and the public in their municipalities. According to Ogola *et al.*, (2012), the costlier components of local solid waste management systems are solid waste collection and transportation to landfills. They mention that the introduction of source separation of waste of household waste generated is a key element of municipal integrated waste management systems that municipalities could introduce as a means of reducing waste for collection and disposal to landfills. Various studies have also highlighted that developing counties are experiencing challenges in MSW management (Mangizvo & Wiseman, 2012; Samah *et al.*, 2013; Pakpour *et al.*, 2014; Miezah *et al.*, 2015).

As municipalities of developing countries aspire to achieve modern sustainable waste management systems, many have neglected to acknowledge nor incorporate the already existing 'informal waste sector' activities into their plans (Wilson *et al.*, 2009; Dias, 2016). Similar to this, Schenk and Blaauw (2011) state that municipal waste management systems in South Africa do not appear to be ready to incorporate waste pickers into them although Dias (2016) points out to their inclusion in some Asian countries like Peru. A current study by Dias (2016) as previously mentioned by Wilson *et al.*, (2009) indicates that the informal sector continues to contribute to high

recycling recovery rates of clean source separated material in urban areas of developing countries whilst providing sustainable livelihoods to the waste pickers.

2.3 What is Waste?

The waste hierarchy approach can be better effected if the definition of waste is understood by all relevant stakeholders. A number of studies concur that the crux of sustainable waste practices rests with the definition of waste (Pongracz & Pohjola, 2004; Oelofse & Godfrey, 2008; Oberlin, 2013). According to Pongracz and Pohjola (2004: 142), a definition is considered to be “the most obvious and perhaps the only adequate method of characterising a scientific concept”. Several studies indicate that there are many definitions of ‘waste’ and these definitions have an influence on the sustainable waste practices of stakeholders such as residents (Pongracz & Pohjola, 2004; Oelofse & Godfrey, 2008; Oberlin, 2013; Matter, 2013 and Pakpour *et al.*, 2014). The different definitions of waste from an international and national context and their implications for waste recycling and minimisation have been analysed by Oelofse and Godfrey, (2008). They argue that New Zealand’ definition of waste lacked the capacity to effectively manage waste nor reduce waste production whilst the Singapore definition was as ambiguous as the South African definition of the 1990s which regarded everything as waste unless the generator was able to prove otherwise.

The South African legislation on waste contains many different definitions of waste. One regulative definition of waste used in the Environmental Conservation Act (1989) which has since been repealed is; “an undesirable or superfluous by-product, emission, residue or remainder of any process or activity, any matter, gaseous, liquid or solid or any combination thereof originating from any residential, commercial or industrial area, which is discarded by any person, is accumulated and stored by any person with the purpose of eventually discarding it with or without prior treatment connected with the discarding thereof, or which is stored by any person with the purpose of recycling, reusing or extracting a useable product from such matter,” (Environment Conservation Act. 1989).

Another legal definitions of waste as given in the NEMWA Act 59 of 2008 states that waste is;

“any substance, whether or not that substance can be reduced, reused, recycled and recovered—

- (a) that is surplus, unwanted, rejected, discarded, abandoned or disposed of;
- (b) where the generator has no further use of for the purposes of production, reprocessing or consumption;
- (c) that must be treated or disposed of; or
- (d) that is identified as a waste by the Minister, but—
 - (i) a by-product is not considered waste; and
 - (ii) any portion of waste, once re-used, recycled and recovered, ceases to be waste.” (NEMWA, 2008: 30)

Both definitions are legal definitions of waste that stakeholders can use to determine what constitutes waste. The ECA (1989) as stated by Oelofse and Godfrey, (2008) mainly focuses on waste being created once material has been discarded hinting towards ownership being the key point of waste creation. In addition, the ECA (1989) was mainly regulated to cater for waste disposal and associated treatment of such waste. This latter definition did not focus on the other waste related aspects such as re-use, recovery or recycling of waste in South Africa. Oelofse and Godfrey (2008) propose that a good re-definition of waste must consist of the following characteristics: potential to promote waste re-use and material exchange; natural resource recovery; reduction of costs both to generators and landfills and long-term diversion of waste. However, on a more sustainable note, the NEMA definition does incorporate the principle of recycling such that once material has a recycling potential it ceases to be waste, as also corroborated by Pongracz and Pohjola (2008). Pongracz and Pohjola (2004) explore the different definitions of waste and its relationship with waste management and conclude by giving a definition for non-waste. Pongracz and Pohjola (2004) mention that the re-definition of waste is vital to the different stakeholders and the process of sustainable waste practices and management. They mention that the definition of waste is related to the concept of ownership and intended usage. In that light, it can be concluded that waste can be regarded as waste by one owner when its intended use has expired and, when

ownership is transferred, as a useful resource by the new owner. Pongracz and Pohjola (2004) therefore argue that when 'waste' still has an intended use for a new owner, it should be regarded as secondary raw material.

In a similar viewpoint, Oelofse & Godfrey (2008) focus their study on the legal definition of waste in South Africa and internationally. Their aim was to provide a "critical analysis of the definition of waste and the shift to waste as a resource" and the potential hindrance it may have on the effective implementation of the waste hierarchy strategies when negatively defined. In as much as the waste management hierarchy has been adopted by many countries, its success is deterred by the lack of a concrete definition of waste as each country has had to formulate their own definition. Oelofse & Godfrey (2008) emphasize the need for South Africa to re-define its definition of 'waste' towards terms such as renewable 'resource' that could be used towards achieving waste minimization through recycling.

Another definition of waste is given by Ogola *et al.*, (2012) who indicate that not all waste that goes to disposal sites is useless or has no value because it was recycled by informal waste reclaimers after it has incurred unnecessary costs to the waste service providers. This article places an economic value on waste that was recyclable from and by the residential households as it indicated that about 60% of waste in South Africa was recyclable. From another perspective, Pakpour *et al.* 2014 in their research refer to household waste as heterogeneous waste produced by households and collected as municipal solid waste for disposal into landfills. This therefore signifies the fact that household waste contains recyclable material that could be separated at source of generation (households). Their article supports the fact that household waste contains some materials of a special (valuable) nature, which has to be separated at source by residents and/or households. According to Matter *et al.*, (2013) the tangible and economic value of waste that could be recycled for income generation could be enhanced when households were encouraged not to mix their waste indiscriminately and an effective collection system existed. It may be concluded that the definition of waste has seen a shift from the 1990s to present day since the Oelofse and Godfrey (2008) article to studies by Matter *et al.*, 2011; Oteng-Ababio (2014) that indicate the re-thinking of the definition of waste towards being a resource that should be diverted from landfill disposal. Moreover, Pongracz and

Pohjola (2004) would be regarded to have influenced other studies that regard definition of waste to being linked to the concept of ownership and intended usage. In conclusion, waste can be defined in terms of the concept of ownership and intended usage, as a secondary raw material or resource for re-use or as a source of income to new owner and whether it is wanted or no longer needed.

2.4 Separation at Source

The process of separation at source refers to the “practice of setting aside post-consumer materials and household goods so that they don’t enter the mixed waste stream” that is collected and sent to landfills for final disposal (State of the Environment Report, 2011). The practice of separation at source promotes the process of recycling which ultimately minimizes the potential for recyclable material to enter landfills. Separate bags are used to place the different materials that are to be recycled. Depending on the systems used, sometimes two or more such separate bags or bins are used such that the recyclable materials to be recovered maintains its ‘value’ (Matter *et al.*, 2011; Oteng-Ababio, 2014). A number of authors concur that waste minimisation and waste separation at source are vital pre-requisites for recycling and sustainable waste practices (Zhang *et al.*, 2014; Pakpour *et al.*, 2014; Nguyen *et al.*, 2015; Permana *et al.*, 2015; Zeng *et al.*, 2016).

According to Pakpour *et al.*, (2014), recycling refers to the process that ensures previously used materials are collected, processed, rebuilt and re-used without being mixed with the real “waste”. Most municipalities regard the process of recycling through separating waste at source as a more sustainable and less costly means that can be used to deal with the harmful impacts of increased waste so generated in their cities (Oberlin, 2013; Babaei *et al.*, 2015). Whilst conducting a study in the Kinondoni Municipality in Dar es Salaam, Tanzania that focused on the potential resource recovery from household waste, Oberlin (2013) conducted a study on the composition of household waste and their findings show that households generate a large amount of kitchen waste and other recyclables such as paper, plastic and glass. His findings indicate that when there is little or no separation at source by residential households, potentially recyclable material ends up being collected for

landfill disposal, which is not a sustainable option. Some literature has indicated that the process of separating waste at source presents a big challenge for sustainable waste management programs as its success is influenced by many factors (Banga, 2011; Pakpour *et al.*, 2014; Nguyen *et al.*, 2015).

Miezah *et al.*, (2015) acknowledge that waste characterization and quantification are effective measures of waste management. They indicated that the segregation of 'waste' into various streams such as plastics, bottles and food waste added value to these materials as they could be utilized as recycled materials. The benefits of segregating are also highlighted in the Pikitup annual report (2007) that about 26% of the different classes of waste it collected was paper waste, 10% was plastic, 5.7% was glass, 2.7% was metal, 20% was garden waste, 21.8% was residue and the remainder of approximately 13% was recycled. These statistics indicated the untapped potential to increase the amount of waste that can be recycled. Oberlin (2013) also indicates that paper and plastics were relatively high in supply after food waste, as retail shops and businesses supplied goods to customers that are always packaged in these materials.

2.5 Informal separation by waste pickers

A relatively large body of literature indicates that informal waste separation and extraction of recyclables by waste pickers plays a significant role in diverting recyclable material from waste disposal (Samson, 2008; Katusiimeh *et al.*, 2013; McKay *et al.*, 2015; Dias, 2016). Wilson *et al.*, 2009 highlighted that the informal waste sector collected source separated materials from households, which they sold to sustain their livelihoods. Waste pickers extract a range of materials out of the trash that can either be recycled or re-used. The common factor is that they can be sold and/or re-used (Schenk and Blaauw (2010). A number of studies show that waste pickers take out certain material from the residents' bins and at landfills which are mainly plastic bottles, glass, paper, aluminium cans that have the potential for re-use personally or for sale to earn income for themselves (Samson, 2008; McKay *et al.*, 2015; Dias, 2016). Schenk and Blaauw (2010) reveal that the recyclables that are collected by waste pickers are determined by what they can sell and/or re-use. Furthermore, Samson (2008) found that waste pickers that worked from landfill sites

collected materials such as pots and pans, blankets and detergent, which they could use in their own homes. Yet, despite the range and quantity of materials extracted by waste pickers, Sembiring and Nitivattananon (2010) observe that many urban solid waste management policies of developing countries have not incorporated the contribution of the informal waste sector, which highlights the negative perceptions by municipal authorities towards informal recycling.

The study by Sembiring and Nitivattananon (2010) indicates that the informal sector contributions focus more on recovering paper, plastics and metals from normal waste rather than disposing it as municipalities do. This process points out to an informal form of separation of waste from bins or waste left in the streets and landfill sites. Moreover, Wilson *et al.*, (2009) mention that informal waste pickers also recover recyclables from residential households' clean source separated materials. Unlike the residents of Johannesburg where all matters pertaining to MSW management from the provision of wheelie black bins, kerbside weekly collection and disposal to landfills as well as recycling programmes were handled by the CoJ, the residents of Abidjan as studied by Andriansia *et al.*, (2016) were primarily responsible for their own solid waste management. Despite this suggestion, the authors indicate that integrating informal waste picking partnerships with formal waste recycling systems is not without its pitfalls and bureaucratic challenges, which need to be sorted (Andriansia *et al.*, 2016). The residents of Abidjan were in agreement that the services that was provided by the private waste pickers was very efficient and greatly improved the city waste management state, which they willingly paid for.

2.6 Societal Participation in Waste Separation and Recycling

Research has also emphasized the importance of societal participation in waste management activities (Banga, 2011; Oteng-Ababio, 2014; Babaei *et al.*, 2015; Miezah *et al.*, 2015). It is important to understand factors that influence recycling behaviour in communities as this can lead to successful and more effective recycling programs in communities of urban areas. Much attention has been given in existing literature which discusses the environmental effects of municipal waste over the last several years (Pakpour *et al.*, 2014; Dai *et al.*, 2015; Nyugen *et al.*, 2015). On the

other hand, some literature exists of factors influencing recycling behaviour in communities (Pakpour *et al.*, 2014; Nyugen *et al.*, 2015). Banga (2011) assessed the composition of municipal solid waste generated in Kampala as was done by Miezah *et al.*, (2015) as well as the knowledge and attitudes associated with its effective management. Whilst both Banga (2011) and Oberlin (2013) highlight that recyclable material has potential to be recovered creating income for those involved, Banga (2011) further indicates that household knowledge and attitudes of stakeholders influence their participation in waste management practices such as source separation and recycling.

Oberlin (2011) reinforces the concept that households will be positively engaged in recycling if they were able to benefit financially from the practices. In addition, Oberlin's (2013) recommendation was that when household waste had a great proportion of recoverable waste, future planning should be to separate and compost it rather than the municipality collecting it for disposal at landfills. The findings of Oberlin (2013) were more on policy change towards none disposal of recyclable material rather than separation at source and recycling instead. A similar study was conducted by Babaei *et al.*, (2015) in Iran and similar conclusions were arrived at.

Nyugen *et al.*, (2015) used a questionnaire in their survey to conclude that the residents' who found waste separation as a difficult chore had a negative inclination to participate in waste separation at source regardless of the financial implications. Their study, however, did not attempt to include a definition of waste as a factor that might influence waste separation by households. On the part of affected municipalities, such behaviour may result in increased costs of operations that could otherwise be avoided. Mason *et al.*, (2004) and Dai *et al.*, (2015) highlighted that the recyclable rate of waste would be improved by ongoing education and awareness of relevant stakeholders. Furthermore, Pakpour *et al.*, (2014) linked participation in recycling by households to significant predictors of behaviour such as past behaviour, intention, moral obligation and attitudes of households. The study by Dai *et al.*, (2015) went a step further and gave examples of ways of disseminating information as a means of enhancing households' cooperation to separate waste at source. The research by Abd'Razack *et al.*, (2017) also research corroborated by

Dai *et al.*, (2015) that households who do separate their waste for recycling purposes are seen those who are well informed about recycling.

Based on analysis of separation at source in Dar es Salam, Tanzania, Oberlin (2013) determined that 77% of these households kept recyclables for their own use, 10% gave them away to others and 13% mixed the recyclables with other types of waste. Among those given the recyclables are waste pickers although there is hint of strained relationships between waste pickers and households (Oberlin 2013). In a study done in Iran, Pakpour *et al.*, (2014) suggest that the success of household recycling programs hinges on increased household participation in waste separation at source, using the theory of planned behaviour (TPB) as their theoretical framework. They suggested, as also indicated by Nguyen *et al.*, (2015), that while TPB relies on behaviour, subjective norms and attitudes as predictors of residents' waste separation intentions, there are other variables such as economic incentives, sanctions, communication, altruism, reciprocity, social norms and convenience. Similarly, whilst also determining urban waste characteristics and households' participation in separation at source programmes in Eastern and Southern Africa, the residents of Mombasa, Lusaka and Bulawayo interviewed by Mbiba (2014) displayed an overwhelming willingness to participate in at source separation of waste prior to waste collection provided they were encouraged to do so. Nevertheless, there were a few households that were not participating in S@S and they cited reasons such as time constraints and lack of incentives to participate.

When recycling programmes are introduced, it is not always everyone that sees recycling as a part of the activities they should participate in. According to Moh and Manaf (2017) in a study done in Malaysia, recycling behaviour is influenced by numerous and diverse factors which include convenience, social norms and environmental awareness knowledge. Source separation and recycling among households are mostly hindered by the lack of willingness to separate waste for recycling, inconvenience in terms of space and availability of bins and public perceptions as well as a lack of recycling behaviour by the households. When there is a general perception that municipalities are solely responsible for all issues pertaining to MSW, participation rates in recycling and waste separation at source tend to be low (Babaei *et al.*, 2015; McKay *et al.*, 2015).

2.7 The effect of relationships between waste pickers and residents on waste practices

Mbiba (2014) indicates that whilst most Africa cities already have vibrant (formal and informal) waste recycling economies that are creating incomes and livelihoods for households and businesses, environmental sustainability as related to waste management is being hindered by many factors such as weak environmental sustainability policy frameworks that are integrative of all relevant stakeholders. Furthermore, he indicates that it is vital for integrated waste initiatives designed by municipalities to involve not only residential households but the informal sector as well. This is because that in most developing countries due to poverty and other factors the informal waste sector has always been in existence. In 2008, Medina (2008) reported that approximately one percent of all urban dwellers in developing countries sustain their livelihoods from waste picking. Waste pickers make a living by collecting recyclable and reusable materials from rubbish bins and landfills. They are also referred to as reclaimers, scavengers or private operators (Samson, 2010; Schenk & Blaauw, 2011; Katusiimeh *et al.*, 2013).

Waste pickers have been operating mostly in developing countries and some of them have forged relationships with households as they are involved in recycling of materials such plastics, paper, glass to name a few (Mbiba, 2014). In a study conducted in Doula, Cameroon by McKay *et al.*, (2015) where they looked at how informal operators could be better integrated into the solid waste management chain found that the lack of their integration has resulted in low recycling rates in Doula. Informal operators such as waste pickers arise in situations where city governments fail to successfully deal with MSW and, although they exist in parallel with public and formal private sector contenders, they are still not officially recognized. This is similar to the fact highlighted by Matter *et al.*, (2013: 1) that the contribution of the informal sector to municipal solid waste management is seldom acknowledged as waste pickers are perceived as “unclean people who create a mess in public spaces, while sorting and dumping the refuse indiscriminately”. They face countless experiences of marginalisation and stigmatisation from residents and city officials due to the nature of their work, which is often perceived as filthy.

Contrary to popular belief, Dias (2016) highlights that waste pickers play a vital role in reducing costs to municipalities by decreasing the amount of municipal waste that is collected for landfill disposal. Various studies on waste and the informal sector have sought to identify the unjust treatment of informal recyclers in the waste management system (Beall, 1997; Samson, 2009; Matter, 2011; Guerrero *et al.*, 2013). Samson (2008) and Guerrero *et al.*, (2013) argue that waste pickers are seldom integrated into solid waste management frameworks despite the significant role they play in minimizing solid waste volumes. As waste pickers are in closer proximity to households who generate waste than the formal waste sector (municipalities among others), Katusiimeh *et al.*, (2013) and a number of other authors note that the informal sector and the formal sector are interlinked. According to Dias (2012), the UN-HABITAT 2010 publication called *Solid Waste Management in the World's Cities* indicates that the contribution of waste pickers in waste management in most cities in developing countries is between 50 and 100 percent of the waste recovery rates whilst operating as an informal sector. This contribution is provided at no cost to the budget of the city municipalities saving them money in their solid waste management duties. Waste pickers have been referred to as green economy workers because their efforts have not only created cleaner and healthier cities but also enhanced recycling rates in most developing countries in tandem with generating sustainable incomes for their own livelihoods (Dias, 2016).

Moreover, as Dias (2016) discusses the environmental and economic contributions of informal waste pickers to cities, she highlights that integrating informal waste pickers into city waste management policies is beneficial to both waste pickers and the municipalities. Dias (2016) refers to waste pickers as key economic agents and argues that, as they obtain the recycling material they sell from households, it would be prudent for city municipalities to incorporate these two key stakeholders into their sustainable waste management policies and programmes as Mbiba (2014) also corroborates. From a different perspective, the study done by Katusiimeh *et al.*, (2013) discusses the relationship between informal waste collectors and formal public and private sectors in solid waste management in developing countries, whereby waste pickers operate by pushing simple push carts to transport reclaimed and recyclable waste from outside the household streets to designated subsidiary

collection and selling centres. In this instance, the existence of the informal waste sector is there to create employment and provision of solid waste collection services to the residents.

2.8 Conclusion

This chapter has reviewed literature on municipal solid waste management, various definitions of waste, the process of waste separation at source by residential households and informal S@S by waste pickers and how societal participation in S@S has influenced recycling and recovery of recyclables. It has identified that many developing countries are facing MSW challenges as it is their responsibility to manage MSW generated by residential households, who have been identified as the greatest contributors to MSW. Furthermore, whilst MWSM is predominantly concerned with pre-collection and collection and ultimate disposal at landfills, municipalities has begun to develop and implement sustainable waste plans that promote separation at source by residential households which enhances recovery rates of recyclables. Numerous definitions of waste have been noted by various authors as having an influence on residents' participation in S@S. Some definitions of waste have been associated with ownership and intended usage, others with the recycling potential of material. The legislative definition in South Africa has been debated that previously it was more towards disposal of waste but is now more aligned to recycling as with international practice.

Numerous authors have highlighted that S@S is a key element necessary for recycling and high recovery rates in urban areas. However, this process of S@S is influenced by participation of residents and other stakeholders. In addition to formal S@S, some authors have indicated that informal S@S by the informal sector such as waste pickers already exists in cities of most developing countries, which posits untapped potential that municipalities could use to enhance recycling rates. This study sought to contribute towards debates on household participation in S@S by drawing on the literature in terms of the conceptualizations of waste and exploring conceptualizations of recycling and the recycling system and how they shape each other as well as residents' participation in S@S.

CHAPTER 3 CONCEPTUAL FRAMEWORK

The development of a conceptual framework is an important aspect of research as it ensures a clear visualisation of the concepts and assumptions, variables and theoretical perspectives that the study will follow (Babbie and Mouton, 2007). The concepts that inform this Masters Research Report are 'waste' and 'separation at source'. Conceptualising waste is important in waste management as it determines what happens to the 'waste' after it has been generated by the residential households. As discussed in the literature review, various definitions of waste and various literature has debated how the conceptualisation of waste has shaped wasting practices by residents (Pongracz and Pohjola, 2004; Oelofse & Godfrey, 2008; Oteng-Ababio, 2014). According to Pongracz and Pohjola (2004), the definition of waste is related to the concept of ownership and intended usage. In that light, waste can be considered to be something that exists and should be disposed and/or discarded when its intended usage by the owner ceases.

However, it can be concluded that what is regarded as waste by one owner can cease to be 'waste' but becomes a secondary raw material when ownership changes. Materials regarded as waste by residents when passed to waste pickers become recyclables that can be resold to sustain livelihoods. Another concept utilised in this study was the conceptualisation of 'recyclables waste'. It is noted that it is not only the positive conceptualisation of waste but also the conceptualisation of recyclable waste that is key to shaping residents' participation in S@S activities. Matter *et al.*, (2013) also looks at waste as having a tangible economic value when it is segregated at source for recycling and is diverted from landfill disposal. This study draws on the definitions by Pongracz and Pohjola (2004) and Oteng-Ababio (2014) argue that a positive re-definition of waste by residential households has the potential to shape their wasting practices and participation in separation at source of recyclables. How waste is conceptualised positively or negatively, by residential households will be used to ascertain wasting practices of residential households and their participation in separation at source practices.

Another concept used in this study is 'separation at source' of waste. The process of 'separation at source' involves the setting aside of recyclable materials such as

plastics, bottles, glass, cans and food waste into separate bins or recycling bags from the rest of the waste (Mason *et al.*, 2004; Ogola *et al.*, 2012). This is a process that can be practiced by various stakeholders involved in the generation of municipal solid waste such as residential households (Matter *et al.*, 2013; Babaei *et al.*, 2015; Nguyen *et al.*, 2015; Zeng *et al.*, 2016). Many authors have argued that separation at source is a vital pre-requisite for sustainable waste management plans using the waste hierarchy system (Banga, 2011; Mbiba, 2014; Zeng *et al.*, 2016). As discussed in the literature review, waste pickers play a significant role in separating waste when residents do not do so (Medina, 2008; Dias, 2016). Separation in this study is understood to encompass separation at source by residents, as well as separation by waste pickers literally on their doorsteps (the residents' yards). This study brings the two concepts together to understand how conceptualisations of waste shapes whether and how residents participate in separation activities.

CHAPTER 4 RESEARCH METHODOLOGY

4.1 Introduction

Methodology focuses on the manner in which knowledge about the world is gained and research data is collected (Mouton, 2012). This chapter gives a detailed description of the research design and methodology as applied to this study. The research data for this study was collected from the residents of Newlands and Franklin Roosevelt Park and Pikitup waste management personnel concerned with the waste separation at source programme in the Waterval Depot. This section of the report encompasses a description of the study area, research design, ethical considerations, data collection methods used and the limitations faced in the study. The residents' definition of waste, and their wasting practices, beginning from their participation or non-participation in separating waste at source to their perceptions on recycling and waste pickers will be compared in the two different income areas of Newlands and Franklin Roosevelt Park. In addition, the perceptions of city officials tasked with waste management and management of S@S in the CoJ on residents' participation and success of the programme will also be examined.

4.2 Area under study

The City of Johannesburg Metropolitan Municipality is found in the smallest province of South Africa, the Gauteng Province (CoJ, 2015). The CoJ consists of seven regions and is considered to be the economic hub of South Africa as it attracts both locals from surrounding provinces as well as international people in search of economic emancipation (Figure 1 below). Hence, it is characterized by a unique and diverse population in addition to the state of the art infrastructure in terms of communication, water and power, waste management, health and educational facilities. It covers an area of 1 645km², with a projected population of about 4.9 million people which is representative of about 36% of the Gauteng province and 8% of the national population (CoJ, 2015; IDP, 2015-16). As a result, the number of residential households has been remarkably increasing from a total number of 1 006 910 in 2001 to 1 434 856 in 2011 and now currently projected at 1 588 711 which represents an increase of approximately 57.7% from 2001 to 2016 (CoJ, 2015).

Newlands and Franklin Roosevelt Park suburbs are the low income and high income areas respectively found in the City of Johannesburg in which the research was conducted. These suburbs were chosen based on the diversity of the residential households in terms of first language and population dynamics; and their flexible accessibility to the researcher. Apart from this, the huge difference in income of the two areas was another factor which the researcher regarded as a necessary factor that could be explored as the residents' wasting practices were being investigated (StatsSA, 2011). In addition to that, these residential areas were part of the chosen suburbs in which the S@S programme was to be initiated.



Figure 1: Regions of the CoJ³

³ (Source: Pikitup, 2015-16 integrated annual report) [

4.2.1 Newlands

Newlands is an integrated, low income neighbourhood that covers an approximate area of 1,98 km² of the City of Johannesburg as shown in the map below (StasSA, 2011). It has an appropriate population of about 11 295 people and comprises of about 3 384 households. This population consists of about 39% black Africans, 32% are coloured, 24% are white and others make up the remaining 3%. According to StasSA, 2011 approximately 50% of the population of Newlands are female and the most common first language is Afrikaans (36,7%), followed by English (27,8%), Setswana (10,0%), IsiZulu (7,5%) and 9% for other languages (StasSA, 2011).

Newlands comprises mostly of free standing residential households of which some have subdivided to accommodate tenants. According to the researcher's observations, most of the households were approximately 250-300m² in size. The households were single-storey buildings with a few flats to be found above commercial shops along the Main Road used by buses and commuter taxis travelling to Roodepoort and other suburbs. Most of the households interviewed indicated that they were the owners of the house in which they resided in.

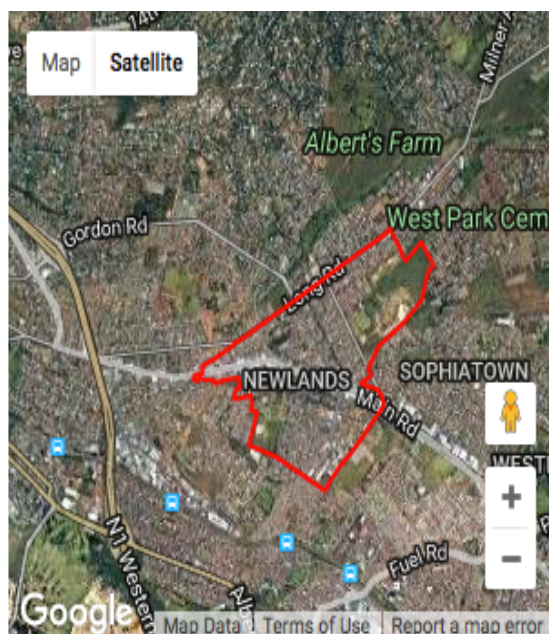


Figure 2: Map of Newlands⁴

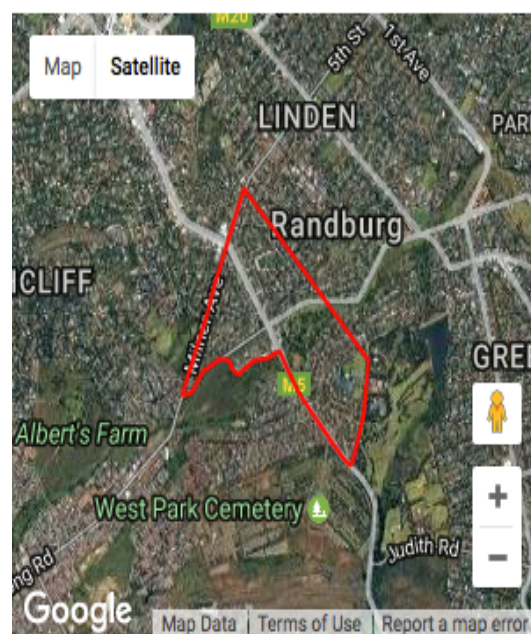


Figure 3: Map of Franklin Roosevelt Park⁵

4.2.2 Franklin Roosevelt Park

⁴ Source: google maps

⁵ Source: google maps

Franklin Roosevelt Park is a relatively high income suburb, located on the north-western side of Johannesburg; which boasts of large family homes with lovely gardens and a few complexes (Accessed on <http://www.sa-venue.com> on 20 March, 2017). In 2011 StatsSA reported that it covers a size of 1,58km², with a population size of 3 467 and consists of 1 289 households (StatsSA, 2011). Of this population, 59% are whites, 21% are African blacks, 14% are Indians, 5% are coloured and 2% constitute others. In terms of gender, there are approximately 1 893 females, who make up 55% of the population and 45% are males. Furthermore, the StatsSA (2011) states that 65% of the Roosevelt Park suburb speak English as their first language followed by Afrikaans at 18% and 4% speak IsiZulu.

4.3 Research design

The research was qualitative in nature using an exploratory case study approach. This choice was informed by the use of qualitative methodology in similar studies (cf Oteng-Ababio, 2014; Emelumadu et al., 2016). Qualitative research methodologies are referred to as procedures that produce descriptive data; either in written form or as spoken words of people and observable behaviour. Leedy and Ormrod (2013) indicate that a qualitative approach is subjective and can be used to describe an event in its natural setting in an attempt to explain the behaviour and attitude of the respondents under study. Qualitative research aims to provide answers to the “why” and “how” process questions to ensure an understanding of multi-faceted questions in order to explain experiences and behaviour whilst engaging with evolving and new topics. Furthermore, a case study approach enables an in-depth exploration of a complex and unique project, policy, institutional programme or system from a ‘real-life’ context in order to generate knowledge and understanding from various perspectives (Creswell, 2003; Simon, 2009). Besides facilitating the in-depth study of experiences and their interpretations within their socio-economic context, case studies also allow for flexibility in exploration and understanding of the processes and dynamics of change of an event in its natural setting.

The qualitative approach was used in this study because the study sought to explore and investigate the residents’ participation in Pikitup’ waste separation at source and

factors that influenced or inhibited their participation as a tool for sustainable waste practices in the CoJ municipality. The research questions were designed to provide meaning, understanding and conceptualisation of waste and wasting practices and behaviours. According to Greyson and Crang (2010), waste management is not only a complex issue that is produced but it has to be managed, disposed and transformed by humans, whom therefore must be engaged with. Furthermore, qualitative research allowed for an in-depth approach to people's experiences, practices and behaviours using specific methods such as interviews, focus groups, discussions, content analysis, observations methods and life histories.

Similar qualitative approaches have been conducted by Matter *et al.*, (2012); Babaei *et al.*, (2015) and Miezah *et al.*, (2015) whilst conducting research on waste management. Most of the previous literature consulted used field research in the form of observations, questionnaires, focus group discussions and semi-structured interviews to obtain primary data. Some have also gone on to include quantitative methods as well in their studies following a mixed-method approach (Banga, 2011; Babaei *et al.*, (2015); Miezah *et al.*, 2015). Everyone produces waste whose management posits a societal dilemma to local city governments. In that light, a qualitative approach is important because it emphasises words, actions and meaning about the residents' wasting practices rather than quantification in the collection and analysis of data (Creswell, 2003). In addition, the waste service Provider Pikitup officials were also interviewed to determine their perceptions of residents' participation and how their enforcement of the S@S programme has contributed towards the attainment of their sustainable waste targets of minimising waste sent to landfills.

4.4 Access

This research was conducted as part of the broader DST-DEA-CSIR funded research project "Lessons from Waste Picker Integration Initiatives - Development of Evidence Based Guidelines to Integrate Waste Pickers into South African Municipal Waste Management Systems" coordinated by Dr. Melanie Samson. Permission to conduct the research and access to research sites and subjects were granted under

the 5-year Memorandum of Understanding negotiated between Pikitup and the University of the Witwatersrand.

4.5 Data collection methods

This research study involved the use of both primary and secondary data as has also been done by Abd'Razack *et al.*, (2017). There are a variety of methods of data collection that can be used in qualitative research which include observations, textual or visual analysis and interviews. Primary data was obtained from forty semi-structured interviews with the residents (twenty from Newlands and twenty from Franklin Roosevelt Park) and two with Pikitup officials; two focus groups with the residents (one focus group for each area), some of which were audio-recorded after consent was given and photographs were taken also and used to authenticate the response of the residents residing in the Newlands and Franklin Roosevelt Park suburbs in the CoJ. The residential households will be referred to as residents, households or participants in the study. Data was also obtained from ten waste pickers in the form of semi-structured interviews.

The researcher' ultimate intent with the data was to develop themes that would explain the residents' wasting practices in Pikitup separation at source (Mouton, 2012). Evidence required to answer the research questions was collected in the form of primary documentation, personal responses of participants to the questions asked, personal observed recordings using qualitative research tools as outlined in the Table 3. Secondary data sources such as the City of Johannesburg annual reports, Pikitup annual reports, South African legislation, the internet, academic journals and buyback centre reports among others were also accessed and utilized to gather data on solid waste management, residential wasting practices and attitudes and perceptions pertaining to SWM in the CoJ.

4.5.1 Sampling

According to Leedy and Ormrod (2013), sampling is a crucial initial step of every research project as it ensures that the information gathered for the research is not biased. Purposive sampling and convenience sampling was done in this research.

4.5.1.1 Sampling of key informants

Purposive sampling was used to identify the two key informants from Pikitup who are involved in the S@S programme. Purposive sampling is a non-random sampling technique that can be used in exploratory research which enables the researcher to purposefully select the participants, who will ensure that the sample consists of all the relevant individuals concerned (Mouton, 2012) with the responsibilities on Pikitup separation at source programme. Semi-structured interviews were conducted with one official responsible for Pikitup Separation at Source programme from Waterval depot and one of the leaders running one of the buy-back centres where the collected separated waste in both areas under study is taken for sorting and re-sale. The drivers and other employees of Pikitup at the Watervaal Depot were not included in the study.

4.5.1.2 Sampling of residential households

Convenience sampling was used to select residential households living in Newlands and Franklin Roosevelt Park in the City of Johannesburg metropolitan municipality. In studies done by Andrianisa *et al.*, (2016) and Abd'Razack *et al.*, (2017) on waste, random sampling of respondents was used. Furthermore, Katusiimeh *et al.*, 2013 also randomly selected respondents of urban citizen of Kampala, Uganda from three different income areas concerning the provision of solid waste management by informal and formal waste providers. The unit of analysis of the sample was a residential household who was willing to participate in the research at the time the researcher was conducting the research. The residential households were selected using random convenience sampling choosing any house on the street where the bell was answered in most streets in Newlands and Franklin Roosevelt Park and where there was no-one present, the researcher moved to the next house along that street. At least two houses were interviewed on each street in order to most of the areas. A sample size of 40 households gave consent to participate in the semi-structured interviews of which 19 residents reside in Newlands and 21 reside in Roosevelt Park. Only one adult resident per household was interviewed, some of whom were tenants, others were landlords or relatives of the landlord. No residents

under the age of 18 were interviewed in either area. Only the residents residing in Newlands and Franklin Roosevelt Park were considered in this study.

Employing the qualitative research tools outlined in Table 3, the evidence required to answer the research questions was obtained in the form of primary documentation, personal responses of participants to the questions asked, and non-participant observations. The methods chosen to answer the over-arching question included interviews, focus groups and participant observations.

Table 3: Methods Table

<u>Research sub-questions to be answered</u>	<u>Evidence required</u>	<u>Targeted participants</u>	<u>List of suggested method(s)</u>
What materials that still possess value are disposed as waste by the residents?	-The presence of different types of material found in the waste bins -Personal experience of waste service providers	-Residents -Waste service providers -Informal reclaimers	-Observations -Focus groups -Practical fieldwork
How does the residents' understanding of the definition of waste influence their waste practices and participation in separation at source?	Personal opinions and views of the residents. -On-field personal observations to link personal opinions and actual practice. -Information from Pikitup and CoJ documents	-Residents	-Observations -Focus groups -Semi-structured interviews
How has participation in the separation at source programme changed how residents understand waste and their waste practices?	-Personal opinions and views of the residents. -Personal experiences of Pikitup officials and informal reclaimers -Information from Pikitup and CoJ documents.	-Residents -Pikitup officials	-Observations -Focus groups -Semi-structured interviews
What socio-economic and cultural factors inhibit residents' participation in separation at source?	-Personal opinions and views of the residents. -Researchers observations	-Residents	-Semi-structured interviews -Focus groups
How will residents' understanding of the	-Personal opinions and views of the	Residents -Waste service	-Observations -Focus groups

role of reclaimers and their relationships with waste reclaimers affect their participation in waste separation at source?	residents and Pikitup. -Researchers observations	providers -Informal reclaimers	-Practical fieldwork -Semi-structured interviews
--	---	-----------------------------------	---

4.5.2 Semi-structured interviews

There are various methods of qualitative interviews: structured, semi-structured and unstructured interviews. Structured interviews mostly involve verbally administered questionnaires, whereby a list of pre-determined questions are asked without allowing for variation and/or scope for follow-up questions to the responses given by the participants (Leedy & Ormrod, 2012). They are relatively quick and easy to administer; however, they don't allow for elaborate participant responses. On the other hand, semi-structured interviews are commonly used in qualitative studies and allow for follow-up questions to the participants' responses (Mouton, 2012). Semi-structured interviews were used in this study because the study revolved around some key questions and they facilitate rapport with residents as compared to structured interviews. Unstructured interviews would not have been suitable due to the time constraints of the researcher and the need to ask some key questions concerned with the Pikitup S@S programme. Similarly, Banga (2011) used interviews and structured questionnaires to determine the attitudes and perceptions that enabled residents to engage in solid waste segregation and recycling. In Hanoi, Vietnam, Nguyen *et al.*, (2015) used a questionnaire at the beginning of their separation at source project to determine the factors that motivated residents to separate their waste for recycling.

4.5.2.1 Semi-structured interviews with key informants at Pikitup

Three semi-structured interviews were conducted with two official responsible for the S@S programme at Waterval Depot and one official in charge of the buyback centre where the Pikitup trucks transport all collected separated at source material from the residents in Newlands and Roosevelt Park to. These semi-structured interviews were conducted on the 22nd of March 2017 at the Watervaal depot and buy-back centre behind Shoprite respectively. This was done to ensure that work continued without too much disturbance and in a setting where the respondents were comfortable as well as to create rapport. All interviews with the key informants were recorded after

written consent was obtained.

4.5.2.2 Semi-structured interviews with residential households

Forty semi-structured interviews were conducted with residential households of which, twenty were from Newlands and twenty were from Franklin Roosevelt Park. The semi-structured interviews involved the use of some structured questions followed by a few more questions tailored to elucidate more information from the residents. Such interviews can be used to create rapport with the participants resulting in more information being gathered because of the diversity of the participants involved as done by Dai *et al.*, (2015). According to Mouton (2011), any number of participants more than thirty interviews is a reasonable sample size for a Masters' study. These semi-structured face-to-face interviews were done at the residents' place because they had a distinct advantage over telephonic or postal interviews as they increased chances of their co-operation. Most residents were wary of audio-recording despite assurances of confidentiality.

4.5.2.3 Semi-structured interviews with waste pickers

Semi-structured interviews were administered to ten waste pickers who were selected through convenience sampling (Mouton, 2012). Convenience sampling was used because the waste pickers were chosen as and when they were met by in both areas. Five waste pickers were interviewed in the streets of Newlands and five in Franklin Roosevelt Park. Fieldwork was done between 6am and 10 am on the same days as waste and S@S collection as the waste pickers mostly conducted their work during those early hours. The participants were first given information that explained the nature and purpose of the research and their right to participate voluntarily without being coerced and their privacy and confidentiality was to be respected. The participants were also given consent forms to sign after agreeing to participate. An interpreter was used for some of the waste pickers as only five could speak English. The interviews lasted between ten to twenty minutes. In some instances, the participants refused to be audio recorded. Audio recording was important for transcribing and translation since most interviews were not conducted in English.

4.5.3 Focus Groups with residential households

Dai *et al.*, (2015) indicated that "focus groups and interviews are well established

qualitative methods”. Focus group discussions are useful qualitative methods that facilitate in-depth discussions. Mouton (2012) explains that a focus group is a useful way for gathering data about cultural and social norms of a group of people which also enables the identification of more broad issues of concern. Two focus group discussions were conducted, each consisting of five participants from Newlands and Roosevelt Park although ten participants were invited. In both areas, two of the participants were male and three were female. The focus groups took approximately forty minutes. The researcher tried to ensure that each participant had an equal chance to respond to the few key questions the researcher had designed prior to the focus groups. These questions centered around the residents’ wasting practices and its influence in their participation in Pikitup S@S programme as well as their relationships with waste reclaimers in their respect areas.

4.5.4 Personal Observations

Non-participant observations were conducted in this research which involves the observation of participants without actively participating (Mouton, 2012). This is well used in research where an understanding of a phenomenon necessitates entering the community involved and at the same time ensuring that researcher stays separate from the activities under observation. Observations are flexible, qualitative techniques that researchers can use to gather data from unforeseen data sources as they materialise (Mouton, 2012). The researcher conducted observations of participants wasting practices at their residential households to determine how they separated their waste. The collection of the separated waste and the weekly waste collection from Newlands and Franklin Roosevelt Park on Mondays by Pikitup were observed by the researcher twice during the research period. This was done so as to obtain a clearer picture about waste generation and separation practices. Photographs were taken of separated waste on the streets and at the buy-back centre. Afroz *et al.*, (2011) in their study used observation to determine the composition of waste generated and whether it was influenced by socio-economic factors.

4.6 Data analysis

The process of qualitative data analysis involved three phases; observation, data collection and thematic content analysis (TMA). The qualitative data collected from non-participant observations, semi-structured interviews and focus groups was transcribed and organized according to the broad themes of the research derived using TMA which included conceptualizing waste; wasting practices, separation at source participation and relations with waste pickers. Where no recordings were done, the participant's responses had been written down by hand. This study was based on a combination of both primary and secondary sources. The primary data was obtained from the semi-structured interviews, non-participant observations and focus groups whilst the secondary sources mainly consisted of e-journal articles, books, municipal and Pikitup annual reports and management plans and the internet.

4.7 Ethical consideration

Ethical clearance was sought from the University of the Witwatersrand's Human Research Ethics Committee (non-medical) prior to the research as the research involved human participation of the residents, informal waste pickers and Pikitup officials. Ethical approval for this research study was acquired in July 2016 prior to the start of fieldwork. The ethics clearance certificate Protocol number is H16/07/10 (refer to appendix). Prior consent to participate in the semi-structured interviews, focus groups and taking of photographs and recording of the interviews was sought from the participants. All the participants completed the consent form prior to participation after being informed that their participation was voluntary and they had the right to withdraw from participation any time they wished to do so. No participants under the age of 18 were interviewed or took part in the focus groups. Not all the participants agreed to be recorded. Some of the direct quotes which have been included in the report were written down at the time of the interview. All participants in individual interviews were assured of confidentiality and anonymity. Focus groups could not be assured confidentiality or anonymity as the other focus group members were privy to their contributions; however, focus group members' names are also not used in the report. In addition, both focus groups were recorded after permission was obtained from the participants. Arrangements were made with Pikitup officials prior to

the conduction of the semi-structured interviews and trips to observe the system used by the recycling trucks in Newlands and Franklin Roosevelt Park.

4.8 Limitations

Only one resident was interviewed per residential property, where it was established that there was more than one family residing at the premise and contributing to the waste generated. In that light, tenants were included in the study if they were the first respondents found by the researcher at the residential property. Other employees of Pikitup except the key official at the Watervaal depot and at the buy-back centre were not interviewed. Waste is a sensitive issue and some of the respondents may not have fully shared their thoughts. Lastly, as this report was a mini-report and not a thesis, there was reduced time available and hence the scope and analysis of the research was not in-depth. During the interviews some of the participants refused to be audio recorded. Responses therefore had to be handwritten.

4.9 Conclusion

This study used a qualitative approach to explore residents' conceptualisation of waste and how it shapes their recycling behaviour and participation in Pikitup S@S. Different definitions were obtained and wasting practices were accessed and noted. Purposive sampling was used to select key officials interviewed in order to determine how the S@S programme was designed and to determine Pikitup' perception of the role of waste pickers and residents in this programme. Focus groups and semi-structured interviews were administered to residents from Newlands and Franklin Roosevelt Park through random convenience sampling. Waste pickers were chosen through convenience sampling to determine their relationships with residents and what recyclables they found separated for them and in most instances unseparated in the residents' black wheelie bins. Results for all the data collected using the different qualitative methods will be presented in the following three chapters.

CHAPTER 5 PIKITUP SEPARATION AT SOURCE (S@S) PROGRAMME

5.1 Introduction

As the custodians of waste service delivery in South Africa, municipalities perform their duties related to waste management based on legislation. In terms of waste management, the Integrated Development Plans (IDPs) 2012/16 indicates that South Africa produces approximately 1,8 million tonnes of waste each year of which approximately 244 200 tonnes is illegally dumped and 1 779 tonnes is collected from the streets. Its strategic aim is to reduce 50~% of this amount from going to landfills by 2012 and zero waste by 2022. Whilst the CoJ has an excellent weekly waste collection coverage of 98%, it is the heterogeneous nature of the collected waste that still contains recyclable which raises concern despite the introduction of sustainable waste practices.

5.2 Background to the S@S in the Waterval Area in the City of Johannesburg

The Pikitup S@S programme was initially introduced in the City of Johannesburg at the Waterval Depot in 2009 (accessed on <http://www.joburg.org.za> on 10 April 2017) in accordance with national legislation. The Separation at source (S@S) programme was introduced by Pikitup as a pilot programme at the Waterval Depot for some of its suburbs in line with the waste hierarchy strategy of waste minimization through the three Rs (reduce, reuse and recycle). The most preferred option is source reduction of waste generated whereby one of the aims of the CoJ (IDP 2015-16) is to reduce waste by 70% through the promotion of an integrated waste management system that enables city-wide participation of separation at source of plastics, paper, glass, organics and metals. Moreover, the City of Johannesburg Integrated Waste Management Plan (CoJ IWMP, 2011) states that waste separation at source and waste characterisation studies are needed which were both key parts of this study.

The Pikitup S@S initiative begun in 2009 in partnership with Mondi Recycling. It was initiated in the northwestern suburbs and informal settlements of Johannesburg which are serviced by the Waterval Depot (Pikitup, 2010). The suburbs that were targeted in the initial programme are given in Table 4. Mondi Recycling was required to operate as a private entity whereby they met their operating costs whilst collecting the recycled material in the Waterval area. It was projected that 57 000 households in the area would participate in the programme. The programme was targeted predominantly at residential households residing in different forms of residence such as stand-alone houses, complexes, town-houses, cluster homes without excluding different businesses of various sizes (Accessed on <http://www.pikitup.co.za/seperationsource/> accessed on 09/08/2017).

According to the plan, these households would receive additional litter receptacles in the form of clear plastic bags for dry recyclable waste such as cans, glass, plastic bottles, jars, and milk and juice cartons, as well as orange 'Ronnie bags' (a Mondi paper recycling initiative) to be used to separate paper such as newspapers, magazines, books, cardboard etc. The residents would be required to place these bags outside on their collections days as shown in the Table 4 together with the black wheelie bin (which all the residents are already using), which would just contain non-recyclable material such as "food scraps, light bulbs, broken crockery and paint tins" as indicated on the official CoJ website (accessed on <http://www.joburg.org.za> on 10 April 2017). The then acting managing director for communications at Pikitup, Mr. Pansy Jali encouraged residents to participate (Accessed on <http://www.pikitup.co.za/seperationsource/> accessed on 09/08/2017).

The first phase of this programme involved educational awareness campaigns of the residents residing in the participating suburbs. According to the CoJ, only approximately 38.5% of the projected 57 000 residential households that would participate were reached by the door-to-door educational awareness campaign and informed about the recycling project and informed about what their participation in this initiative would involve. The S@S programme aimed at educating people about the value of separation of recyclables as similarly mentioned by Nguyen et al., (2015). The pilot programme was also intended to promote a whole new way of

thinking towards bringing about changes to lifestyles of residential households and businesses in the Waterval Depot Area. Pikitup also initiated the S@S programme as they identified a crucial need to improve participation of residential households as they are the greatest contributors to the amount of waste generated in the city as it is committed towards sustainable waste management practices in response to growing international trends (Pikitup, 2013, 2014; CoJ, 2015).

Table 4: Suburbs under the Waterval Depot taking part in the S@S programme in 2009 ⁶

Mondays	Tuesdays	Wednesdays	Thursdays	Fridays
Albertsville	Auckland Park	Amalgam	Berario	Emmerantia
Blairgowrie	Brixton	Northcliff	Blackhealth	Greenside
Claremont	Coronationville	Horse Shoe	Bosmont	Melville
East Town	Crosby	Industria	East London	Parkview
Greymont	Homestead	Janhofmeyer	Fairlands	Victory Park
Linden	Park	Mayfair North &	Montroux	
Montclair	Hursthill	South	Northcliff Ext 1	
Montgomery Park	Langlaagte	Newclare	to 13, 15 & 25	
Newlands	Martindale	Pageview	Risidale	
Pinepark	Mayfair West	Parktown West	Valeridene	
Franklin Roosevelt	Melville	Richmond	Waterval Estate	
Park	Rossmore	Riverlea Ext 2	Roosevelt Park	
Victory Park	Triomf	New House		
	Waterval Flats	Vrededorp		
	Westbury	Westcliff		
	Westdene			

After the second phase involved the distribution of starter packs in the form of the previously mentioned clear plastic and orange Mondi bags and a sticker that households would place on the black wheelie bin. A third phase was also mentioned, which would involve the roll-out of a black bin with a green lid for collection of garden waste among other things (Accessed on <http://www.joburg.org.za>). However, the

⁶ (Source: <http://www.joburg.org.za> accessed on 10 April 2017)

partnership between Mondi and Pikitup ended in 2011 with Pikitup now utilising three buy-back centres in the Waterval area.

5.3 Waterval S@S Feedback in CoJ and Pikitup annual reports.

The continued increase in the number of residential households has made it prudent for the city's waste provider to tap on their potential participation in waste minimisation campaigns (adapted from the CoJ 2014-15 report). It states that the number of Johannesburg households could potentially increase from approximately 1,49 million in mid-2011 to about 2,16 million in 2021 at an implied annual growth rate of approximately over 3,5%, whilst at the same instance household size could be expected to decrease from an average of three individuals per residential household in 2011 to less than three individuals in 2021. As at 2011, the domestic household customer base for Pikitup stood at 450 000 households. This amounted to the highest Pikitup' total customer base (Pikitup, 2011) as compared to its other customers, which supports the literature that residential households have a key role to play in waste management initiatives targeted at minimising waste sent to landfills through waste minimisation and waste source separation (Pikitup, 2011). The Pikitup 2012 annual report reported that the S@S was on track although no participation rates were given and Pikitup' partnership with Mondi was continuing till April 2011. According to the Pikitup key informants interviewed on 23/03/2017 and 23/06/2017, Mondi was not provided with any resources from Pikitup when the S@S programme was initiated. Mondi was responsible for its own fuel, vehicles and any other costs related to their collection of the recyclables. Mondi was expected to meet its operational costs from the sale of the collected recyclable material. It was in 2011 that Mondi pulled out of the S@S programme after highlighting that it was no longer lucrative to continue without any financial support from Pikitup. Thereafter, Pikitup then linked to three buy-back centres that were already operating in the area and continued with the S@S programme but this time providing a truck, driver and the recyclable bags (Key informant 1, 23/03/2017).

Thereafter, Pikitup took over the project and has been running it since. The project now entails three buy-back centres which are run by corporatives. One is run by a

former Pikitup driver, and the other two by individuals, who are neither former waste pickers nor Pikitup employees. Pikitup provides the recycling trucks and drivers only (see Figure 4 on the right). The cooperatives are required to provide workers who travel with the truck to collect the separated waste by the residents and place it into the truck. In addition, the three buy-back centres are required to also provide workers who are involved in preparing the starter packs. The researcher was also informed that each of the six recycling trucks that left Waterval depot were supplied with approximately 500 cream plastic bags and white sacks respectively for each trip for collection of the separated waste on a daily basis (Pikitup website, <http://www.pikitup.co.za/seperationsource/> accessed on 09/08/2017: Key informant 1, 23/03/2017)



Figure 4: Trucks used for collecting separated (left) and non-separated waste from CoJ residents. (Source: Taken by the researcher)

According to the buy-back centre owner interviewed (Key informant 2, 23/03/2017), they are not former waste pickers and only became involved after applying to run their centres. However, they employ any former waste pickers interested in working for them. Contrary to statements by Pikitup management at previous workshops, the current S@S programme being run by Pikitup was not designed for former waste pickers. Key informant 2 indicated that most waste pickers were not interested in working at their buy-back centres as they did not desire to work at a 9-to-5 job but actually preferred to sell their recyclables to them on some days. Reasons given for

this was that these three buy-back centres had lower buying rates as compared to the ones in Newtown. In addition to the separated waste collected from the participating suburb, the buy-backs centres also supplemented their income by collecting from any willing complexes and businesses in areas not covered by the Watervaal depot. Therefore, the figures provided to Pikitup for record reporting could well be including this excess collected recyclable material.

The key informants from Pikitup indicated that another educational awareness campaign was conducted from April 2011 to June 2011, whose main focus was to increase participation rates in the concerned area. Various forms of advertising media such as newspaper advertising, wheelie bins, knock n drop leaflets, direct mailers, street pole posters, mail activations, mobile billboards and advertorials were used by Pikitup. Furthermore, the refuse collection rounds vehicles also referred to as (RCR) vehicles were branded to promote residents' awareness of the S@S programme as shown in Figure 4 above. The Pikitup annual report of 2011-2012 reflected increasing tonnages of the different recyclable materials between June 2010 and 2011 which Pikitup was interested in collecting from the residents under the S@S programme which includes paper, glass, plastic, cans, and tetrapak.

Table 4: Table showing the actual participation rates of S@S since inception against set targets⁷

Annual period	2010/11	2012/13	2013/14	2014/15	2015/16	2016/17
Actual (%)	7,7	17	20	21	18	Not yet available
Target (%)	10	20	30	50	70	30

⁷ Data adapted from CoJ annual reports by the researcher.

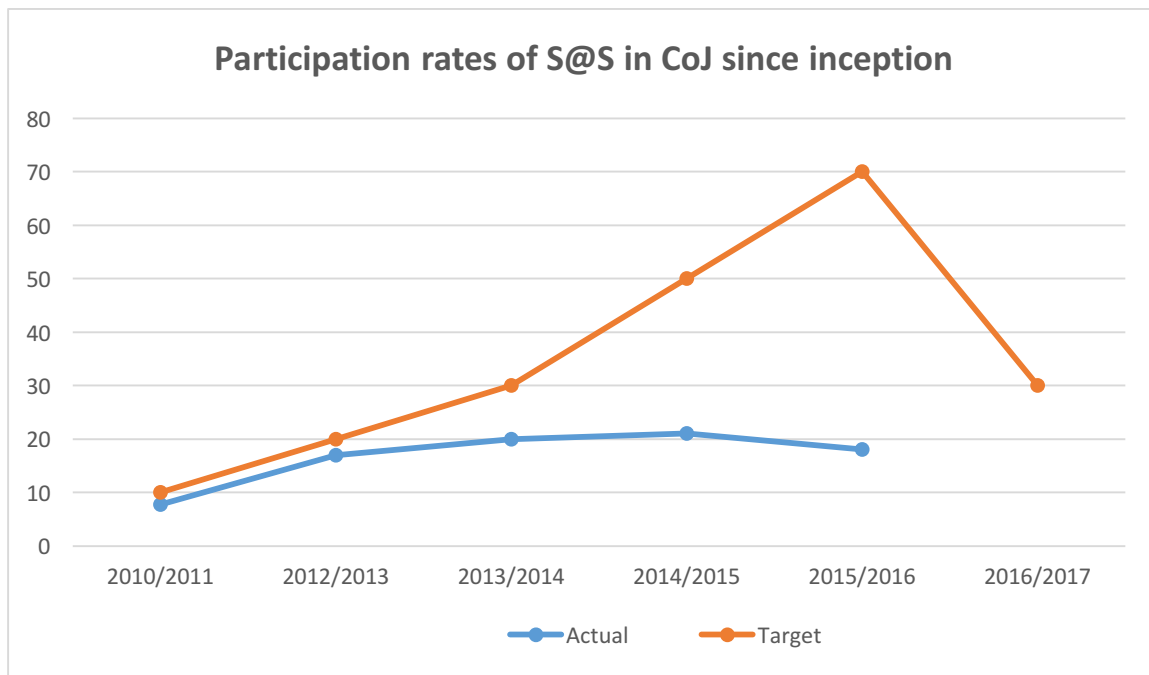


Figure 5: Graph showing participation rates of S@S in the CoJ since its inception (based on the CoJ annual reports)⁸

It was noted that actual participation rates of the S@S programme has been below the targets set since inception (Table 4 and Figure5). Various reasons have been given over the years by Pikitup for the low participation rates such as the interference of waste pickers who take the separated material before the trucks drive by; lack of interest, knowledge and awareness by many residents in the different suburbs, particularly in the low income areas. Apart from residents, the rolled out S@S programme was also introduced to schools and companies. However, these other participants are not part of this study and will not be discussed any further.

5.4 Conclusion

The introduction of the Pikitup separation at source programme was done in accordance with legislation to divert recyclable material from landfills as the lifespan of landfills is diminishing. The S@S programme was initially started in 2009 with Mondi company, who were not provided with any assistance by Pikitup but whose only benefit was from the sale of the separated recyclables they would have

⁸ Graph done by the researcher based on participation rates obtained from Pikitup annual reports from 2010/2011 to 2016/2017

collected. Awareness campaigns and pamphlets were given to 57 000 participating households under the Waterval Depot. The residents were supplied with the Mondi 'orange' bag for paper and newspapers and a clear plastic bag for plastics and cans and bottles. In 2011, Mondi ended the partnership with Pikitup after failing to obtain financial assistance from Pikitup. Thereafter, Pikitup entered a new partnership with three buy-back centres operating within the Waterval Depot area, whereby these are supplied with Pikitup recycling trucks and drivers and the new recycling bags (a white sack for newspapers and a clear plastic bag for plastics). According to Pikitup, the S@S programme incorporates waste pickers but the buy-backs were not initially started by waste pickers as alluded by Pikitup although they do employ some former waste pickers. It has been highlighted that waste pickers prefer to work for themselves on the streets as they do not like working from nine to five.

However, participation levels continue to be low in the Waterval areas as the pilot programmes is hindered by residential participation and waste picker interferences according to the Pikitup annual reports. Municipal and Pikitup annual reports attribute this to the interference of waste pickers in the affected suburbs that take the separated waste before the Pikitup trucks do their collection. On a closer inspection, it can be noted that the Pikitup separation at source programme, whilst promoting recycling by residents does not incorporate waste pickers who have been noted to be vital to sustainable waste practices of cities (Dias, 2016).

CHAPTER 6: RESULTS AND FINDINGS IN NEWLANDS

6.1 Introduction

This chapter discusses the findings of the study in Newlands in tandem with some background to the Waterval S@S programme. The results of key informants' semi-structured interviews, residents' response in semi-structured interviews and focus groups and researchers' personal observations found in Newlands are presented below in the form of narratives and photographs. Newlands was chosen as a low income area in contrast to Franklin Roosevelt Park based on secondary data. The residential households are also sometimes referred to as participants or households.

6.2 Theorizing Waste in Newlands

According to study by Pongracz and Pohjola (2004) and Oteng-Ababio (2014), the manner in which waste is defined may have an influence on the wasting practices of the residents and may shape the residents' participation in the S@S programme. The conceptualization of waste was defined by defining waste and viewing waste as positive or negative. The participants in Newlands mostly elaborated on their understanding of the definition of waste with examples of waste. One of the responses was *"waste is material that cannot be recycled like torn clothes, bad food, stuff like that"* (Resident 2, L2, 01/11/2016). Seven households defined waste as material that they no longer needed, what they no longer had use for in the house and whatever they felt made their houses or yards untidy. Various terms were also brought up as definitions of waste such as *"waste is garbage"* (Resident 10, L8, 03/11/2016) and *"waste is rubbish"* (Resident 11, L9, 03/11/2016). Resident 6 (L4, 01/11/2016) considered waste to be whatever she no longer wanted. Despite this stance, (resident 10, L8, 03/11/2016) also indicates that old clothes were not regarded as waste although she no longer had a need for them. She also indicated that her definition of waste was both positive and negative. The residents who defined waste as garbage or rubbish correlated with those who did not participate in S@S. The residents' sense of tidiness or cleanliness of their space had an influence on their understanding of the definition of waste such that most did not participate in the S@S programme.

In terms of old clothes and appliances, two of the residents referred to themselves as poor; therefore, they definitely did not regard old clothes as waste but instead as a source of income when they sold them to pawn shops and/or buyback centres to generate income for themselves. According to one informant (Resident 11, L9, 03/11/2016), *“waste is rubbish. We give old clothes to charity. Old appliances we fix because hubby is a handy man then we sell them. One guy’s garbage is something of value to someone”*. The majority of the residents in the low income areas didn’t mention garden waste but did refer to bad food or leftover food as waste material for disposal into the Pikitup black wheelie bins.

Regarding whether waste was seen as positive or negative, 10/20 viewed waste as negative, 4/20 viewed it as positive and the rest didn’t not know or thought it was both dependent on your actions with regards to the waste. The residents that viewed waste negatively associated waste with being untidy and had a sense of maintaining order and referred to it as rubbish or garbage. When the residents negatively viewed and defined waste, they did not bother to participate in separation at source.

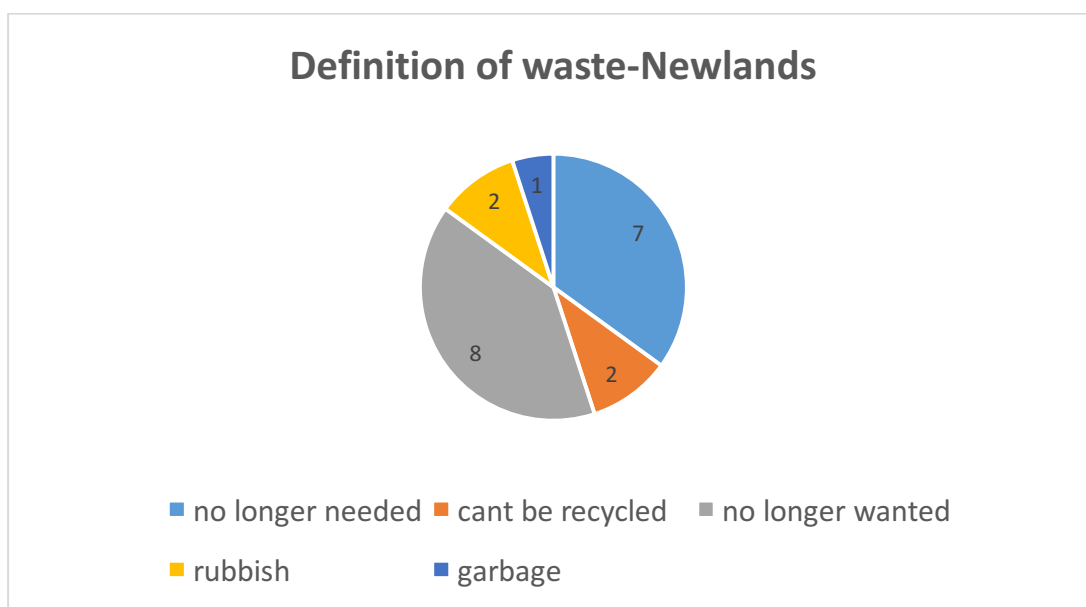


Figure 6: Definition of waste given by Newlands residents

6.3 Recycling practices in Newlands

The level of separation at source activities of households in Newlands was found to be very low. As previously noted, residential households play a key role in waste management of any area as they are the greatest generators of MSW. It was imperative to determine the composition of the MSW so generated in Newlands in the CoJ.

From the twenty residents interviewed in Newlands, when asked “What types of material do you put in the bin?”, all gave varied responses. Of these residents, thirteen out of twenty did not separate their waste and they indicated that they placed everything they regarded as waste into the Pikitup black wheelie bin as shown in Figure 7. The materials commonly mentioned were plastics, leftover food, unwanted stuff, empty bottle, used pampers and papers. One resident indicated that “We put everything we no longer need to use in the house into the bin” (Resident 2, L2, 01/11/2016). A tenant highlighted that the caretaker at their place of residence had informed all tenants that everything must be placed in the black wheelie bin (Resident 5, L3, 01/11/2016). From the residents’ responses, their perception of municipal solid waste management that is all the material they no longer need in the house after the initial intended usage must be placed in the black wheelie bin.

However, for the seven residents that were separating their waste, some mentioned that they had two bins whereby they placed plastics, glass and newspapers in one of the bins and the rest of whatever waste they generated into the black wheelie bin whilst others indicate that they had two bins they use for recycling (one for papers and another for plastic bottles -Resident 29, L13, 01/11/2016) and the black wheelie bin for all the other stuff. In conclusion, a form of recycling was taking place in Newlands although some of the residents were not separating as described by Pikitup. It was observed that only a minority of residential households had the Pikitup recyclable bins outside their yards but that everyone had 240L black bins filled with both recyclable and non-recyclable material on the Monday collection day as shown in Figure 7.



Figure 7: Photographs of Newlands residents' black bins with unseparated waste (Source: Photo taken by the researcher)

6.4 Waste Separation at Source and Recycling Practices

The behaviour of the households on waste separation at source was also looked at. It was discovered that there were various forms of participation in terms of separation of waste by the residents in the two income areas. In Newlands, thirteen of the twenty residents interviewed do not participate in waste separation at source. Only seven of the twenty households were involved in the Pikitup separation at source programme (Figure 8). The reasons given for non-participation were time constraints, “not my responsibility”, lack of provision of recycling bins by Pikitup for use in recycling, lack of adequate awareness and lack of environmental consciousness. More than half of the households indicated that they did not see the need to separate their waste as they did not receive the recycling bags from Pikitup. However, a key official from Waterval Depot and the owner of one of the Pikitup supported buyback centres stated that residents of low income areas were not active participants of S@S programme regardless of the provision of starter packs of the

S@S programme material as shown in Figure 8. The starter pack consists of the cream plastic bag, the white sack and Pikitup pamphlet containing S@S information. They indicated that they conducted follow-ups after provision of these starter packs and still found these residents would not be bothered about separating their waste.

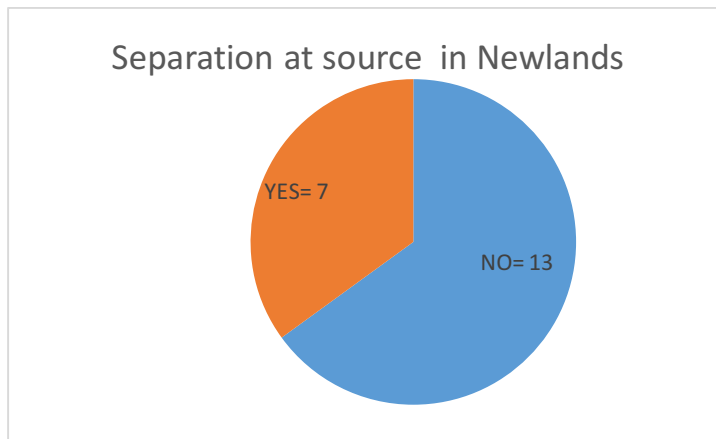


Figure 8: Pie chart showing participation rates of 20 Newlands residents

As noted above, two residents indicated that they were poor and therefore didn't purchase much material that required separating at source for collection by Pikitup. Of the few residents that were participating in the S@S of recyclables, one indicated that she kept her separated material for the waste picker that she knew and did not put it outside for Pikitup to collect. Three residents indicated that they have seen their neighbours separating their waste into the Pikitup waste bins, however their wasting practices were not at all influenced by that. The residents' conceptualisation of waste was mostly based on what they no longer needed and what they no longer had any use for as outlined by Pongracz and Pohjola (2004).



Figure 9: Photograph of recyclable bags outside two residential households in Newlands.

6.5 Factors affecting wasting practices by residents

Recycling behaviours are influenced by a myriad of factors which have been explored by different researchers (Mason *et al.*, 2004; Banga, 2011; Pakpour *et al.*, 2014; Dai *et al.*, 2015; Mbiba, 2014; Miezah *et al.*, 2015; McKay *et al.*, 2016). As recycling presents a plausible path to sustainably reducing the amount of waste generated by a country, Sheau-Ting *et al.*, (2016) conducted a study which attempted to identify their preferred attributes for waste separation among communities in Malaysian universities. As there was a low participation rate in S@S, most of the residents raised many factors that hindered their participation in separating their waste. The following questions were asked of the residents; “*What factors do you think have an influence on what you do with the waste?*” and “*What would motivate you to separate your waste?*”

Table 5: Newlands households' reasons for none participation in S@S⁹

Reason	Number
Provision of more bins	7
Knowledge and awareness	5
Time constraints	5
Can't see the importance	1

6.5.1 Provision of more bins

One of the reasons cited for not participating in any form of waste separation activities was the lack of provision of recycling bins by the Pikitup workers. Seven of the twenty residents cited that they would be motivated to participate if they were provided with more bins. Furthermore, (Resident 7, L5,01/11/2016) and (Resident 33, L17, 13/02/2017) were of the opinion that proper bins such as the black wheelie bin in different colours could better motivate at source separation than the currently provided plastic bag and white sack. Two residents indicated that some of their neighbours were participating in the project and they frequently saw the clear plastic bags and the white sacks placed outside with the black wheelie bins every Monday (Resident 11, L9, 03/11/2016) and yet this did not motivate them to recycle. Contrary to this, there was one resident, (Resident 12, L10, 03/11/2016) who indicated that she was motivated to separate her waste by her neighbour's positive wasting practices and Pikitup' efficient service delivery. Apart from strike times, Pikitup service delivery in terms of collection of waste in Newlands was regarded as very efficient despite some complaints raised by some residents of Pikitup collections not being very consistent.

The researcher was informed by some of the interviewed residents and in the focus group discussions that the Pikitup workers did not replace any new recycling bags if they did not take any from those residential households. The researcher was of the opinion that these residents were not really bothered by this fact as they also gave other reasons for not participating in waste separation practices. Interviews with key informants from Pikitup and buy-back centres indicated that this was really the case

⁹ Some residents gave more than one reason.

as residents could request the recycling bags from the Pikitup truck and be provided if they wanted to participate in the S@S programme. The key informants from the buy-back centre named Newlands as one of the suburbs in the CoJ where the residents S@S participation was very low. In his opinion, most of the residents of Newlands were simply not interested in waste separation whilst of those that did separate, there were some who separated for other reasons besides for the Pikitup S@S project. Furthermore, he indicated that they separated and sold the recyclables to generate income for themselves as he informed the researcher that a full cream bag of recyclables was likely to earn a resident approximately R10.

6.5.3 Time constraints

Three of the residents mentioned that they placed all their waste into the black wheelie bin because they wanted to keep their house neat and tidy as the presence of various bags in their yards was not likely to create order in the space where they live. Resident 1 (L1, 01/11/2016) responded by saying: *“I am a tidy person and like order.”* and Resident 7 (L5, 01/11/2016) said; *“I want order in my house so whatever I don’t need goes into the bin.”* It was interesting to note that this sense of neatness and orderliness didn’t extend to environmental awareness and a desire to recover recyclable material. Most of the people in a study done by Singhirunnusom *et al.*, (2012) stated that their main reason for non-participation was time availability.

6.5.4 Knowledge and awareness

Knowledge and awareness were also cited as factors that would influence the residents’ wasting practices. Despite the low performance in the waste separation at source activities, 5/20 of the residents in Newlands indicated that they would be willing or motivated to participate if Pikitup enhanced its door-to-door campaigns, placed advertisement on S@S on the television and other campaigns that disseminate more information to the residents about the S@S initiative and the role of residents in this process. However, personal observations in terms of the location of Pikitup supported buy-back centres reflected the presence of more than five centres where the residents of Newlands could sell their recyclables without participating in the Pikitup S@S programme. Over and above this, it was noted that

there were also plenty of pawn shops and second-hand shops where two residents indicated that they took their recyclables to sell. One of them had this to say; *“It won’t work. We are poor. What we can recycle we sell for ourselves.”* (Resident 12, L10, 03/11/2016). He also mentioned that from his conversations with one of the colored waste pickers, he was informed that this waste picker had found “dope” things such as “jewellery, hair dryers and other stuff” in the Sandton and Fourways areas. Sandton and Fourways are some of the more affluent areas in the City of Johannesburg of which Roosevelt Park is closer in similarity to them and Newlands is completely the opposite of them. This is not surprising, as Medina (2008) notes that waste pickers are of the viewpoint that waste from high-income residential areas are of greater value as wealthy residents having higher disposable incomes will tend to discard more materials with recycling potential and items that have the potential to be repaired and/or re-used.

6.6 Participation in informal recycling by waste pickers

All twenty residents interviewed in Newlands had seen waste pickers operating in their area. Apart from being poor, some of the residents who separated their waste did so out of solidarity with waste pickers and not for Pikitup. Three residents highlighted that they separated their waste for waste pickers that they had forged relationships with and felt were much poorer than them and could benefit more than Pikitup from their wasting efforts of separating waste. This view is similar to that discussed by Matter *et al.*, (2013), where they discovered that the residents in Dhaka had an end-pipe viewpoint perception that the responsibility for waste lay with the municipality and not with them.

Furthermore, Resident 1, L1, 01/11/2016 indicated that: *“I think that they are involved. People make an honest living should be left to do that”,* when asked the question; *“Do you think waste pickers should be involved in recycling of waste?”*. The residents noted that the waste pickers took plastics, bottle and cardboard packaging which they separate from the rest of the waste from the bins. Resident 6, L4, 01/11/2016 responded by saying: *“Yes, I have seen them.”*, and when further asked if she would separate waste for them, she responded by saying that

she felt that she should benefit if she separated for the waste pickers although she was not recycling. One of the respondents in the Newlands focus group indicated that she separated her materials for a particular waste picker as she developed a relationship with him as they both spoke Afrikaans. Their relationship was so strong that he was allowed to knock at her gate to collect the recyclables.

It was observed that there were thirteen of the participating households who placed the 240L bins outside for collection with unseparated waste from which many waste pickers were observed to retrieve recyclables from prior to collection by Pikitup as mentioned by Medina (2008). It was also observed that most of the waste pickers didn't speak English and a few of them confirmed that they spoke mainly Sesotho and Afrikaans. Waste picker 2 interviewed on 26/06/2017 indicated that many residents in Newlands did not separate their waste except for the few streets. This was also authenticated by the key informant at the buy-back centre when he mentioned that approximately half a truck load of recyclables was frequently collected from Newlands. Figure 10 shows some of the collected S@S recyclable bags collected and transported to one of the buy-back centres under the S@S programme.



Figure 10: Residents S@S recyclable bags residents collected by buy-back centres (Source: Photo taken by the researcher)



Figure 11: Recyclable collected by waste pickers from households' black bins by waste pickers. (Source: Taken by the researcher)

Five waste pickers were interviewed in Newlands to determine the relationship between them and the residents. All of them were male, two were colored and three

were black. In addition, two blacks were foreigners. The trolleys of three of the waste pickers interviewed, are shown in the photos. All of the waste pickers indicated that they had mixed relations with the residents. They mentioned that some residents gave them stuff directly such as food and old clothes and different types of waste. As the interview was in progress, Waste Picker 2 (03/07/2017) was given food by a resident and kindly advised not to leave a mess. One of waste pickers had this to say;

“Sometimes we waste pickers are stout (stubborn). The other waste pickers sometimes they open the bin and leave a mess after taking what they want. Other people don’t want that. I have seen the white sacks and cream plastics. They are used a lot in Greymont which is an affluent area. Other waste pickers do take those plastics and when Pikitup comes, the residents are not give new ones. That is not good.” (Waste Picker 4, 03/07/2017).

All five waste pickers said that they were aware of the Pikitup recyclable bags and two of them mentioned that they did not touch them as they knew they were not supposed to. Waste Picker 3 (03/07/2017) and Waste Picker 4 (03/07/2017) highlighted that some waste pickers had allocated themselves streets but they personally had no streets and collected anywhere. When asked how often they collect waste from Newlands, the following responses were given:

“I don’t go to all the places. They are many of us. I have got my places that I operate in, like Newlands, Crosby, Brixton, Mayfair. They are people who know me and give materials. Sometimes they give me jobs like sweeping and they pay me” (Waste Picker 4, 03/07/2017).

“I have seen the recyclable bags. We search them and take whatever we want and leave the plastics. We are not allowed to take them. Ig Pikitup sees you with them they will take them away from you” (Waste Picker 3, 03/07/2017).

6.6.1 Waste pickers and Separation at Source

From the researcher’ observations, the waste pickers were involved in separating waste and diverting it from landfill disposal. They had plastic containers of milk, juice,

coke and detergents; boxes, broken plastic buckets, old clothes and steel and electrical gadgets. These materials have recycling potential and serve to generate income to alleviate poverty for the waste pickers. Most of this material was obtained from the residents black 240L bins indicating that the majority of the Newlands residential households are not participating in recycling. This supports conclusions raised by Dias (2016) that waste pickers are actively involved in recycling in urban areas despite being shunned in local city government plans related to recycling and source separation. Two of the waste pickers interviewed concurred that there were forged relationships with some of the residents;

“No. I have got my places. There are people. We are too many so I have got my areas where people know and give me things...clothes, many things, food and sometimes I sweep and do jobs and get paid.” (Waste Picker 5, Newlands, 26/07/2017)

“Sometimes they call me and give me something. They are few of them and they mostly give food and old clothes. If I keep them for a long time, they get stolen so I sell them because I stay in the park “(Waste Picker 4, Newlands 26/06/2017).

While the waste pickers were therefore making an important contribution in separating waste, those interviewed indicated that they had chosen waste picking because they wanted to generate income for themselves, working as their own boss with flexible hours therefore; they would not like to work for Pikitup.

6.7 Conclusion

Newlands is an old low income suburb under the Waterval Depot where S@S was initiated. The participation rate in S@S of households was found to be low at seven out of twenty residents participating in the research. The focus group participants indicated that they had intents to recycle in the future should they be given recyclable bins in the future. This low level of participation in the S@S programme was confirmed by waste pickers operating in the area as well as the key informant at one of the buy-back centres. Where the residents' view of waste was negative, the residents did not participate in S@S leading to low recycling rates. In addition to their negative view of waste, other factors cited for non-participation were the need for

provision of more bins, time constraints and lack of adequate knowledge and awareness. Those that did separate, indicated that they were motivated by their environmental knowledge and awareness through work and the initial pilot programme education awareness campaign.

All twenty interviewees and focus group participants were aware of waste pickers that operate in Newlands. It was noticed that the waste pickers were more aware of the Pikitup S@S programme than the residents as they all highlighted that they had seen the recyclable bags. In addition to this, some of them had forged relationships with residents that saw them being given set aside waste, food and old clothes meaning that these residents positively viewed waste pickers and felt compelled to let them instead of Pikitup benefit from their wasting practices as mentioned by Medina (2008). From the researcher's observation of material in their trolleys, it was concluded that the waste pickers have informally integrated themselves into the Pikitup S@S programme, by separating materials on residents' doorsteps that the residents had failed to separate inside their houses.

CHAPTER 7: RESULTS AND FINDINGS IN FRANKLIN ROOSEVELT PARK

7.1 Introduction

This chapter presents data on residents' responses to the semi-structured interviews and in the focus group discussions conducted in the high income area of Franklin Roosevelt Park in the City of Johannesburg. According to Miezah *et al.*, (2015), high income areas are regarded as those areas that have access to good municipal services, with enjoyable social amenities and well planned houses, schools and supermarkets. In addition, the houses are often big with big yards and paving and occupied by single families. Based on these characteristics as well as secondary data, Franklin Roosevelt Park can be referred to as a high income area although some of the households had tenants. In addition, the response from the key municipal officials will also be given and used to validate some of the responses given by the residents and the researcher' observations. Twenty respondents were interviewed by the researcher only and one focus group consisting of five residents was conducted, as well as the two key officials interviewed.

7.2 Recycling practices in Franklin Roosevelt Park

The general average household size in the area was about four people per household with the number of children ranging from none to three based on answers given by the twenty participants. All twenty households had at least one person who was working except five households that had more than one family living there. These properties had tenants also residing there. It should also be noted that one tenant and a foreman who resides at the household were interviewed as they were the only people present at the households. Households were asked what types of materials they put into their bin(s). From the participants interviewed, six out of the twenty participants indicated that they did not separate their waste and they placed everything ranging from paper, plastics, leftover food, appliances that no longer worked and whatever else they did not need into the 240L black wheelie that is provided by Pikitup. Other types of material mentioned were banana peels, bottles, cereal boxes, egg shells and glass. One of the residents interviewed stated that

“Everything we no longer need such as paper, leftovers, plastics, appliances that don’t work” was placed in the black wheelie bin (Resident 3,H1, 01/11/2016).

From the fourteen households that were separating at source, they all indicated that they had more than the one Pikitup black wheelie bin that is collected once every Monday on a weekly basis. One resident said that *“I have a small bin for rubbish that can’t be recycled. I also have a plastic bin and another bin for paper only. We use bokashi to compost leftover food.”* (Resident 15, H5, 09/11/2016). Most of the residents mentioned that they placed empty plastic “coke” bottles into the cream Pikitup plastic bag as shown in Figure 12 below. One of the residents’ who has tenants indicated that he encouraged his tenants to put the plastics only into the cream plastics as shown in the Figure 12 (Resident 16, H6, 14/11/2016). Most of the residents indicated that they placed non-recyclable waste into the black wheelie bin, newspapers into the white sack supplied by Pikitup and recyclable material such as plastics, tins, bottles, milk cartoons into another separate bin.



Figure 12: Types of recyclables separated by residents in FRP

The photograph on the right in Figure 12 shows an innovative and creative wheelie bin for recyclables created by one of the resident had created for herself, which

indicated how recycling had been embraced. Almost all residents were in agreement that old clothes and old appliances do not constitute solid waste for disposal into the black wheelie bin. Banga (2011) refers to solid waste as a by-product of human and animal activities, of which its classification can be determined based on its original usage such as packaging material, the type of material used such as glass or plastic, the origin of the material (domestic, commercial or industrial) and last but not least its physical properties, that is whether it is combustible or biodegradable.

7.3 Theorizing Waste in Franklin Roosevelt Park

Theorising of waste was based on defining waste and whether waste was viewed as positive or negative. All twenty residents in Roosevelt Park gave a definition for waste based on their own understanding.

7.3.1 Defining waste

The residents gave various definitions of waste. Eight of the twenty residents referred to waste as all the stuff or material that cannot be recycled (see Figure 12). According to Resident 26, H16, 16/11/2016 *“waste is something that cannot be recycled again, not suitable for recycling and what no one else wants in the house”*.

It was interesting to note that some of the residents just substituted the word “waste” with another term such as “rubbish”, and “garbage”. The term “refuse” as commonly used by Pikitup was not used by any of the residents. None of the residents included old clothes as waste in their definitions of waste as they felt that someone could benefit from using these clothes again or could sell them to obtain an income for themselves.

In addition, a few participants gave definitions based on the source or usage of the material. According to Resident 21(H11, 16/11/2016), defined waste as *“stuff likely to leave the house untidy so whatever you no longer need”*. Unsurprisingly, her household was not separating at all and everything including garden waste, leftover food and papers among others were placed in the same black wheelie bin.

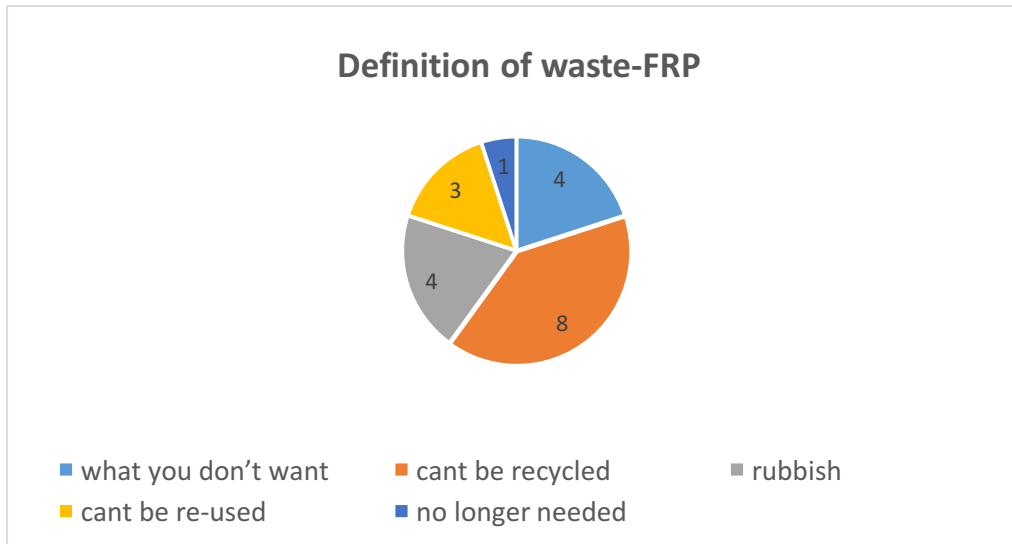


Figure 13: Defining of waste by 20 FRP residents

7.3.2 Viewing waste as positive or negative

In terms of viewing waste as positive or negative, eleven of the twenty households indicated that they had a positive definition for waste and hence considered that not everything that was produced in the house after its initial intended usage was regarded as waste. In that light, they defined waste as material that cannot be recycled anymore; this made them put glass in the clear plastic recycling bin, paper in another bag and over and above this, they had an extra bag for garden trimmings and another for glass and polystyrene as shown in Figure 14 (Resident 22, H12, 16/11/2016). Only two residents mentioned organic waste and of these two, one was using bokashi to compost all organic waste for use in her garden (Resident 15, H5, 09/11/2016). She indicated that she tried to ensure that her purchases contained less material that is likely to become waste. Old clothes and appliances were cited as recyclable materials by all the twenty residents and the focus group participants as well, that should never be placed in the black wheelie bins as these were not regarded as waste.

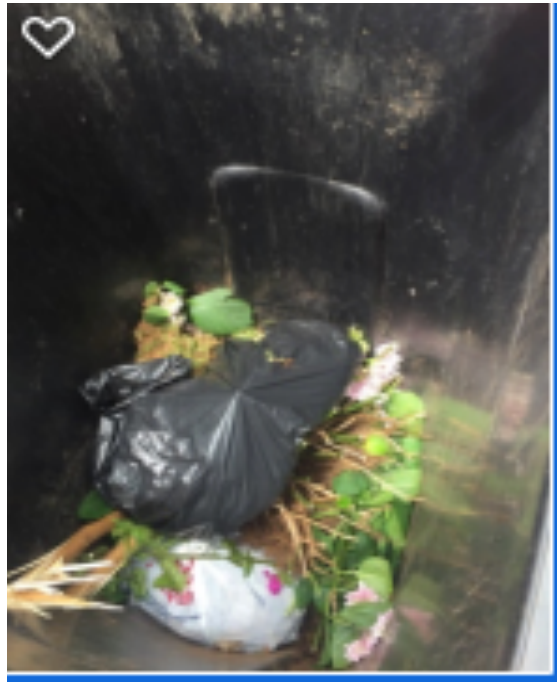


Figure 14: Garden trimmings and lawn shavings separated for garden centre disposal.

Below are some of the residents' responses.

"Positive because I recycle" (Resident 20, H10, 09/11/2016) and

"Positive because plastics paper and glass can be recycled" (Resident 23, H13, 16/11/2016).

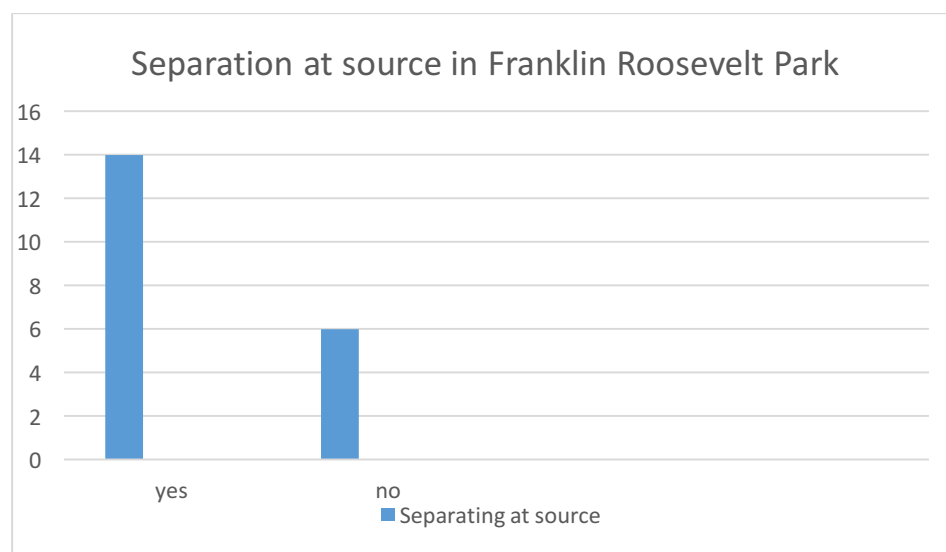
9/11 of the residents that viewed waste as positive were recyclers whilst two were non-recyclers. The rest of the residents did not know or thought waste was both negative or positive. This indicated that there was a link between the thought of recycling and separating waste and practice. It can be concluded that conceptualization of waste has an influence on recycling behaviour and S@S participation.

7.4 Waste Separation at Source in Franklin Roosevelt Park

It was found that fourteen out of the twenty participants separate all or some of their waste. They gave various reasons for separation their waste. The range of participation of the residents was varied from those involved in complete separation

at source using the cream plastic bags, the white sack and the black wheelie bin (all provided by Pikitup), to some doing partial S@S of some material and those who do not bother completely to participate in S@S in any manner. Five out of twenty residents took part in the separation at source programme because they were part of the Pikitup pilot programme when it was initiated. One of the residents (Resident 22, H12, 16/11/2016) had this to say *“I am part of the pilot programme. I am pleased with the programme and the recyclable packages we get”*. Environmental education provided by Pikitup at the inception of the programme succeeded in changing the behaviour of these residents. This is seen in the use of the recyclable bins provided by Pikitup as shown in the Table 6. They placed plastic bottles into the cream plastic bag, newspapers and other papers into the white sack and the rest into the black wheelie bin. These residents in the high-income area indicated that all material they felt could be re-used or recycled was not mixed with the rest of the refuse/garbage/rubbish.

Table 6: Separation at source by 20 Franklin Roosevelt Park residents



Three of the households indicated that they were exposed to separation of recyclable material and its collection by municipalities in their travels overseas and another resident who is a teacher developed her environmental awareness from personal experiences. Where a positive attitude towards recycling was observed, it was noticed that the residents separated their waste at their residences. (Resident 4, H2, 01/11/2016; Resident 16, H6, 14/11/2016).



Figure 15: Resident 18 recycling bag and sack. (Source: Photo taken by the researcher)



Figure 16: Recycling bags outside the FRP residents' gates. (Source: Photo taken by the researcher)

7.5 Factors affecting wasting practices in Franklin Roosevelt Park

The twenty residents that were interviewed and five that participated in the focus group discussion gave various factors that influence their wasting practices. Households were asked who placed the waste into the bin(s) at their residence. More than eighteen of the households indicated that everyone placed their waste into the bins, whether they were separating or not. Three of the residents mentioned that they had assistance from their maids or gardeners. Of the households interviewed, three resided with tenants and extended family members in which case, at one household it was the responsibility of the granny to separate the waste into the different recyclable materials into their respective bags. Households were also asked who was responsible for separation of waste at their households. Various answers were given in response to this question. Two landlords of residents indicated that their tenants were also separating at source as they had advised them to. In the majority of the households, every family member was responsible for separating the waste.

7.5.1 Willingness to participate in Pikitup S@S

Participants identified five factors that could increase their willingness to participate in the Pikitup' programme. These are more information and awareness programmes of the S@S programme, provision of more bins, incentives to promote participation and fines for non-participation. In an attempt to verify the willingness of residents to participate in waste separation at source, respondents were asked *“what would motivate you to separate waste and participate”*.

Seven of the fourteen residents participating in S@S felt that dissemination of information and increased awareness program to non-participating residents could enhance their willingness to participate as that had helped them to be involved in the programme. One resident (Resident 13, H3, 03/11/2016) indicated that she needed a monetary incentive from Pikitup to motivate her to separate her waste although she claimed to be environmentally friendly. Incentives to separate waste were identified as one of the attributes that could motivate people to participate in a sustainable

activity such as waste separation at source (Sheau-Ting *et al.*, 2016). These incentives could take the form of either monetary incentives or non-monetary incentives. The results of that study demonstrated that financial incentives were the second most important attribute in fostering waste separation behaviour and especially in the low-income groups. One of the residents was of the opinion that some residents would be motivated to recycle if Pikitup introduced fines for non-participating residents (Resident 24, H14, 16/11/2016; Resident 26, H16, 16/11/2016). It was evident that when residents were provided with adequate knowledge and awareness about S@S and recycling, their conceptualization of waste could be positively altered such that they could re-define waste and view it positively and be compelled to develop good recycling behaviour.

Some of the residents felt that Pikitup presence in the S@S programme was not being felt by the residents (Resident 14, H4, 01/11/2016). A few of the residents could not remember when they had last seen a pamphlet or any form of advertising by Pikitup concerning the S@S programme since the initiation of the pilot project or when they first began to reside in the area (Resident 26, H16, 16/11/2016). One of the said *"I read a lot and recently went to the Pikitup website and read about S@S. I have just being separating all these years because other people in the street do so and Pikitup gives us two extra bins."* Some indicated that Pikitup must advertise the programme in the form of television advertisements, posters and pamphlets. This is similar to findings done by Matter *et al.*, (2013) where the majority of the residents in Uttara, Bangladesh indicating a willingness to participate in source separation projects, provided they had been taught how to do it, the survey conducted found the participation to be low.

7.5.2 Provision of more bags

Some residents raised the issue of availability of recycling bags. Residents in complexes indicated that they did not have access to recycling bins whilst a few mentioned that Pikitup did not replace them with recycling bags if they were taken by waste pickers. However, the Pikitup official indicate they had plenty of these recycling bags and the workers that moved with the truck had instructions to provide any residents with the recycling bags at all time. He also mentioned that at times,

residents could be provided with more than one recycling bag of the same type if the residents were so inclined. These workers were noticed throwing the new recycling bags into the yards of the residents in Roosevelt Park on the 14th of November 2016 although they were not spoken to. A few residents in the focus group highlighted that different coloured wheelie bins would greatly motivate the recycling of waste by residents whilst simultaneously acknowledging that the costs associated with the provision of such bins to residents would be a mammoth task for the CoJ municipality.

7.5.3 Time constraints or lack of interest

All six residents that did not participate in the S@S programme indicated that either the process was too time-consuming for them or they were just not interested about the S@S programme.

7.6 Relationship between waste pickers and residents in Franklin Roosevelt Park

All twenty residents interviewed indicated that they were aware of the waste pickers who collected recyclables each and every week from outside their gates. Others further indicated to see them along other streets pushing trolleys filled with plastics in different forms and paper.

7.6.1 Residents' views of waste pickers' impact on recycling

There was no dispute that waste pickers were taking part in the recycling in the city. Responses from some of the residents are that indicated this are given below:

"I do see them...They always come the night before the bins are collected. They take plastics (empty coke bottles), cardboard and papers. One time they got an old pram and microwave from one of the bins" (Resident 14/ H4/ 16/11/2016)

"They take plastics from the streets but leave a mess as they rummage through the bins" (Resident 19/H9/16/11/2016)

“Yes I have seen them. They take the material from the bins for those that don’t recycle. If I see them I give them the recyclables” (Resident 20/H10/16/11/2016).

When Waste Picker 3 (26/06/2017) was interviewed, he refuted this saying most of the waste pickers are aware of the recyclable bags and rarely take stuff from them. He said that they collect recyclable material from the black bins. Furthermore, he confirmed that he was on good terms with most of the residents and one of the them had given him the following material that was in his trolley: the green sand pit, an old lawn mower and steel materials from inside his yard as shown in Figure 17.



Figure 17: Material collected by waste picker 3 in FRP (Source: Photo taken by the researcher)



Figure 18: Waste picker trolleys in FRP (Source: Photo taken by the researcher)

Figure 18 depicts two waste pickers' trolleys that the researcher observed next to a residence in Franklin Roosevelt Park with the black bin and recyclable bags next to it. It was noticed that the two waste pickers were working together and did not touch the recycling bags. Their presence highlights that not all residents are separating at source. Whilst three of the residents said they were afraid of the waste pickers and hesitant to speak to them, a few of the residents had forged relationships with the waste pickers and willingly gave them separated material and old clothes and appliances. Residents with a positive conceptualisation of waste pickers said the following:

"I see the waste pickers every Monday outside our complex. They take lots of stuff from the bins and leave them in nice order. Just recently my son took an old electric heater and broken kitchen stool and two linen baskets. He told me that the guys were happy and helped him to carry the stuff from the gate" (Resident 26/H16/16/11/2016).

"I think waste pickers are amazing and recycle a lot. I give them empty juice bottles which they put on their platform trolleys. Pikitup should work with waste recyclers because they do an amazing job" (Resident 16, H6, 14/11/2016).

However, five of the residents felt that waste pickers left a mess outside their gates during the process of taking recyclables from the bins. More than three people in the focus group were also of the opinion that waste pickers were messy people who took waste from their dustbins although one did not separate her waste and the other two were separating as required by Pikitup. On the other hand, waste picker 3 countered this as he indicated that most waste pickers were aware that they should not take the recyclable bags therefore only collected material from the black bins. He said,

‘I asked for permission to take unwanted stuff from their yard and they allowed me to take it. I do not take stuff from the recycling bags. We are not allowed. We don’t take the white sacks’ (Waste picker 3 FRP/26/06/2017).

The waste pickers were referred to as private operators by the focus group participants because they apparently do not seem to work for Pikitup. In fact, the waste pickers were blamed for the theft of the white recycling sack and tearing of the cream bags resulting in residents not receiving a new starter pack to continue S@S. According to Resident 22, H12, 16/11/2016,

“they make a mess when they search for recyclables”.

This resident was participating in separating his waste, and despite his negative comments about waste pickers, he gave them old clothes. Furthermore, one of the key informants at Waterval Depot confirmed that in some instances the residents source separated waste was taken by waste pickers instead of Pikitup. He further indicated that this was likely to dissuade some residents from participating.

7.6.2 The residents, waste pickers and Separation at Source

There are competing views about the role of waste pickers in separation at source by residents. Some of the residents think that waste pickers assist in recycling in the cities as mentioned by Dias (2016) whilst Pikitup says that they are undermining the S@S programme as the set S@S targets fail to be reached. Most of the residents in the Roosevelt Park area had positive intentions to separate their waste as they were of the opinion that the S@S programme was a good programme which they felt was disrupted by waste pickers at times in their area. This claim was also raised in the Pikitup 2014/15 annual report that highlights that one of the reasons for their failure

to meet their S@S targets of recyclable waste stems from waste reclaimers who take material already separated by residents at their gates on collection days such that this material failed to enter the recording system for capture. This was what the key officials had to say about this issue:

“Pikitup has tried to call meetings with these guys (trolley guys/waste pickers) to form cooperatives but they are not interested. They don’t want to sell to Pikitup buyback centres. They take the contents together with the bag. Then we are not able to replace the residents’ recyclable bags because they call to complain. We are trying to communicate to them that they should leave the bags alone and take stuff from the black bins” (Key official 1/13/06/2017).

“The trolley guys are taking our recyclables and now we are collecting less therefore Mondi will not come back. They will not make a profit” (Key official 3/13/06/2017.)

However, this was refuted by some of the waste pickers interviewed as they indicated that it was not all of the waste pickers that took the materials S@S by residential households. In addition, residents also viewed the provision of the recycling bins as an incentive for them to continue separating at source. The key officials further highlighted that the rate of participation in Franklin Roosevelt Park was considered to be one of the best regardless of these above mentioned challenges. Interviews with most waste pickers confirm that there is a higher participation rate in S@S in the affluent areas such as Franklin Roosevelt Park, Victory Park, Montgomery Park and Emmerantia. However, the overall participation rates in the CoJ are low, as many households in all participating suburbs do not bother to recycle.

7.7 Conclusion

Thirteen out of the twenty residents were participating in the Pikitup S@S programme whilst seven did not participate. Most of the participating residents defined waste as what cannot be recycled, that is, they were narrowly defining waste as not being recyclable or re-usable and therefore, they were conceptualizing

recyclables and re-usable materials positively. Therefore, those residents that positively viewed waste also possessed environmental knowledge and awareness which motivated them to be willing to separate their waste. On the other hand, the non-participating residents cited time constraints and lack of adequate provision of bins as reasons for their non-participation. It was also noted that some of them viewed waste as negative.

Furthermore, all residents mentioned that they were aware of the waste pickers operating in their community. Relationships had been forged between some of the residents and waste pickers, that resulted in waste pickers being personally given recyclable waste by residents instead of Pikitup. A few residents in the focus group discussions complained about the mess that waste pickers left after collecting recyclable stuff from their bins and at the same time gave them old clothes and food. These comments showed how waste pickers, given that they had been excluded from formal programme have informally integrated themselves into it by extracting materials from the streets before the trucks come.

CHAPTER 8 DISCUSSION and ANALYSIS of FINDINGS

This chapter focuses on the comparative analysis and discusses the findings of the study in both Newlands and Franklin Roosevelt Park using the various themes so derived from the primary data collected and the secondary data read.

8.1 Conceptualisation of Waste

A key issue explored in this research was how residents conceptualised waste, and how this shaped their wasting practices. This section compares the findings related to conceptualisation of waste in the two study areas.

8.1.1 Defining waste

The research in Franklin Roosevelt Park revealed that 8/20 based their definition of waste on what can't be re-cycled and 3/20 based it on what can't be re-used; 4/20 on what one does not want and 4/20 on waste being rubbish. Whereas in Newlands, 2/20 based waste on what can't be recycled; 7/20 on what was no longer needed; 8/20 on what is no longer wanted and 3/20 referred to waste as rubbish or garbage. There were five forms of conceptualisation of waste with the main conceptualisation in Franklin Roosevelt Park focusing on the recycling potential of the material determining which bin the material would be placed whilst in Newlands, the main conceptualization was based on whether the materials would be needed or wanted preceding initial usage. The definitions were primarily associated with recycling potential of the material as "waste" and the intended usage of the material. This is similar to the findings of Pongracz and Pohjola (2004) who argue that the definition of waste is related to the concept of ownership and intended usage and value. When the intended usage of the material expired, the primary owners (the residents) now considered it to be "waste", for example when they drank juice and after the container is empty, the container became waste and had to be thrown away. Similarly, Beall (1997: 73) defined solid waste or garbage as "organic and inorganic waste materials that have lost their value in the eyes of the first owner."

Furthermore, Babaei *et al.*, (2015) point out that knowledge and possession of a positive attitude towards recyclable waste can predict the recycling behaviour of households. More studies have found out that residents' knowledge is closely related to the S@S participation rate. Their study indicates that it is not positive conceptualisation of waste that is key to S@S of waste but a positive conceptualisation of recyclables. Some studies have used the theory of planned behaviour to determine the factors that influence residents' participation in the separating of waste at source of generation (Knussen *et al.*, 2004; Abd'Razack *et al.*, 2017)).

8.1.2 Viewing waste as positive or negative

Figure 19 indicates the residents' views of waste in both suburbs. There were more residents in Franklin Roosevelt Park that viewed recyclable and reusable waste as positive than in Newlands. Of the residents participating in S@S, more residents in Franklin Roosevelt Park viewed waste as positive (ten out of the fourteen S@S residents) than Newlands (three out of seven) regarded waste as positive. In addition, among the non-participating residents, more residents in Newlands than in Franklin Roosevelt Park regarded waste as only negative as shown in the diagram below. In Franklin Roosevelt Park when recyclable and reusable waste was positively viewed, there was a higher participation rate.

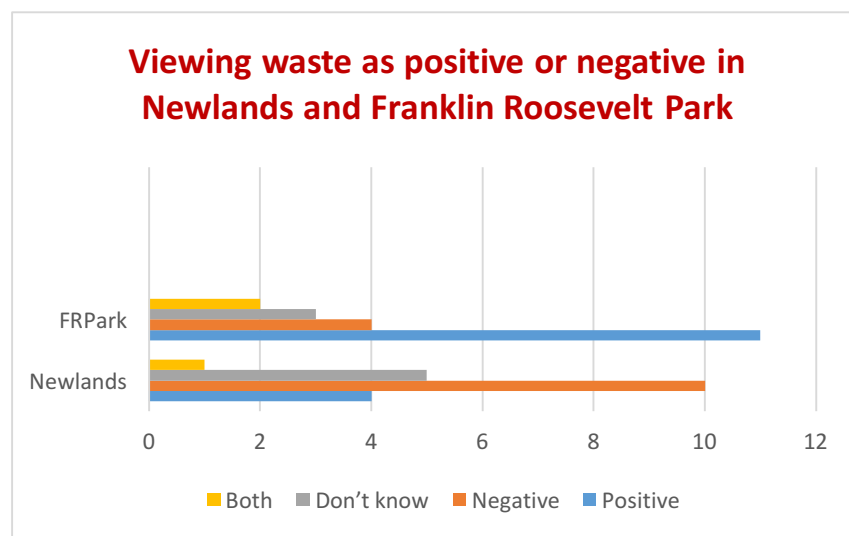


Figure 19: Comparison of views on waste in Newlands and Franklin Roosevelt Park

The Franklin Roosevelt Park residents were placing plastics, newspapers and glass in one bin and the rest of the waste in the black wheelie bin. The residents that had a positive definition for waste were all participating in separating waste at source. This point is also highlighted by Guerrero *et al.*, (2013) whose findings suggest that when residents are well informed about how to separate waste and the benefits of recycling, they will be more likely take part in recycling programmes. The Pikitup pilot programme helped to provide knowledge and awareness to residents in their initial campaign that a few of these residents are using to positively conceptualise recyclable and reusable waste. Some of the households just defined waste as material that is no longer needed and tended to make the home unclean or untidy. This indicated a negative perception towards their definition of waste which also negatively influenced their wasting practices and led to little or no S@S. Existing literature anticipated that most residential participants would view waste negatively (Gregson & Crang, 2010; Moore, 2012). Furthermore, Greyson and Crang (2010) stated that waste can be perceived as unpleasant, unwanted and a bother to its generators. The non-recycling participants' negative view of waste would explain why they do not separate their waste. The waste was viewed as negative because the residents assumed that if they did not want or need the materials, they were also not of value to anyone else. Therefore, they believed that it had to be removed from their immediate environment. Considering that many of the residents did not place old clothes into the black bins as they felt that the old clothes still had value even though no longer wanted nor needed does indicate that, they could be motivated to change their wasting practices and recycling behaviour positively.

8.2 Residents' participation in Separation at Source and wasting practices

Residential households play a key role in waste management systems that involve separation at source as their participation in separating waste forms the basis for all the later stages in the collection and recycling of waste. In addition to conceptualisation of waste, there were many factors that were highlighted as either motivating or hindering participation by residents in the S@S programme in both areas of Newlands and Franklin Roosevelt Park, some of which were common to both areas. When residents considered materials to have positive value, they were

more likely to separate recyclables from waste. This demonstrated that when participation in separation at source was analysed, the conceptualisation of recyclables and re-usable materials was considered to be as useful and important.

In general, in Polokwane, there exists disparities in waste generation volumes whereby high income areas were found to generate more waste than low income areas (Ogola *et al.*, 2011). Their study indicated that the amount of waste generated in the different income groups they observed was dependent on the socio-economic level of the group. This was not ascertained but it was concluded that more recyclable materials were collected by Pikitup from Franklin Roosevelt Park (high income area) than Newlands (low income area) due to truckload volumes collected and delivered to buyback centres. The results of Abd'Razack *et al.*, (2017) were contrary to these findings as their result concluded that low income households in Kaduna in Nigeria were found to recycle more than the high income areas.

Household waste generated in both areas were dominated by plastics such as empty coke bottles, milk bottles and cartons, plastic bags, empty cardboard cartons and organic food waste. Results of this study show that households in the low income area of Newlands did not dispose of plastics, bottles, paper, cardboards and cans readily. Nguyen *et al.*, (2015) indicates that the number of years that residents have spent in a community will more likely lead to residents that are more informed about waste S@S. To a little extent, this was proved by the more elderly residents interviewed in Franklin Roosevelt Park than in Newlands.

The researcher' personal observations showed that plastics were the most prominent fraction of waste found in the recycled waste and in the residents' black wheelie bins. By contrast, Banga (2011) and Miezah *et al.*, (2015) found that organics comprised the significant majority of waste in Kampala, Uganda and in Ghana, indicating differences in consumption patterns. Whilst the CoJ has a high successful collection system rate of more than 90% of waste from the black wheelie bins, it's collection of separated materials from households was far less successful.

8.2.1 Residents' knowledge and awareness of S@S

This theme brought together residents' participation in separation and source and how knowledge and awareness affected this. Besides the definition of waste, households' wasting practices and participation in the separation at source programme in Newlands and Franklin Roosevelt Park was shaped by different factors which will be discussed henceforth. More residents in Franklin Roosevelt Park (14/20) than in Newlands (7/20) expressed a higher intention to separate at source based on their positive knowledge and attitude towards S@S. The residents who said that they were environmentally conscious would be said to portray a positive belief in themselves as they were convinced that participation in S@S would avert environmental pollution and ensure resource sustainability for future generation. Seven out of twenty respondents in Franklin Roosevelt Park participants demonstrated significant knowledge about what materials to recycle and those that cannot be recycled such as glad wrap and aluminium. This participation was influenced by the information they received as participants of the pilot Pikitup project when it was initiated in 2009. As for the Newlands residents, more than half of the non-recyclers felt that they would be motivated to recycle as alluded by Banga (2011) and Babaei *et al.*, (2015), because when residents have knowledge and exhibit positive attitude towards recycling they will practice S@S of household waste. According to Babaei *et al.*, (2015), knowledge and attitudes are two social factors that determine the behaviour of a society. Furthermore, three residents in Franklin Roosevelt Park had taken initiatives of taking garden waste such as grass cuttings, tree branches and big used appliances and furniture to garden centres as they were cognizant of the fact such wastes should not be taken to landfills.

The research in both areas found that when residents exhibit positive attitudes and knowledge about environmental benefits of recycling, they tend to separate at their home. This finding was similar to the conclusion highlighted by Guerrero *et al.*, 2013, whose study recognized that the recycling of waste by households is influenced by knowledge, awareness and the effective removal of recycled waste. Recycling behaviours of neighbours, and the consistency of Pikitup' collection of municipal solid waste positively impacted on a few residents and motivated their participation to separate their waste. Most residents in Franklin Roosevelt Park indicated that they

had last obtained information and awareness about the S@S programme from Pikitup during the pilot programme, and one key informant had also indicated that Pikitup had not continued to conduct information campaigns. When people lack more information they are more likely to have negative conceptualizations of waste such that they fail to see the difference between waste and things of value.

8.2.2 Willingness to Recycle

Generally, there was a greater willingness to recycle and participate in S@S in Franklin Roosevelt Park than in Newlands. The residents in Franklin Roosevelt Park that participated in Pikitup' S@S showed good habits with recyclable waste, where most used the recycling bins provided by Pikitup and others had additional bins for organic waste and/or garden waste. The findings of this study indicated that higher income areas residents exhibited higher recycling habits and a larger amount of separated material was collected from Franklin Roosevelt Park than Newlands, (a lower income area). This finding was based on the key informants' interviews but numbers would not be obtained. Evidence for this was based on the size of the truckloads that go to buy-back centres. This information was provided by the key informants based on the number of houses that do recycling based on the fullness of the recycling trucks when they go to the buy-back centres. These findings are similar to those obtained by Singhirunnusorn *et al.*, (2012) done in a field survey. Their analysed results indicated that the lack of continuous dissemination of knowledge after ignition of the recycling project led to low participation rates. More people in Newlands than Franklin Roosevelt Park indicated they lacked knowledge about S@S and therefore did not participate.

The findings of Banga (2011) indicate that despite the households of Kampala, Uganda is awareness of recycling and S@S they still failed to participate because they did not know how they had to participate. Nevertheless, it was concluded that awareness was a significant predictor in influencing waste separation. The need for environmental knowledge as a motivator was high among none participants in S@S in Newlands meaning it could influence their future participation.

8.2.3 Factors hindering participation in Separation at Source

In both suburbs there were some households that did not participate at all in S@S, more so in Newlands (13/20) than in Franklin Roosevelt Park 6/20 residents. Reasons given for non-participation were time constraints, “not my responsibility”, lack of provision of recycling bins by Pikitup to use, lack of adequate awareness and lack of environmental consciousness as also alluded to by Banga (2011). This suggests when people’s level of perceived obstacles are high, their level of intention to participate in source separation of waste decrease. In a study done by Mbiba (2014) in three African cities: Lusaka, Mombasa and Bulawayo it was noted that in all these cities residents took their own initiative to separate at source, not as a means for recycling and diverting waste sent to landfills but as a response to poor collection services. On the contrary, the residents in the City of Johannesburg all had the normal wheelie black bins provided by Pikitup and none of them had any complaints about the kerbside waste collection of MSW for disposal at landfills. Quite a number of residents in the high income area cited the lack of provision of recycling bins as what prevented their participation in S@S at certain times. The Pikitup white truck employees working on these trucks did not provide some of the residents with recycling bags if they did not put out any by their kerbsides.

Some single parent residents and those with families comprising of five or more members felt that they were constrained by time factors to separate their waste. Quite a number of residents mentioned that they were not willing to separate their waste because they wanted to keep their houses clean and tidy leaving no time for separating waste. Similar to the findings of Singhirunnusorn *et al.*, (2012), Banga (2011) also cited time constraints as the main reason for non-participation in the community waste recycling project, which the majority of the twenty residents interviewed in Newlands gave as their reason too. In this study, it was observed that most of the residential households visited had plenty of space to put a number of bins but the residents’ perception of cleanliness did not encompass having more than one bag for separation of their waste. Nguyen *et al.*, (2015) mentions that recycling behaviour of residents can be motivated by convenience of infrastructure for necessary participation in S@S. In the context of complex properties, this could

stand to motivate positive recycling behaviours as compared to just having wheelie black bins as the only waste receptacles available for waste disposal.

Residents are more likely to participate in separation at source when they have previously recycled or being exposed to recycling in their past (Banga, 2011). When the residents have ingrained into their minds that they were paying for a service, some of them made decisions not to participate as they felt whatever they are paying towards waste management by the council should cover separation of waste elsewhere. According to Matter *et al.*, (2012), urban residents of most cities have been affected by the “we dump-they collect” attitude which has being cultivated among the residents such that they feel that waste management is not their concern but a municipal responsibility. This attitude is more prevalent in the low income area of Newlands than in Franklin Roosevelt Park. Such findings highlight the need for municipalities to constantly continue to support their S@S programmes with increasing environmental awareness and education in the communities. Despite the residents’ recommendations for more permanent bins for recycling, they were also cognizant of the associated costs of providing these bins in terms of operating costs vis a vis maintenance of truck and labour-force. In addition to that, these residents feared that there would be other residents that might not still participate.

Some of the residents that took part in the focus group in the high income area indicated that it was difficult to conduct S@S in a complex type property as they were only provided with the black wheelie bins. As previously mentioned, there exist different property types of residential households in the CoJ from stand-alone houses, complexes, estates and gated communities. There was a suggestion that S@S could be enhanced at complexes through involving the residents’ associations, body corporates as well as the introductions of fines and penalties by the municipality on any residential households found not to be participating in S@S.

8.3 Residents’ perceptions of waste pickers and the implications for Separation at Source

All the residents interviewed and in the focus groups in both Newlands and Franklin Roosevelt Park indicated that they had seen the waste pickers. From the residents’

responses, it can be concluded that waste pickers are highly visible in the communities researched as they present a visible component of a large recycling system that could greatly benefit from integrating them. Samson (2008) argues that waste picking should be formally recognized as waste pickers contribute significantly towards solid waste management since they recover large volumes of waste for recycling and reusing. Regardless of the fact that some residents in both income areas felt that waste pickers left a mess at the gates of their residence after collecting recyclable materials from their bins; all residents regarded them as waste recyclers or private operators (as mentioned by some residents in the Franklin Roosevelt Park focus group discussion). Some of the residents were sympathetic towards waste pickers and consciously chose to separate reusable items (such as food, old clothes and appliances) for waste pickers. In addition, they kept recyclable waste for them instead of giving it to Pikitup. This was evidence of forged relationships.

From the residents' comments and responses concurred with findings by Andriansia *et al.*, 2015 that waste pickers are viewed as "poor, disadvantaged, vulnerable and/or marginalized social group" whose livelihood comes from salvaging recyclable and reusable material from residents' bins. The waste pickers were also regarded as actively involved in the separating of waste from the residents' black wheelie bins before collection by Pikitup during its collection rounds for ultimate landfill disposal. Apart from collecting recyclables from the black bins, most of the waste pickers interviewed in both areas indicated that some residents kept waste for them. Similar to this study in Hanoi, Vietnam which is a developing country, which is a developing found that more than 60% of the respondents had good recycling habits but they sorted their recyclables for sale to generate income whilst it was noted that about 23% voluntarily gave their sorted waste to the poor or waste collectors (Nguyen *et al.*, 2015). This supports the argument that the number of people separating their waste may be higher than levels recorded for participation in S@S, as some separators are selling materials themselves and others are separating them for the waste pickers.

From the researchers' observations of the waste pickers' trolleys in both areas (photographs in previous chapters), the recyclable materials they retrieved from the

residents' waste consisted mostly of different forms of plastic. Their decisions to collect these materials for recycling were shaped by access to the waste, the community they worked in, the distance to the buy-back centres and the prices at the buy-back centres. In Newlands, waste pickers felt that they acquired more materials from the black bins as fewer residents separated their waste. Due to the residents' higher income in Franklin Roosevelt Park, they disposed higher value materials. Whilst some separated and saved these materials for waste pickers, others left them mingled with the trash. Regardless, waste pickers working in Franklin Roosevelt Park accessed more high value reusable material. In terms of the material in the Pikitup recyclable bags placed outside by the residents', most of the waste pickers showed hesitance to collect stuff from them as they felt that if they were caught by Pikitup, their valuable waste would be confiscated. This showed that the Pikitup S@S programme was not formally including waste pickers. Interviews with key officials also confirmed this viewpoint that Pikitup did not want the street waste pickers to tamper with the residents' separated waste.

Furthermore, the study revealed that residents are participating in two forms of S@S taking place; Pikitup' S@S and waste pickers' S@S. The waste picker S@S includes receiving separated waste from residents, as well as them separating waste when residents failed to do so. This finding is in alignment with Mbiba (2014), who points out municipalities in Africa have put forth interventions on waste management which seek to ignore the benefits of forging expanded partnerships with informal waste pickers, who already collect, recycle and process large volumes of recyclable waste in urban Africa. If so implemented, this will result in minimization of waste municipalities will have to collect and send to landfills for final disposal (Pikitup, 2016). Such partnerships promote the extraction of materials with recyclable potential and value from MSWM by municipalities in tandem with increasing the contribution of the waste sector to the green economy which is one of the strategic goals of Pikitup and the CoJ as stated in the Pikitup 2015/16 report.

From one perspective, the waste pickers were viewed in a negative light by some of the residents in the high income area. Apart from being accused of leaving a mess after collecting recyclables from the residents' bins, they were also accused of theft of the Pikitup white recycling sacks provided by Pikitup. In their study, Matter *et al.*,

(2012) point out to the fact that segregating recyclables at household level not only creates interesting opportunities for enhancing waste recycling and higher recycling rates, but could also increase the creation of employment opportunities for the recyclable dealers and the informal waste pickers.

Furthermore, the residents in Newlands in the focus group discussion also highlighted that, through their interactions with the waste pickers in their area they learned that waste pickers had aligned themselves certain streets from which they collected from before others could also collect anything. This highlights the ability for organisation and respect for each other amongst the waste pickers themselves and that residents can forge relationships with waste pickers where such behaviour could be explained by Pongracz and Pohjola (2009) where they indicate that the concept of waste is associated with the tangible value of the material and intended usage and transfer of ownership of the material to avoid creation of waste.

Whilst some of the residents in both suburbs did not have any relationships with the waste pickers and did not engage with them due to fear and anger of the mess they created, other residents forged relationships with the waste pickers and gave them separated materials and other materials of value they had not placed in the black bins. As discussed in chapter six and seven, residents that developed relationships with waste pickers saved materials for them. As noted above, the study therefore revealed that residents were participating in different forms of separation activities, not only for Pikitup, but also by passively contributing towards informal separation by waste pickers from the black bins outside their yards on collection day.

When asked if the waste pickers should work together with Pikitup, the residents gave varying responses. The residents were predominantly concerned with whether Pikitup would be able to pay the waste pickers suitable wages to sustain their families. A few residents thought that if the waste pickers became employed by Pikitup, they would make less than they actually get when they work alone. The residents' responses implied a financial mistrust about Pikitup especially in light of the April 2016 strikes that occurred. Many residents raised concerns about the safety and long distances that waste pickers had to travel to sell their recyclable material. The waste pickers interviewed in both areas felt that they would be unable to work for Pikitup as they enjoyed flexible hours and being their own bosses. This sentiment

was raised by the residents in both areas who felt that Pikitup would not be able to pay adequate wages to the waste pickers. This is similar to the views given by Oteng-Ababio (2014), who viewed waste picking as an informal activity which is individually organized and the key informants were also in consensus with this view. They highlighted that integrating waste pickers into formal working condition would prove difficult and daunting as some of the waste pickers preferred to work as and when they pleased without adhering to a routine nine-to-five work schedule. This indicates that more creative ways need to be found to integrate the formal and informal separation activities so that waste pickers can retain independence and improve their incomes, while maintaining and improving their contribution to recycling in the city.

None of the residents in either area had an idea what integration of waste pickers was. The focus group participants were of the opinion that waste pickers must be registered and supplied with protective wear. It was suggested by a few that if waste pickers could be easily identified by households once they were regulated, it would be easier for residents to feel comfortable around them. In a study conducted in Pretoria about the public's perceptions of waste pickers, it was established that no social relationship existed between the public and the waste pickers (Schenk & Blaauw, 2011). They were either ignored or looked down upon due to the nature of their work, which was perceived to be dirty. An important point made by Samson (2008) was that despite residents observing waste pickers on the streets, "remarkably little is known about the reclaimers in South African cities and scant attention is being paid to them". This point reflects Pikitup as their S@S programme claims to include reclaimers and yet it actually excludes them.

In as much as residential households are regarded as great contributors of waste and have to be involved in source separation and recycling activities, waste pickers should not be ignored. In the waste cycle, waste can only be collected after it has been generated (see Figure 20) and waste pickers constitute part of waste collectors. While the CoJ annual reports from 2012-2016 (CoJ, 2012-16)) report on the amount of recyclable waste that is diverted from landfills through the S@S programme it hardly mentions the role played by informal waste pickers in this

process. From a discussion with key informant at Waterval Depot, it was indicated that three buyback centres are run by waste picker corporatives, who have since employed other waste pickers to take them off the streets into a safe working environment. However, upon discussion with the buyback centre officials, they were not all former waste pickers although they have employed some former waste pickers. It was indicated that most waste pickers do not like to have formalized jobs with formal working hours but are content to work for themselves under flexible working hours.

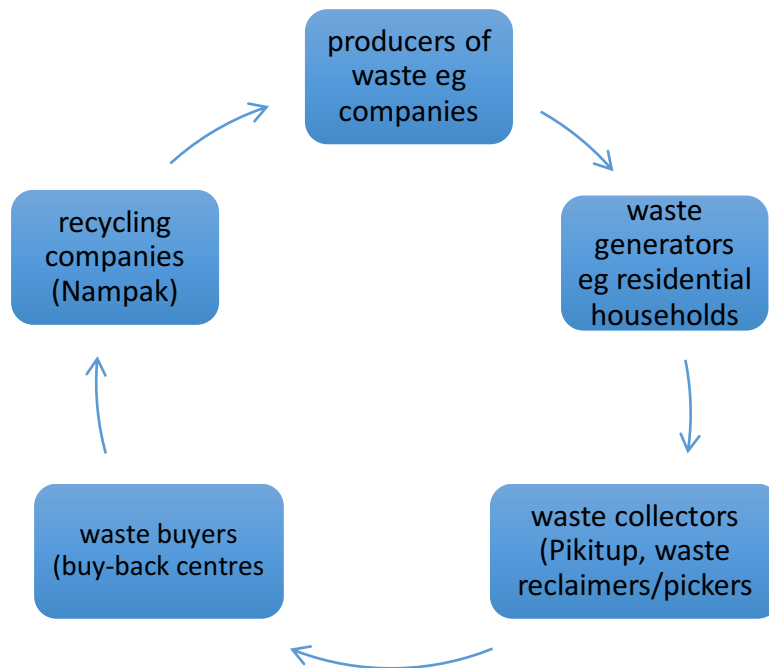


Figure 20: The waste cycle (Adapted from Schenk & Blaauw, 2011)

Municipal waste management systems have the potential to coordinate participation of all key stakeholders highlighted in the waste cycle in initiatives that promote source separation and recycling. There are many studies that highlight that the informal recyclers are part of the stakeholders that are reducing waste disposed of at landfills and need to be engaged with (Samson, 2008; Schenk & Blaauw, 2011; Dias, 2016; McKay 2015). In a study similar to Mbiba' (2014), Andriansia *et al.*, (2016) suggested that it would be highly counterproductive of municipalities to implement formal recycling systems that do not include informal waste pickers into systems that already exist. Various studies have concluded that waste pickers provide economic and environmental benefits to the cities they work in provided attempts are made to integrate them into formal integrated municipal waste management systems

(Medina, 2008; Samson, 2008; Dias, 2016). The process of formalization of waste pickers could facilitate the improvement of their working conditions in terms of health and safety whilst also offering them an opportunity to sustain better livelihoods. Of crucial importance to this study, it can also ensure more accurate data on the diversion of separated materials from landfills.

8.4 Conclusion

More residential households in Franklin Roosevelt Park associate waste with recycling potential whilst those in Newlands associate it with its usage and need as alluded to by Matter *et al.*, (2013) and Pongracz and Pohjola (2004). Where waste was positively defined there was a higher Pikitup S@S participation rate and positive recycling behaviour. Results showed consistency between thought and practice amongst the recycling residents as residents that held positive views of waste separated their waste at source. Participation in S@S was mostly motivated by knowledge and awareness from pilot project, personal experiences and environmental awareness. It was also noted that past behaviour and the intention to recycle also favored S@S. Non participating households indicated they were deterred by time constraints, lack of recycling bins, lack of intent to recycle and the “we dump-you collect” syndrome and lack of incentives and fines in both areas. When residents had high level of perceived difficulties concerning separation at source, their intention to participate were low and they did not separate their waste.

The continued presence of waste pickers in both areas pointed to the fact that waste pickers play an important role in the process of recycling in cities. As mentioned by Dias (2016), waste pickers have always been actively involved in cities of developing countries as green economy workers that enhance recycling recovery rates from MSW and yet are never recognized for their efforts. All the residents interviewed in Newlands and Franklin Roosevelt Park had seen the waste pickers and were aware that they were collecting recyclables from their bins. Both local and international views of integrating waste pickers into recycling programmes in agreement stands to increase recovery rates of recyclable materials before it reaches landfills. In this study, it was noted while some residents did not want to engage with the waste pickers due to fear and anger to the creation of a mess they left, other residents

made a proactive decision to give materials of value to waste pickers. This pointed out that participation in separation activities that would be higher than those recorded by the Pikitup statistics as residents were also found to be participating in informal separation activities for the waste pickers and indirectly passively participating when the waste pickers extracted recyclable material they placed in their rubbish bins.

CHAPTER 9: CONCLUSION

This research aimed to explore how the residents' conceptualization of waste and recycling behaviour and perceived relations with waste pickers shaped their participation in waste separation at source as a tool for sustainable waste practices. The following were the main results drawn from the study. The residents' conceptualization of waste was shaped along three main frames; what cannot be recycled, what was no longer wanted and what was no longer needed. Most of the residents of the high income area of Franklin Roosevelt Park conceptualized waste based on its recycling potential whereby they also viewed waste as positive if it could be recycled. However, in the low income area of Newland associated the definition of waste with whether it was needed or wanted anymore such that they regarded waste in a negative manner and more than half of the twenty residents did not bother to separate their waste. When waste was positively viewed, there was consistency between thought and practice in recycling such that waste was separated at source.

There were separation activities taking place in both Franklin Roosevelt Park and Newlands. Whilst some residents were separating at source for Pikitup, other residents were passively participating in informal separation at source for waste pickers by providing them with already separated waste or with materials of value in their bins that waste pickers could separate for themselves on the streets. The factors that influenced good recycling behaviour were found to be knowledge and awareness of S@S, a willingness to recycle, provision of more bins. Some residents indicated that they were hindered from participation in S@S due to time constraints, lack of knowledge and awareness about S@S. There was active informal separation of waste by waste picker in both areas. Forged relationships existed between some residents and waste pickers that could be regarded to contribute to higher participation rates in S@S that is indicated in the Pikitup statistics. The research argued that the residents' understanding of the conceptualization of waste and recycling and participation in S@S shaped each other.

From the findings, the researcher made some suggestions that will increase participation rates in separation at source by residents in Newlands and Franklin Roosevelt Park which may also be extended to other suburbs of the CoJ. Pikitup

should change the design of and approach to their separation at source programme by ensuring that residents are provided with continuous environmental education to inform them that will change their negative mindset in order to regard S@S as a sustainable waste practice that benefits them and the environment. It is also recommended that Pikitup' approach to S@S as a tool for sustainable waste practices should also include of waste pickers as stakeholders that positively contribute towards enhancing recycling recovery rates in cities rather than disregarding their presence and efforts as recommended by Mbiba (2014) and Dias (2016). Based on the waste cycle adapted from Schenk and Blaauw (2011), it was concluded that waste pickers were as crucial to municipal solid waste management systems as residential households. This was noted through their activities in Newlands and Franklin Roosevelt Park and the forged relationships that they formed with residents, some of whom were engaged with informal separation of waste pickers instead of Pikitup. Furthermore, Pikitup should endeavor to shift from the S@S programme being viewed as a pilot project in certain suburbs towards introducing it to the whole of the City of Johannesburg taking into consideration that landfill space is diminishing in the CoJ.

References

- Abd'Razack, N.T., Medayese, S.O., Shaibu, S.I. and Adeleye, B.M., 2017. Habits and benefits of recycling solid waste among households in Kaduna, North West Nigeria. *Sustainable Cities and Society*, 28, 297-306.
- Afroz, R., Tudin, R., Hanaki, K. and Masud, M. M., 2011. Selected socio-economic factors affecting willingness to minimise solid waste in Dhaka city, Bangladesh. *Environmental Planning and Management*, 54(6), 711-731.
- Andriansia, A. A., Yves, O. K. B. and Alphonse, S. 2016. Role and importance of informal collectors in the municipal waste pre-collection system in Abidjan, Cote d'Ivoire. *Habitat International*, 53, 265-273.
- Babaei, A. A., Alavi, N., Goudarzi, G., Teymouri, P., Ahmadi, K. and Rafiee, M., 2015. Household recycling knowledge, attitudes and practices towards solid waste management. *Resources, Conservation and Recycling*, 102, 94-100.
- Babbie, E. and Mouton, J., 2007. *The Practice of Social Research*. 7th Edition. Oxford. Cape Town.
- Banga, M., 2011. Household Knowledge, Attitudes and Practices in Solid Waste Segregation and Recycling: The case of Urban Kampala. *Zambia Social Science* 1(2), [Available from <http://scholarship.law.cornell.edu/zssi/vol2/iss1/4> accessed on 14 August 2017]
- Beall, J., 1997. Thoughts on poverty from a South Asian rubbish dump: gender, inequality and household waste. *IDS Bulletin*, 28(3), 73-90.
- City of Johannesburg (CoJ)., 2011. City of Johannesburg Medium Term Budget 2011.
- City of Johannesburg (CoJ)., 2014. Johannesburg Development Agency 2014/15 Integrated Annual Plan. [Available from <http://www.joburg.org.za> accessed on 20 March, 2016]

City of Johannesburg., 2008. State of the Environment Report 2008: Waste Management, [Available from http://www.joburgarchive.co.za/2009/pdfs/report_environment/ accessed on 20 March 2016]

City of Johannesburg (CoJ)., 2012/16. Integrated Development Plan. [Available from <http://www.jobrg.org.za> accessed on 20 March 2016]

CSIR. n.d. Solid Waste Management. [Available from <https://www.csir.co.za> accessed on 13 May 2017]

Dai, Y. C., Gordon, M. P. R., Ye, J. Y., Xu, D. Y., Lin, Z. Y., Robinson, N. K. L., Woodard, R. and Harder M. K., 2015. Why doorstepping can increase household waste recycling. *Resources, Conservation and Recycling*, 102, 9-19.

Dias, S.M., 2016. Waste pickers and cities. *Environment and Urbanization*, 28(2), 375-390.

Department of Environmental Affairs (DEA). 2012a. *National Waste Strategy Management Plan*. Pretoria.

Emelumadu, O.F., Azubike, O.C., Nnebue, C.C., Fazubike, N. and Sidney-Nnebue, Q.N., 2016. Practice, Pattern and Challenges of Solid Waste Management in Onitsha Metropolis, Nigeria. *American Journal of Public Health Research*, 4(1), 16-22.

Engledow, S. 2007. *Integrated Analysis Solid Waste Baseline Report*. Report compiled for the UNDP. Stellenbosch: Sustainability Institute.

Gallardo, A., Carlos, M., Peris, M. and Colomer, F.J., 2015. Methodology to design a municipal solid waste pre-collection system. A case study. *Waste management*, 36, 1-11.

Gauteng Department of Agriculture and Rural Development (GDARD). 2011. Gauteng State of the Environment Report 2011. Gauteng Provincial Government. [Available from <http://www.gdard.gpg.gov.za> accessed on May 11, 2017].

Greyson, N and Crang, M., 2010. Materiality and waste: inorganic vitality in a networked world. *Environment and Planning*, 42, 1026-1032.

Guerrero, L. A., Maas, G. and Hogland, W., 2013. Solid waste management challenges for cities in developing countries. *Waste Management*, 33, 220-232.

Katusiimeh, M. W., Burger, K. and Mol, A. P. J., 2013. Informal waste collection and its co-existence with the formal waste sector: The case of Kampala, Uganda. *Habitat International*, 38, 1-9.

Knussen, C., Yule, F., MacKenzie, J. and Well, M., 2004. An analysis of intentions to recycle household waste: The role of past behaviour, perceived habit, and perceived lack of facilities. *Environmental Psychology*, 24, 237-246.

Leedy, P. D. and Ormrod, J. E., 2013. *Practical Research Planning and Design*. 10th Ed. Pearson. USA.

Mangizvo, R.V. and Wiseman, M., 2012. The management, practice and environmental health implications of the municipal solid waste dump site in Alice, South Africa. Online *J Soci Sci Res*, 1(5), 125-131.

Matter, A., Dietschi, M. and Zurbrugg, C., 2013. Improving the informal recycling sector through segregation of waste in the household—The case of Dhaka Bangladesh. *Habitat International*, 38, 150-156.

Mason, I.G., Oberender, A. and Brooking, A.K., 2004. Source separation and potential re-use of resource residuals at a university campus. *Resources, Conservation and Recycling*, 40(2), 155-172.

Mbiba, B., 2014. Urban solid waste characteristics and household appetite for separation at source in Eastern and Southern Africa. *Habitat International*, 43, 152-162.

McKay, T.J., Mbanda, J.T.D. and Lawton, M., 2015. Exploring the challenges facing the solid waste sector in Douala, Cameroon. *Environmental Economics*, 6(3), 93-102.

Medina, M., 2008. The informal recycling sector in developing countries: Organizing waste pickers to enhance their impact. [Available from <http://www.openknowledge.worldbank.org/handle/10986/10586> accessed on 20 June 2017]

Miezah, K., Obiri-Danso, K., Kadar, Z., Fei-Baffoe, B. and Mensah, M. Y., 2015. Municipal solid waste characterization and quantification as a measure towards effective waste management in Ghana. *Waste Management*, 46, 15-27.

Moh, Y. and Manaf, L. A., 2017. Solid waste management transformation and future challenges of source separation and recycling practice in Malaysia. *Resources, Conservation and Recycling*, 116, 1-14.

Mouton, J., 2012. *How to succeed in your Master's and Doctoral Studies*. Van Schaik. Pretoria.

Moore, S. A., 2012. Garbage Matters: Concepts in new geographies of waste, *Progress in Human Geography*, 36, 780-799.

National Waste Management Strategy (NWMS). 2011. [Available from https://www.environment.gov.za/mediarelease/nationalwaste_managementstrategy accessed on 20 March 2017]

Nahman, A., De Lange, W., Oelofse, S. and Godfrey, L., 2012. The costs of household food waste in South Africa. *Waste Management*, **32**(11), 2147-2153.

National Waste Management Strategy (NWMS). 2011. [Available from <http://www.iwmsa.co.za> accessed on 10 May 2016]

Nguyen, T.T.P., Zhu, D. and Le, N.P., 2015. Factors influencing waste separation intention of residential households in a developing country: Evidence from Hanoi, Vietnam. *Habitat International*, 48, 169-176.

Nzeadibe, T., C. 2009. Solid waste reforms and informal recycling in Enugu urban area, Nigeria, *Habitat International*, 33(1), 93-99.

Oberlin, A. S., 2013, Resource recovery potential: A case study of household waste in Kinondoni municipality, Dar es Salaam. *Tanzania Journal of Natural and Applied Science*, 4(1), 563-574.

Oelofse, S.H.H. and Godfrey, L., 2008. Defining waste in South Africa: moving beyond the age of 'waste'. *South African Journal of Science*, 104(7-8), 242-246.

Ogola, J.S., Chimuka, L. and Tshivhase, S., 2011. Management of municipal solid wastes: A case study in Limpopo Province, South Africa. *In Integrated Waste Management*, 1, 91-111.

Ojeda-Benitez, S., de Vega, C.A. and Ramí, M.E., 2003. Characterization and quantification of household solid wastes in a Mexican city. *Resources, Conservation and Recycling*, 39(3), 211-222.

Oteng-Ababio, M., 2014. Rethinking waste as a resource: insights from a low-income community in Accra, Ghana. *City, Territory and Architecture*, [Available from <http://www.cityterritoryarchitecture.com/content/1/1/10> on 10 May 2016]

Pakpour, A. H., Zeidi, I. M., Emamjomeh, M. M., Asefzadeh, S. and Pearson, H., 2014. Household waste behaviours among a community sample in Iran: An application of the theory of planned behaviour. *Waste Management*, 34, 980-986.

Pikitup Johannesburg SOC Limited 2010-2011 Annual Report. [Available from <http://www.pikitup.co.za/annual-reports/>. on 20 February 2017]

Pikitup Johannesburg SOC Limited 2013-2014 Annual Report. [Available from <http://www.pikitup.co.za/annual-reports/>. on 20 February 2017]

Pikitup Johannesburg SOC Limited 2014-2015 Annual Report. [Available from <http://www.pikitup.co.za/annual-reports/>. on 20 February 2017]

Pikitup Johannesburg SOC Limited 2016/17 Business Plan. [Available from

<http://www.pikitup.co.za> on 10 June 2017].

Polokwane Declaration on Waste Management, Polokwane, Northern Province, South Africa. National Waste Management Summit 26-28 September 2001. [Available from <http://www.soer.deat.gov.za> on 20 February 2017].

Pongracz, E. and Pohjola, V. J., 2004, Re-defining waste, the concept of ownership and the role of waste management. *Resources, Conservation and Recycling*, 40(2), 141-153.

Republic of South Africa. 1996. Constitution of the Republic of South Africa Act, 1996, (Act No.108 of 1996).

Republic of South Africa. 1989. Environmental Conservation Act, (Act 73 of 1989), [Available from http://www.environment.gov.za/sites/default/files/legislations/environment_conservation_act73of1989.pdf accessed on 16 August 2017].

Republic of South Africa. 2008. National Environmental Management: Waste Act. (Act 59 of 2008). Gazette 32000. Government Gazette, 10 March 2009.

Samah, M. A. A., Manaf, A. A., Ahsan, A., Sulaiman, W. N. A., Agamuthu, P. and D'Silva, L., 2013. Household Solid Waste Composition in Balakong City, Malaysia: Trend and Management. *Political Journal of Environmental Science*, 22(6), 1807-1816.

Samson, M., 2008. Reclaiming livelihoods: the role of reclaimers in municipal waste management systems. Groundwork.

Samson, M., 2009. Refusing to be cast aside: Waste pickers organising around the world. *Women in Informal Employment: Globalizing and Organizing (WIEGO)*.

Samson, M., 2015. Accumulation by dispossession and the informal economy—Struggles over knowledge, being and waste at a Soweto garbage dump. *Environment and Planning D: Society and Space*, 33(5), 813-830.

Schenk, R. and Blaauw, P.F., 2011. The work and lives of street waste pickers in Pretoria—a case study of recycling in South Africa's urban informal economy. *In Urban Forum*, 22 (4), 411-430.

Sheau-Ting, L., Sin-bee, T. and Weng-Wai, C., 2016. Preferred attributes of waste separation behaviour: An empirical study. *Procedia Engineering*, 145, 738-745.

Singhirunnusorn, W., Donlakorn, K., Kaewhanin, W., Kpxgukicvgu, U., Kp̄wgpekpi, H., Tge, J. and Dgjcckqwt, E., 2012. Household recycling behaviours and attitudes toward waste bank project: Mahasarakham Municipality. *ASIAN Behavioural Studies*, 2(6), 35-41.

Sembiring, E. and Nitivattananon, V. 2010. Sustainable solid waste management toward an inclusive society: Integration of the informal sector *Resources, Conservation and Recycling*, 54(11), 802-809.

Statistics South Africa (StatsSA). 2011. [Available from http://www.statssa.gov.za/?page_id=3839 accessed on 20 March 2017].

Talalaj, I.A. and Walery, M., 2015. The effect of gender and age structure on municipal waste generation in Poland. *Waste management*, 40, 3-8.

Tchobanoglous, G., Theisen, H. and Vigil, S., 1993. Integrated solid waste management: engineering principles and management issues. McGraw-Hill Science/Engineering/Math.

Wilson, D. C., Araba, A. O., Chinwah, K. and Cheeseman, C. R. 2009. Building recycling rates through the informal sector. *Waste Management*, 29, 629-635.

Wilson, D. C., Velis, C. and Cheeseman, C. 2006. Role of informal sector recycling in waste management in developing countries. *Habitat International*, 30, 797-808.

Zeng, C., Niu, D., Li, H., Zhou, T. and Zhao, Y., 2016, Public perceptions and economic values of source-separated collection of rural solid waste: A pilot study in China. *Resources, Conservation and Recycling*, 107, 166-173.

Zhang, H. and Wen, Z.G., 2014. Residents' household solid waste (HSW) source separation activity: A case study of Suzhou, China. *Sustainability*, 6(9), 6446-6466.

Zhang, W., Che, Y., Yang, K., Ren, X. and Tai, J., 2012. Public opinion about the

source separation of municipal solid waste in Shanghai, China. *Waste Management & Research*, 30(12), 1261-1271.

Appendix 1



HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)
R14/49 Kadyamadare

CLEARANCE CERTIFICATE

PROTOCOL NUMBER: H16/07/10

PROJECT TITLE

Assessment of waste separation at source by residential households as a tool for sustainable waste practices: A case study of the City of Johannesburg

INVESTIGATOR(S)

Mrs G Kadyamadare

SCHOOL/DEPARTMENT

APES/

DATE CONSIDERED

22 July 2016

DECISION OF THE COMMITTEE

Approved unconditionally

EXPIRY DATE

15 August 2019

DATE

16 August 2016

CHAIRPERSON

(Professor J Knight)

cc: Supervisor : Dr M Samson

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10005, 10th Floor, Senate House, University.

I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to completion of a yearly progress report.**

Signature

_____/_____/_____
Date

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES