

**ASSESSMENT OF BARRIERS PREVENTING RECYCLING PRACTICES  
AMONG BARS AND EATERIES IN CENTRAL SOUTH AFRICA**

By

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## DECLARATION

I, CARIEN DENNER, declare that the Masters Degree dissertation or interrelated, publishable manuscripts / published articles that I herewith submit for the Masters Degree qualification in Consumer Science at the University of the Free State is my independent work, and that I have not previously submitted it for a qualification at another institution of higher education.

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## **Abstract**

Recycling is an important aspect of a sustainable society and depends largely on the willingness of consumers to participate in this practice. Some regions in South Africa (SA) recycle actively, but nothing yet in the central part of the country. The area selected for this study included Bloemfontein, Welkom, Bethlehem, Clarens, Kroonstad, and Kimberley, which are all located in the central part of SA. Eateries and bars are businesses that generate a large amount of recyclable solid waste in terms of glass, plastic, paper, polystyrene, metal, and compostable items.

By identifying the barriers preventing these businesses from recycling, the local municipalities and recycling services could create a solution. Owners or employees of eateries and bars completed a self-administered questionnaire. Empirical data was obtained on knowledge of recycling, participation in recycling. Likert scale type questions were used to identify barriers that prevent recycling practices, also to determine motives that could encourage the implementation of recycling programs.

The respondents indicated a willingness to recycle if there is a financial benefit, as well as support offered by the municipality or government. Respondent's knowledge regarding recycling seem to be positive although their attitude and willingness tend to be more negative. Barriers that prevent recycling practices included implementation effort and cost, as well as lack of knowledge thereof. Only a small number of respondents were aware of buy-back centres (BBC) or collection services. These results indicate that these businesses do not grasp the impact that they can have with their recycling contributions and that the giveback would be worth the effort. They are also unaware of the services available to assist with implementation and practices of a recycling plan. The municipality and government would have to get involved by enforcing businesses to comply with recycling laws that should be implemented. Furthermore, interviews were conducted with BBC in Bloemfontein. Results showed that the BBC are willing to reach an agreement with the eateries and bars, should they start to recycle more effectively.

## **Keywords:**

Recycle, buy-back centre, solid waste, recyclable waste, eateries, restaurants, bars

## Opsomming

Herwinning is 'n belangrike aspek van 'n volhoubare samelewing en hang grootliks af van die bereidwilligheid van verbruikers om deel te neem aan herwinnings aksies en projekte. Sommige streke in Suid-Afrika (SA) is aktief besig met herwinnings projekte en dit is ook deel van hul lewenswyse. Tans is daar egter geen van hierdie aksies of projekte in sentraal SA nie. Die areas wat vir hierdie studie gekies is sluit Bloemfontein, Welkom, Bethlehem, Clarens, Kroonstad en Kimberley in, wat almal in sentraal SA geleë is.

Eetplekke en kroeë is besighede wat groot hoeveelhede herwinbare afval genereer in terme van glas, plastiek, papier, polistireen, metale en organiese afval wat in kompos gemaak kan word. Deur die moontlike struikelblokke te identifiseer wat hierdie besighede verhoed om te herwin, kan die plaaslike munisipaliteite en herwinningsdienste 'n oplossing vind. Eienaars of werknemers van betrokke eetplekke en kroeë het 'n selfgeadministreerde vraelys voltooi. Empiriese data is verkry rakende hul kennis van herwinning en deelname aan herwinning.

Likert-skaal tipe vrae is gebruik om hindernisse te identifiseer wat in herwinningspraktyke voorkom, asook om faktore te bepaal wat die implementering van herwinningsprogramme sal aanmoedig. Die resultate het aangedui dat respondente bereid is om te herwin indien daar finansiële voordeel is, asook ondersteuning van die plaaslike munisipaliteite of regering af. In die algemeen vertoon respondente se kennis rakende herwinning positief, alhoewel hulle aksies, houding en gewilligheid geneig is om negatief te wees.

Hindernisse wat in herwinningspraktyke voorkom, sluit die implementering van 'n herwinningsprogram in, kostes verbonde, asook die gebrek aan kennis daarvan. Slegs 'n klein aantal van die respondente was bewus van sentrums of besighede in hulle areas wat herwinbare afval terugkoop. Hierdie resultate dui daarop dat besighede nie begryp hoe groot die impak kan wees van hul herwinningsbydraes nie. Hulle besef ook nie dat herwinning tot baie voordele lei nie. Nie net vir die omgewing nie, maar ook vir hulself.

Hulle is ook onbewus van die beskikbare dienste wat help met die implementering en uitvoer van 'n herwinningsplan. Munisipaliteite en die regering sal betrokke moet raak deur besighede wetlik te forseer om te voldoen aan herwinningswette en maatreëls wat geïmplementeer moet word. In verdere navorsing is onderhoude gevoer met besighede en sentrums in Bloemfontein wat herwinbare afval terugkoop. Resultate het getoon dat die besighede en terugkoop-sentrums bereid is om 'n ooreenkoms met die eetplekke en kroeë te bereik, indien hulle meer effektief begin herwin.

**Sleutelwoorde:**

Herwinning, terugkoop-sentrum, vaste afval, herwinbare afval, restaurante, kroëë, eetplekke

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# Chapter 1: General introduction

## 1.1 Introduction

Waste generation is globally viewed as a manifestation of the inefficient use of resources, the root cause of pollution, and it is connected to environmental degradation (DEA, 2012).

According to a report by the World Bank, South Africa produces 54,425 tonnes of waste daily (BusinessTech, 2016). There are 876 legal landfills in South Africa. When waste is unloaded at the landfill, it is compacted to minimise the space between waste materials; it is then covered with a soil layer to prevent contact with the outside air. Water that filters through these layers and gathers contaminants is known as leachate. Leachate is a major concern associated with older landfills as it has the potential to contaminate groundwater resources if it is not managed correctly. Recent landfill sites must be prepared with a liner, which typically consists of a combination of high-density polyethylene (HDPE-plastic) and a mineral layer (clay or bentonite) at the bottom that will prevent the contamination of groundwater. Currently, most landfill sites are reaching capacity, while available land to extend landfill sites is declining (IWMSA, 2017).

Solutions for environmental sustainability is mainly narrowed down to technology, economy, an informed society and social development (Wyngaard & de Lange, 2013). For a waste management system to work, it is necessary to have a definite link or relationship between legislation, the institutions, economics, environment, social culture and the technical aspects (Guerrero *et al.*, 2013). Eco initiatives can be considered in any setting, from households to larger organizations, businesses and factories, which can improve sustainability in different aspects (Wyngaard & de Lange, 2013).

Guerrero *et al.* (2013) report four crucial factors for a recycling system to maintain sustainability. Firstly, the government must provide funds. Waste services have expenses that are not covered by the public. Secondly, municipal leaders of the districts must have an interest in waste management and the problems associated with it. Additionally, participation in the management of waste and willingness to recycle by the different service users as well as the public. Lastly, proper management of the funds.

“Think global, act local” is the conception towards the search for a more sustainable future for everyone (Steel, 1996). Moreover, problems regarding the environment can be successfully approached and reduced by including, informing, educating and encouraging people, communities, businesses and households (Barr, 2007).

Plans and systems must be in place providing adequate services to all communities in local municipalities. According to Godfrey & Nahman (2007), the South African government is either unable or unwilling to enforce pollution and waste related legislation. Most (59.7%) of the local municipalities in South Africa could not, under the legislation, effectively perform their waste management functions because of insufficient equipment, staff and budgets. It is important to educate workers, technicians and professionals in the waste management and environmental sustainability fields. According to Guerrero *et al.* (2013), research have shown that when waste workers maintain a higher status and education, the general public would be more responsible towards them which leads to having cleaner cities.

It was predicted in 2015 that the Gauteng landfills only had seven years' capacity left. Only 10% of waste is recycled, and 90% end in landfills due to the lack of recycling (Ringwood[B], 2016).

On June 26, 2018 Eyewitness News reported that the city of Johannesburg residents would be compelled to start recycling. Furthermore, it was reported that should the residents of Johannesburg not start recycling in 2018, their biggest landfill which is situated in Turffontein would only have three years of capacity left. Nico de Jager, Member of Mayoral Committee for Environmental affairs said recycling must become compulsory in order to prevent a crisis (EWN, June 2018).

In April 2018, the Western Cape Environmental Affairs Department warned that some of the province's landfill sites could reach full capacity in less than a year. James-Brent Styan, Environmental Affairs MEC spokesperson, stated that of 164 landfill sites in the Western Cape, only 71 are operational (EWN, April 2018).

The National Waste Management Strategy (NWMS) is a legislative requirement of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008), commonly known as the 'Waste Act'. The intent of the NWMS is to achieve the objects of the Waste Act (NWMS, 2011).

The objections of the Waste Act are:

- A. To protect health, well-being and the environment by providing reasonable measures for (1) minimising the consumption of natural resources; (2) avoiding and minimising the generation of waste; (3) reducing, re-using, recycling and

recovering waste; (4) treating and safely disposing of waste as a last resort; (5) preventing pollution and ecological degradation; (6) securing ecologically sustainable development while promoting justifiable economic and social development; (7) promoting and ensuring the effective delivery of waste services; (8) remediating land where contamination presents, or may present, a significant risk of harm to health or the environment: and (9) achieving integrated waste management reporting and planning.

- B. To ensure that people are aware of the impact of waste on their health, well-being and the environment.
- C. To provide for compliance with the measures set out in paragraph (A).
- D. To give effect to section 24 of the Constitution in order to secure an environment that is not harmful to health and well-being.

In fulfilling the rights contained in section 24 of the Constitution, the State, through the organs of state responsible for implementing this Act, must put in place uniform measures that seek to reduce the amount of waste that is generated and, where waste is generated, to ensure that waste is re-used, recycled and recovered in an environmentally sound manner before being safely treated and disposed of (Waste Act).

The implementation of the Waste Act requires a baseline of waste information as indication on which to base policy decisions and measure the implementation thereof. The Waste Act states that the Minister must launch a national waste management strategy and declare priority waste streams; prescribe measures for the management of identified waste streams; set targets for recycling as well the minimization of certain waste streams; and completely ban certain waste streams from landfill. The National Waste Management Strategy was approved by Cabinet in 2011 and sets targets to promote waste minimization, reuse, recycling and recovery of waste. The implementation of the strategy must be monitored and reviewed at least every five years (DEA, 2012).

The classification of waste according to the Waste Act:

Business waste - waste that comes from premises that are used mainly for commercial, retail, wholesale, entertainment or government administration purposes (Waste Act).

By-product - a substance that is produced as part of a process that is mainly intended to produce another substance or product and that has the characteristics of an equivalent virgin product or material (Waste Act).

Container - a disposable or re-usable vessel in which waste is placed for the purposes of storing, collecting, handling, transporting, treating or disposing of that waste, including bins, bin-liners and skip bins (Waste Act.)

Domestic waste - excluding hazardous waste, that emanates from premises that are used mainly for residential, educational, health care, sport or recreation purposes (Waste Act).

General waste - waste that does not pose an immediate hazard or threat to health or to the environment including domestic waste, business waste and inert waste (Waste Act).

Hazardous waste – any waste that contains organic or inorganic elements or compounds that may consist of harmful chemical or toxicological characteristics that can have a damaging impact on health and the environment (Waste Act).

Inert waste - waste that does not undergo any significant physical, chemical or biological transformation after disposal; does not burn, react physically or chemically biodegrade or otherwise adversely affect any other matter or environment with which it may come into contact; and does not impact negatively on the environment, because of its pollutant content and because the toxicity of its leachate is insignificant (Waste Act).

Waste - any substance, whether or not that substance can be reduced, re-used, recycled and recovered (1) that is surplus, unwanted, rejected, discarded, abandoned or disposed of; (2) which the generator has no further use of for the purposes of production; (3) that must be treated or disposed of; (4) that is identified as a waste by the Minister by notice in the Gazette, and includes waste generated by the mining, medical or other sector, 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 (Waste Act).

## **1.2 Problem statement**

“What is required from us as the city, and every member of the public, is a change in behaviour. A move away from the irresponsible generation of waste and its disposal, to

one that acknowledges that waste management is an acute concern for each of us” (Matshidiso Mfikoe, Johannesburg Waste Summit as cited in Knopjes, 2015).

Waste management should be regarded as a priority. Plans and/or systems must be positioned to provide the much-needed services to communities in local municipalities. Some of the main problems in South Africa include: (1) the lack of information and education on recycling, (2) waste collection services, (3) reusing and recycling is not encouraged, (4) illegal dumping, as well as illegal dump sites, and the biggest problem of all (5) the lack of waste related regulations and enforcement by the government and municipalities (Fiehn & Ball, 2005). According to Godfrey & Nahman (2007), the South African government is either unable or unwilling to enforce pollution and waste related legislation.

Gauteng and the Western Cape provinces have recycling programs in place. Bloemfontein is also a big and expanding city that could and should participate in recycling. However, this does not seem to be the case. In the 2001 census Mangaung Metropolitan Municipality of which Bloemfontein is the heart, the population was 645 440, in census 2011 the population grew to 747 431, and in the 2016 Community Survey the population grew to 787 803. In 2011 Bloemfontein’s population were 256 185. The 2001 and 2016 statistics for Bloemfontein is not available (Statistics South Africa, 2018).

Eateries and bars use many products that could be recycled, or the packaging is recyclable. There are many recyclable items (glass, metal, plastic) in the waste of eateries and bars, which are currently taken to the landfills.

Matinise *et al.* (2018) conducted a study assessing the recycling potential of restaurant waste in eThekweni Metropolitan Municipality. Results showed that of the sampled restaurants more than 74% of their waste could be recycled, this includes compostable food waste, as well as paper, plastic, glass and metal. Recyclables like plastic, paper, glass and metal add up to between 25% and 28% of waste generated in these restaurants, while the rest are non-recyclable waste. Currently, 100% of these waste is sent to landfill as mixed waste. These results indicate the need for a more all-inclusive approach towards integrated waste management by municipalities. The contributions of commercial and institutional waste like eateries and bars should also be addressed because of their high recycle potential.

Buy-back centres play a vital role in creating formal jobs, i.e., people working on-site sorting recyclables as well as informal income opportunities for poor and unemployable individuals, i.e. street waste pickers. Buy-back centres are mostly located in industrial areas and areas with high-density population and low-income. In central South Africa, there are no processing facilities, where the recyclable materials are treated and processed into 'raw materials' ready to use again, buy-back centres have to send all the recyclables to Gauteng. This also reflects on the prices per kilogram of recyclable solid waste, as transport costs have to be included (Viljoen *et al.*, 2012).

Street waste pickers are mostly seen as a nuisance, but in South Africa, it is estimated that waste pickers save municipalities up to R750 million per year and additionally, conserve landfill space on the process (Shenck *et al.*, 2017).

By determining and understanding the pitfalls and barriers preventing bars and eateries in central South Africa from recycling, a better solution could be implemented.

### **1.3 Research questions:**

In order to assess the situation and determine what the factors are that prevent these establishments from recycling their waste, the following research questions are posed:

1. Does any of the bars and eateries have a recycling system?
  - 1.1 To which extent (if any) do the eateries and bars participate in recycling?
2. What is preventing recycling at the bars and eateries?
  - 2.1 Is a lack of knowledge a barrier to recycling?
  - 2.2 Is lack of time a barrier to recycling?
  - 2.3 Is the perception that it is difficult to implement a recycling program a barrier?
  - 2.4 Is the lack of municipal and government support a barrier to recycling?
3. What would motivate the bars and eateries to recycle?
  - 3.1 Are financial incentives a motivational factor to recycle?
  - 3.2 Will government enforcement make a difference in their recycling habits?
4. Does the eatery or bar have knowledge regarding buy-back centres in their vicinity?
5. Are the buy-back centres willing to collect recyclable waste from establishments?

5.1 Are financial incentives a motivational factor for buy-back centres to support the bars and eateries to recycle?

#### **1.4 Aim and objectives**

The aim of the study was to assess the level of participation in recycling activities, the use or absence of a solid waste recycling system as well as the willingness to implement a recycling plan of the participating eateries and bars in central South Africa. In addition, to determine the influence that the buy-back centres could have on the recycling activities of eateries and bars. Moreover, to obtain an understanding of what the motivation is, for those who are unwilling to recycle and how government and provincial legislation is significant in promoting recycling.

By understanding the barriers preventing businesses from recycling, the municipality or government may be more inclined to assist.

#### **1.5 Terminology and Abbreviations**

BBC – buy-back centre.

DEA - Department of Environmental Affairs.

Eateries - a place where you can buy and eat food (Collins Dictionary, 2019). Merriam-Webster (2019) defines an eatery as an informal restaurant, as well as beanery, café, diner and a grill.

Environmental sustainability - the rate of renewable resource harvest, pollution creation, and non-renewable resource exhaustion that can be continued indefinitely. If they cannot be continued indefinitely then they are not sustainable (Thwink, 2014).

IWMP - Integrated Waste Management Policy.

IWMSA - Institute of Waste Management of Southern Africa.

Landfill - the disposal of waste materials by burying it (Merriam-Webster, 2019).

MMM - Mangaung Metropolitan Municipality.

NWMS - National Waste Management Strategy.

Recycle - the action or process of converting waste into reusable material (Cambridge Dictionary, 2019).

Reduce – reduction or conservation, using natural resources wisely, and using less than usual in order to avoid waste and protect the environment (Cambridge Dictionary, 2019).

Reuse - is the action or practice of using something again, whether for its original purpose or to fulfil a different function (Cambridge Dictionary, 2019).

SAWIS - South African Waste Information System.

Separation at source - the practice of setting aside and sorting post-consumer waste materials at the point of generation in order to prevent them from entering the waste stream and ending up in landfills (Pikitup, 2015).

Waste - a material, substance or by-product discarded as no longer useful or required after the completion of a process (Oxford Dictionary, 2019).

Waste Act (Act 59 of 2008) – act which requires standard information of waste as an indication for policy decisions and measure implementation (Waste Act).

Waste management – it is the collection, transportation, disposal or recycling and monitoring of sewage, garbage, and other waste. Waste management incorporates management of all processes and resources for proper handling of waste materials. This includes the maintenance of waste trucks and dumping facilities or landfills (Business Dictionary, 2019).

Single stream recycling – also single-sort recycling, is a system in which all recyclables, plastic, paper, metals and glass are placed in a single bin for recycling (Leblanc, 2019).

Dual stream recycling – glass, plastic, metals are combined in one bin, and newspapers and mixed paper and office paper in a different bin. The two bins/bags are placed in separate compartments on the recycling truck (Leblanc, 2019).

Front of house/store recycling – marked bins are placed inside the store where customers can discard of their recyclable waste themselves in the marked bins.

Back of house/store recycling – recyclable waste is sorted in bins in the back of the store by staff members out of the public eye.

## **1.6 Limitations**

Eateries and bars in selected areas were requested to participate; shebeens and food carts were excluded as well as any eateries and bars located in the townships. No distinction was made between the types of establishment, e.g. restaurant, take-away, coffee shop, deli or bar.

Buy-back centres located in Bloemfontein were the only centres included. They were sometimes very reluctant to answer the questions, and some refused to participate in the study. Buy-back centres from the surrounding towns were not included as a result of time and budget constrictions.

Only one branch per chain restaurant group, in each town, were included in the study.

## **1.7 Ethical considerations and approval**

The following ethical issues were considered during the construction and execution of the study.

No children or persons with disabilities were involved in the study. There was no reward offered for participation, it was voluntary. Care was taken to ensure that all the participants remained anonymous. No names were used on the questionnaires, only numbers to identify the area in which the establishment is situated. During the interviews, no names were mentioned, and a letter was assigned to each buy-back centre to sustain anonymity.

Ethical approval was obtained on the 7<sup>th</sup> of November 2017, from the Natural and Agricultural Sciences Ethical Committee. UFS-HSD2017/0942 (Included in Appendix).

## **1.8 Outline of the study**

This dissertation represents two published research articles. Therefore, it does not follow the usual format of a dissertation, and the chapters have been compiled as follows:

Chapter 1 contain a short general introduction to recycling and problem statement. A brief background of the main problems, solutions and ideas for environmental sustainability in South Africa and how recycling can have an impact. Also, a list of definitions and

abbreviations are included, along with the limitations of the study and ethical considerations.

Chapter 2: Article 1: Recycling behaviour and practices among bars and eateries in Bloemfontein. This chapter presents the first article as it has been published, with the language and style as required by the publisher. This report dealt with eateries and bars in Bloemfontein and what is preventing them from recycling as Bloemfontein is the biggest city in Central South Africa, an in-depth look at the problems in Mangaung and its recycling by-laws. Background on other countries' methods in handling the recycling problem is also reviewed.

Chapter 3: Article 2: Assessment of barriers preventing recycling practices among bars and eateries in Central South Africa. This chapter presents the second article as it has been published, with the language and style as required by the publisher. General background on recycling in South Africa and the challenges faced. The Waste Act and the National Waste Management Strategy's goals and measures to overcome the challenges, as well as how eateries and bars can implement a successful recycling program.

Chapter 4 contains a discussion of statistical analyses of the feedback from the surveys distributed to eateries and bars in Central South Africa. This chapter is included because the two articles did not contain any statistical analyses. Data from all the towns are included. The Statistics Department, University of the Free State executed the analysis on the data to reveal significance.

Chapter 5 contains another important aspect of recycling. Buy-back centres (BBC) and the recycling industry. The main focus is that they buy back recyclable waste which could have been sent to landfills, dumped illegally or littered the streets. Feedback from interviews with Buy-back centres in Bloemfontein.

Chapter 6 contains the conclusions made to answer the research questions as they were discussed in chapters four and five. This study aimed to explore the recycling practices of eateries and bars and determine the barriers preventing recycling, as well as possible motivators.

## Chapter 2: Recycling behaviour and practices among bars and eateries in Bloemfontein.

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# Recycling behaviour and practices among bars and eateries in Bloemfontein

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### ABSTRACT

Waste has become a global issue and the management regarding it a priority. Landfills are not an option anymore and contingency plans will have to be implemented. Some of the main problems in South Africa (SA) include: (1) the lack of information and education, (2) waste collection services, (3) reusing and recycling is not encouraged, (4) illegal dumping, and the biggest problem of all (5) the lack of enforcement by the government and municipalities. In SA, there are provinces such as Gauteng and the Western Cape that have some recycling programs in place, but nothing yet in the central part of the country. Through the evaluation of the recycling behaviour of these businesses, factors can be identified that prevent sustainable practices. Data collection consisted of questionnaires, which were completed by participating businesses, consisting of sit-down and take-away restaurants, coffee-shops and bars in Bloemfontein.

### KEYWORDS

Eateries, Recycling, Sustainable Practices, Waste.

## INTRODUCTION

Over the past three decades, South Africa (SA) has effectively grown a recycling economy, with the assistance of informal waste pickers and buy back centres. There is still much to be done, given that significant quantities of recyclables are still disposed of to landfill. SA has a policy environment that actively promotes the diversion of waste away from landfill through prevention, reuse, recycling, and recovery. However, the response to this policy has been slow. In 2011, approximately 108 million tonnes of waste was generated in SA, of which 98 million tonnes were disposed of at the landfill. It consisted of approximately 59 million tonnes of general waste, 48 million tonnes unclassified waste and the remaining 1 million tonnes, was hazardous waste. An estimation of 10% of all waste generated in SA was recycled in 2011 (DEA, 2012).

According to Godfrey & Nahman (2007), the South African government is either unable or unwilling to enforce pollution and waste related legislation. Most (59.7%) of the local municipalities in South Africa could not, under the legislation, effectively perform their waste management functions because of insufficient equipment, staff, and budgets. It is important to educate workers, technicians, and professionals in the waste management and environmental sustainability fields. According to Guerrero *et al.* (2013) research have shown that when waste workers maintain a higher status and education, the general public would be more responsible towards them, which will result in cleaner cities.

Only 10% of waste is recycled, and 90% ends up in landfills due to the lack of recycling (Ringwood[B], 2016). When solid waste is managed incorrectly, it can have various direct and indirect impacts on the environment. It was predicted in 2015 that the Gauteng landfills only had seven years' capacity left. The lack of planning, poor service delivery, inadequate waste site operation, reckless actions, lack of environmental consciousness by industry and most importantly, limited legislation of statutory regulations will worsen the situation. The effect of waste on the environment is mostly negative with very little social and environmental benefits, derived from the waste stream (Fiehn & Ball, 2005).

## RECYCLING OF WASTE IN SA

Society is facing two enormous issues, climate change, and sustainable development. Thus, it is important to reduce the environmental impacts of products and services throughout its life cycle. Companies are asked to address this issue in the design of their products, failing to do so will result in difficulty to compete in the global market. Products and packaging must be highly if not one hundred percent recyclable (Petco, 2016). Recycling could be defined as the reusing of materials that would have been thrown away, but instead, turned into new products. It is disposing of material no longer needed or useable by the consumer, but disposing of it in a manner that this material can be reprocessed into another new usable product (DEA, 2011).

### The Process

The steps involved in the recycling process according to the Institute of Waste Management of Southern Africa are:

1. The collection of enough recyclable materials worthwhile moving to the next stage.
2. Transportation to a drop-off or buy-back centre.
3. Sorting, cleaning, compacting, baling and preparation of recyclable materials for sale to a recycling company or processing centre.
4. The materials are processed so that it is suitable for use as a raw material.
5. The cleaned reclaimed material is transported to the manufacturer.
6. Re-use of the recovered material as raw material to produce a new product.
7. Purchase of the new product made partially or wholly from recycled materials.

Members of the public are generally involved in the first two steps, with entrepreneurs being involved in the first three steps ([www.iwmsa.co.za](http://www.iwmsa.co.za)).

In South Africa, many households and businesses are not aware of the procedures regarding the proper disposing of packaging for recycling. Clean recyclables are easier to handle and to process; therefore, recyclables collected from the kerbside has to be cleaned first (Hunt, 2017). The recycling

process begins when products that can be recycled, known as recyclables, are separated from the other waste. This separation can be done in multiple ways including single-stream recycling, dual-stream recycling and source separation recycling (Lovda, 2014).

The National Waste Management Strategy (NWMS), compiled by the Department of Environmental Affairs in 2011, presented a list of challenges:

- There exists no recycling infrastructure in South Africa, which requires separation of waste, followed by the diversion of waste from landfills to buy-back centres and recycling plants.
- The waste management infrastructure is outdated, with decreasing investments and maintenance.
- The increasing amounts of waste being generated together with a growing population and economy, increase pressure on limited waste management facilities.
- The cost of waste management is not valued by the industry and consumers; as a result, waste disposal became the easy option.
- Limited waste treatment options are available, and these are more expensive than landfill costs.
- Acceptable landfills and hazardous waste facilities are limited.
- Urbanization and industrialization caused waste systems to become more complex.
- Incomplete and inadequate waste services for informal, rural and tribal areas caused unpleasant living circumstances in the past.
- The submission of waste data is not mandatory. Therefore, there is limited understanding of national waste flows.
- Waste management is not supported by the regulatory environment (DEA, 2011).

The City of Johannesburg (CoJ) is considering waste minimization options as a legal requirement since the Waste Act is inclined to waste minimization, as well as the fact that landfill space for the existing sites are running out and that there is very limited suitable and available space left for new sites. This situation forced a paradigm shift in the thinking and planning of the CoJ. This approach adopted the Waste Management Hierarchy principles, which advocate for waste reduction, re-use, recycling and recovery as the preferred waste management options and disposal as the last resort to deal with the rest.

Most garden waste sites of the CoJ also act as drop-off centres for recyclables such as paper, plastic, and cans. Some sites also accept E-waste. Additionally, eighteen buy-back centres operate. Some shopping centres also provide recycling deposit facilities. These facilities accept glass, plastic, cardboard, paper, tins, metal and E-waste. Waste minimization programmes enforced by Pikitup include; source separation, composting and crushing of building and demolition waste (CoJ, IWMP, 2011).

A critical factor to the implementation of the Integrated Waste Management Policy (IWMP) is the supporting legal framework. This framework needs to support and guide the implementation of the objectives of the IWMP, as well as the By-laws. This provides a chance to ensure the alignment of both plan and policy and support the implementation of the desired outcome. As an important component of waste management at municipality level, the Gauteng Provincial Government confirms the need for laws for the recovery, reuse, and recycling of all waste. Laws will also guide and encourage the recovery, reuse, and recycling of waste through source-separation and collection programmes. Therefore, the Gauteng Provincial Government supports existing and new laws intended for the encouragement of the manufacturing and purchasing of products made from recovered and recycled materials (CoJ, IWMP, 2011).

## **RECYCLING IN BLOEMFONTEIN**

### **Mangaung recycling By-laws**

“Storage, separation, and collection of recyclable domestic waste

1. Any person who is undertaking any activity involving reduction, re-use, recycling or recovery of waste including scrap dealers, buy-back centres and formalized recycling groups must ensure that the activity is less harmful to the environment than the disposal of such waste, before undertaking that activity. Written notification must be submitted to the municipality of the intention to undertake such an activity.

2. Any person undertaking the activities contemplated in subsection (1) must adhere to the requirements set out in national or provincial legislation.
3. The municipality may require any person or owner of premises to separate their waste and use different receptacles provided by the municipality or service provider.
4. In cases where the municipality, service provider or industry has provided separate receptacles for recyclable material, no person may use other receptacles for recyclable material (MMM, Provincial Gazette, 2013)".

During the review of the by-laws, some changes were advised. Separation at source has become a necessity with the declaration of the Waste Act and the targets set in the NWMS of 2011. An alternative to the current 'landfill only' option was provided. Because of limited landfill space, this option should be considered strongly in all areas.

The Department of Economic Development, Tourism and Environmental Affairs (DETEA) with support from Mangaung Metropolitan Municipality (MMM) and Tuffy initiated a source separation pilot project in Fichardt Park. The project management consists of task teams for education and public awareness. Residents in this area were provided with a clear bag for dry recyclables. The aim was to get residents to separate their dry and clean recyclables from wet waste, by placing the recyclables in clear bags provided. The residents were informed by the distribution of an information starter pack. Rat Race Waste, a buy-back collector, would follow the council refuse truck and collect all the dry recyclable plastic bags left behind. The clear bags were taken to the buy-back centre where the recyclables are sorted into their various fractions and sold off to recycling companies in Gauteng. Some challenges were encountered, which subsequently led to a partnership between the waste collector and the street pickers (MMM, IWMP, 2016).

Unfortunately, this is the only separation at source and recycling collecting program currently available and still running in Mangaung. No literature could be found on recycling initiatives or programs for recyclable waste generated by restaurants. Furthermore, food waste is also generated, but it does not form part of the scope of this project.

### **Composition of restaurant waste**

Restaurants generate vast volumes of solid waste including glass, metals, paper, cardboard, plastics, wood, food waste, special waste, and hazardous waste. 50 – 70% of a foodservice business garbage is made up of compostable items, while the remaining volume is made up of packaging (Singh *et al.*, 2014). In more recent times, the intake of food and drink out-of-home is increasing as a result of social or work-related habits or norms. In some fast food restaurants, bars, and for example at festivals and events, disposable or single-use table ware is distributed instead of regular table ware. This is done in an attempt to reduce management and evade washing-up. As a result of these practices, waste quantities have increased considerably (Razza *et al.*, 2008).

By assessing and monitoring the types and amounts of garbage that is thrown away, it can lead to substantial savings for restaurants and bars. Furthermore, a waste audit will be able to establish what waste is being generated. Most of these restaurants and bars throw out a lot of garbage that could have recycled and diverted from landfills (Singh *et al.*, 2014).

## **RECYCLING INITIATIVES IN OTHER COUNTRIES**

The Ohio EPA passed a House Bill in 1988, after problems with their solid waste program. The following provisions were made:

- Regulations for disposal facilities.
- Implementation of a solid waste management plan.
- The creation of a consultative council for formulating and approving the state plan.
- The formation of solid waste management districts for all 88 counties, either individually or in combination with other counties.

- The establishment of a solid waste management plan for each district.
- Requirements for solid waste facilities created prior to January 1st, 1980 to elevate to modern technology.

By encouraging recycling, reusing and reduction, they became less dependent on landfill sites. The central aim of the Bill stayed the same although some changes were made during the years. (Lovda, 2014).

In Sweden, less than one percent of their waste was sent to landfill sites since 2011. They developed a culture of looking after the environment, which resulted in excellent recycling practices. Gripwall, director of communications for Avfall Sverige (The Swedish Waste Management's recycling association) stated that they had to work a long time on communication toward consumers not to throw away, but rather to recycle and reuse (Sheffield, 2016).

The United Kingdom government just announced that all drink containers would be covered by a deposit return system. This system intends to minimize polluting by returning a small amount of cash back to the individual who returns the empty container. Retailers of the containers are held responsible for the suitable recycling of the container. In the UK, only 43% of plastic bottles sold is recycled (Carrington, 2018). In Germany, this deposit return system improved recycling rates to 98, 5% and in Sweden to 80% (Simon, 2010).

On the 28th of August 2017, the Eyewitness News (EWN, August 2017) reported that Kenya would be joining more than forty other countries that have banned, taxed or partly banned single-use plastic bags. Any Kenyan individual or business that will keep on using, selling or producing plastic bags, risks imprisonment of up to four years, or fines up to \$40 000, will be applied.

These examples include only a few of the recycling activities implemented in other countries that could also be practiced in SA.

The aim of the study was to assess the level of participation in recycling activities, the use or absence of a solid waste recycling system as well as the willingness to implement a recycling plan of the participating eateries and bars in Bloemfontein. By understanding the barriers preventing businesses from recycling, the municipality or government may be more inclined to assist. Purposive sampling technique was utilized to include participants from various types of food and drink services such as sit-down restaurants (chain stores and independent stores), take-away restaurants, coffee shops, bars and combinations of these.

## **METHODOLOGY**

A purposive sampling technique was applied, and a total of 57 eateries and bars were identified to participate. These included sit-down and take-away restaurants, bars and coffee-shops in Bloemfontein.

Data was collected by means of a questionnaire containing 82 questions and statements. An 88 percent return rate was achieved, with a total of 50 completed questionnaires received back.

Likert-scale questions were included, based on a scale of strongly disagree to strongly agree, while others included scales of never to always. Sections of questions were included to determine (1) the participant's knowledge of recycling, (2) daily actions, habits, and willingness regarding recycling, (3) information regarding the establishment's use of disposable, recyclable materials, and the (4) municipality's involvement and basic services. The owners or employees of eateries and bars completed the self-administered questionnaire.

## **RESULTS**

The following data was extracted from the responses. A list of items was stated and the participants had to indicate the use of these items in their establishment (figure 1). This question was included to determine the composition of the solid waste of the restaurant. It was found during the pilot study that

most participants are unable to describe the composition of their establishment's waste, which is a critical question to ascertain whether recycling would be a viable option for their solid waste.

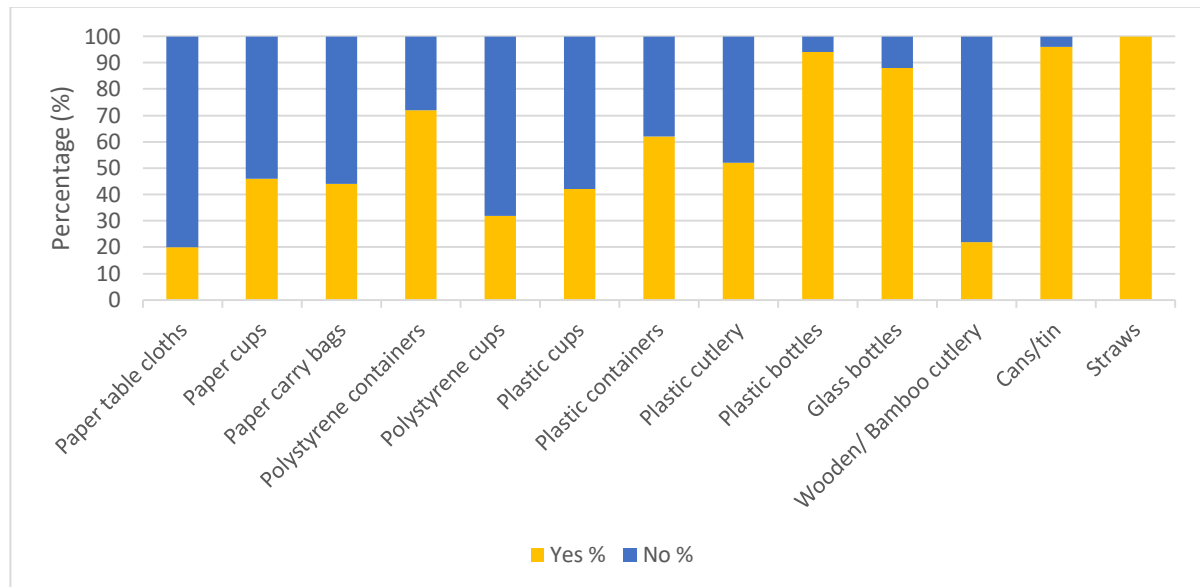


Figure 1: Items used by the eateries and bars.

The use of straws has recently been eliminated by many eateries in SA. It cannot be recycled and could be viewed as unnecessary, therefore being reduced for sustainable practices (Averda[A], 2018). As illustrated in figure 1, all the participants indicated that they use straws, which could lead to the conclusion that they are either unaware or uninformed about sustainable practices or do not care to participate in sustainable practices. A very small amount of participants uses paper tablecloths, which should not be recycled but rather added to compost. When paper has been soiled with food (paper plates, tablecloths, napkins), the fibres cannot be separated anymore (McNatt, 2016). However, many of these items can be recycled, such as recyclable paper cups and bags, plastic cups, containers, cutlery and bottles, wooden/bamboo cutlery and glass bottles. Takeaway coffee cups were always a problem regarding the recyclability because of the plastic lining inside. An estimated 500 billion coffee cups are produced annually, and each cup breaks down and decomposes in about 50 years. Fortunately, new recycling technology made it possible to recycle coffee cups together with milk cartons as well as juice boxes (Averda[B], 2018).

Some statements were included to establish the participant's level of knowledge about recycling. Some of these statements and the participant's answers are illustrated in figure 2. Most of the participants showed basic knowledge about recycling. According to Barr (2007), recycling can be characterized as fundamentally normative behaviour, relying on access to facilities, awareness of these facilities, and perceptions of convenience. He also states that knowledge is important, but the effect of abstract knowledge is weak as opposed to policy and concrete knowledge, which is more significant. Recycling experience has little effect on recycling behaviour, but it appears to have an impact on their willingness to reduce and reuse waste supporting a snowball effect (Barr, 2007).

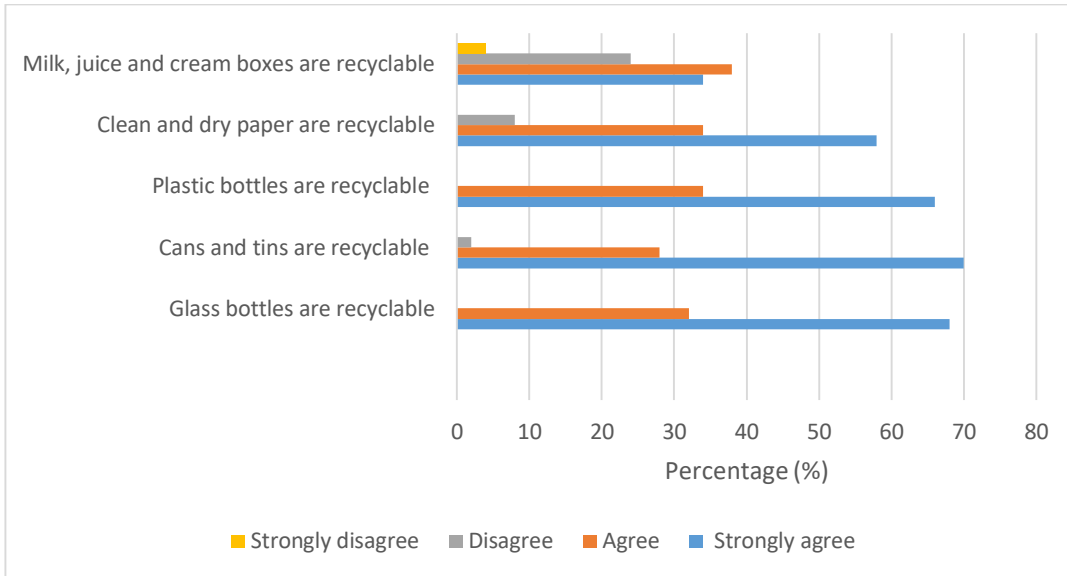


Figure 2: Statements included in the questionnaire to determine level of knowledge about recycling

The results on the involvement in recycling or sustainable practices indicated that only 32% of the participants were recycling. It was also visible that the participants were not completely sure if Tetra pak boxes are recyclable or not.

The participants involved in recycling indicated that the kitchen and cleaning staff were responsible for sorting the recyclables, while the customers are rarely or never responsible (figure 3). If there are bins provided, customers could easily participate in recycling. It should not only be the duty of the staff but everybody's responsibility to recycle more efficiently. People who have better access to recycling equipment or services, tend to recycle more. It can thus be concluded that people with access to recycling facilities or bins will be more encouraged to recycle (Barr, 2007).

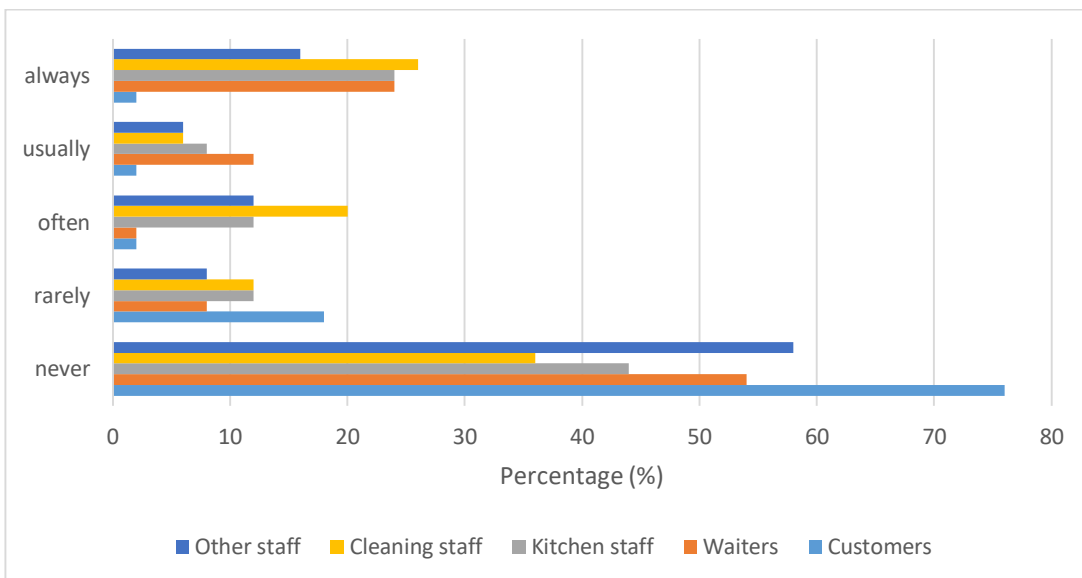


Figure 3: People participating in the sorting of recyclables.

Furthermore, 84% had no knowledge of collection services or buy-back centres in their vicinity. They also had to indicate which methods they use to promote recycling in their establishment. Less than 14% of the eateries and bars that participate in recycling make an effort to promote recycling.

The participants indicated that they would be willing to implement recycling activities if there would be a financial benefit. The enforcement of recycling by municipalities or government by awarding fines for waste offenders was indicated as a significant motive. Some municipalities in Gauteng have penalties from R50 for littering in public and up to R10 000 or 3 years of imprisonment for more serious waste related offences. If these penalties are purposefully enforced, it could be a very strong motive to obey the law and handle waste properly (CoJ, 2013).

It has been found that personal benefits from recycling and sorting waste are psychological. People gain higher thinking about themselves for being responsible and contributing to a better environment. People feel that they want to do what others do, while others just want to obey the law (Berglund, 2006).

## CONCLUSION

It could be concluded that the most significant barrier is knowledge and lack of information. These businesses do not comprehend the impact that they can have with their recycling contributions, not only on the environment but also on the consumers that they serve. Currently, there is no source of motivation to persuade the eateries and bars to recycle. Consequently, it seems that there is also no effort to reduce the number of items they use that contribute to the solid waste going to landfills.

One of the main challenges will be the implementation of the necessary by-laws and policies in Central South Africa. Mangaung's Integrated Waste Management Plan has the right guidelines, strategies, and principals. Unfortunately, none of them are effectively implemented. Law enforcement could be a solution.

It is clear that there is a need for recycling in Central South Africa. Private institutions and local municipalities should make a joint effort in order to get a successful operation running. Provincial governments should include suitable and practical by-laws for the municipalities.

An exciting prospect, which would simplify the management of restaurants and bars, is to use biodegradable and compostable cutlery, dishes, cups and tablecloths, which can be disposed of together with food scraps. The mixed waste could be collected as a whole and recycled by means of organic recovery and composting.

It is recommended that further research be conducted on the collection services and buy-back centres that exist in Bloemfontein, which would form part of the next phase of this research project.

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## Chapter 3: Assessment of barriers preventing recycling practices among bars and eateries in Central South Africa.

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### ASSESSMENT OF BARRIERS PREVENTING RECYCLING PRACTICES AMONG BARS AND EATERIES IN CENTRAL SOUTH AFRICA

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#### ABSTRACT

Recycling is an important aspect of a sustainable society and depends largely on the willingness of consumers to participate in this practice. Some regions in South Africa (SA) recycle actively, but nothing yet in the central part of the country. The area selected for this study included Bloemfontein, Welkom, Bethlehem, Clarens, Kroonstad, and Kimberley, which are all located in the central part of SA. Eateries and bars are businesses that generate a large amount of recyclable solid waste in terms of glass, plastic, paper, polystyrene, metal, and compostables. By identifying the barriers preventing these businesses from recycling, the local municipalities and recycling services could create a solution. Owners or employees of eateries and bars completed a self-administered questionnaire. Empirical data were obtained on knowledge of recycling, participation in recycling. Likert scale type questions were used to identify barriers that prevent recycling practices, also to determine motives that could encourage the implementation of recycling programs. The respondents indicated a willingness to recycle if there is a financial benefit, as well as support offered by the municipality or government. Barriers that prevent recycling practices included implementation effort and cost, as well as lack of knowledge thereof. Only a small number of respondents were aware of buy-back centres or collection services. These results indicate that these businesses do not grasp the impact that they can have with their recycling contributions and that the giveback would be worth the effort. They are also unaware of the services available to assist with implementation and practices of a recycling plan. The municipality and government would have to get involved by enforcing businesses to comply with recycling laws that should be implemented.

*Keywords: eateries, recycling, sustainable practices, solid waste.*

#### INTRODUCTION

SA implemented the National Environmental Management: Waste Act (Act 59 of 2008), which requires standard information of waste as an indication for policy decisions and measure implementation. The Waste Act states that - the minister must implement a national waste management strategy - declare priority waste streams, - prescribe measure regarding management of waste streams, - set recycling targets for waste streams, - set waste minimization targets for waste streams and - ban some waste streams completely from landfills. However, in 2011, 98 million tons of waste ended up in landfills. It consisted of roughly 59 million tons of general waste, 48 million tones uncategorized waste and 1 million tons of hazardous waste. In 2011, approximately 10% of the waste generated in SA was recycled [1].

#### RECYCLING IN SOUTH AFRICA

The government in SA is either unwilling or incapable to legalize waste related legislation [2]. Most (59.7%) of the municipalities in SA could not, under the legislation, successfully accomplish their waste management operations because of inadequate equipment, staff, and small budgets. Education,

knowledge and basic skills are important amongst workers, technicians, and professionals in the waste management and environmental sustainability fields. Research showed that when waste workers maintain a higher status and education, the public would be more accountable towards them; this can cause a chain reaction, which can result in cleaner cities [3].

Ringwood stated that 10% of waste is recycled, and 90% ends up in landfills. Should separation at source be implemented, it will not only minimize the large amounts of waste going to landfills but also unlock the economic potential of this waste stream [4]. Solid waste that is managed wrong can have several direct and indirect effects on the environment [5].

Recycling serves many functions, for instance (1) reducing the amount of waste going to landfills, (2) preservation of precious resources, (3) saving energy and (4) reducing the carbon footprint [6]. Garforth and Venter [7] divide recycling into two parts, internal and external recycling. Internal recycling refers to reusing waste products created by a manufacturing process. For instance, reusing the peels of fruit to compost from a factory that produces jam or fruit juice. External recycling refers to reusing some or most parts of a product that has already been used and discarded. For example recycling glass bottles and containers, plastic bottles, newspaper and soda cans.

In SA, consumers are not aware of the procedures regarding the proper disposing of packaging for recycling. For example, clean recyclables are easier to handle and process, therefore, recyclables collected from the kerbside need to be cleaned first [8].

The recycling process begins when recyclables are separated from the waste. Recyclables refer to products that can be recycled. This separation can occur in multiple ways. These methods include single-stream recycling, dual-stream recycling and source separation recycling [9].

Individuals that are open to change, altruistic and feel closer to nature, are more likely to be pro-environmental. Behavioural context, individual characteristics, and individual knowledge and experience are factors that influence waste management behaviour. That being said, people who have better access to recycling, tend to recycle more. People with stronger values and knowledge, as well as awareness of the waste problem, are more likely to reduce waste. People who find reusing behaviour convenient are people that have storage space.

Recycling can be characterized as fundamentally normative behaviour, relying on access to facilities, awareness of these facilities, and perceptions of convenience. Thus access to recycling facilities has a large impact on recycling. However, it has a negative effect on the intentions to reduce and reuse more waste. Knowledge is important, but the effect of abstract knowledge is weak as opposed to policy and concrete knowledge, which is more significant. Recycling experience has little effect on recycling behaviour, but it appears to have an impact on their willingness to reduce and reuse waste, creating a snowball effect [10].

The National Waste Management Strategy (NWMS), created by the Department of Environmental Affairs posed some challenges faced in SA:

- There is no infrastructure in SA that requires separation or diversion of waste from landfills to buy-back centers and recycling plants.
- The existing waste management infrastructure is outdated.

- Because of a growing population and economy, increasing amounts of waste is being generated; this increases the pressure on limited waste management facilities.
- Waste management and the expenses regarding it are not valued by the industry or consumers, which resulted in the disposal of waste as the easy option.
- Waste treatment options are more expensive than landfill costs.
- Legal landfills and hazardous waste facilities are scares.
- Waste systems became more complex because of urbanization and industrialization.
- Unfinished and insufficient waste services for informal and rural areas caused unpleasant living circumstances.
- Submission of waste data is not obligatory, as a result, there is limited understanding of national waste flows.
- Waste management is not supported by the regulatory environment [11].

The Waste Act provides waste management measures in order to help achieve waste management goals and overcome challenges:

- Waste classification and management system provide organizing and evaluation levels for waste disposal.
- Norms and standards provide clear standards for waste management in different stages.
- Licensing required for activities that need to be done according to guidelines and conditions.
- Industry waste management plans to help companies manage their waste.
- Extended producer responsibility (EPR) by industries are responsible for certain product after-sales and the after-care. These products could have toxic elements or pose management challenges.
- Priority wastes require special waste management measures to ensure that there is no risk toward human health, safety, and the environment.
- Economic instruments support or prevent certain behaviour and arguments other regulatory instruments.

The National Waste Management Strategy is institutional inclusive because achievement relies on the public sector, private sector, and civil society. To implement the Waste Act successfully, all of the below has a responsibility [11].

The government must outline standards, regulations, legislation and integrated waste management plans. Waste management must be regulated by means of licenses enforcement of their conditions. The South African Waste Information System (SAWIS) must be implemented. Waste management officers must coordinate waste management activities. Proper import and export controls must be ensured, and effect to multilateral agreements must be given. There have to be plans developed for future needs as the expansion of cities and towns arise, while in the meantime expand access to basic levels of waste services. The establishment of a national recycling infrastructure must be facilitated. Framework for the remediation of contaminated land must be provided. Lastly, the government must form a partnership with the civil society and the private sector.

The private sector should take the EPR very seriously, take responsibility for their products' life cycle. The generation of waste should be reduced and cleaner technology practices established. Systems, facilities, and operations should be launched to take back recyclable waste at the end of the lifecycle, to close the loop. Waste management technologies must be developed to manage all the waste

produced in the country according to the hierarchy. Waste management plans must be prepared and implemented. Comply with licensing conditions and regulations set by the government.

The civil society should separate waste at source. Take part in waste awareness movements, as well as recycling initiatives. Comply with waste regulations. Restaurants could fall under both categories, the private sector, and civil society.

#### RESTAURANTS AND RECYCLING

Amongst others, restaurants generate large quantities of solid waste made up of paper, plastic, glass, cans and tins, food waste, etc. A waste audit allows restaurants to perceive the waste they produce; this is the first step towards reducing the amounts of waste they generate.

Food industries are capable of reducing input and disposal costs by implementing structured practices. This practice should be to rethink, then to reduce, then to reuse and lastly, to recycle [12].

Despite various acts, measurements, declarations, policies, strategies and action plans developed and approved in South Africa over the last two decades, the recycling figure stands still at 10 %. Other countries that are more efficient include Switzerland 52 %, Austria 49.7 %, Germany 48 %, The Netherlands 46 %, Norway 40 %, Sweden 34 % and the United States 31.5 % [13].

Eateries and bars could follow the next steps to implement a successful recycling program;

1. Start by writing a policy statement to show that the company is committed to recycling. In the policy, specific goals must be set which is measurable. For example, the restaurant must reduce 20 % of the actual garbage thrown away. Goals like this must then be communicated and explained to all employees. For a small business, a recycling coordinator can be appointed to manage a recycling program. Bigger businesses can appoint a recycling team with members from all the different departments to develop a recycling program.
2. A waste audit must be performed to determine the amounts and type of waste is generated. This will help to decide how many collection containers will be needed, and how often the waste must be collected. After the recycling program is implemented and managed, a second waste audit must be performed to see if the program is, in fact, working and reducing the amounts of waste generated.
3. With knowledge gained from the first two steps, the third step is then to reduce and reuse. The generation of unnecessary waste must then be prevented by reusing what is possible and reducing the consumption of resources.
4. Identify materials that are recyclable based on the waste audit. Glass, paper, plastic, metals, and oil are the most recycled materials. These materials can all be placed in different identifiable bins for each material. This will make it easy for employees and even clients or customers to spot and recycle.

5. Contact a recycling facility. There are recycling facilities that are willing to do weekly collections of recyclables, and they are even willing to pay you instead of the business having to pay them.
6. Buy recycled products. By purchasing recycled products, a demand is created, which is good for the economy.
7. The success of a recycling program can rely on the education and promotion of recycling. Employees and customers must inform and educate [14].

“The Constitution of South Africa, (1996) provides the foundation for environmental regulation and policy in South Africa. The right to environmental protection and to live in an environment that is not harmful to health or well-being is set out in the Bill of Rights (section 24 of Chapter 2)”.

This vital right supports the environmental policy and law, more specific the framework environmental legislation established by the National Environmental Management Act, (Act No. 107,1998):(NEMA). The Waste Act essentially reforms the law regulating waste management, resulting in a coherent and integrated legislative framework addressing the steps in the waste management hierarchy.

The waste management hierarchy consists of options for waste management during the lifecycle of waste, arranged in descending order of priority. In order, it starts with waste avoidance, reduction, reuse, recycling, recovery, treatment, and finally ends with safe disposal [11].

#### METHODOLOGY

A purposive sampling technique was applied, and a total of 114 eateries and bars were identified to participate. These included sit-down and takeaway restaurants, bars and coffee-shops in Bloemfontein, Kimberly, Bethlehem, Clarens, Welkom, and Kroonstad.

Empirical data were collected by means of a questionnaire containing 82 questions and statements. Likert-scale questions were included, based on a scale of strongly disagree to strongly agree, while others included scales of never to always. Sections of questions were included in determining (1) the participant’s knowledge of recycling, (2) daily actions, habits, willingness and motivation regarding recycling, (3) information regarding the establishment’s use of disposable, recyclable materials, and the (4) municipality’s involvement and basic services.

#### RESULTS

The following data was extracted from the completed questionnaires. On a scale from strongly agree to strongly disagree, participants were asked about recycling and saving money, the implementation of recycling and the support of the government towards recycling (Fig. 1). These questions were included to ascertain the participant’s knowledge of recycling and also, a willingness to recycle.

It was found that more than 70 % of the participants agreed that they could save money by recycling. Furthermore, 70 % of the participants also agreed that recycling is a process that is difficult to implement. Recycling can be characterized as fundamentally normative behaviour, relying on access to facilities, awareness of these facilities, and perceptions of convenience [10]. As soon as people

perceive recycling as effective and operational, the more likely they are to contribute or to fully participate [15].

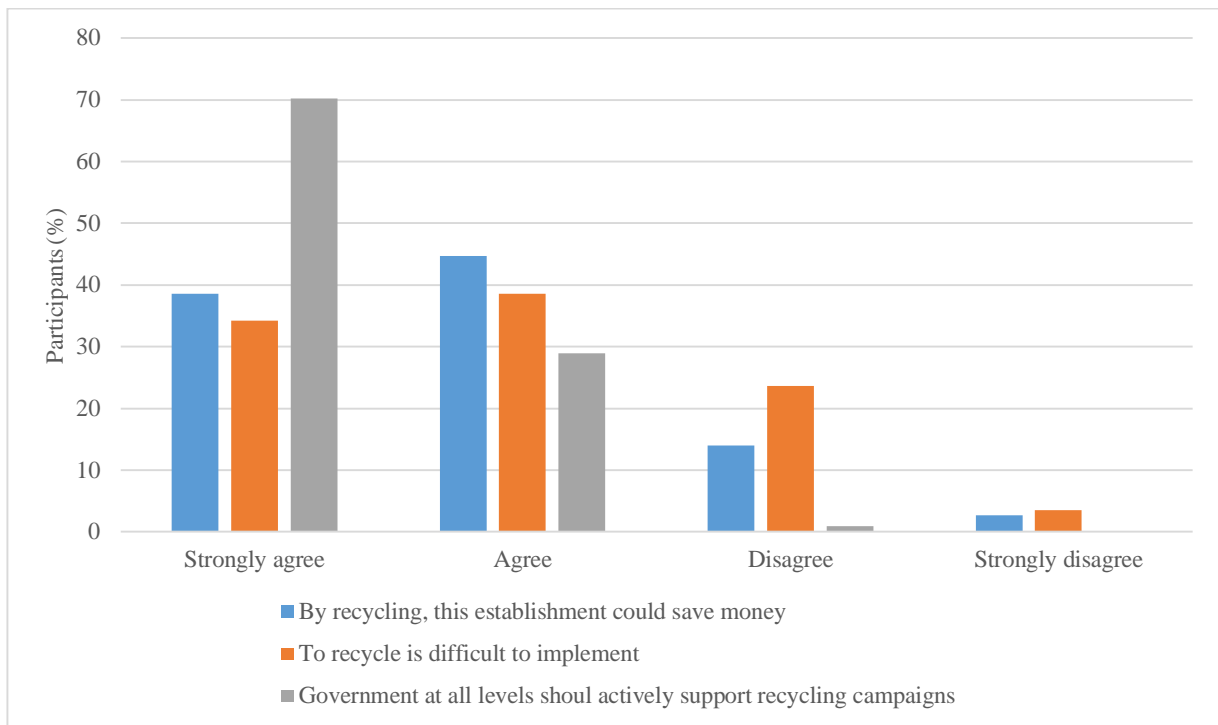


Figure 1: Level of agreement of participants to possible barriers.

People are always looking for convenience. According to Wagner [23], there are five factors that can determine convenience: (1) knowledge requirement, an individual's knowledge on what and who to recycle; (2) proximity to collection points, distance to travel in order to drop off recyclables; (3) one's opportunity to drop off materials, regular business hours might not work for most individuals; (4) accessibility of collection points, participation will increase when individuals combine their recycling trip to a drop off point with a more desirable activity; and (5) the ease of the process.

In the end, collection systems are usually referred to as more convenient than drop-off systems.

Almost 100% of the participants agreed that the government should support recycling at all levels (Fig. 1). In the UK, the government intervened not only with regards to legislation and waste strategy but also with financial support and the formation of the Waste and Resources Action Program (WRAP), which developed markets for recycling materials that would have gone to landfills. The government also provided support for smaller local municipalities to develop working recycling infrastructures and programs. The result was that recycling participation increased dramatically [18]. People generally know that it is necessary to recycle and they mostly agree that the government should support recycling. It is just the matter of getting systems and program in place.

For non-recyclers, it is normal to discard of all waste in a single bin, in order for this behaviour to change, information on what and how to recycle have to be supplied, as well as providing support to

make the change easier and make recycling systems accessible. To inspire non-recyclers to begin recycling every day, interventions are needed to address different issues like knowledge and understanding of recycling, and service provisioning [19].

Table 1: The level of agreement of participants with statements containing possible barriers to recycling practices.

Statements	Strongly agree	Agree	Disagree	Strongly disagree
It is time-consuming to sort through the waste	35	46	16	3
Staff is willing to sort through waste	16	46	32	6
Customers will sort through waste if there are clearly marked bins	14	25	49	11
Lack of information is an obstacle	46	43	8	3
Lack of storage is an obstacle	55	33	10	2
Lack of recycling institutions is an obstacle	51	37	9	4
The cost of setting up a recycling program is an obstacle	39	40	18	3
The cost of buying reusable items is an obstacle	37	32	26	4
The cost of maintaining reusable items is an obstacle	36	40	23	1

The participants indicated (Table 1) that they consider it time-consuming to sort waste; they also indicated that it is more the staff's duty to recycle and that customers would not help to sort the recyclables. If there are bins provided, customers could participate in the recycling, especially at fast-food restaurants where your food is served in a cardboard box or polystyrene container. It should not only be the duty of the staff but everybody's responsibility to recycle more efficiently. People with access to recycling equipment or services, tend to recycle more. It can be concluded that people with access to recycling facilities or bins in restaurants would be more encouraged to recycle [10].

More than 80 % of participants agreed that it is time-consuming to sort through the waste. This could be true because they might not be equipped with the necessary bins and a functioning recycling program. According to FSG property services [21], recycling is overlooked as it is time-consuming to sort and cannot be dumped with the regular waste. This makes recycling less appealing to businesses, as they do not want to sort through the different recyclables or the inclination to deal with the multiple companies needed for removing different the types of waste.

The willingness of staff to sort the waste could rely mostly on easy access to recycle bins and strict rules and regulations. Easily accessible bins in dining areas can also motivate customers to sort through their recyclables in store. In addition, storage space for the recyclables is a hindrance as most restaurant and eateries use their space to receive and dine guests. It has been noted by Vassanadumrongdee & Kittipongvises [20] that inconvenience can be associated with (1)lack of storage space, excessive time requirements, or possible risks associated with recycling; and (2)it requires bringing recyclables to a drop-off point. The desire for comfort and convenience are motivators for recycling behaviour.

Research has indicated that the first important factor was the convenience of the waste-collection system. Consumers with access to a kerbside collection system are likely to sort more of their recyclables than consumers without a similar system. Another important factor was that better communication and additional information could improve the sorting of recyclables [20]. Almost 90 % of all participants agreed that the lack of knowledge or information of what and how to recycle is an obstacle. Thomas and Sharp [19] stated that the provisioning of services and basic knowledge of how to recycle equally play a significant role in the recycling habits of people.

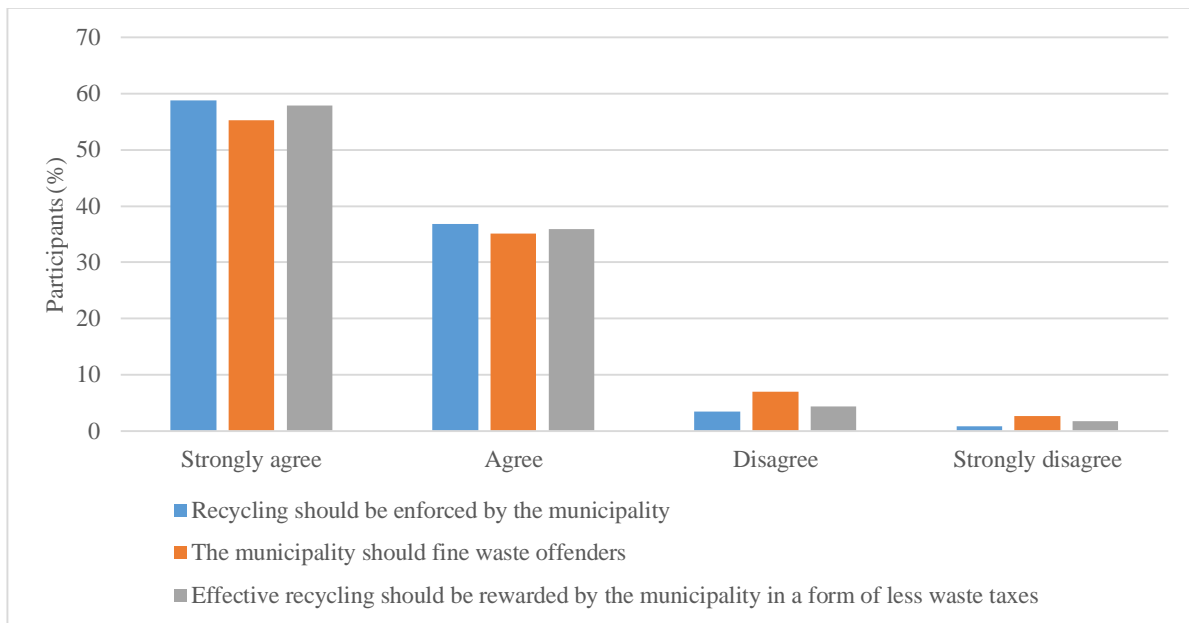


Figure 2: Level of agreement of participants to possible motivators.

Most participants agreed that they would be willing to implement recycling practices if there would be a financial gain (Fig. 2). The enforcement of recycling by municipalities or government by awarding fines for waste offenders was also indicated as a significant motive. According to research reward highly affects attitude towards recycling habits. An increase in reward can increase attitude towards recycling by 41.4 %. By providing rewards, it would positively change their social beliefs and form a positive attitude towards recycling. This also indicates that respondents have a positive perception of reward as an economic instrument [16],[17]. Shaw and Maynard [16] investigated the potential of financial incentives to enhance householders' kerbside recycling behaviour in London. They found that respondents have a positive attitude towards a reward for increasing recycling behaviour in communities. In both studies, it is apparent that reward, most likely financial, can increase recycling. Amini, Ahmad, and Ambalis [17] also stated that an increase in penalties affects perceived behavioural control, an increase in penalty lead to the decreased perception of difficulties and impossibility of recycling by 34 %.

## CONCLUSION

The data extracted from the completed questionnaires were clear on various barriers and motivators in regard to recycling. Businesses do not grasp the impact that they can have with their recycling contributions. At present, there is no motivation to persuade the eateries and bars to recycle. There

is no effort to reduce and recycle, although they agree with the fact that recycling should be pursued. There also do not seem to be enough information available to educate these owners and managers to be aware of the consequences of the actions by not implementing sustainable practices.

South Africa's Waste Act and Integrated Waste Management Plan have the right guidelines, strategies, and principals. Unfortunately, none of these is implemented successfully. Law enforcement could be a solution, as these consumers will only participate in recycling if they are motivated or forced.

Municipalities could also consider turning the waste management and recycling systems completely over to the private sector. In return, people in the private sector should realize that waste management is a profitable business and should encourage the public, businesses, and household to recycle and separate at the source.

The need for recycling in Central South Africa is crucial as it is stated more than once that only 10% of SA's waste is recycled. Private recycling institutions, local municipalities, and eateries and bars should make a joint effort in order to get a successful operation running.

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## **Chapter 4: Discussion of Statistical Analyses**

The empirical data gathered by the questionnaires were extracted with the Evasys© system in the form of descriptive statistics, namely frequencies and percentages. Data from all the towns consisted of a total of 114 completed questionnaires from Bloemfontein (50), Betlehem (10), Clarens (14), Kimberly (17), Kroonstad (5) and Welkom (18). The Statistics Department, University of the Free State executed further analysis on the data to reveal significance.

### **4.1 Methods**

#### **4.1.1 Reliability and validity**

Validity is the ability of a tool or instrument to measure that which it is supposed to measure. The measurement is not considered valid if the instrument repeatedly measures a characteristic in the same person or group higher or lower than it actually is (Monsen & van Horn, 2008). Validity was guaranteed by researching evidence-based literature concerning recycling practices, and including these in the questionnaire.

Reliability is the degree of correlation between sets of data when the measurement is done more than once on the same study participant or group, by the same or a different observer (Monsen & van Horn, 2008). To ensure reliability in this study, the researcher used the same, standardised questionnaire to obtain information from respondents. Structured interviews with owners of buy-back centres were all conducted by the researcher.

Because of response bias, it is a possibility that some questionnaire results could be due to a systematic response bias instead of the assumed effect. This bias can have a weighty effect on research using questionnaires or surveys.

Environmental desirability responding (EDR) is similar to the construct of 'social desirability' (Paulhus, 1991), individuals have a common tendency to respond to items on a questionnaire or survey in a way they believe to be more socially desirable or acceptable, regardless of their true approach or beliefs regarding the issue (Kaiser, 1998). EDR suggest that individuals may possibly respond to questions designed to

measure attitudes about a subject in a way that reflects a perception of social correctness, or it suggests that the individual will be giving the 'right answer', instead of their true perceptions and beliefs.

#### **4.1.1.1 Congeneric reliability**

The objective is to determine to what extent specific sets of questions measure the same thing. Factor analysis was used to find an underlying factor explaining the responses to a group of questions as a whole. The measures calculated here are related to the famous Cronbach's  $\alpha$ , but considered more accurate (Woodruff and Wu, 2012).

#### **4.1.2 Chi-square test**

The statistic evaluations were executed using the Chi-squared test. Chi-square test is one of the most important nonparametric tests that is used to compare more than two variables for a randomly selected data (Chegg, 2019).

The assumption is made that the expected number of responses in every category (agree, neutral, etc.) is the same for a single question. The next step is to calculate the probability of seeing differences in the categories as large or larger than what is observed under the assumption. If this probability is less than 0.05 it is concluded that there is evidence of grouping or consensus (Chegg, 2019).

According to the test results, the questionnaires was purposefully and consequently answered and not by chance. The Chi-squared test was done for questions: 2.14 – 2.18; 3.1 – 3.9; 4.1 – 4.13; 4.15 – 4.17; 5.1 – 5.9; 6.1 – 6.3; 7.1 – 7.7 because they are Likert scale questions.

#### **4.1.3 Binomial test**

The most common use of the binomial test is when the outcome is two categories are likely to occur, like tossing a coin. An exact is required of two categories (Howell, 2007). The binomial test is simplest of all statistical tests as there is only one parameter in this test and it is quite easy to understand distribution. The binomial test

is defined as a precise test for the statistical significance, which measures the deviations from the estimated distribution of observations when they are in the form of two categories (TutorVista, 2019).

Binomial tests were done on questions: 2.1 – 2.13; 3.12, 3.13, 3.15, 3.17, 3.18.

## **4.2 Results and discussion of statistical analyses**

Plastic, glass, paper, tin and polystyrene are four commonly used materials in restaurants, bar and eateries, either as drink container, food container or take-away containers. These materials are recyclable if used and disposed of correctly.

The data illustrated in Table 4.2.1 indicates that plastic bottles (95%), cans (96%) and plastic straws are used predominantly. The plastic bottles and cans contribute to recyclable waste, while plastic straws are not recyclable.

Of the eight million tons of plastic that make its way through streams and rivers to the ocean each year, 0.025% is plastic straws. Plastic straws is a single-use plastic. The banning of plastic straws became a hot topic for various reasons. It is non-recyclable, it is harmful to marine life and it is an object that most normal and healthy people can avoid (Gibbens, 2019).

It was also indicated that most (85%) of the establishments use glass bottles every day. The Glass Recycling Company (TGRC) promotes glass recycling in South Africa, any company, business or school can apply for a glass bank if there is not one in your vicinity. Unfortunately, the only glass banks located in the Free State is in Welkom. None in Bloemfontein, Kroonstad, Kimberly, Beth~~l~~lehem or Clarens (TGRC, 2017).

Glass makes up 4.5% of all the waste generated in South Africa. Glass can be recycled infinitely without harming the quality. More than three million tonnes of glass is used in South Africa per annum. Twothirds of the glass used can be reused or recycled. By recycling glass effectively, energy, water and natural resources can be saved. Greenhouse gas emissions can be lowered, as well as landfill space minimized. Returnable glass bottles can be used and refilled up to thirty times before it needs to be recycled. Recycled glass melts at a lower temperature, and in this manner, energy requirement is reduced and the carbon footprint regarding glass shrink (Consol, 2019).

The establishments do not use plastic cups, paper cups and paper carry bags significantly. As a variety of eateries and bars participated, most take-away containers in beverage form is metal and glass, therefore plastic and paper cups are not used as often. In sit-down restaurants and bars, reusable glasses, cups and mugs are used most likely. Half (54%) of the respondents admitted to using paper cups and the others (46%) to using plastic cups. Manufacturers and companies promote that paper cups are recyclable, however, because of the complicated manner they are produced, it is quite difficult to break it down for recycling. Thus vast amounts of paper cups never get recycled, in fact less than 1% of coffee cups end up being recycled (Gabbatiss, 2018).

Disposable paper cups are lined with plastic in order to contain liquid. Recycling of these paper cups are more complicated because the paper part of the paper cup gets contaminated with the liquid. Because of this, recycling must take place in specialized recycling facilities. Furthermore, paper cups are made of virgin paper pulp. It is clear that paper cups can be regarded as a single-use item and has a noticeable impact on the environment. Plastic that end up in landfills, like plastic cups, takes hundreds of years to break down if it is not recycled properly. It breaks down into micro-plastic which is harmful to the environment in all forms (Gabbatiss, 2018).

The data (Table 4.2.1) also indicated that many (48%) of respondents is using paper carry bags. Paper carry bags are recyclable, but mostly end up contaminated by food or liquid which deems it hard to recycle. It is a common believe that paper carry bags are more environmentally friendly, yes they can be recycled, but plastic shopping bags can be used more than once or twice while the reusing of paper bags is more challenging because they tear easily. The manufacturing of paper bags uses more natural resources than plastic bags. In the end, both end up in landfill when they are not recycled (All About Bags, 2012).

**Table 4.2.1: The use of the recyclable and non-recyclable waste in the establishments.**

<b>Q. Nr</b>	<b>Which of the following items is used in this establishment:</b>	<b>Percentage of establishments that use the item (%)</b>	<b>P-value</b>	<b>Significance</b>
2.1	Paper table cloths	19	0	Significant
2.2	Paper cups	54	0,452	Not significant
2.3	Paper carry bags	48	0,779	Not significant
2.4	Polystyrene containers	72	0	Significant
2.5	Polystyrene cups	27	0	Significant
2.6	Plastic cups	46	0,509	Not significant
2.7	Plastic containers	75	0	Significant
2.8	Plastic Cutlery	70	0	Significant
2.9	Plastic bottles (e.g. water, soft drinks, milk)	95	0	Significant
2.10	Glass bottles (e.g. beer, cider, soft drinks)	85	0	Significant
2.11	Wooden/Bamboo cutlery	18	0	Significant
2.12	Cans (e.g. beer, soft drinks, food tins)	96	0	Significant
2.13	Plastic straws	99	0	Significant

(The significance level chosen is  $p < 0.05$  to indicate significance.)

The knowledge of the respondents regarding recycling were evaluated in the statements illustrated in Table 4.2.2. The results indicate that the respondents have basic knowledge regarding recycling. However, many (44%) were uncertain if reusing plastic bottles is dangerous. Desa *et al.* (2011) found in a study regarding the knowledge, attitudes, awareness status and behaviour concerning the management of solid waste, that the participant's knowledge tested positive regarding recycling but their attitudes regarding recycling negative.

Most (77%) of the respondents agreed that milk, juice and cream bottles are recyclable, while ninety-three percent indicated that clean, dry paper is recyclable. Du Plessis (2018) did a similar study regarding knowledge and attitudes regarding recycling, and found that people are aware of the importance of recycling even though they do not participate in actual recycling. Most (86%) of the respondents also agreed that their establishment could generate an income by recycling, and seventy-eight percent agreed that they could save money by recycling (Table 4.2.2). However, only 35% of the respondents indicated that they recycle.

Sidique *et al.* (2010) indicate that education is an important element of recycling and an individual's actions and attitudes, however, Azizan & Suki (2013) reported that respondents are not familiar with the labelling on products. They suggest that there is a need to improve eco-labelling awareness so that consumers can have a better perception of the product and what to do with the packaging after the contents have been used.

**Table 4.2.2: Questions related to general knowledge of recycling.**

<b>Q nr.</b>	<b>Question</b>	<b>Percentage of respondents that agreed (%)</b>	<b>P-value Positive</b>	<b>Significant Positive</b>	<b>P-value Average</b>	<b>Significant Average</b>
3.1	Recycling is the process of converting waste materials into new materials and objects.	100	0	Significant	0	Significant
3.2	Glass bottles are recyclable.	99	0	Significant	0	Significant
3.3	Cans and tins are recyclable.	99	0	Significant	0	Significant
3.4	Plastic bottles are recyclable.	99	0	Significant	0	Significant
3.5	Clean and dry paper is recyclable.	93	0	Significant	0	Significant
3.6	Milk, juice and cream boxes are recyclable.	77	0	Significant	0	Significant
3.7	To reuse plastic bottles are dangerous to your health.	44	0,92	Not significant	0,165	Not significant
3.8	Recycling is good for the environment.	100	0	Significant	0	Significant
3.9	By recycling, this establishment could generate an income.	86	0	Significant	0	Significant

(The significance level chosen is  $p < 0.05$  to indicate significance.)

**Table 4.2.3: Recycling practices in the eateries and bars.**

Q. Nr.	Question	Percentage of respondents that agreed (%)	P-value Average	Significance
3.12	Do this establishment use a recycling program?	35	0,007	Significant
3.13	Would this establishment consider implementing a recycling waste plan?	60	0,061	Not significant
3.15	Does this establishment use a recycling company?	36	0,007	Significant
3.17	Should the waste be sorted for the recycling company?	61	0,072	Not significant
3.18	Are you aware of any institutions that buy back recyclables in your immediate area?	20	0	Significant

(The significance level chosen is  $p < 0.05$  to indicate significance.)

Table 4.2.3 illustrate the presence or absence of a recycling program in the eatery or bar. As already mentioned, only 35% of the respondents indicated that they recycle. However, sixty percent of the respondents indicated that they would consider implementing a recycling plan.

It could be argued that it is the same respondents that already have a recycling program running also know about recycling companies. Whereas the remaining respondents would consider recycling program but have no knowledge of recycling companies.

Vasileva & Ivanova (2014) report similar findings, the influence of a limited or undeveloped recycling infrastructure demotivate respondents to recycle. Participation in recycling is hindered by the lack of knowledge on methods and companies that may assist. As well as the lack of understanding why recycling is pertinent.

When asked about the promotion of recycling, by social media, flyers, posters, information on the menu or word of mouth in (Table 4.2.4), the general tendency that emerge, is that most establishments do not promote recycling effectively. On a scale from never, rarely, often, usually and always, it is significant that respondents deliberately chose never. It is clear that the participating eateries and bars do not advertise or promote recycling.

It is significant that these establishments do not expect their customers to participate in recycling at all. Respondents chose never and rarely, which points to the fact that they do not recycle. They do not promote recycling; they do not expect customers or staff to do any sorting of recyclables. Should there be any recycling taking place, it is done outside and not physically on the eatery or bar's premises. We can assume the recycling that takes place is waste pickers that sort through the waste or maybe staff members that are conscious about recycling and the environment.

The NPD Group, a market research company, found that regardless of the restaurant industry's effort to make processes more environmentally friendly, consumers do not necessarily regard their actions as evolving, concerning "going green". To overcome this situation, it is important to make the efforts in the industry more applicable to customers (Chiu & Hsieh, 2016).

Chiu & Hsieh (2016) concluded that better and evolved practices could improve the restaurants' competence and potential. The restaurant could practice greener methods, which could improve their reputation, as well as the customers' perceptions of the establishment. Therefore, green practices i.e. recycling, reducing and reusing is a good way to maintain positioning in the market during times of crisis.

By embracing these measures, for example to advertise that you recycle, informing customers of green practices, encouraging staff as well as customers to recycle and to sort waste in bins provided. A new customer can be attracted to the restaurant that is concerned about the environment or job creation or just a different menu.

Hu et al. (2010) pointed out important topics for a greener restaurant:

Recycling and composting - Start to use recycled products, products that recycle easy and reuse where possible: serviettes, paper towels, office paper, take-out containers, plates, and bowls.

Sustainable food - Sustainable ingredients and local sourcing support long-term maintenance of ecosystems and agriculture for future generations. Organic agriculture avoid the use of toxic synthetic insecticides and composts. Locally grown foods reduce unnecessary transportation.

Pollution prevention - Can be accomplished through reduction of waste generation, reusing where possible or improving existing operational practices.

Recycle - Recycled, biodegradable, and organic products. Recycled products are made from postconsumer or post-industrial waste sources. Biodegradable products are capable of decomposition by means of biological agents, particularly bacteria. No toxic synthetic pesticides and fertilizers are used to grow organic products.

Employee education – The need to train all employees, managers, and owners about green practices as well as informing customers are unquestionable. Topics to cover include landfills, water pollution, air pollution, global warming, and facts to describe the restaurants' impact on the environment.

**Table 4.2.4: Promotion towards recycling, participant's involvement and location of recycling.**

Q. Nr	Question	Percentage of respondents that agreed (%)	P-value Positive	Significant Positive	P-value Average	Significant Average
	Methods used to promote recycling:					
4.1	Social media. (I.e. Facebook, Youtube or Instagram)	84	0	Significant	0	Significant
4.2	Flyers.	95	0	Significant	0	Significant
4.3	Posters.	88	0	Significant	0	Significant
4.4	Information on menu.	90	0	Significant	0	Significant
4.5	Word of mouth.	70	0	Significant	0	Significant
	People participating in recycling:					
4.6	Customers.	93	0	Significant	0	Significant
4.6	Waiters.	61	0	Significant	0	Significant
4.8	Kitchen staff.	58	0	Significant	0,001	Significant
4.9	Cleaning staff.	55	0,001	Significant	0,003	Significant
4.10	Other staff.	69	0	Significant	0	Significant
	Where does recycling take place:					
4.11	In the serving area of the restaurant.	92	0	Significant	0	Significant
4.12	In the restaurant kitchen.	70	0	Significant	0	Significant
4.13	Outside.	51	0,011	Significant	0,049	Significant

(Likert scale consisted of: Never, Rarely, Often, Usually, Always. In this case, the positive percentage was actually a negative answer)

(The significance level chosen is  $p < 0.05$  to indicate significance.)

The results (Table 4.2.5) indicate that most (97%) of the respondents agree that the government must support recycling campaigns at all levels. They are, however, under the impression that recycling is difficult to implement. The assumption could be made that if the government fully supports recycling, and provides the necessary environment for businesses and households to recycle, it would not be difficult to implement recycling. For instance, if there are bins provided on the streets and in public buildings, areas and shopping malls with the proper indications of what to place in each bin, it would be easier for individuals to recycle. The EPR have a significant

**Table 4.2.5: Attitudes and possible correlation between the government, implementation of recycling and financial gain.**

Q. Nr.	Question	Percent age of respondents that agreed (%)	P-value Positive	Significant Positive	P-value Average	Significant Average
4.15	By recycling, this establishment could save money.	78	0	Significant	0	Significant
4.16	To recycle is difficult to implement.	62	0,028	Significant	0,021	Significant
4.17	Government at all levels should actively support recycling campaigns.	97	0	Significant	0	Significant

(The significance level chosen is  $p < 0.05$  to indicate significance.)

role to play regarding the environmentally responsible manufacturing of packaging as well as the correct information on packaging (NWMSISA, 2005). The distribution of more pick-up points for recyclables is another option to make recycling easier. Smaller recycling centres could be outsourced by municipalities to do weekly pick-ups of recyclables at different institutions, businesses or neighbourhoods’.

Regarding the waste sorting in eateries and bars, bins could be provided for different recyclables or single stream recycling could be initiated with more frequent pick-ups. Single stream recycling could lead to job creation, as the recyclables must then be sorted again.

Most of the respondents (78%) are positive that by recycling they could save money. There are services available that will collect recyclables, weigh the different types and pay the company or the amount of recyclable materials collected.

Musema *et al.* (2018) pointed out that some of the recovered recyclable materials in South Africa is exported to China and southeast Asia, however, China instituted a ban on bad quality recyclable materials. The ban led to the drop in prices for recyclables. Most recyclables in South Africa are recovered by the informal sector, small BBC's and waste pickers, which does a remarkable job taking into account the lack of diversion of waste from landfill and separation at source programs. The government and the private sector is presented with an opportunity to collaborate with the private sector to educate on waste and recycling, develop skills and entrepreneurship regarding waste management and recycling. By adding value to the recycled materials collected, prices for the recyclable materials can increase. Small businesses and BBCs don't always have the necessary knowledge or means to bring this about. This is a chance for the private sector and the government to work together in terms of sector-specific training for small businesses and entrepreneurs concerning the waste and recycling sector.

The data illustrated in table 4.2.6, indicate that most (91%) of the respondents agree on the lack of information regarding recycling. Thomas and Sharp (2013) stated that the provisioning of services and basic knowledge of how to recycle, equally play a significant role in the recycling habits of people. Knowledge and information or the lack thereof is a thread that runs through this study as a whole. This is in contrast as the respondents also clearly agree that recycling is good for the environment, but they are still ignorant when it comes to the act of recycling. This is also reflected in questions 5.2 and 5.3. Almost half (42%) of the respondents are not willing to sort through the waste, and most (82%) consider it time-consuming to sort through the waste. According to FSG property services (2018), recycling is considered a time-consuming task because of the need to sort waste not dumped with the regular waste. This discourages businesses, as they do not want to sort through recyclable waste or to deal with the BBC's to remove the different types of waste.

In addition, most (60%) of the respondents agree that customers will not sort the waste even if bins are provided. The motivation behind the willingness of the staff to sort the recyclables could be measured on easy access to recycle bins as well as rules and regulations. Easily accessible and marked bins in dining areas can also motivate customers to sort their recyclables in store. According to Barr (2007), people tend to recycle more efficiently if they have access to recycling equipment or services. Therefore, it could be argued that if people have access to recycling facilities or bins in restaurants would be more encouraged to recycle.

Furthermore, storage space for recyclables is a limitation, as most bars and eateries use most of their space to receive and serve guests, as well as food preparation and food storage. Vassanadumrongdee & Kittipongvises (2018) revealed that inconvenience can be connected to lack of storage space, limited time, or possible risks associated with recycling; and it requires bringing recyclables to a drop-off point.

Comfort and convenience are notable motivators for recycling behaviour. Further research revealed that the one important factor was the convenience of the waste-collection system. Consumers with access to a kerbside collection system are more prone to sort their recyclables than consumers without a similar arrangement. An additional factor was that better communication and information could improve the sorting of recyclables. These results concur with those of Conke (2018), whom identified barriers to waste recycling development in Brazil. Points similar to this study are listed below.

- Lack of return or response for actions regarding the environment, either rewards or fines.
- Shortage of landfills and uncertain locations of drop-off sites.
- Illegal dumping sites.
- Residents' have a distaste towards waste and separating facilities.
- There is a lack of knowledge and management in recycling associations
- No payments for services done concerning the environment.
- Shortage of facilities, pick-up trucks and weighing scales.

- Lack of tax incentives for the recycling industry as well as producers who use recycled materials.
- Payment of outsourced collection companies is unsustainable.
- Waste legislation is non-existent.

All these points listed by Conke about recycling in Brazil connects with the barriers, limitations and problems faced by the respondents in Central South Africa. Both are developing countries. With help from the government and proper legislation steps can be taken to overcome these barriers. Lack of information about recycling remains one of the main barriers. Recycling programs and guidance is needed to inform the uninformed and change their attitudes towards recycling.

**Table 4.2.6: Statements containing possible barriers to recycling practices.**

<b>Q. Nr.</b>	<b>Question</b>	<b>Percentage of respondents that agreed (%)</b>	<b>P-value Positive</b>	<b>Significant Positive</b>	<b>P-value Positive</b>	<b>Significant Average</b>
5.1	It is time consuming to sort through the waste.	82	0	Significant	0	Significant
5.2	Staff is willing to sort and waste.	58	0,055	Not significant	0,023	Significant
5.3	Customers would sort waste if there are clearly marked bins.	37	0,998	Not significant	0,976	Not significant
5.4	Lack of information regarding recycling is an obstacle.	91	0	Significant	0	Significant
5.5	Lack of storage space is an obstacle.	89	0	Significant	0	Significant
5.6	Lack of recycling institutions are an obstacle.	88	0	Significant	0	Significant
5.7	The cost of setting up a recycling program is an obstacle.	80	0	Significant	0	Significant
5.8	The cost of buying reusable items is an obstacle.	69	0	Significant	0	Significant
5.9	The cost of maintaining reusable items is an obstacle.	74	0	Significant	0	Significant

(The significance level chosen is  $p < 0.05$  to indicate significance.)

**Table 4.2.7: Municipal involvement and enforcement of recycling as a possible motivator.**

Q. Nr.	Question	Percent age of respondents that agreed (%)	P-value Positive	Significant Positive	P-value Positive	Significant Average
6.1	Recycling should be enforced by the municipality.	96	0	Significant	0	Significant
6.2	The municipality should fine waste offenders (as they do in the case of, e.g. traffic offenders)?	90	0	Significant	0	Significant
6.3	Effective recycling should be rewarded by the municipality in a form of less waste taxes?	94	0	Significant	0	Significant

(The significance level chosen is  $p < 0.05$  to indicate significance.)

Results in table 4.2.7 showed that most (90%) respondents indicated that the enforcement of recycling by municipalities or government by awarding fines for waste offenders is a significant motive. Most (94%) respondents agreed that they would be willing to implement recycling practices if there would be a financial gain. These findings are supported by Shaw and Maynard (2008), as well as Amini *et al.* (2014). Reward or financial incentives affect attitude towards recycling habits profoundly. Increase in reward can increase attitude towards recycling by 41.4%. The provisioning of rewards would positively change their social beliefs and form a positive attitude towards recycling. This also indicates that respondents have a positive perception of reward as an economic instrument.

Shaw and Maynard (2008) investigated the possibility of financial incentives to improve householders' kerbside recycling behaviour in London. They found that respondents have a positive attitude towards a reward for increasing recycling behaviour in communities. In both studies, it is obvious that reward, most likely financial, can increase recycling. Amini *et al.* (2014) also stated that an increase in fines affects perceived behavioural control, an increase in penalty lead to the decreased perception of complexities and impossibility of recycling by 34%.

**Table 4.2.8: Questions regarding waste collection of the bars and eateries.**

Q. Nr.	Question	Percentage of respondents that agreed (%)	P-value	Significance
6.4	Does this establishment pay for weekly collection of waste by the municipality?	73	0	Significant
6.5	Does this establishment pay a private company to collect waste?	41	0,075	Not significant
6.6	If the municipality or a recycling company provide recycling bins, would this establishment recycle?	89	0	Significant

(The significance level chosen is  $p < 0.05$  to indicate significance.)

In table 4.2.8 the respondents indicated that most (73%) of them pay for weekly collection of waste by the municipality. However, 41% of them additionally pay and make use of a private company to collect and dispose of their waste. This could possibly be explained by unreliable services offered by the municipality. In June 2018, Bloemfontein Courant reported a pending strike by municipal workers. Services were not executed for long periods of time including removal of refuse in Bloemfontein (Bloemfontein Courant, 2019).

Moreover, respondents agree that if the municipality provides the necessary bins, they will start to recycle. The results (table 4.2.6) regarding customer's willingness to recycle, thirty-seven percent (37%) of respondents felt customers would recycle if there are bins, meaning sixty-three (63%) agreed that customers would not sort recyclables even if there are bins. Barr (2007), disagrees, and state that people tend to recycle more efficiently if they have access to recycling equipment or services.

Respondents demonstrated in Table 4.2.9 again that financial incentives could be the main motivation behind recycling. Ninety-six percent of the respondents agree to discounts on waste removal costs by recycling, although irregular waste removal (88%) could be a contributing factor. More recycling, less waste would have to be removed. Again, ninety-six percent of the respondents agree that payment for their recyclables would inspire them to recycle. Once again, these findings are supported by Shaw and Maynard (2008), as well as Amini *et al.* (2014), who both found that financial rewards motivate recycling behaviour.

**Table 4.2.9: Other possible motivational factors to recycling.**

Q. Nr.	Question	Percent age of respondents that agreed (%)	P-value Positive	Significant Positive	P-value Average	Significant Average
7.1	By recycling, discount should be received on waste removal costs.	96	0	Significant	0	Significant
7.2	Irregular waste removal should motivate recycling.	88	0	Significant	0	Significant
7.3	Payment received for recyclable waste would motivate recycling.	96	0	Significant	0	Significant
7.4	Customers are more loyal to restaurants that recycle.	40	0,985	Not significant	0,876	Not significant
7.5	Customers prefer restaurants that recycle.	33	1	Not significant	0,994	Not significant
7.6	Recyclable waste should be rinsed or cleaned.	47	0,744	Not significant	0.159	Not significant
7.7	Recyclables should be sorted before handed over to recycling services	74	0	Significant	0	Significant

(The significance level chosen is  $p < 0.05$  to indicate significance.)

Respondents do not believe that customers have a specific preference towards restaurants that recycle (33%), as well as measure their loyalty on whether the eatery or bar recycle (40%). Jeong & Jang (2010) found that customers might not notice the fact that eateries actually practice green believes and is pro-environment if it is not advertised. Most (74%) participants believe that the recyclables should be sorted before handing over the recyclables. This is not always the case as Single stream recycling and dual stream recycling gives a choice.

Single stream recycling – also single-sort recycling, is a system in which all recyclables, plastic, paper, metals and glass are placed in a single bin for recycling. Dual stream recycling – glass, plastic, metals are combined in one bin, and newspapers and mixed paper and office paper in a different bin. The two bins/bags are placed in separate compartments on the recycling truck (Leblanc, 2019).

Less than half of the participants (47%) agree that recyclable waste should be rinsed or cleaned. Heavily soiled paper cannot be recycled, only clean and dry paper are accepted (Packaging SA, 2015). Sorting of plastics is primarily done by hand, special equipment is used to shred and granulate the plastic to reduce the size. After it is shredded, the plastic flakes are then separated into different plastic groups in a water-based washing process. Thereafter the plastics are cleaned and separated into different material fractions or types of plastics (Packaging SA, 2015).

Question 7.8 is a single-answer multiple-choice question. Participants were asked should the municipality engage in recycling, would this establishment consider any of the following: Dual stream or separation at source recycling (21%), Single stream recycling (20%), both (72%) or none (1%).

Out of 114 participants only 1% said that they would not engage in recycling in any way. All the rest (99%) agreed to engage in recycling.

### 4.3 Comparisons of Questions Groups

The following questions in each table were analysed to determine whether the factor tested by them, was a significant indicator.

**Table 4.3.1: Comparison of questions regarding money/income generation.**

Q. Nr	Question	Percent age of respondents that agreed (%)	P-value Positive	Significant Positive	P-value Average	Significant Average
3.9	By recycling, this establishment could generate an income.	86	0	Significant	0	Significant
4.15	By recycling, this establishment could save money.	78	0	Significant	0	Significant
7.3	Payment received for recyclable waste would motivate recycling.	96	0	Significant	0	Significant

(The significance level chosen is  $p < 0.05$  to indicate significance.)

The Congeneric reliability of the questions regarding money/income generation produced a reliability factor of 0.55, which indicates that a single concept was tested (Table 4.3.1). The respondents acknowledge that recycling could save money, and also generate money, while payment received for recyclables, will motivate them to recycle. By reusing articles that would under normal circumstances be discarded as trash, the human need to be creative is satisfied, and by reusing articles, money is saved (Abdul-Rahman, 2014).

When a single stream recycling program was conducted at a hospital in Ohio in 2008, they compared six months of recycling against six months of not recycling non-hazardous solid waste. Employees of the hospital were educated about the benefit of recycling and on what and what not to recycle. Bins were placed in offices, waiting areas, gift shop, kitchen and cafeteria, laboratories, waiting areas, lounges, halls, operating rooms and the pharmacy together with posters explaining to the public about

recycling. Results showed that \$4,672.88 was saved on non-hazardous waste disposal costs (Riedel, 2011).

**Table 4.3.2: Comparison of questions regarding the involvement of the municipality.**

Q. Nr	Question	Percentage of respondents that agreed (%)	P-value Positive	Significant Positive	P-value Average	Significant Average
6.2	The municipality should fine waste offenders (as they do in the case of, e.g. traffic offenders)?	90	0	Significant	0	Significant
6.3	Effective recycling should be rewarded by the municipality in a form of less waste taxes?	94	0	Significant	0	Significant
7.1	By recycling, discount should be received on waste removal costs.	96	0	Significant	0	Significant

(The significance level chosen is  $p < 0.05$  to indicate significance.)

The analysis of the questions regarding the involvement of the municipality produced a reliability factor of 0.84, which indicates that a single concept was tested (Table 4.3.2). As illustrated in Table 4.3.2, most (96%) of the respondents agreed that a discount on waste removal costs should be received when recycling. They (94%) also agreed that effective recycling should be rewarded. Ninety percent (90%) of the respondents agreed that waste offenders must be fined, which is in contrast to results that Shaw & Maynard (2008) extracted. Out of over three hundred surveys, they found that only five percent (5%) of respondents agreed to fines for failure to recycle. Furthermore, they found that different types of financial incentives would be motivators for recycling, for instance, additional services to elevate the community and neighbourhoods, environmental improvements and cash rewards.

The National Waste Act 2008 provides a legal basis for waste policies developed over time. This should result in higher prosecution rates for offenders.

#### **4.4 Conclusion**

Results show that most establishments make use of plastic bottles as well as glass bottles, both of which are recyclable. The respondents' basic knowledge with regard to recycling is above average and they are positive about recycling, yet their actions prove otherwise. The findings further indicate that support from the government will motivate the establishments to recycle more effectively and that incentives are also a positive motivator.

## **Chapter 5: Buy-back centres and the recycling industry.**

### **5.1 Introduction**

Buy-back centres (BBC) form an important part of this study. BBC's has many merits. However, the main focus here is that they buy back recyclable waste. The waste they buy could have been sent to landfills, dumped illegally or littered the streets.

Plastic bag levy is the only product tax with environmental benefit in South Africa. There are some buy-back and deposit-refund schemes that are initiated by the recycling industry. These focus mostly on paper, plastic, glass and aluminium beverage cans. These initiatives can be enlarged to include other recyclable products (Nahman & Godfrey 2010).

In the National Waste Management Strategy of 2011, eight goals were set to achieve the industry waste management plans (IndWMP) by 2016. Goal number one was to promote waste minimisation, re-use, recycling, and recovery. This goal was then divided into two objectives. First, to promote waste minimisation in the design, composition, and manufacturing of products, in short, the Extended Producer Responsibility (EPR). Second, to promote the re-use, recycling, and recovery of recyclable waste. In order to achieve this objective, the following statements were made:

“Producer responsibility initiatives in which industry takes responsibility for the lifecycle of products that they produce, establish methods and funding mechanisms to manage the products once they become waste, and sets targets for re-use, recycling or recovery in IndWMPs.

Mandatory Extended Producer Responsibility (EPR) schemes declared by the Minister where IndWMPs have been ineffective, and the Minister wishes to determine how certain waste streams are to be managed.

Collection and sorting of general recyclable waste materials, supported by a recycling infrastructure. General recyclable waste collection systems will be coupled to existing waste collection services, and disposal sites will be

transformed into waste management sites. Material recovery facilities and buy-back centres will be established in different municipalities, and space will be provided to sort waste into re-usable and recyclable waste.

Nationally coordinated awareness campaigns which support separation of recyclables from the domestic waste stream at the source for all households, businesses, and organisations.

Diverting particular waste streams from landfill within prescribed periods as provided for by the draft Standard for Disposal of Waste to Landfill. Local control measures for general waste entering landfill sites will reinforce diversion of recyclable waste from these sites. Municipalities will take responsibility for diverting organic waste, which they can compost or use in biogas digesters.

Some waste management activities which stimulate the re-use, recycling and recovery of waste will be listed as activities that do not require a waste management licence, thereby decreasing regulatory constraints on these activities. Applications must demonstrate that the proposed waste management activity can be implemented and conducted consistently and repeatedly in a controlled manner without unacceptable impact on, or risk to the environment and health.

For waste types that cannot be re-used or recycled, various options exist for energy recovery, including biogas projects and methane gas from landfills. The Renewable Energy White Paper will set out the mechanisms that the government will implement to facilitate renewable energy technologies, including the Renewable Energy Feed-in Tariff. Thermal treatment of waste must conform to air emissions standards to mitigate the impact on health and the environment.

In some instances, the Minister of Environmental Affairs will declare a required percentage of recycled material in a product to actively promote markets for recycled material. The Waste Act provides for such a declaration.” (DEA, 2011).

A fact not very well known was reported by Carte Blanche on 27 June 2016 about waste pickers. Besides from earning a small salary from their efforts, they play an important role in the preserving of our environment and saving taxpayers millions of Rands. As mentioned previously, South Africa is fast running out of landfill space, but with the help and efforts of waste pickers who reduce the enormous amounts of waste going to the landfills, the lifetime of some of these landfills is extended by several years. Furthermore, waste pickers also minimize the extent to which municipalities have to collect and sort waste, saving the municipalities up to R750 million per annum.

BBCs play a significant part in creating formal jobs as well as informal income-generating opportunities for poor and unemployed individuals. These jobs include (1) the entrepreneur who started or owns the BBC, (2) sorters and balers who receives, sorts and bales the recyclables and (3) the individual waste picker or collector. Unemployed people can earn some income by means of collecting and selling recyclable goods on an informal basis, these people are mostly street waste pickers of landfill pickers. BBC's rely quite strongly on waste pickers (Viljoen *et al.*, 2012).

In order for all this to happen, BBC's must operate as the intermediary between waste pickers and big recycling companies.

## **5.2 Methodology**

Interviews were held by the researcher, with seven buy-back and recycling centres in Bloemfontein. Interviews with these establishments were anonymous, in the results these seven establishments are referred to as establishment A – G.

All the interviews were structured, the same straightforward questions were asked to all of the participants, and no leading questions were asked. Addresses and contact details of these establishments were located on the internet.

Some of the BBCs were very helpful and eager to answer the questions, while two of the establishments were less inclined to help.

The questions aimed to determine the recyclables that they buy back, and the prices per kilogram. As well as, whether they collect recyclables from businesses. More information were asked about the process that they follow once the waste reached

them. The list of structured questions for the interviews could be found in the Addendum.

### **5.3 Results and discussion of interviews with the buy-back centres.**

The following tables (5.3.1, 5.3.2, 5.3.3) summarize all the questions asked during the interviews, and sheds light on how some recyclables are recycled and the big role buy-back centres play in recycling and the diversion of waste from landfills.

The findings above indicate which recyclable materials are bought back by the centres. None of them buy back polystyrene. Unfortunately, the eateries and bars indicated that most (70%) of them use polystyrene packaging. The implication is that all the polystyrene ends up in landfill. The Polystyrene Packaging Council (PSPC) in South Africa is running some projects to encourage the recycling of polystyrene including, Bread tags for Wheelchairs. The PSPC face many difficulties in developing markets for used polystyrene because used polystyrene containers are soiled. To wash and dry the use containers are not financially plausible as a result of the high water and electricity rates and because it is not environmentally friendly (Spangenberg, 2014).

Matinese *et al.* (2018) concluded that more than 74% of restaurant waste could be diverted from landfills by proper recycling practices; this includes solid waste like paper, plastic, glass and metal, as well as organic waste that could be composted. The average recyclable waste generated by eateries can be up to 27% of the total amount of waste generated per week.

Most of the BBCs confirmed that they recycle the basic recyclable waste generated by the eateries and bars namely: glass, metal, paper, PET, HDPE and LDPE. When this is considered, it is possible for the eateries and bars in Bloemfontein to start a successful recycling program.

Four of the BBCs confirmed that they buy Tetra Pak, milk, juice and wine cartons. Not many of the eateries and bars are aware that Tetra Pak is recyclable. The recycling process takes a little more effort than the process to break down plain carton, as the aluminium film inside goes through a process to separate it from the cardboard.

**Table 5.3.1: Different recyclable waste products accepted by the BBCs.**

Y = Yes; N = No

Code	Description	A	B	C	D	E	F	G	Totals
FN: Flat news	Newspaper	Y	Y	Y	Y	Y	Y	Y	7 yes
CMW: Common mixed waste	Magazines, pamphlets, phone books	Y	Y	Y	Y	Y	Y	Y	7 yes
K4: Used cardboard	Flattened boxes	Y	Y	N	Y	Y	Y	Y	6 yes 1 no
HL 1: Heavy letter 1	White office paper	Y	Y	Y	Y	Y	Y	Y	7 yes
HL 2: Heavy letter 2	Coloured paper	Y	Y	Y	Y	Y	Y	Y	7 yes
IMW: Industrial mixed waste	Cereal boxes	Y	Y	N	Y	Y	Y	Y	6 yes 1 no
Tetra Pak	Milk, juice, wine cartons	N	N	N	Y	N	N	N	1 yes 6 no
PET: Polyethylene Terephthalate	Cold drink and mineral water bottles	Y	Y	N	Y	Y	Y	Y	6 yes 1 no
HDPE: High-Density Polyethylene	Milk bottles, sauce bottles, plastic buckets	N	Y	N	Y	Y	Y	Y	5 yes 2 no
PVC: Polyvinyl Chloride	Non-food bottles, pipes and plastic fencing	N	Y	N	N	N	N	Y	2 yes 5 no
PLSS / LDPE: Low-Density Polyethylene	Plastic shrink and clear, clear bags, bubble wrap, shrink plastic	Y	Y	N	Y	N	N	Y	4 yes 3 no
PP: Polypropylene	Plastic chairs, containers, dispensing bottles	N	Y	N	Y	Y	N	Y	4 yes 3 no
PS: Polystyrene	Packaging bead, containers, materials	N	N	N	N	N	N	N	7 no
UBC: Used beverage cans	Aluminium and metal food and drink cans	Y	Y	Y	Y	Y	N	Y	6 yes 1 no
GL: Glass	Wine and beer bottles, jam and sauce bottles.	Y	Y	N	Y	Y	N	Y	5 yes 2 no

Tetra Pak packaging is made from 75% paper fibres that can be recycled quite a few times, the inside is a thin layer of polymers / plastics which can be blended with other polymers when recycled and turned into new products. Over one million tonnes of used Tetra Pak cartons are collected for recycling per annum, and there are more than hundred and sixty recycling companies over the globe that can recycle Tetra Pak by extracting the paper fibres, polymers and aluminium (Tetra Pak, 2019).

Packaging South Africa prepared a document in 2015, called Design for Recycling. This document or book is aimed at packaging designers and sustainability managers to give information on what elements is needed to design with recycling in mind. This document takes the designer through the steps, to decide what material will be used for the product or container, guidelines is given for the material selected and labels for the type of container or product to optimize recycling by the end user (Packaging SA, 2015).

According to Packaging South Africa, all plastic containers/items must be marked with the correct identification code for that specific material:



Polyethylene Terephthalate (PET) – mostly used for beverage bottles, other packaging formats include jars, trays and punnets, strapping tapes as well as packaging for courier purposes. Clear and light blue bottles have higher value than coloured PET packaging. Six BBCs in Bloemfontein accept PET, and three of them bale plastic to be sent to Johannesburg. Buy-back prices varies from R1 – R2 per kilogram.



High Density Polyethylene (HDPE) – also used for bottles and jars (most commonly milk bottles and sauce bottles), tubs, cups and trays, tubes, crates, caps and closures, bags, buckets. Colourless HDPE have the best recycling value as opposed to HDPE with colour pigments added. Five BBCs in Bloemfontein accept HDPE and their prices varies between 70c – R1 per kilogram.



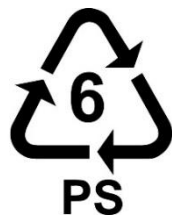
Polyvinyl Chloride (PVC) – used for non-food bottles, jars, tubs, trays, buckets, film (clingwrap) and building material such as pipes and fencing. Only two BBCs accept PVC and pays between 20c and 40c per kilogram.



Low Density Polyethylene (LDPE) – used for bags, wrapping and plastic film and bubble wrap. Value of LDPE is higher if it is kept clear. Four BBCs accept LDPE and pays between 70c and 80c.



Polypropylene (PP) – used for bottles and jars, furniture, 'Tupperware', squeeze drink bottles, baby bottles, tubes, wraps and films, bags and woven bags and sacks and plastic chairs. Unpigmented and white PP have more value and is more reusable than pigmented PP. Four BBCs accept PP and prices varies from 20c – 40c per kilogram.



Polystyrene (PS) – colour of PS packaging have no impact on recyclable value. Packaging that is designed with a smooth finish is preferred for recycling purposes. PS is not widely recycled in SA and none of the BBCs in Bloemfontein would accept PS.

In South Africa the sorting of plastics is primarily done by hand. Equipment is used to shred and granulate the plastic to reduce the size. After it is shredded the plastic flakes are then separated into different plastic groups in a water-based washing process.

The plastics are cleaned and separated into different material fractions or types of plastics. The differences in the density of the types of plastic is used to separate them in the water. PET and PVC sink to the bottom, PPS does not sink nor float, it hovers in the middle, HDPE, LDPE and PP floats on the top (Packaging SA, 2015).

All paper that is produced is 100% recyclable. White office paper (HL 1 – heavy letter 1), coloured paper (HL 2 – heavy letter 2), shredded paper, magazines, brochures,

pamphlets, phonebook (CMW - common mix waste), newspapers (FN - flat news), corrugated cardboard and flattened boxes (K4 - Used cardboard), cardboard boxes such as cereal boxes (IMW - industrial mixed waste), and the outside layer of Tetra Pak (Packaging SA, 2015).

**Table 5.3.2: Maximum and minimum prices of different recyclable waste product as indicated by the BBCs.**

<b>Code / Product</b>	<b>Price per Kg Minimum</b>	<b>Price per Kg Maximum</b>
FN: Flat news	20c	40c
CMW: Common mixed waste	20c	40c
K4: Used cardboard	20c	50c
HL 1: Heavy letter 1	70c	R1
HL 2: Heavy letter 2	70c	R1
IMW: Industrial mixed waste	20c	50c
Tetra Pak: Carton	20c	50c
PET: Polyethylene Terephthalate	R1	R2
HDPE: High-Density Polyethylene	70C	R1
PVC: Polyvinyl Chloride	20c	40c
PLSS / LDPE: Low-Density Polyethylene	70c	80c
PP: Polypropylene	20c	40c
PS: Polystyrene	-	-
UBC: Used beverage cans	R1,20	R8
GL: Glass	30c	35c

The prices per kilogram as indicated in Table 5.3.2, fluctuate from week to week because of supply and demand. HL price vary from 70c - R1 per kg and CMW, FN, K4, IWM from 20c – 50c per kg. Only one BBC in Bloemfontein buy-back Tetra Pak, and group is with the CMW group.

Paper is non-recyclable when it is heavily soiled, plastic layers are added (dogfood packaging), heavy foils (birthday cards), glue (sticky notes) and wax coatings (baking paper) are added. The more times paper is recycled, the shorter the paper fibre gets. Some paper fibres can be recycled up to seven times (Packaging SA, 2015).

Price for tin and aluminium varies between R1,20 – R8 per kilograms. Six of the seven BBCs in Bloemfontein accept tin and aluminium and can reach quite a high price per

kilogram. Cans are compressed into bales and then sent to steel mills where they are melted to produce “prime” steel. Used metal cans, like glass, are 100% recyclable, and can be recycled without end without degradation. Recyclable metals include: beverage cans, aluminium bottles, tinned food containers, foil containers, collapsible squeeze tubes (ointment) and foil wrappers (Packaging SA, 2015).

Glass can be recycled without end without losing any of its characteristics and its performance never degrades. Five of the BBCs in Bloemfontein accept glass. By recycling glass, energy is saved as well as carbon emission is reduced when new containers are manufactured. When waste glass is collected it is broken at the collection point without being sorted, this is done to cut transport costs. Glass is delivered in mixed state to the glass factory cullet processing plants, two of these plants are in Gauteng and one in the Western Cape. One BBC said during the interview that their company rent a truck once or twice weekly, depending on how much glass they receive that week, to transport glass to Johannesburg for processing (Packaging SA, 2015).

Preferably the cullet returns should be in similar colour proportions for manufacturing requirements and sales. Green glass is the most accommodating and recycling-friendly glass because all the other colours can be used to produce green glass (Packaging SA, 2015).

BBCs in Bloemfontein pay for glass (brown, green, regular) between 30c – 35c per kilogram, only beverage and canning bottles are recycled, they do not accept windshield glass, window glass, drinking glass or treated glass (Pyrex) which is used for cooking and also not recyclable.

The capabilities and limitations to the operations of the BBCs are illustrated in table 5.3.3. BBC A expect to receive the recyclable waste already sorted in the different categories, as they do not have the space or personnel to do the sorting, the rest of the BBC’s manage to sort recyclable waste should it not be already sorted.

Only three of BBCs have the necessary equipment and facilities to bale the recyclable waste. Loose or non-baled recyclable materials need a huge amount of space for storage and transportation in comparison with baled waste.

Two BBCs stated that they have weekly appointments with certain eateries to collect recyclable waste, one institution is willing to collect from eateries. BBCs seldom do collections from eateries, as smaller entrepreneurs collect from them, as well as waste-pickers. They are, however, willing to arrange with eateries that would like to participate, although sorting of recyclables must be done in the different categories. Furthermore, all but one BBC collect from corporate businesses. It could be argued that they mostly collect paper from corporate businesses, which is one of the highest paying recyclables to collect.

All the BBCs are willing to pay the establishment for their recyclable waste per kg. Furthermore, only one of the BBCs expect payment for the removal of the recyclables in return.

The three BBCs with the baling facilities send their loads to recycling companies in Johannesburg, while the smaller BBCs collect from street pickers and small companies and send their recyclable waste to the three bigger companies. Glass is sent to companies in Johannesburg to be processed.

Company F is a waste management and service company, which is different from company A-E. Company F offers an all-inclusive service, from basic cleaning services, waste removal and waste management, waste and recycling collection services and carbon footprint analysis. Businesses as well as residential packages are available. They have teams of people that go from business to business to clean as required or they position a 'permanent' cleaning staff or worker in the business. They maintain contracts with the staff so the businesses don't have to deal with additional admin.

**Table 5.3.3: Operations of the Buy-Back Centres.**

<b>Q. Nr</b>	<b>Question</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>G</b>
1	Receive recyclable waste sorted	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2	Able to sort the waste themselves	No	Yes	Yes	Yes	Yes	Yes	Yes
3	Able to bale the recyclables	No	Yes	No	No	No	Yes	Yes
4	Collect from eateries or bars	No	No	No	No, but willing	Yes	Yes	No
5	Collect from corporate businesses	Yes, on request	Yes, have regular clients	Yes	No	Yes	Yes	Yes
6	Pay businesses for their recyclables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
7	Expect payment to collect the recyclables	No	No	No	No	Yes	No	No
8	Send recyclables to other local centres	Yes, paper and metal	No	Yes	Yes	Yes	No	No
9	Send recyclables to JHB	Yes, glass	Yes	No	No	No	Yes	Yes

## **5.4 Conclusion**

Waste pickers play an important role towards saving the environment, saving landfill space and saving municipalities money. Waste pickers form the main income of recyclable waste for the Bloemfontein BBCs. The BBCs in Bloemfontein are willing to work with some establishments in Bloemfontein should they start recycle properly. The results show that only two of the seven BBCs is functioning on a larger scale and is dependent on the smaller companies for support. Better advertising of their services might gain support from establishments in Bloemfontein.

## **Chapter 6: Conclusion and recommendation**

### **6.1 Conclusion**

The aim of this study was to explore the recycling practices of eateries and bars and determine the barriers preventing recycling. In addition, to determine what would motivate recycling. Empirical data was gathered with the questionnaires, results were discussed in articles (chapter 2 and 3), while chapter 4 dealt with the statistical analysis results. Information was received regarding recyclable and non-recyclable waste that is generated, their knowledge about recycling was evaluated and their recycling activities or lack thereof was determined. A good indication of possible barriers are is given, as well as possible motivators to get these establishments to recycle. The influence that the involvement of government and municipalities could have were established. In addition, the effect of money in the form of cash back or less taxes, as motivator. In chapter 5 interviews held with several buy-back centres in Bloemfontein was discussed. Questions were asked to understand their operations and methods, which recyclables they buy-back, and an indication of prices per kilogram of recyclable waste, as well as how they deal with the recyclable waste. BBCs play an enormous roll in the diversion of waste from landfills.

#### **Research questions:**

##### **1. Does any of the bars and eateries have a recycling system?**

It was expected that not all of the participating eateries and bars would have active recycling practices, but a small amount of thirty-five percent of the participating eateries and bars indicated that they have a working recycling program.

##### **1.1. To which extent (if any) do the eateries and bars participate in recycling?**

The participants that indicated that they recycle, make use of recycling companies. Most of the establishments do not promote recycling in the bars or eateries by means of flyers, information on the menu, posters, social media or word of mouth. Ninety-three percent of participants said that customers do not participate in recycling, while none of the staff is also inclined to recycle. Most participants stated that if any recycling takes place, it is outside of the establishment, where street pickers do their part.

## **2. What is preventing recycling at the bars and eateries?**

Many barriers were identified that prevent the establishments from recycling. These barriers include time, information, storage space, money and information of buy-back centres and recycling companies in the establishments' areas. These factors will be discussed as barriers in the following sub-questions.

### **2.1. Is a lack of knowledge a barrier to recycling?**

Most of the participants (91%) feel that there is a lack of information and knowledge about recycling. The results indicate that they do have the basic knowledge regarding recycling, however, forty-four percent of participants were uncertain if the reuse of a plastic bottle is dangerous to their health. Further, most of the participants were fully aware that glass bottles, cans and tins, plastic bottles and paper are recyclable. Only twenty percent of participants had knowledge of buy-back centres in their areas. The participants are under the impression that recycling is difficult to implement, when the only difficulty is to place different recyclables in different bins.

This leads to the conclusion that the lack of knowledge is a barrier even though the participants possess the basic recycling knowledge. They have strong ideas on what to recycle, but how to recycle is a barrier.

### **2.2. Is lack of time a barrier to recycling?**

Eighty-two percent of the participants stated that they think it is time-consuming to sort the waste. This could possibly be because these establishments do not have an existing recycling program. Without the necessary tools and information, recycling can be time-consuming. However, once the effort has been made to obtain the necessary equipment like the different bins to separate the recyclable waste, it will become second nature to rinse and place the waste item in the appropriate bin without it being more time-consuming than to place all waste in one bin.

This leads to the conclusion that lack of time may not be the barrier, but rather the lack of knowledge and equipment, which tend to make the participant believe that it will be time-consuming to recycle their waste.

### **2.3. Is the perception that it is difficult to implement a recycling program a barrier?**

Sixty-two percent of the participants agreed that it is difficult to implement a recycling program. Difficulty to perform the task, can be linked to a lack of knowledge. As mentioned before, the participants do not have the knowledge or equipment to implement recycling. Because the establishments are short of equipment (e.g. recycle bins), and knowledge, it leads them to think recycling is difficult to implement. Eighty-nine percent agreed that if the municipality would provide bins, they would be more inclined to recycle. Participants are also aware of the cost of obtaining reusable items and the maintaining thereof, but not persuaded by the fact that it is a once of expense followed by maintenance.

This leads to the conclusion that advanced knowledge and in some instances, the shortage of finances to obtain necessary bins, is a barrier that prevent some establishments from recycling.

### **2.4. Is the lack of municipal and government support a barrier to recycling?**

It was found that the municipalities' and governments' support could overcome many of the barriers preventing the eateries and bars from recycling. Eighty-nine percent of these establishments said that if the municipality provides bins, they will place their recyclables in those bins.

A possible solution is that the municipalities consider turning the waste management and recycling systems completely over to the private sector. In return, people in the private sector should realize that waste management is a profitable business and should encourage the public, businesses, and household to recycle and separate at the source. Waste pickers could be utilized in these activities, and it could even create more job opportunities.

The need for recycling in Central South Africa is crucial, as it is stated more than once that only 10% of SA's waste is recycled. Private recycling institutions, local municipalities, and eateries and bars should make a joint effort in order to get a successful operation running. Therefore, the conclusion could be made that the lack of government and municipal support is definitely a barrier to recycling.

### **3. What would motivate the bars and eateries to recycle?**

The participants agreed to the possible motivator of financial incentives in more than one respect. Government enforcement emerged as a definite motivator, while eighty-eight percent of participants agreed that the common occurrence of irregular waste removal is also a motivator to recycle.

#### **3.1. Are financial incentives a motivational factor to recycle?**

Ninety-four percent of the participants agreed that less waste taxes would be a motivator, while ninety-six percent of the participants agreed that discount on removal costs and payment received for recyclable waste are both recycling motivators. Everybody is looking for ways to save money or to gain more. Waste removal costs and tax is a fixed expense when running or owning a business. If by effective recycling money could be saved, more than ninety percent of the participants agreed to recycling.

For these reasons, it could be concluded that financial incentives would motivate recycling.

#### **3.2. Will government enforcement make a difference in their recycling habits?**

Almost all (96%) of the participants agreed that municipalities must enforce recycling. Currently, the law does not enforce recycling. Ninety percent of the participants approved of fines for waste offenders who do not participate in recycling, therefore they would avoid fines and rather recycle. However, only thirty-five percent of the participants recycle, ninety percent of them agreed to fines.

South Africa's Waste Act and Integrated Waste Management Plan have the right guidelines, strategies, and principals. Unfortunately, none of these are implemented successfully. Law enforcement could be a solution, as these consumers will only participate in recycling if they are motivated or forced. The participants are willing to recycle but they must be strongly motivated, forced or compelled by law to recycle. Provincial governments should include suitable and practical by-laws for the municipalities.

For these reasons, it can be concluded that the most efficient way to change the participant's recycling habits is by government enforcement and the full support of municipalities and the law.

#### **4. Does the eatery or bar have knowledge regarding buy-back centres in their vicinity?**

Only twenty percent of the participants had knowledge of buy-back centres in their vicinity. BBCs should make a larger effort to advertise and inform businesses and the public about their services. People cannot make use of their services if they do not know they exist.

Therefore, the conclusion could be made that the lack of knowledge, once again, is a barrier to recycling practices.

#### **5. Are the buy-back centres willing to collect recyclable waste from establishments?**

In Bloemfontein, six of the seven buy-back centres are willing to cooperate to a certain extent with eateries and bars, but according to the survey results very little of these eateries are aware of the BBCs and the services they provide. However, this lack of knowledge about the existence of the BBCs, and gap in the system between the eateries and bars, and the BBCs could easily be resolved.

##### **5.1. Are financial incentives a motivational factor for buy-back centres to support the bars and eateries to recycle?**

The buy-back centres already make a steady living in Bloemfontein without the full support of bars and eateries.

However, all of the BBCs accept paper whether it is regular office paper, cardboard, newspaper, or cereal boxes. These are all recyclable waste products used in eateries. Milk bottles, mineral water, beverage and sauce or condiments bottles and containers are accepted by at least four of the BBCs. Aluminium and tin, beer cans, mixers and cold drink cans, canned fruit and vegetables, are accepted by six of the seven BBCs. These recyclables are the ones the bars should focus on. Glass is also widely accepted and can make up an enormous part of eateries and bar's waste. Considering what they can collect from eateries and bars, they would gain immensely from

collecting recyclable waste from eateries and bars. Therefore, the conclusion could be made that financial incentives are not a motivator for the BBCs to support the bars and eateries to recycle.

## **6.2 Recommendations**

Future research could include the operations of waste pickers and their relationships with BBCs and eateries and bars. This could lead to better knowledge of where they get most of their recyclables, which recyclables they prefer and how much they gather over certain periods. Future research should also include an in-depth look at the smaller town's waste and recycling systems, whether there are any recycling done and where they are sending it. The lack of recycling and waste systems in itself is a barrier for these smaller towns.

Customers of eateries and bars could also be more involved by completing a survey to understand their preferences, aversions, actions and knowledge towards recycling.

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## **Appendix**

- I Questionnaire
- II Interview Questions with Buy-back Centres
- III Ethical Approval

# I Questionnaire



Dear Respondent,

**RESEARCH PROJECT: RECYCLING OPPORTUNITIES AND PITFALLS OF EATERIES AND BARS IN CENTRAL SOUTH AFRICA.**

I am a MSc student at the University of the Free State, conducting a research study on the recycling opportunities and pitfall of eateries and bars in central South Africa. The aim of the study is to gather information using surveys and interviews to find answers to the research questions. A program or method can be worked out and supplied to businesses willing to participate in recycling and to help realize the seriousness of the matter.

To determine the public concern regarding recycling and sustainability, what they are already doing and what they are willing to do. To determine whether government enforcement will make a change in the ways businesses operate and the attitude of the public regarding recycling.

Your participation is very important to the success of the study. Your identity will remain anonymous and confidential. Kindly spare your time and energy to complete the questionnaire. It will take approximately 10minutes. Please express your personal views as honestly as you can. **By completing the questionnaire, you indicate your consent to be part of the study.**

In case you have any queries regarding this research project, you are welcome to contact my supervisor:

Dr Jana Vermaas, [neljf@ufs.ac.za](mailto:neljf@ufs.ac.za). Tel: +27514019750

Instructions for completing the questionnaire:

- No names should be given
- Read the question carefully
- Tick relevant options in appropriate boxes.
- Where required, write the answer in the space provided
- Do not leave out any questions
- Remember, the first answer to come to mind is usually the appropriate one

Thank you for your co-operation.

Carien Denner (researcher)

051 401 2301

[dennerc@ufs.ac.za](mailto:dennerc@ufs.ac.za)



Mark as shown:     Please use a ball-point pen or a thin felt tip. This form will be processed automatically.  
 Correction:     Please follow the examples shown on the left hand side to help optimize the reading results.

**1. Demographics**

1.1 What is your occupation ?  Manager  Owner  Cashier  
 Other

1.2 If other, please specify:

1.3 How long have you been in the position mentioned above?  1 - 11 Months  1 - 3 Years  4 - 6 Years  
 7 - 9 Years  10 years or more

**2. Establishment Information**

Which of the following items is used in this establishment?

	Yes	No
2.1 Paper table cloths	<input type="checkbox"/>	<input type="checkbox"/>
2.2 Paper cups	<input type="checkbox"/>	<input type="checkbox"/>
2.3 Paper carry bags	<input type="checkbox"/>	<input type="checkbox"/>
2.4 Polystyrene containers	<input type="checkbox"/>	<input type="checkbox"/>
2.5 Polystyrene cups	<input type="checkbox"/>	<input type="checkbox"/>
2.6 Plastic cups	<input type="checkbox"/>	<input type="checkbox"/>
2.7 Plastic containers	<input type="checkbox"/>	<input type="checkbox"/>
2.8 Plastic Cutlery	<input type="checkbox"/>	<input type="checkbox"/>
2.9 Plastic bottles (e.g. water, soft drinks, milk)	<input type="checkbox"/>	<input type="checkbox"/>
2.10 Glass bottles (e.g. beer, cider, soft drinks)	<input type="checkbox"/>	<input type="checkbox"/>
2.11 Wooden/Bamboo cutlery	<input type="checkbox"/>	<input type="checkbox"/>
2.12 Cans (e.g. beer, soft drinks, food tins)	<input type="checkbox"/>	<input type="checkbox"/>
2.13 Straws	<input type="checkbox"/>	<input type="checkbox"/>

Approximately how much of the following is included in this establishment's weekly recyclable waste?  
 (Please note that the answers must add up to 100)

	< 10%	10%	20%	30%	40%	50%	> 50%
2.14 Plastic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.15 Paper	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.16 Glass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.17 Cans/tin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.18 Polystyrene	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



### 3. General

Please indicate to what extent do this establishment agree or disagree with the following statements:

- |  | Strongly agree                                     | Agree   | Disagree                           | Strongly disagree        |
|--|--|---|------------------------------------|--------------------------|
| 3.1 Recycling is the process of converting waste materials into new materials and objects. | <input type="checkbox"/>                           | <input type="checkbox"/>                                    | <input type="checkbox"/>           | <input type="checkbox"/> |
| 3.2 Glass bottles are recyclable.  | <input type="checkbox"/>                           | <input type="checkbox"/>                                    | <input type="checkbox"/>           | <input type="checkbox"/> |
| 3.3 Cans and tins are recyclable.  | <input type="checkbox"/>                           | <input type="checkbox"/>                                    | <input type="checkbox"/>           | <input type="checkbox"/> |
| 3.4 Plastic bottles are recyclable.  | <input type="checkbox"/>                           | <input type="checkbox"/>                                    | <input type="checkbox"/>           | <input type="checkbox"/> |
| 3.5 Clean and dry paper is recyclable.   | <input type="checkbox"/>                           | <input type="checkbox"/>                                    | <input type="checkbox"/>           | <input type="checkbox"/> |
| 3.6 Milk, juice and cream boxes are recyclable.  | <input type="checkbox"/>                           | <input type="checkbox"/>                                    | <input type="checkbox"/>           | <input type="checkbox"/> |
| 3.7 To reuse plastic bottles are dangerous to your health.                                 | <input type="checkbox"/>                           | <input type="checkbox"/>                                    | <input type="checkbox"/>           | <input type="checkbox"/> |
| 3.8 Recycling is good for the environment.   | <input type="checkbox"/>                           | <input type="checkbox"/>                                    | <input type="checkbox"/>           | <input type="checkbox"/> |
| 3.9 By recycling, this establishment could generate an income.                             | <input type="checkbox"/>                           | <input type="checkbox"/>                                    | <input type="checkbox"/>           | <input type="checkbox"/> |
| 3.10 How many times a week does the municipality collect waste from this establishment?    | <input type="checkbox"/> 1                         | <input type="checkbox"/> 2                                  | <input type="checkbox"/> 3 or more |                          |
| 3.11 If other, please specify:   | <input type="checkbox"/> Other                     |   |                                    |                          |
|  | <input type="text"/>                               |   |                                    |                          |
| 3.12 Do this establishment use a recycling program?  | <input type="checkbox"/> Yes (If Yes skip to 3.15) | <input type="checkbox"/> No                                 |                                    |                          |
| 3.13 Would this establishment consider implementing a recycling waste plan?                | <input type="checkbox"/> Yes                       | <input type="checkbox"/> No                                 |                                    |                          |
| 3.14 Please motivate the answer in 3.13 and skip to 3.18.                                  | <input type="text"/>                               |   |                                    |                          |
| 3.15 Does this establishment use a recycling company?                                      | <input type="checkbox"/> Yes                       | <input type="checkbox"/> No                                 |                                    |                          |
| 3.16 If Yes, do they:  | <input type="checkbox"/> Collect waste             | <input type="checkbox"/> You have to take the waste to them |                                    |                          |
| 3.17 Should the waste be sorted for the recycling company?                                 | <input type="checkbox"/> Yes                       | <input type="checkbox"/> No                                 |                                    |                          |
| 3.18 Are you aware of any institutions that buy back recyclables in your immediate area?   | <input type="checkbox"/> Yes                       | <input type="checkbox"/> No                                 |                                    |                          |



**3. General [Continue]**

3.19 If yes, please name the recycling institutions:

- 3.20 Which of the following recyclable material do they buy back? (Tick all appropriate boxes)
- |                                   |                                      |                                |
|-----------------------------------|--------------------------------------|--------------------------------|
| <input type="checkbox"/> Plastic  | <input type="checkbox"/> Paper       | <input type="checkbox"/> Glass |
| <input type="checkbox"/> Tin cans | <input type="checkbox"/> Polystyrene |                                |

**4. Recycling in this establishment**

**Please indicate to which degree does this establishment participate in the following actions. If this establishment does not recycle, skip to 4.15**

- |   | Never                    | Rarely                   | Often                    | Usually                  | Always                   |
|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <b>Which of the following methods does this establishment use to promote recycling?</b> |                          |                          |                          |                          |                          |
| 4.1 Social media. (I.e. Facebook, Youtube or Instagram)                                 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4.2 Flyers.   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4.3 Posters.  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4.4 Information on menu.  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4.5 Word of mouth.  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

- |   | Never                    | Rarely                   | Often                    | Usually                  | Always                   |
|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <b>How often do the following people participate in the sorting of recyclables?</b> |                          |                          |                          |                          |                          |
| 4.6 Customers.  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4.7 Waiters.  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4.8 Kitchen staff.  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4.9 Cleaning staff.   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4.10 Other staff.   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

- |   | Never                    | Rarely                   | Often                    | Usually                  | Always                   |
|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <b>Where does most of the recycling take place?</b> |                          |                          |                          |                          |                          |
| 4.11 In the serving area of the restaurant.         | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4.12 In the restaurant kitchen.                     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4.13 Outside.                                       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

- 4.14 Which of the following **bins** for recyclables does this establishment have? (Tick all appropriate boxes)
- |                                   |                                  |                                |
|-----------------------------------|----------------------------------|--------------------------------|
| <input type="checkbox"/> Plastic  | <input type="checkbox"/> Paper   | <input type="checkbox"/> Glass |
| <input type="checkbox"/> Tin/cans | <input type="checkbox"/> Compost | <input type="checkbox"/> None  |

**Please indicate to what extent does this establishment agree or disagree with each of the following statements.**

- |  | Strongly Agree           | Agree                    | Disagree                 | Strongly Disagree        |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 4.15 By recycling, this establishment could save money.                    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4.16 To recycle is difficult to implement.                                 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4.17 Government at all levels should actively support recycling campaigns. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |



### 5. Challenges regarding Reducing, Reusing and Recycling

To which extent does this establishment agree or disagree with the following statements:

	Strongly agree	Agree	Disagree	Strongly disagree
5.1 It is time consuming to sort through the waste.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.2 Staff is willing to sort and waste.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.3 Customers would sort waste if there are clearly marked bins.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.4 Lack of information regarding recycling is an obstacle.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.5 Lack of storage space is an obstacle.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.6 Lack of recycling institutions are an obstacle.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.7 The cost of setting up a recycling program is an obstacle.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.8 The cost of buying reusable items is an obstacle.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.9 The cost of maintaining reusable items is an obstacle.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### 6. Recycling and the municipality

The following questions are related to waste collection from this establishment.

Please indicate to which extent this establishment agree or disagree with the following statements:

	Strongly agree	Agree	Disagree	Strongly disagree
6.1 Recycling should be enforced by the municipality.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>A waste offender is a person or establishment who does not want to comply with enforced recycling or is guilty of illegal garbage dumping</i>				
6.2 The municipality should fine waste offenders (as they do in the case of, e.g. traffic offenders)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.3 Effective recycling should be rewarded by the municipality in a form of less waste taxes?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.4 Does this establishment pay for weekly collection of waste by the municipality?	<input type="checkbox"/> Yes	<input type="checkbox"/> No		
6.5 Does this establishment pay a private company to collect waste?	<input type="checkbox"/> Yes	<input type="checkbox"/> No		
6.6 If the municipality or a recycling company provide recycling bins, would this establishment recycle?	<input type="checkbox"/> Yes	<input type="checkbox"/> No		



**7. Motivation**

**Please indicate to which extent does this establishment agree or disagree with the following statements.**

	Strongly agree	Agree	Disagree	Strongly disagree
7.1 By recycling, discount should be received on waste removal costs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.2 Irregular waste removal should motivate recycling.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.3 Payment received for recyclable waste would motivate recycling.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.4 Customers are more loyal to restaurants that recycle.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.5 Customers prefer restaurants that recycle.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.6 Recyclable waste should be rinsed or cleaned.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.7 Recyclables should be sorted before handed over to recycling services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*Single stream recycling involves placing all the recyclables into the same bin. Dual stream or source separation requires that the paper fiber products must be placed in a separate bin.*

- 7.8 Should the municipality engage in recycling, would this establishment consider?
- Dual stream or separation at source recycling
  - Single stream recycling
  - Both are acceptable
  - None is acceptable

**7.9 Additional comments:**

**Thank you for taking the time to complete this survey**



## II Interview Questions with Buy-back Centres

### Questions:

Item	Take in?	Price per kilogram?
FN: Flat news Newspaper		
CMW: Common mixed waste Magazines, pamphlets, phone books		
K4: Used cardboard Flattened boxes		
HL 1: Heavy letter 1 White office paper		
HL 2: Heavy letter 2 Coloured paper		
IMW: Industrial mixed waste Cereal boxes		
Tetra Pak Milk, juice, wine cartons		
PET: Polyethylene Terephthalate Cold drink and mineral water bottles		
HDPE: High-Density Polyethylene Milk bottles, sauce bottles, plastic buckets		
PVC: Polyvinyl Chloride Non-food bottles, pipes and plastic fencing		
PLSS / LDPE: Low-Density Polyethylene Plastic shrink and clear, clear bags, bubble wrap, shrink plastic		
PP: Polypropylene Plastic chairs, containers, dispensing bottles		
PS: Polystyrene Packaging bead, containers, materials		
UBC: Used beverage cans Aluminium and metal food and drink cans		

GL: Glass Wine and beer bottles, jam and sauce bottles.		
--	--	--

1. Do you receive recyclable waste sorted or unsorted?
2. Is this establishment able to sort the waste?
3. Is this establishment able to bale the recyclables?
4. Do you collect recyclables from eateries?
5. Do you collect recyclables from corporate businesses?
6. Do you pay businesses for their recyclables?
7. Do you expect payment to collect the recyclables?
8. Do you send recyclables to other local centres within Bloemfontein?
9. Do you send recyclables to Johannesburg?
10. Any other comments?



### III Ethical Approval



Faculty of Natural and Agricultural Sciences

07-Nov-2017

Dear **Miss Carien Denner**

Ethics Clearance: **Recycling opportunities and pitfalls of eateries and bars in Central South Africa**

Principal Investigator: **Miss Carien Denner**

Department: **School of Education Studies (Bloemfontein Campus)**

**APPLICATION APPROVED**

This letter confirms that a research proposal with tracking number: **UFS-HSD2017/0942** and title: **'Recycling opportunities and pitfalls of eateries and bars in Central South Africa'** was given ethical clearance by the Ethics Committee.

Your ethical clearance number, to be used in all correspondence is: **UFS-HSD2017/0942**

Please ensure that the Ethics Committee is notified should any substantive change(s) be made, for whatever reason, during the research process. This includes changes in investigators. Please also ensure that a brief report is submitted to the Ethics Committee on completion of the research.

The purpose of this report is to indicate whether or not the research was conducted successfully, if any aspects could not be completed, or if any problems arose that the Ethics Committee should be aware of.

**Note:**

1. This clearance is valid from the date on this letter to the time of completion of data collection.
2. Progress reports should be submitted annually unless otherwise specified.

Yours Sincerely

Prof. RR (Robert) Bragg  
Chairperson: Ethics Committee  
Faculty of Natural and Agricultural Sciences

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**Natural and Agricultural Sciences Research Ethics Committee**

**Office of the Dean: Natural and Agricultural Sciences**

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