



**Socioeconomic Determinants of Households' Curb Side Recycling  
Behaviour in the Drakenstein Municipality**

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## DECLARATION

I, Ms Liza-Mari Volschenk, declare that:

The research in this minor dissertation, except where otherwise indicated, is the authentic and original work of the researcher.

This minor dissertation has not been submitted to any other university for purposes of obtaining a degree or any examination before.

The information used herein has been sourced, constructed and analysed by the researcher herself and, where otherwise stated, the sources of such data or information have been specifically acknowledged.

Signed at .....UJ.....on the...24...day of.....February.....2020.



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## **ABSTRACT**

Waste is a major environmental problem faced by many societies and is fast becoming a concern not only locally, but on an international scale. With increasing population sizes and urbanisation, the available land is becoming scarce even to serve the purpose of providing space for waste disposal. With annual increases in waste generation rates and municipalities' significant dependence on landfilling as method of disposal, it is just a matter of time before significant difficulties of limited space, poor health and environmental concerns will be evident. Therefore, municipalities, such as the Drakenstein Municipality in the Western Cape, are forced to search for new ways to decrease the amount of waste that end up on the landfills. One solution to this problem is to implement separation at source also called curb side recycling. The Drakenstein Municipality has already implemented such a programme in selected suburbs but finds that participation from households in this Municipality is low. The issue of households' behaviour and choice to participate or not to participate in curb side recycling is one of vital importance.

It is important investigate the factors that encourages or discourage households to participate in the curb side recycling programme. Knowledge of these factors can guide the municipality to put efficient policies in place to increase households' involvement in the curb side recycling programme.

The aim of this study is to investigate the socio-economic determinants that impact the curb side recycling behaviour of the households in the Drakenstein Municipality. This study uses a quantitative approach and primary data obtained through a structured questionnaire of 247 households in the Drakenstein Municipality. This study incorporates a Principal Component Analysis (PCA) to create two indexes that are used as explanatory variables in the binary probit regressions to determine households' behaviour and socio-economic factors that impact the households' choice to participate or not participate in the curb side recycling programme. The results agree with the Theory of Planned Behaviour, that advocate that households' intention to participate in curb side recycling will increase the probability of curb side recycling participation. The results also indicate that the lack of space and the use of social media could increase the probability of households' curb side recycling participation.

In households where women are responsible for the households' waste management activities, the probability of those households' curbside recycling participation is higher than for other households. The results agree with previous research that households with more educated members responsible for the waste management activities tend to increase the probability of household curbside recycling participation. The study further revealed that households with school-going children also have a higher probability to participate in the curbside recycling programme. The results also indicate that households in the Drakenstein Municipality place great value on access to the free curbside recycling bags provided by the Municipality and that access to these bags increases the probability of households' curbside recycling participation significantly.

## TABLE OF CONTENTS

<b>ACKNOWLEDGEMENTS</b> .....	<b>i</b>
<b>DECLARATION</b> .....	<b>ii</b>
<b>ABSTRACT</b> .....	<b>iii</b>
<b>LIST OF FIGURES</b> .....	<b>ix</b>
<b>LIST OF TABLES</b> .....	<b>x</b>
<b>ABBREVIATIONS</b> .....	<b>xi</b>
<b>CHAPTER 1: INTRODUCTION</b> .....	<b>1</b>
1.1 Introduction and background to the study .....	1
1.2 Problem Statement .....	2
1.3 Research question, aims and objectives.....	4
1.4 Significance of the Study .....	5
1.5 Research Methodology .....	7
1.6 Deployment of the Study.....	8
<b>CHAPTER 2: CONCEPTS AND CONTEXT OF CURB SIDE RECYCLING</b> .....	<b>9</b>
2.1 Introduction .....	9
2.2 Definition of key concepts .....	9
2.2.1 Municipal solid waste management .....	9
2.2.2 Recycling and curb side recycling.....	10
2.3 Waste management and curb side recycling in South Africa .....	11
2.4 Curb side recycling in Drakenstein Municipality .....	12
2.5 Summary .....	14
<b>CHAPTER 3: LITERATURE REVIEW</b> .....	<b>15</b>
3.1 Introduction .....	15
3.2 Theoretical Framework.....	15
3.2.1 Theory of Reasoned Action .....	16
3.2.2 Theory of Planned Behaviour .....	16
3.2.3 Theory of Achievement Motivation.....	18
3.2.4 Theory of Propositional Control .....	19
3.2.5 The Model of Altruistic Behaviour .....	19

3.2.6 Media Dependency Theory .....	19
3.3 Determinants of households' curb side recycling .....	21
3.3.1 Intention .....	21
3.3.2 Attitudes towards recycling .....	21
3.3.3 Subjective norm .....	22
3.3.4 Time availability and storage space .....	23
3.3.5 The impact of social media .....	23
3.3.6 Gender .....	24
3.3.7 Age .....	24
3.3.8 Education .....	25
3.3.9 Monthly household income and consumption .....	25
3.3.10 Months lived in the same dwelling .....	25
3.3.11 Household size .....	26
3.3.12 Facilities and lack of resources .....	26
3.3.13 School-going children living in the household .....	27
3.3.14 Knowledge of recycling .....	28
3.4 Summary .....	29
<b>CHAPTER 4: RESEARCH METHODOLOGY .....</b>	<b>30</b>
4.1 Introduction .....	30
4.1.1 Research question, aim and objectives of the study .....	30
4.2 Research design .....	31
4.3 Research methods .....	31
4.4 Sample population, Sampling technique and Sample size .....	32
4.4.1 Sample population .....	32
4.4.2 Sampling technique .....	33
4.4.3 Sample size .....	34
4.5 Data collection .....	35
4.5.1 Data collection instrument .....	35
4.5.2 Data collection procedure .....	36

4.5.3 Ethical issues.....	36
4.5.4 Validity of information .....	37
4.6 Data Analysis .....	37
4.6.1 Econometric model specification .....	37
4.6.1.1 Attitude Index .....	40
4.6.1.2 Subjective Norm Index .....	41
4.7 Summary and Conclusion .....	43
<b>CHAPTER 5: DATA ANALYSIS AND PRESENTATION OF FINDINGS .....</b>	<b>45</b>
5.1 Introduction .....	45
5.2 Household demographics and socio-economic characteristics .....	45
5.3 Household characteristics and curbside recycling participation status .....	46
5.4 Characteristics of households and household member(s) responsible for the waste management activities according to participation status .....	50
5.5 Factors influencing households' curbside recycling participation status.....	55
5.5.1 Households' awareness of the curbside recycling programme.....	55
5.5.2 Sufficient information available on the curbside recycling process.....	56
5.5.3 Months in same dwelling.....	57
5.5.4 Access to free curbside recycling bags.....	59
5.5.5 Households with school-going children.....	60
5.5.6 The use of social media .....	61
5.6 Households' intention to participate in curbside recycling .....	63
5.7 Results of the probit models.....	65
5.7.1 The results of the Attitude and Subjective Norm Indexes using the Principal Component Analysis technique.....	65
5.7.2 Results of the probit model for the behavioural variables .....	66
5.7.3 Results and discussion of the probit models on the socio-economic determinants and households' curbside recycling participation .....	70
5.8 Summary.....	77
<b>CHAPTER 6: SUMMARY AND CONCLUSIONS .....</b>	<b>80</b>
6.1 Introduction .....	80
6.2 Summary.....	80

6.3 Main findings of the study.....	84
6.4 Recommendations .....	85
6.5 Limitations of study and areas for further research .....	87
<b>REFERENCES.....</b>	<b>89</b>
<b>Appendix A .....</b>	<b>100</b>
<b>Appendix B .....</b>	<b>113</b>
B1. Attitude Index.....	113
B2: Subjective Norm Index.....	115

## LIST OF FIGURES

Figure 3.1: Schematic overview of the behavioural theories .....	20
Figure 5.1: Household participation in curb side recycling per suburb ( $n = 240$ ) .....	47
Figure 5.2: Monthly household gross income per suburb ( $n = 184$ ) .....	55
Figure 5.3: Sufficient information available on curb side recycling and the curb side recycling participation status ( $n = 235$ ) .....	57
Figure 5.4: Months living in the same dwelling and the household curb side recycling participation status ( $n = 212$ ) .....	58
Figure 5.5: Access to free curb side recycling bags and household curb side recycling participation status ( $n = 219$ ) .....	59
Figure 5.6: Communication tools that the municipality can use ( $n = 218$ ) .....	63
Figure 5.7: Households' access to free curb side recycling bags and their intention to participate in the curb side recycling programme ( $n = 200$ ) .....	64
Figure 5.8: Path diagram of direct and indirect prediction of households' curb side recycling behaviour ( $N=183$ ) .....	69

## LIST OF TABLES

Table 4.1: Population and sample size per suburb ( $n=240$ ) .....	34
Table 4.2: Dependent and explanatory variables used in the empirical analysis .....	41
Table 5.1: Households' demographics and socio-economic characteristics.....	46
Table 5.2: Households' paper CSR rates per suburb ( $n = 155$ ) .....	48
Table 5.3: Households' plastic CSR rates per suburb ( $n = 155$ ).....	49
Table 5.4: Households' glass CSR rates per suburb ( $n = 155$ ) .....	50
Table 5.5: Characteristics of households and household member(s) responsible for waste management activities according to the CSR participation status.	51
Table 5.6: Results for the probit model analysing the households' curb side recycling participation status and behavioural variables .....	67
Table 5.7: Results for the probit models analysing the socio-economic determinants and households' curb side recycling participation status .....	72

## **ABBREVIATIONS**

CSIR	Council for Scientific and Industrial Research
CSR	Curb side recycling
DEA	Department of Environmental Affairs
EE	Environmental Education
IWMP	Integrated Waste Management Plan
KMO	Kaiser-Meyer-Olkin
MAB	Model of Altruistic Behaviour
MDT	Media Dependency Theory
MRF	Material Recovery Facilities
MSWM	Municipal Solid Waste Management
NEMWA	National Environmental Management: Waste Act 59 of 2008
NWMS	National Waste Management Strategy
PBC	Perceived Behavioural Control
PCA	Principal Component Analysis
SWM	Solid Waste Management
SWMS	Solid Waste Management System
TAM	Theory of Achievement Motivation
TPB	Theory of Planned Behaviour
TPC	Theory of Propositional Control
TRA	Theory of Reasoned Action
WMA	Waste Management Activities
WTE	Waste-to-energy

# CHAPTER 1: INTRODUCTION

## 1.1 Introduction and background to the study

The growing population and increased economic growth coupled with increased consumption rates, as well as “throw-away” habits, have resulted in a generation that produces more waste globally than ever (Oelofse & Godfrey, 2008:259). South Africa is also a country that produces high volumes of waste, in general. South Africa alone produces a daily amount of 54 425 tonne of waste, ranking the country as the 15<sup>th</sup> highest waste producer globally. The amount of waste per capita produced by households roughly amounts to two kilogram per day, ranking South Africa at 38<sup>th</sup> position of waste producers globally in this respect (Business Tech, 2017).

Studies by Anderson, Romani, Wentzel and Phillips (2013:5) and Simatele, Dlamini and Kubanza (2017:123) indicate that developing countries such as South Africa are lagging behind other countries when it comes to waste management. In 2018, only around ten per cent of all waste in South Africa was recycled (StatsSA, 2018), despite the government having identified recycling as a strategic goal towards integrated waste management (Department of Environmental Affairs [DEA], 2011).

Many municipalities in South Africa are now facing serious shortages in available airspace at the landfill, with some municipalities having less than ten years of remaining airspace (Anyasi & Atagana, 2017:1753; Moh & Manaf, 2013:50). This has encouraged these municipalities to vigorously seek more innovative solutions to landfilling that is in line with National Environmental Management: Waste Act 59 of 2008 (NEMWA; Strydom & Godfrey, 2016:1).

Together with this Act, the National Waste Management Strategy (NWMS; DEA, 2011) implemented goals to minimise waste that require changes in the management of waste, including municipal solid waste. One of these goals requires municipalities to initiate waste “separation-at-source” programmes (also called curb side recycling) at household level in all major cities and towns by 2016 (Strydom & Godfrey, 2016:1) to reduce the environmental impact of waste. To support this change in waste

management practices, the municipalities are required to put in place the necessary municipal waste collection services (NEMWA Sections 7(2)(a), 22(2) and 23(2) Republic of South Africa (RSA), 2008).

Despite the efforts that some municipalities have made to increase the amount of recycling at South African household level, the requirements for 2016 was not fully achieved (Strydom & Godfrey, 2016:2).

## **1.2 Problem Statement**

Even though recycling has been broadly encouraged as one of the waste management strategies aimed to reduce the amount of material that needs to be disposed of and to increase the utilisation of valuable waste, recycling participation from households is low (Strydom, 2018:43). Furthermore, not all municipalities have a separation-at-source or curb side recycling (CSR) programme in place, as envisaged by the NWMS.

Strydom and Godfrey (2016), together with the Council for Scientific and Industrial Research (CSIR), assessed whether household recycling behaviours have improved in South Africa. In 2010, their first National Survey on Household Waste Recycling Behaviour in South Africa was conducted, and another in 2015. The results indicate that the percentage of dedicated recycling households in large urban areas doubled in the five years but remained very low at 7.2 per cent (Strydom & Godfrey, 2016:5). Rural areas and smaller towns have households that lag further behind in terms of constant and dedicated recycling behaviour, with a household participation rate of only 2.6 per cent (Strydom & Godfrey, 2016:9).

Ittiravivongs (2011:437) explained that the success of the recycling programmes are dependent on the continuous involvement of people. In agreement with this, authors Anyasi and Atagana (2017:1754) and Strydom and Godfrey (2016:1) found that it was easier for households that already participated in a CSR programme to increase their recycling (in terms of quantity and diversity) than for non-participating households to start participating in such a programme. The challenge is to shift the households' intention and motivation to recycle into actual recycling behaviour and to implement effective and efficient policies and services to support the ongoing recycling behaviour.

These South African studies cover household behaviour and patterns in CSR on a national level but research on understanding the recycling decisions of households within a particular municipality, such as the Drakenstein Municipality in the Western Cape Province, is rare, despite its necessity. In response to this need, this study aims to investigate the socio-economic determinants influencing recycling behaviour of the households in the Drakenstein Municipality in the Western Cape. It is important to investigate and understand what motivates people to recycle and what discourages them from doing so, as this is the first step towards increasing participation. Recognising the obstacles and incentives are key to understanding people's recycling behaviours and habits (Oyekale, 2018:2366; Strydom & Godfrey, 2016:1). Only once the behaviour behind household recycling choices are understood, can the most efficient policies be put in place to encourage households to be more involved in CSR programmes.

There are many international studies including those in Japan (Kuo & Perrings, 2010), Malaysia (Akil, Foziah & Ho, 2015) and India (Jayasubramanian, Meenakshi Saratha & Divya, 2015) that discuss either the behaviours of households or the willingness to pay for CSR programmes. A study by Morris and Holthausen (1994) established a household production model of waste decision-making and characterised the recycling behaviour of households. This study aims to demonstrate that the socio-economic characteristics of households influence their decision to participate in recycling programmes.

Ekere, Mugisha and Drake (2009:3048-3050) found that peer influence, the gender of the person in the household involved in recycling and the location of a household had a significant effect on the household's recycling behaviour in the Lake Victoria crescent of Uganda. The study further found evidence that females, in the household, were more likely to be more involved in recycling activities than males. Moreover, their evidence suggests a positive relationship between income and education levels and recycling involvement.

Studies by Jakus, Tiller and Park (1996: 104; 1997:143) in the United States of America (USA) indicated that older people are more likely to recycle than younger people. Matsumoto (2011: 237) found no relationship between recycling behaviour and age in Japanese municipalities. Jakus *et al.* (1996:107; 1997:144) further found

that recyclers had higher incomes than non-recyclers, and that storage, space and time influenced participation rates in the USA.

The results of these previous studies and the methods incorporated are used in this study to identify the socio-economic characteristics of recyclers and non-recyclers from different regions and countries and to compare the different views and opinions of these groups. Different studies use different determinants and thereby find different results in different regions that justify area-specific studies. This study aims to fill this gap in the literature.

This study is a case study that assesses the socio-economic determinants of households' CSR behaviour in the Drakenstein Municipality but also seeks to include as socio-economic determinants, the impact that the availability of recycling resources and the effect of social media has on the choice of households to participate or not to participate in the CSR programme in the municipality. This study, furthermore, also incorporates the spillover effect that the presence of school-going children in the household has on the CSR participation behaviour of the household.

### **1.3 Research question, aims and objectives**

The research question is: *What are the socio-economic determinants of households' curb side recycling behaviour in Drakenstein Municipality?*

To recommend policies to the Drakenstein Municipality on how to improve household participation in its CSR programme, the following sub-questions need to be answered.

- ❖ *How can the Drakenstein Municipality encourage households to participate in its CSR programme?*
- ❖ *Is there a spillover effect in the household when there are school-going children present in the household?*
- ❖ *Can social media be used to encourage and inform households of CSR programmes?*
- ❖ *How does the households' intention, attitude and subjective norms affect their CSR behaviour?*

❖ *What assistance do households require from the municipality to be able to participate in the CSR programme?*

The aim of this study is to investigate the socio-economic determinants that impact the behaviour of household CSR participation. In order to fulfil this aim, the first objective of this study is to provide an overview of important concepts of CSR and the context of the CSR programme in the Drakenstein Municipality.

The second objective is to undertake an in-depth literature review using local and international studies to explore and identify the socio-economic factors that determine households' choice of whether or not to participate in the CSR programme, based on various behavioural theories, previous studies and empirical results. The factors identified in the literature as possible determinants of household recycling behaviour are included in the construction of the questionnaire.

The third objective is to describe and analyse the data obtained for the study to assess the socio-economic determinants that encourage households in the Drakenstein Municipality to participate in the CSR programme, as well as the significance of the results. The results will inform the best possible solutions and recommendations to increase CSR participation in the Drakenstein Municipality.

The data will then be used to create the most effective and efficient policies and recommendations to increase household participation in the CSR programme in the Drakenstein Municipality.

#### **1.4 Significance of the Study**

The issue of households' behaviour and choice to participate or not to participate in CSR is one of vital importance. The past decade has seen an upsurge in research on environmental sustainability, with increasing talks on serious environmental concerns such as greenhouse effects, climate change, water and air pollution, matters that become more prominent for the future of the world (Anyasi & Atagana, 2017:1751; Kim & Choi, 2005:592). Waste is a major environmental problem faced by many societies and is fast becoming a concern not only locally, but on an international scale.

With annual increases in waste generation rates and municipalities' significant dependence on landfilling as a method of disposal (Moh & Manaf, 2013:50), it is just a matter of time before significant difficulties of limited space, poor health and environmental concerns will be evident.

Waste disposal did not previously pose as such a big concern, since the population sizes were smaller and the land was plenty for the assimilation of solid waste (Tchobanoglous, Theisen & Vigil, 1993:146). With increasing population sizes and urbanisation, the land left is increasingly becoming scarcer, even to serve the purpose of providing space for waste disposal (Moh & Manaf, 2013:50). Therefore, municipalities are forced to search for new ways to decrease the amount of waste that ends up in landfills.

If these landfills are not managed appropriately, it causes concern for human health and surrounding environment, which in turn will have a negative impact on the economy. Waste that is not managed appropriately can result in negative externalities and downstream costs, which are often much higher than the cost of appropriately managing waste in the first place (Nhamo, 2009:121; Schenck, Blaauw, Swart, Viljoen & Mudavanhu, 2019:89). There is, therefore, a need to better understand the habits of the biggest generators of municipal waste, the household, to increase the separating and recycling of waste and to decrease the amount of waste that ends up in landfills (Akil & Ho, 2014:2).

The results and findings of this study might contribute to policies towards environmental sustainability and will provide the Drakenstein Municipality with information on the socio-economic determinants that motivate or discourage households in their Municipality to participate in the CSR programme. It will guide them in how best to communicate recycling initiatives and programmes to households. It will further shed light on aspects on how to encourage households to participate in the CSR programme and how to assist them to increase household participation.

This study will be area-specific, unlike the other studies in South Africa. Henry, Yongsheng and Jun (2005:99) explain that in developing countries, solid waste policies should be area-specific in order to provide solutions to the unique problems

faced by specific municipalities. An area-specific study will assess the recycling challenges faced by people in the same demographic area as certain factors may vary from area to area (Lehman & Geller, 2004:19). In this way the challenges and possibly the solutions will become area specific.

This study further expands on previous studies and seeks to analyse whether social media and the availability of recycling resources have a significant impact on households' CSR behaviour. It also aims to provide a clearer understanding of the impact that the presence of school-going children has on the household's decision to participate in the CSR programme.

### **1.5 Research Methodology**

This area-specific study focuses on the Drakenstein Municipality. The reason for choosing this municipality is that it forms part of a larger CSIR-funded project in which four municipalities were identified for the research on how to change the behaviour of the household and community in the municipality. To collect the necessary information to answer the research question, a structured household-level questionnaire with a combination of closed-ended and open-ended questions was created. To investigate the research questions, a case study design and quantitative research method were incorporated.

The questionnaire consists of eight sections. The first section asks general questions on the participant and the household characteristics. The next section assesses the household's behaviour, participation in, and opinions of the CSR programme. There is a section that determines whether the presence of school-going children and social media encourages households to participate in CSR, and the last section seeks to find ways in which municipalities could encourage and motivate household participation in the CSR programme.

This study uses the empirical framework of Ittiravivongs (2011) in applying the Principal Component Analysis (PCA) technique. The logistic regression models in Ittiravivongs's (2011) study will be replaced with binary probit models to determine the socio-economic determinants that influence the behaviour of households' CSR and to assess the significance thereof. A PCA is used to examine the empirical dimensions of the data obtained, measured on ordinary scales (Ittiravivongs, 2011:440). The aim

of using the PCA is to create two indexes that represent different aspects of households' recycling behaviour. These indexes are included in the binary probit model as explanatory variables.

## **1.6 Deployment of the Study**

The remainder of this study is structured as follows: Chapter two will provide an overview of important concepts of CSR and contextualises the CSR programme in the Drakenstein Municipality. Thereafter, Chapter three will seek to present an in-depth literature review (locally and internationally) to provide a theoretical framework of the behavioural theories and the socio-economic factors that determine households' choice to participate in or ignore recycling initiatives as identified in previous studies. These factors guided the construction of the questionnaire. The fourth chapter will analyse the data obtained using a PCA and probit regressions to determine the socio-economic determinants that encourage households in Drakenstein Municipality to participate in the CSR programme, as well as the significance thereof. In the fifth chapter, a discussion of the results will follow to determine the best possible policy solutions for the Drakenstein Municipality. This study will conclude with policy recommendations and concluding remarks in Chapter six.

## **CHAPTER 2: CONCEPTS AND CONTEXT OF CURB SIDE RECYCLING**

### **2.1 Introduction**

This chapter provides an overview of important concepts and definitions of CSR and the context of the CSR programme in the Drakenstein Municipality. Households are one the major generators of municipal solid waste (MSW) and a significant role-player in the management of this waste. It is predicted that by 2025, Africa's urban waste generation will reach 441 840 tonne per day. This is due to the exponential increase in population growth that brings with it increased consumption rates that encourages excessive packaging and a throw-away generation that increases the waste problem and puts pressure on the limited resources and the environment (Oelofse and Nahman, 2019:23).

By providing a brief overview on existing household solid waste recycling policies and CSR programmes in South Africa and in Drakenstein Municipality, this will offer a clearer understanding on CSR practices in South Africa, and more specifically the Drakenstein Municipality.

Municipalities are faced with significant challenges in a changing environment. The municipalities are responsible to collect, recycle, treat and dispose of growing quantities of solid waste (Akil & Ho, 2014:2). Household sustainable solid waste management (SWM) is a demanding task. It requires a change in public behaviour to minimise the quantity of their waste while simultaneously increasing the recycling rate (Ogwueleka, 2009:174).

### **2.2 Definition of key concepts**

#### **2.2.1 Municipal solid waste management**

Municipal solid waste management (MSWM) incorporates the responsibility of collecting, transferring, recycling and treating of household waste and thereby increasing and sustaining the productivity of the environment (Ogwueleka, 2009:174). Key functions of MSWM are to protect the health of the community in the municipality,

to promote pro-environmental behaviour, maintain a sustainable environment and to provide support to economic productivity (Henry *et al.*, 2005:93). For SWM to be successful, sustainable solid waste management policies must be fully embraced by households and businesses. According to Henry *et al.* (2005:93) MSWM still remains inadequate in countries such as South Africa. Sustainable economic development implies that municipalities need to be able to manage their production and disposal of waste. To achieve efficiency and to return as much of the waste as possible to the economic cycle, re-using and recycling is of utmost importance (Miafodzyeva, 2012:1). Therefore, recycling is a key component in the management of MSWM (Henry *et al.*, 2005; Miafodzyeva, 2012; Ogwueleka, 2009).

### 2.2.2 Recycling and curb side recycling

Recycling is at the heart of an effective and efficient solid waste management system (SWMS; Ho, 2002:2). The term recycling is defined as “the process through which materials previously used are separated, collected, processed, remanufactured, and reused” (Akil & Ho, 2014:2; Shultz, Oskamp and Mainkieri, 1995:105). Two types of recycling procedures have been developed for the general recycling products such as glass, cardboard, paper and plastics, namely primary and secondary recycling. Primary recycling or CSR is when waste that is discarded by consumers and households is separated into wet waste and dry waste. The recycled products (mostly the dry waste) are then used to produce new products. Secondary recycling is responsible for converting these products into different products (Ho, 2002:2).

Secondary recycling is estimated to reduce virgin material by 25 per cent at most, whereas CSR can reduce the volume of virgin material in a product by 20 per cent to 90 per cent (Miller, 2000:588). CSR is an important solid waste reduction and management strategy and further supports the reduction of the amount of waste going to landfills and incinerators. This method decreases resource throughput, as using recycled material means reducing the amount of virgin resources needed to manufacture new products (Ho, 2002:2). Only 3.3 per cent of South Africa’s urban population recycles household waste (Anyasi & Atagana 2017:1753). The low levels of household CSR therefore require closer examination (Du Toit, Wagner & Fletcher, 2017:2034).

### **2.3 Waste management and curb side recycling in South Africa**

CSR is a relatively new area into which municipalities in South Africa are venturing by encourage households to separate their waste (Du Toit *et al.*, 2017:2033). Increasing household participation will assist municipalities in managing waste and recycling, which in turn could buy some landfills a few more years (Anyasi & Atagana, 2017:1751).

Legislation and declarations have been implemented to guide waste management activities in South Africa (Etengeneng, 2012:6). The South African Constitution states in Section 24, “that all South African citizens have the right to an environment that will not be detrimental to their health” (Constitution of the Republic of South Africa, 1996) and therefore local municipalities are responsible for the implementation and oversight of waste management activities to keep the environment clean. In other words, the local municipality is responsible for the collection and disposal of waste.

The National Domestic Waste Collection Standards encourages CSR as a means of diverting waste away from landfills towards recycling and recovery (DEA, 2011:16). The Standards explain in Section 4.1 that “separation at source must be encouraged and supported in line with the relevant industry waste management plans”, with all household waste being sorted at source. The Standards further outline that municipalities “must provide an enabling environment for households to recycle domestic waste which could include curb side collection and/or well-kept drop-off centres within easy reach distance” (DEA, 2011:16). Furthermore, a working relationship between municipalities and the recycling sector is encouraged to ensure the effective and efficient provision of facilities and resources for households to participate in recycling activities (Strydom & Godfrey, 2016:1).

Furthermore, the NEMWA (2008) was updated in line with Agenda 2063 to divert 50 per cent of all waste from landfills and to achieve a 50 per cent household recycling participation rate by 2023 (Dlamini, Rampedi & Ifegbesan, 2017:1836). For such an ambitious goal to be reached, CSR becomes essential and household participation in such programmes therefore becomes crucial for a successful outcome.

Notwithstanding governments efforts, South Africa's recycling industry is still in its infancy stage with waste recycling lagging significantly behind that of developed countries (Waste-to-energy [WTE], 2017:3). In South African municipalities, like many other developing countries, there is a lack of facilities to adequately manage municipal waste (Strydom, 2018:1). Strydom (2018:1) further explains that an estimated 90 per cent of household waste still ended up in landfills in 2011. Diverting these recyclables from the landfills and keeping resources in use for as long as possible through their reuse, recycling and recovery is a worldwide obstacle (Dlamini *et al.*, 2017:1847).

Recycling, waste avoidance and waste minimisation have been encouraged by both local and provincial policies and legislation, but still remain somewhat voluntary activities in South Africa as implementation of these policies is an enormous task. Currently, it is not financially viable for most municipalities in South Africa, nor do they have the human resource capacity to enforce their by-laws. The benchmark provided by developed countries shows that the focus should be moved away from landfilling and directed to recycling and CSR is an evolutionary process that takes years of constant waste education and commitment from households to emerge as a solid foundational pillar of waste reduction to landfills (WTE, 2017:4).

In 2014 the waste sector in South Africa was identified for having significant job creation potential and contributing to the macro economy of South Africa and other countries in the region. However, if the recycling and waste management sectors of South Africa is not optimised, as a result of the minimal information available to people on recycling, this job creation and economic growth potential will remain far-fetched (Anyasi & Atagana, 2017 :1754).

#### **2.4 Curb side recycling in Drakenstein Municipality**

The Drakenstein Municipality is situated in the Western Cape province within the Cape Winelands district of the Republic of South Africa and is one of the local municipalities that already has a CSR programme in place.

Similar to many municipalities in South Africa, Drakenstein Municipality faces an immediate problem with landfill space decreasing at a rapid rate and the quantity of waste generated increasing at an exponential rate. The Drakenstein Municipality's

Wellington landfill will reach its capacity by 2022 at current waste disposal rates, thus calling for a combined waste management approach. However, in the absence thereof, this municipality will in the near future, at significant transport and disposal costs, divert their waste to one of the landfills in the City of Cape Town (WTE, 2017:3). An on-going discussion in South Africa, and in Drakenstein, looks at the impact that CSR can have on reducing the waste volumes going to landfills. Environmental activists believe that CSR, if implemented efficiently, is the key means necessary to adequately reduce the quantity of waste, in an attempt to extend the lifespan of the Wellington landfill site (WTE, 2017:1).

In accordance with NEMWA (Act 59 of 2008) and the Integrated Waste Management Plan (IWMP), the Drakenstein Municipality is actively encouraging pro-environmental behaviour, minimisation of waste and recycling through environmental education (EE) programmes at schools. However, Drakenstein Municipality agrees with Ittiravivongs (2011:437), that it needs the support of households to make the CSR programme a sustainable success. The municipality therefore seeks ways to encourage and support households to participate in the CSR process to increase the CSR programme's effectiveness and to minimise waste that ends up in the landfill (WTE, 2017:4).

In Drakenstein the CSR programme has been in place in selected suburbs for the last five years. Once per week, the households put out their mixed waste along with the clear CSR bags with recyclables for same-day collection. The clear CSR bags are for separating cardboard, plastic, paper, tin and glass from the normal wet waste. A clear bag system is used to encourage the separation of dry recyclables from the other household waste (WTE, 2017:2). The municipality provides the free clear CSR bags to the households on a weekly basis. Every bag that the household leaves out for collection is replaced by an empty clear CSR bag. In other words, if the household leaves two clear CSR bags for recycling collection, the municipal workers will leave two new clear bags for the household.

Once it is collected from the households, it is taken to the material recovery facilities (MRF) at the landfill. There are two types of MRFs, a "dirty" MRF and a "clean" MRF. A "dirty" MRF (where mixed-waste is processed) receives the households' black bags collected by municipal trucks. Through both manual and mechanical sorting, recyclables such as metal, glass, plastic and paper objects are separated. A "clean"

MRF receives the households' clear CSR bags with recyclables already partially separated and these items are then further separated. A "dirty" MRF recovery rate is normally higher than that of MRF's that are "clean" because 100 per cent of the waste stream is sorted and separated, which targets a larger number of materials for recovery. The downside of a "dirty" MRF, however, is greater contamination of recyclables, especially paper, as well as higher operational costs (WTE, 2017:2), which lowers the value of the recyclables.

Six suburbs in the Drakenstein Municipality (referred to as Suburbs A to F in this paper) form part of this study as the CSR programme is in place in these suburbs.

## **2.5 Summary**

This overview provides an important background for the chapter to follow. It discussed the importance of CSR in the Drakenstein Municipality in helping to gain time for the Wellington landfill by reducing some of the waste that is dumped into it. This chapter highlighted some laws and policies that are already in place in South Africa aimed at gaining a higher rate of household participation in CSR by 2023. In the chapter, important concepts of CSR in South Africa, specifically in the Drakenstein Municipality, were discussed. In Chapter three, studies from national and international literature will be discussed to understand the households' recycling behaviour and to identify socio-economic determinants that influence a household's decision to participate in a CSR programme.

## CHAPTER 3: LITERATURE REVIEW

### 3.1 Introduction

This chapter aims to identify, from various theories, studies and empirical results, the factors that might determine a household's recycling behaviour, or the absence thereof. The literature review will cover previous local and international studies to identify the different determinants and opposing opinions that need to be considered when studying households' recycling behaviour in the Drakenstein Municipality. This chapter is separated into two main parts. The first part will analyse the theories on household behaviours relating to recycling and the second part will analyse the socio-economic determinants of households' participation in recycling programmes.

### 3.2 Theoretical Framework

A variety of theories are used to analyse recycling behaviour. These theories could also be incorporated to understand the motivation behind households' decision to participate in CSR (Akil *et al.*, 2015:126; Boldero, 1995:440; Miafodzyeva, 2012:3). According to Thøgersen (1996:536-537), there are two broad theoretical approaches to sum up households' CSR behaviour. The first approach assumes that individuals are *utility maximisers*, which means that their choices are motivated by benefits and costs. According to this assumption, household recycling behaviour can be controlled through a reward and punishment system as determinants of recycling behaviour (Lehman & Geller, 2004:21; Miafodzyeva, 2012:3).

The second approach can be described broadly as an *attitude approach* (Kurz, Linden & Sheehy, 2007:368; Mannetti, Pierro & Livi, 2004:227; Miafodzyeva, 2012:3; Saphores, Nixon, Ogunseitani & Shapiro, 2006:186;) and takes individuals' beliefs, attitudes and intentions into account when explaining their behaviour. Past studies on this approach are focused on analysing and understanding the cognitive determinants of behaviours (in the case of this study, recycling behaviour). This approach has typically been dominated by Ajzen (1985) with his popular 'Theory of Planned Behaviour'. Other theories that also discuss the complexity of human behaviour in recycling include the 'Theory of Reasoned Action' (Fishbein & Ajzen, 1975), the

'Theory of Achievement Motivation' (Atkinson, 1964), the 'Theory of Propositional Control' (Dulany, 1968), the 'Model of Altruistic Behaviour' (Schwartz, 1977), and the 'Media Dependency Theory' (Ball-Rokeach & DeFleur, 1976). Each of these is discussed in more detail in the sections that follow.

### 3.2.1 Theory of Reasoned Action

The Theory of Reasoned Action (TRA) was put forward by Fishbein and Ajzen (1975) and is the forerunner of the Theory of Planned Behaviour (Ajzen, 1985). As the name suggests, it assumes that humans will, under normal circumstances, behave in a rational manner (Ajzen, 1985:12). TRA predicts specific intentions and behaviour. This theory finds that social pressures and attitude are the determining factors of the individual's intention to perform a certain task (Miafodzyeva, 2012:3). Individuals have the intention to perform a certain task if they have a positive evaluation of the task and if the household (in the case of this study) believes that other people will perceive their action as acceptable (the subjective norm). The subjective norm is defined as the pressure to behave in a certain way felt by individuals (or households as a collective, in this study) based on social pressure, judgements and beliefs from other members of their community (Strydom, 2018:3).

Numerous studies have used TRA to measure recycling attitudes, intentions, perceived social norms and cost-benefit beliefs (Goldenhar & Connell, 1993; Jones, 1990; Kok & Siero, 1985; Thogersen, 1994). The majority of these studies determined that the intention to recycle depends on the attitude toward recycling, while social norms seems to have a less significant impact than attitude in most cases.

This theory has been heavily criticised due to the assumption that individuals have *volitional control*, meaning that the individual will act as a rational being (Do Valle, Rebelo, Reis & Menezes, 2005:366). Due to this critique, the theory was adjusted by Ajzen, giving rise to the Theory of Planned Behaviour.

### 3.2.2 Theory of Planned Behaviour

The Theory of Planned Behaviour (TPB), proposed by Ajzen (1985), may be used to explain pro-environmental behaviour and participation (Tonglet, Phillips & Read, 2004:192), such as CSR. TPB, as an extension of the TRA, includes Perceived

Behavioural Control (PBC). TPB can be defined as the intention to perform a certain way, rather than the actual performance of the behaviour (Ajzen, 1991:182). In TPB, behavioural achievement depends on intention or motivation and ability, and therefore expands on the limitations of the previous theory to include the fact that people act as rational beings (Ajzen, 1991:181; Fishbein & Ajzen, 1975:180). A key factor in the TPB is the individual's intention to behave in a certain manner. Furthermore, this theory explains that intention will capture the motivational aspect that influences the individual's behaviour (Miafodzyeva, 2012:5). It sheds light on how much effort the individual will give to a certain task and how willing he or she is to try to perform the task (Mahmud & Osman, 2010:122). The general rule that is followed in this theory is that the stronger the intention to participate in an activity, the stronger the motivation will be, and ultimately the stronger the performance will be (Ajzen, 1991:181). TPB hypothesises that the immediate determinant is the individual's intention to perform, or not to perform, a particular task (Mahmud & Osman, 2010:122). This model discusses three key concepts:

- i. *Attitude*- The behaviour towards recycling is defined as the individual's degree of liking or disliking a behaviour, which will guide him or her in a consistent behavioural response (Ho, Liao & Rosenthal, 2015:80). Attitude is a key factor in the determination of recycling behaviour, such as having enough knowledge about recycling and the correct facilities to recycle (Tonglet *et al.*, 2004:193).
- ii. *Subjective norms* – It relates to how the behaviour of recycling changes, based on the opinions of others. Subjective norms are defined as the perception that individuals have of others' behaviour and the perception of others' approval or disapproval of a specific behaviour (Ho, *et al.*, 2015:80). Behavioural changes in recycling could also be observed through awareness campaigns and educational programmes.
- iii. *Perceived Behavioural Control (PBC)* – This examines how the individual feels about his or her recycling behaviour and can be defined as one's judgement of one's own ability to perform a specific task (Ho, *et al.*, 2015:80).

According to TPB, these three concepts have a direct influence on the individual's behaviour and can therefore be used to directly predict behavioural achievement

(Ajzen, 1991:180). This theory suggests that it is possible to assume that if the household has a positive attitude towards CSR, other households in the neighbourhood will also have a positive attitude towards CSR due to subjective norm. Therefore, TPB analyses how the resources and opportunities available will increase the likelihood of behavioural achievement (Ajzen, 1991: 183).

A study (Taylor & Todd, 1995) found that PBC influenced the recycling intention and recycling attitude, moreover, this study found that subjective norms were negatively influenced. Furthermore, Boldero (1995) stated that attitudes and intentions directly predicted recycling behaviour, as did inconvenience of recycling and past behaviour.

As a theoretical framework, the TPB is used to show the relationships between the three key concepts (attitude, social norms and PBC) and the act of recycling, as determinants of recycling intention, as well as recycling behaviour. This implies that, if households in the Drakenstein Municipality demonstrate a positive attitude towards recycling, this will have a direct and positive effect on their intention to recycle.

A key element in the TPB is PBC, which focuses on the perception of behaviour and the impact it will have on intention, motivation and action (Ajzen, 1991:183). PBC describes the perception the individual has on the ease or difficulty of performing a certain task and is a reflection of people's confidence in performing that task. It has an additional effect on the individual's intention to act without analysing his or her attitude or subjective norm (Strydom, 2018:3). Based on the PBC theory, it can be assumed that a household with a high PBC should also have high intentions and motivations to participate in curb side recycling. However, intentions could be influenced by other determinants as well, and it is therefore possible that two households with different PBCs can have equally strong intentions and motivations to recycle.

### 3.2.3 Theory of Achievement Motivation

A key factor in the PBC is the Theory of Achievement Motivation (TAM; Atkinson, 1964:335). TAM explains the expectancy of success. In other words, if the individual feels that there is a higher likelihood at being successful in performing a task, there is a higher probability that the individual will participate in that task. This theory is of the opinion that individuals' behaviour is strongly influenced by their confidence in their ability to perform a certain task successfully (Ajzen, 1991:184).

### 3.2.4 Theory of Propositional Control

The Theory of Propositional Control (TPC) was developed by Dulany (1968) and deals with the Behavioural Intention (BI) of an individual, which is dependent on their motivation to perform an action. This theory emphasises the value of an individual's beliefs.

### 3.2.5 The Model of Altruistic Behaviour

Schwartz's (1977) Model of Altruistic Behaviour (MAB) explains behaviour in terms of social norms, awareness of consequences and acknowledgement of responsibility. This model finds that social norms do not influence the individual's behaviour directly. Instead, actions are influenced by altruistic behaviour (Do Valle *et al.*, 2005:368). This theory predicts that members of a household will participate in waste separation because they feel that it is the right thing to do and that they have a moral responsibility to do so (Miafodzyeva, 2012:7). The key to Schwartz's (1977) theory is that households who feel morally obligated to participate in waste separation will do so only if they believe that this action will have positive consequences (Do Valle *et al.*, 2005:368).

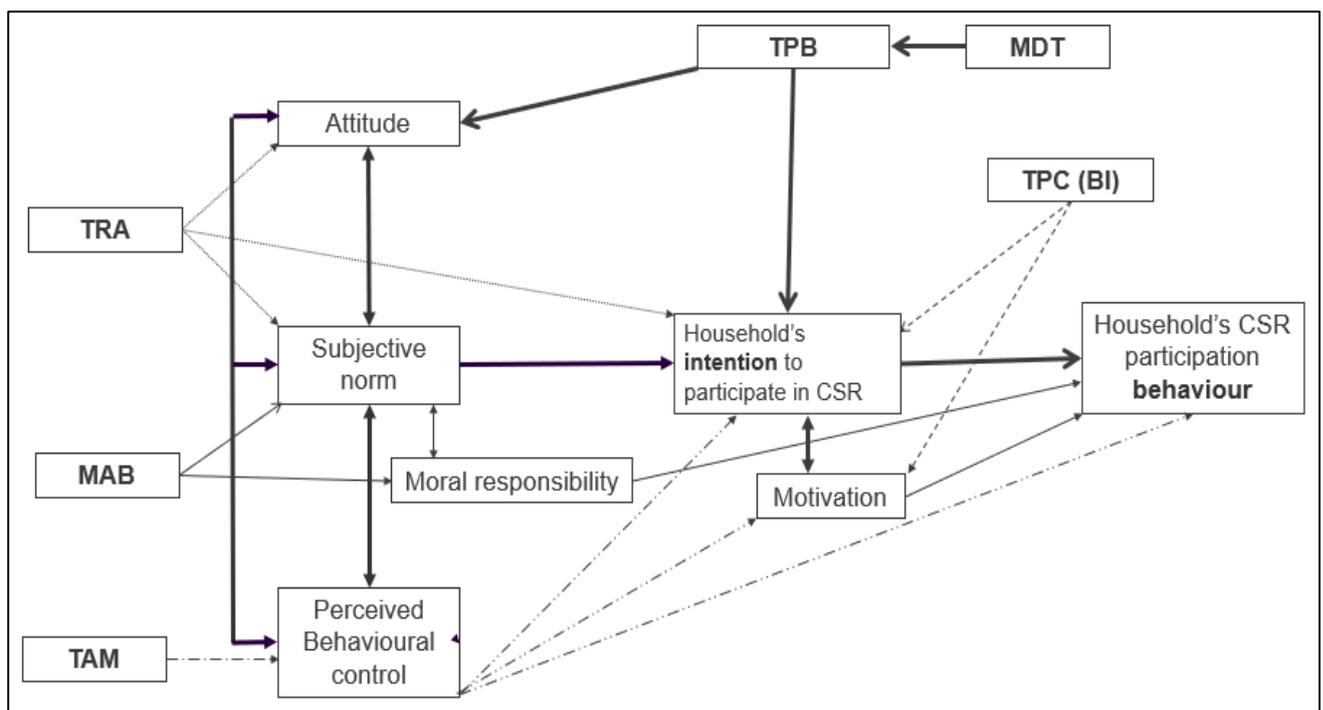
The MAB has been applied to recycling behaviour studies (Hopper & Nielsen 1991; Nielsen & Ellington 1983; Vining & Ebreo, 1992) and found that personal norms have a greater ability to influence recycling behaviour if the individual's awareness of the consequence of his or her behaviour is high (Miafodzyeva, 2012:7).

### 3.2.6 Media Dependency Theory

Media Dependency Theory (MDT) incorporated the TPB and adds the use of media (Ball-Rokeach & DeFleur, 1976). In other words, the MDT analyses attitudes, social norms and PBC, as well as media usage and media dependency, and determines how this impacts behavioural intentions (Ho *et al.*, 2015:78). MDT makes the assumption that individuals rely on mass media for information and this dependency has been shown to predict the changes in individuals' attitudes and behaviours (Lowrey, 2004:340). Lowrey (2004) studied media dependency in the USA after the terrorist attacks of 11 September 2001 and found that media dependency significantly

predicted the changes in individuals' attitudes and behaviour. This theory suggests that the stronger the dependency is on a particular message, the greater the likelihood that the message will influence the individual's behaviour and attitude. Although past studies have incorporated this theory to study the significance of MDT in crisis times, this theory could also be used to see how significant media dependency could be in gaining knowledge on waste separation in households. According to this theory, it is plausible to assume that extensive coverage of separation-at-source programmes could increase the awareness and knowledge of the households.

Figure 3.1: Schematic overview of the behavioural theories



Source: Own illustration based on Ajzen (1985); Atkinson (1964); Ball- Rokeach and DeFleur (1976); Dulany (1968); Fishbein and Ajzen (1975); Schwartz's (1997);

Figure 3.1 shows the schematic overview of these theories, including the various antecedents and factors that may influence CSR behaviour. The CSR behaviour in Drakenstein Municipality will be analysed based on all these theories. The next section will report on the different determinants such as intention, attitudes towards recycling, subjective norm, time availability and storage space, the impact of social media, gender, age, level of education, income, months lived in the same dwelling, household size, facilities and resources, presence of school-going children in the household, and knowledge of recycling as found in the literature.

### **3.3 Determinants of households' curb side recycling**

Many studies found opposing results for determinants of recycling in different regions (Matsumoto, 2011:326). It can therefore be assumed that the results between municipalities and even within municipalities (between suburbs) will differ, as the sociodemographic and socio-economic characteristics in each suburb vary. Results from these studies highlight the important determinants that should be investigated to determine which socio-economic determinants influence the households' recycling behaviour in the Drakenstein Municipality.

Previous empirical studies such as those by Ittiravivongs (2011), Jakus *et al.* (1996) and Strydom and Godfrey (2016) demonstrate that the households' socio-economic characteristics influence their participation in recycling programmes. Some studies found these determinants to be significant contributors to the household's decision to separate waste, while others found them to be insignificant.

#### **3.3.1 Intention**

The TRA and TPB states that if the individual's intention to recycle is high, it is more likely that the individual will actually participate in recycling activities (Ajzen, 1985:11; Fishbein & Ajzen, 1975:907). A South African study found that, if it is easy for the households to participate in waste management activities (WMA), the intention to recycle will be much higher (Strydom, 2018:15). Additionally, Ittiravivongs (2011:444) showed how significant intention to recycle is to actual recycling behaviour in Thailand.

#### **3.3.2 Attitudes towards recycling**

Multiple studies (Gamba & Oskamp, 1994:587; Hornik, Cherian, Madansky & Narayana, 1995:120; Scott, 1999:277; Vining & Ebreo, 1992:1585) suggest that environmental concern and recycling has a positive relationship. When looking at recycling-specific attitudes, Vining and Ebreo (1992:1583) found that attitudes regarding the significance and the inconvenience of recycling directly impact the actual recycling. Strydom (2018:16) found that South Africans had an overall negative attitude towards recycling and that they need a positive attitude to increase CSR

participation. Ho *et al.* (2015:95) found that attitude and PBC in Singapore played a significantly positive role towards more pro-environmental behaviour.

Barr, Ford and Gilg (2003:408) agree that for government policies on recycling to be successful, the attitude of people is imperative for the targets to be met. The study further highlights that British households are more likely to participate in CSR if they have access to a structured CSR scheme (Sternier & Bartelings, 1999:473). Besides improved education, increasing the accessibility and quality of recycling facilities available to households, is one of the ways of creating positive attitudes towards recycling, because it helps to remove some of barriers that may be preventing households from recycling (Omran, Mahmood, Abdul Aziz & Robinson, 2009:278).

A study by Grodzinska-Jurczak, Bartosiewicz, Twardowska & Ballantyne (2003:107) also revealed that in Poland the environmental attitudes of young adults play a key role as they are the ones who will be directly responsible for providing solutions to future environmental concerns. This study indicated that Polish citizens had a somewhat negative attitude towards the effectiveness of their individual efforts and that the majority of the citizens indicated that the responsibility of recycling was with the municipality to make quality environmental improvements. Therefore, the authors believed that, not only knowledge, but attitude are key contributors to increasing recycling participation (Grodzinska-Jurczak *et al.*, 2003:120).

### 3.3.3 Subjective norm

Previous studies and theories, such as the TPB, indicate that the recycling behaviour of people is considerably influenced by the subjective norm and social groups with which they choose to surround themselves (Do Valle, Reis, Menezes & Rabelo, 2004:522; Hornik *et al.*, 1995:120). External factors such as the opinions of the peers play an important part in raising awareness and effecting change in recycling participation (Tonglet *et al.*, 2004:198). Schwartz (1977:224) states that personal norms are essentially influenced by social norms, consequently producing an indirect influence on separation-at-source behaviour. These indirect influences were observed in studies such by Hopper and Nielsen (1991) and Bratt (1999).

Nixon and Saphores (2009:257) and Oskamp, Harrington, Edwards, Sherwood, Okuda and Swanson (1991:511) found that individuals who received waste separation information from family and friends were 7.3 times more likely to recycle, whereas, receiving information from print media, school or work makes households five times more likely to participate in waste separation in the USA. Their findings suggest that simply relying on television or radio advertising does not seem to make a difference but rather, when family is involved in recycling activities, it will encourage more participation. In South Africa, Strydom (2018:17) found that a majority of the individuals indicated that they experienced a lack of social pressure to participate in recycling.

#### 3.3.4 Time availability and storage space

Kuo and Perrings (2010:435) learnt that people from Taiwan typically dislike partaking in recycling as they see it as a waste of time. According to a study from South India, the biggest barrier for people when separating waste, was time constraints. Saphores, Nixon, Ogunseitan and Shapiro (2006:196) showed that both time cost and storage space negatively influenced participation rates in the USA.

The PBC explains that individuals are more prone to participate in recycling initiatives if they are easy to carry out and if there are no unnecessary complications that prevent them from participating. Akil *et al.* (2015:126) agree with the PBC and found that recycling participation could be increased if households and individuals do not face the obstacles of space, time and inconvenience.

#### 3.3.5 The impact of social media

A study from Singapore showed that media dependency and media attention on waste management positively contributed to pro-environmental behaviour (Ho *et al.*, 2014:81). The environmental authorities used mass media to start campaigns that were aimed at raising awareness and, through this, motivate environmentally responsible behaviour. The authors found that when individuals watched relevant information on national television, such as fact-based programmes or documentaries, it had a positive effect on the individuals' pro-environmental behaviour (Ho *et al.*, 2014:81; Lowrey, 2004:341). Therefore, the study found that the more likely an

individual is to watch environmental news or give attention to online content on recycling or pro-environmental behaviours, the more likely they are to gain knowledge and therefore the more environmentally conscious they will be (Ball-Rokeach & DeFleur, 1976:16; Ho *et al.*, 2014:82). Park and Yang (2012:1304) found that websites with high interactivity and regular updates are very effective and this tends to extend to offline participation as well.

### 3.3.6 Gender

Studies such as the one by Saphores *et al.* (2006:272) uncovered strong results indicating that females tend to participate more in recycling activities than males. However, Gamba and Oskamp (1994:610), Meneses and Palacio (2005:844) and Werner and Makela (1998:379) found that this is not necessarily the case. Moreover, Shultz *et al.* (1995:105) found that gender is not a good predictor of recycling in the USA. This emphasises how different studies in different regions find opposing results.

### 3.3.7 Age

Previous studies found mixed results on the relationship between age and recycling participation. Jakus *et al.* (1996:105; 1997:144), Vining and Ebreo (1990:60), Meneses and Palacio (2005:845) and Saphores *et al.*, (2006:194) all showed that in the USA, older people in the household were more likely to recycle than younger people. Furthermore, Nixon and Saphores (2009:272) found that the likelihood of a household's recycling would increase 1.6 times when at least one individual in the household was over 65 years of age. The authors further found that having a retiree in the household was a significant predictor of recycling behaviour.

Akil and Ho (2014:2) found the same trend in Malaysia where older household members were more likely to recycle. Akil and Ho (2014:2) found the average age of people responsible for waste separation in households was 41 years of age and more than 60 per cent of the household waste separators were older than 35 years of age. However, Werner and Makela (1998:379) found no relationship between age and recycling involvement in the household. Furthermore, Shultz *et al.* (1995:105) found age not to be a good predictor of recycling in the USA since past studies all provide mixed findings of gender and recycling.

### 3.3.8 Education

Ekere *et al.* (2009:3050), Jakus *et al.* (1996:103) and Saphores *et al.* (2006:272) found evidence to suggest a positive relationship between education levels and recycling involvement. Akil and Ho (2014:3) discovered that in Malaysia the majority of the people responsible for the households' recycling had secondary school level education. However, a few other studies (such as Gamba & Oskamp, 1994:61; Meneses & Palacio, 2005:845; Nixon & Saphores, 2009:271) found no statistically significant relationship between recycling behaviour and education levels. According to them these opposing results could be explained by the fact that different ranges of education levels obtained were included in their sample. Of the studies that found no relationship between the education levels obtained and recycling participation, the sample was based on relatively fewer ranges of education levels, while the studies that found positive relationships included more ranges of education levels in the sample.

### 3.3.9 Monthly household income and consumption

Shultz *et al.* (1995:105) found that, unlike gender and levels of education obtained, income is a good predictor of recycling in the USA, since income has consistently been found to correlate positively with recycling participation. Ekere *et al.* (2009:3050), Jakus *et al.* (1996:107), Saphores *et al.* (2006:272) and Vining and Ebreo (1990:60) found a statistically significant relationship between recycling participation and income in the USA, meaning that recyclers generally have higher incomes than non-recyclers.

Furthermore, Ekere *et al.* (2009:3050) also found evidence that suggests a positive relationship between income and waste generation. Therefore, the higher the household income, the more waste the household is expected to generate with higher volumes of waste that can be recycled. However, Derksen and Gartrell (1993:439) and Scott (1999:288) explain that higher levels of waste generation does not necessarily translate to higher levels of recycling.

### 3.3.10 Months lived in the same dwelling

Authors such as Padilla and Trujillo (2018:24) and Ittiravivongs (2011:444) find a statistically significant relationship between the number of years a family has stayed in their house and recycling participation in Colombia and Thailand. Tadesse, Ruijs and Hagos (2008:2010) found in Ethiopia that the number of years a family stayed in the same house increased waste disposal, but it was not statistically significant.

### 3.3.11 Household size

Nixon and Saphores (2009:272) found that the more individuals living in the household, the more likely they are to participate in waste separation. Ekere *et al.* (2009:3050) found that the relationship between the size of the household and recycling participation is statistically significant and for every additional household member, the probability of waste separation would increase with 19 per cent. However, these results differ from a study by Tadesse *et al.* (2008:2010) who found that the relationship between recycling participation and household size is insignificant in Ethiopia.

### 3.3.12 Facilities and lack of resources

In a Malaysian study by Omran *et al.* (2009:285), it was discovered that recycling habits are poor due to the lack of facilities and lack of resources. Research into larger metropolitan areas of South Africa showed that respondents were more likely to recycle if the recyclables were collected at their curb side and indicated that there would be a decrease in recycling activity the further away collection points are from the respondents' homes (Strydom, 2018:15).

Du Toit *et al.* (2017:2035) indicate that, where curb side recycling initiatives were recently implemented, households did not always take part in these initiatives. Strydom (2018:15) also explains that if households are situated in areas where there are already recycling programmes in place, the probability of households' participation will be much higher than in areas where separation at source still has to be introduced.

### 3.3.13 School-going children living in the household

A comparative study between Sweden and Singapore indicated that it was of vital importance to instil environmentally conscious behaviour in children from an early age in order to have a long-term effect so that they, as adults, will continue with pro-environmental attitudes and behaviours (Ho, 2002:11).

A study from the UK suggests that while educating the youth is an important part of pro-environmental behaviour, part of the solution lies in also educating the rest of the household. This study included 6705 primary school children from 39 schools to analyse the intergenerational influence that might occur when the primary schools increase the knowledge and understanding of waste reduction and recycling among their pupils. This study found that recycling had increased by 8.6 per cent in the UK (Maddox, Doran, Williams & Kus, 2011:2597). Similarly, a Polish study revealed that school environmental programmes have a spillover effect into the household, which impacts the environmental knowledge, attitudes and behaviours of adults.

The school's environmental programme provided opportunities for parents to become more environmentally conscious through discussions with their children. During the school environmental programme, teachers promoted environmentally responsible behaviour at school and home. After the school environment programme was implemented at schools, 70 per cent of the children shared their knowledge of waste management with their parents and a third (34 per cent) implemented practices to improve waste management at home (Grodzinska-Jurczak *et al.*, 2003:114).

Malaysia has been recycling waste since 1993. However, in 2010 their recycling rate was only 5 per cent, which is low compared to developed countries where the recycling rates are between 30 per cent and 47 per cent (Mahmud & Osman, 2010:119). Based on these low rates, Mahmud and Osman (2010) found that as the PBC among the students increased, behaviour intention for recycling increased, therefore suggesting that all Malaysian schools should focus on elements that can increase pro-environmental behaviour among students (Mahmud & Osman, 2010:119). These studies are significant as they give a good indication that a similar recommendation could work in South Africa. Increased activities involving recycling and waste

management in schools might therefore have a positive spillover effect into the households' CSR participation behaviour in South Africa.

#### 3.3.14 Knowledge of recycling

Knowledge is a key factor in determining recycling behaviour. Increased recycling knowledge will translate into a change in recycling behaviour (Akil & Ho, 2014:4; Vining & Ebreo, 1990:60). People must be made aware of the dreadful impact of improper waste management (Grodzinska-Jurcza *et al.*, 2003:106; Jayasubramanian *et al.*, 2015:520). Strydom (2018:1) emphasises that a lack of knowledge is a contributing factor to the low participation rates of household waste separation in South Africa. Knowledge and awareness about such projects, together with efficient recycling processes could have a positive influence on South African households' recycling behaviour. Individuals who are more mindful of the consequences of their actions will be more likely to engage in pro-environmental programmes, such as separation at source (Barr *et al.*, 2004:409).

A study in Malaysia by Omran *et al.* (2009:278) also showed that recycling habits are poor due to a lack of knowledge. They experienced that participation in the recycling of household waste relies on the household's awareness and understanding of recycling.

Ho (2002:13) and Shultz *et al.* (1995:105) explain that even if a person has a pro-environmental attitude or belief but a lack of information, this still results in ineffective recycling behaviour. In 2002, 70 per cent of the waste separated by Singaporeans could not be recycled due to ignorance of what can or cannot be recycled. Ho (2002:13) also concludes that the ability to recycle is determined by gaining the correct knowledge about waste separation.

### **3.4 Summary**

The objective of the literature review was to provide an overview of the literature on household behavioural theories and the determinants of recycling. The theories revealed that households' intention to recycle and their knowledge and attitude towards recycling influences their recycling behaviour. The literature review revealed that studying the behaviour of households is complex and many different determinants can influence the households' decision to participate in waste separation. Furthermore, different studies found opposing results in terms of recyclers' age, gender, income and education level. Some studies found strong results that show that school projects can have spillover effects into the households and that social media can be used to remind, inform and encourage households to participate in the curb side recycling programme.

Strong opposing cases built by different researchers in different regions, however, prove that it is crucial to analyse socio-economic determinants of recycling behaviour of households on a municipal level, as each municipality will give unique results and calls for unique actions.

The next chapter will provide an overview of the research methodology and quantitative tools used to answer the research question.

## **CHAPTER 4: RESEARCH METHODOLOGY**

### **4.1 Introduction**

This chapter presents the research methodology used to obtain information on the socio-economic determinants of households' CSR behaviour in the Drakenstein Municipality and the analysis of the data. The first part of the chapter reviews the research question, aim and objectives followed by the research design and research methods used. This chapter will also outline the research population, sampling technique, sample size, data collection instrument and econometric model used. Thereafter, the data analysis procedure will be provided, and the chapter will end with a summary.

#### **4.1.1 Research question, aim and objectives of the study**

The research question asks what the socio-economic determinants are that impact households' CSR behaviour in the Drakenstein Municipality. For this reason, it is important to analyse and understand why households choose to behave in a particular way in terms of participating in the CSR programme. Answers to this question will provide a better understanding of how to encourage households to participate in the CSR programme, which will, in turn, assist with the limited remaining lifespan of the Wellington landfill.

To recap the objectives discussed in Chapter one, the first objective is to provide an overview of concepts relating to CSR and the process of the CSR programme in the Drakenstein Municipality. The second objective is to review literature, both nationally and internationally, on the behavioural theories that could be applied to change households' recycling behaviour towards CSR participation and to better manage their household waste. Furthermore, this study reviews past studies to identify socio-economic determinants that may influence households' intention and decision to participate in the CSR programme. Specific attention is given to the spillover effect that occurs when school-going children are present in the household as they may have been exposed to school projects or initiatives on waste management. Specific attention is also given to the role that social media and available recycling resources play in informing and encouraging household participation in CSR. The third objective

is to analyse the socio-economic determinants that play a role in the households' CSR participation decisions in the Drakenstein Municipality. The last objective is to determine the significance of the relationship between households' CSR participation status and households' intention, attitude and subjective norm and other socio-economic determinants through means of probit models.

## **4.2 Research design**

Due to the nature and the purpose of the research question, this study uses a case study design. According to Baxter and Jack (2008:545), a case study design incorporates descriptive and exploratory methods and is based on a real-life extensive investigation of a group of people. This study makes use of primary household-level data that was collected in the form of a survey to answer the research question. Surveys are a popular method of collecting primary data in case study research and can be described as a flexible tool that can produce both quantitative and qualitative information (Centre for Local Economic Strategies [CLES], 2011:11).

## **4.3 Research methods**

Some researchers prefer to combine qualitative and quantitative methods in a single research project to take advantage of the differences between the methods (Thomas, 2010:302). Quantitative methods "highlight objective measurements and provide for mathematical or numerical and statistical analysis of data collected through questionnaires" (Baxter & Jack, 2008:544; Denzin & Lincoln, 2005:3) such as in this study. The goal of conducting quantitative research is to collect data and use it to analyse the relationship between the dependent and explanatory variables (Creswell, 2019:1), thereby determining the relationship between an dependent variable (in this study, the households' CSR participation status) and the explanatory variables (in this study, behavioural and socio-economic determinants of recycling) within a population.

Quantitative research designs can be broken up into two categories. The first category is "descriptive" (subjects are usually measured only once) and the second category is "experimental" (subjects are measured before and after treatment). A descriptive study looks only at the relationships between variables, whereas an experimental study, causality is established (Bijou, Peterson & Ault, 1968:175).

A quantitative research method with a descriptive design is therefore the best choice for this study because it allows to identify the socio-economic determinants that influence the households' actual recycling behaviour. The significance of such determinants can also be measured with an econometric technique.

#### **4.4 Sample population, Sampling technique and Sample size**

##### 4.4.1 Sample population

The sample population consists of households in the suburbs of the Drakenstein Municipality in which the CSR programme is implemented. This Municipality was chosen as the research area as it forms part of a larger CSIR-funded project in which four municipalities were identified for research on how the behaviour of households and communities may be changed. Furthermore, a CSR programme has been in place for the last five years in certain areas in the Drakenstein Municipality, giving households ample time to get into the habit of participating in the CSR programme. This municipality therefore lends itself well to finding determinants influencing households' decision to participate or not to participate in the CSR programme. The Drakenstein Municipality comprises 33 suburbs in total and six of which were identified by the municipality as most suitable for inclusion in the study as they are the only suburbs that have a CSR programme in place. These six suburbs are referred to as Suburbs A to F in this study.

Suburb A has only one main road from which it may be entered and therefore has strict security measures. For this reason, waste pickers are not allowed into the suburb to collect recyclable materials.

In Suburb B, the CSR programme is still relatively new to the area and was only implemented in the last five years. Since this is a closed security estate, the expectation is that these households will follow similar waste management behaviours.

Suburb C is visibly a higher income suburb and has a primary public school within walking distance of the homes in this suburb.

Suburb D is divided into two parts by a main road. On the one side, going up the mountain are larger houses, with smaller houses on the opposite side of the main road. This suburb also has schools within its borders.

Suburb E also has many large properties, suggesting that households in this suburb are at the higher end of the income scale.

Suburb F seems to have lower income category households and is closer to town. The streets are filled with litter.

#### 4.4.2 Sampling technique

Initially, a random sampling technique was planned, whereby every fourth household would have been interviewed for this study. However, the interviews were conducted on weekdays during working hours. Consequently, many challenges arose for the fieldworkers and it was therefore not possible to stick to this random sampling method. Challenges encountered were that people that were too busy and/ or not home during the day and could therefore not be interviewed. Some people did not want to open their doors to talk to the fieldworkers. In cases where respondents were Afrikaans speaking and the original fieldworkers were not able or comfortable to conduct the interview in Afrikaans, one of the Afrikaans fieldworkers had to be called to conduct the interview.

Therefore, the strategy changed, and it was decided to interview as many households willing to participate in this study in these suburbs as possible. The random sampling technique was replaced by a convenience sampling technique, which is a non-probability sampling method (Davis, Gallardo & Lachlan, 2009:162-164; Etikan, Musa & Alkassim, 2016:2). In cases where someone (household members or domestic worker) was home but not able to complete the questionnaire, the fieldworkers left the questionnaire to be completed for collection at a more convenient time.

A non-probability sampling technique has its limitations, such as non-random selection of participants (Etikan *et al.*, 2016:4), but is a good tool to use when randomisation is not possible (Davis *et al.*, 2009:162-164; Etikan *et al.*, 2016:1). It can be used in both qualitative and quantitative studies. The key objective of convenience sampling is to

collect information from available participants. Thus, the sample size represents households who were willing and available to participate at the time of the interviews.

#### 4.4.3 Sample size

Confirmed in an email (S. Frans, 2019; personal communication, 31 May), the selected suburbs in the Drakenstein Municipality have a reported population size of 1880 households. A total of 247 questionnaires were collected, therefore representing a confidence interval of 5.81 per cent. This confidence interval was calculated based on the Sample Size Calculator, which is offered through the Creative Research Systems Survey as public service and incorporates the confidence level and confidence interval in the calculation to determine the level of precision in the sample (Creative Research Systems, 2016:1).

While cleaning the data, seven questionnaires could not be used and therefore the number of observations decreased to 240 households, the breakdown per suburb of which is depicted in Table 4.1. The reasons why these questionnaires could not be used were because two were completed by businesses, one was completed by a 17-year-old, another could not be used as it could not be determined if the household participates in the CSR programme or not and a further three questionnaires were incomplete.

Table 4.1: Population and sample size per suburb ( $n=240$ )

<b>Suburb</b>	<b>Total households in suburb</b>	<b>Questionnaires collected</b>	<b>Percentage</b>	<b>Date of the interviews</b>
Suburb A	300	60	25	10 April 2019
Suburb B	470	12	5	11 April 2019
Suburb C	390	26	10.8	8 April 2019
Suburb D	150	52	21.7	9 April 2019
Suburb E	170	21	8.7	12 April 2019
Suburb F	400	69	28.8	11 April 2019
<b>Total</b>	<b>1880</b>	<b>240</b>	<b>100</b>	

Source: Frans (2019), Personal communication.

## 4.5 Data collection

### 4.5.1 Data collection instrument

The primary data was obtained through face-to-face interviews based on a modified structured household-level questionnaire created by Viljoen (2014) for a study in Vrededorp. The questionnaire includes both open and closed-ended questions to gather the necessary information needed to answer the research question.

The questionnaire consists of eight sections (sections A to H). Section A deals with questions on the demographics of the participant and the household. Section B covers questions on the general household characteristics. Section C asks questions regarding the general household waste management. Section D asks a series of closed-ended questions to assess the households' behaviour and participation in the CSR programme operating in the suburb. If the household indicated in Section D, that they did participate in the CSR programme, they were required to complete the questions from Section E, Part one, which deals with their participation in the CSR programme. If they indicated in Section D, that they did not participate in CSR, they were asked to complete only Part two of Section E, to obtain more information on the reasons for not participating in the CSR programme.

In order to collect data on the households' behavioural characteristics, Section F delves into questions on the households' perceptions, intentions, and behaviour relating to the CSR programme as well as littering. Statements are rated on a Likert scale from, 1 (*strongly agree*) to 5 (*strongly disagree*). These Likert scale statements are used to form indexes that represent the households' behavioural characteristics. Sections G and H were added to the questionnaire to determine whether the presence of school-going children in the household and social media encourage households to participate in the CSR programme. The last section seeks to find ways, through open-ended questions, in which the municipality can encourage and motivate households to participate in the CSR programme.

#### 4.5.2 Data collection procedure

The interviews were conducted in situ at each of the households to obtain the data. Before the fieldwork commenced, a meeting was held with the officials from the Drakenstein Municipality to obtain background information on the CSR programme that has been implemented at the municipality. During this meeting, the six suburbs in the municipality in which a CSR programme is in place were identified. The household questionnaire was discussed with the municipal officials and, at their request, two more questions were included in the questionnaire. These questions are “If you can pay less for refuse collection will you take the recyclables to the Wellington landfill or to a closer drop off centre?” and “What is the distance you are willing to travel to drop off your waste/recyclables?”

In order to equip the fieldworkers with the necessary skills to administer the questionnaire, a summary background of the study, together with the aims and objectives were presented. The presentation provided the fieldworkers with a clear understanding of the study and their role in the data collection process. The questionnaire was discussed in detail, including how each question was expected to be asked and how the answers were to be captured. The fieldworkers were also provided time to go through the questionnaire and to practise on each other. In this way, the fieldworkers became familiarised with the research instrument and were made aware of what to look for while they were collecting the data.

#### 4.5.3 Ethical issues

For research to be ethical and to respect the rights and privacy of each of the participants, confidentiality and anonymity are required (Murray & Overton, 2003:32). The participation in this study was based on the households’ willingness to participate and discuss their recycling behaviours. Households were informed at the start of the interview that they had the right to withdraw from the interview at any time.

The household respondent was provided with a letter of consent that was explained to them, which he or she had to sign before each interview commenced. The consent letter outlined that the households’ participation was completely voluntary, that they could withdraw from the interview at any time and that all their data would be kept

completely confidential. In some instances, the questionnaire had to be translated to the participants who experienced problems as a result of linguistic barriers. The fieldworkers had to explain to the participants that the information gathered from them in this study would be kept anonymous and that the data would be treated as confidential.

On the day of the training, each of the fieldworkers signed a confidentiality agreement, stating that they would maintain the strictest confidentiality in terms of any information that they handled during the course of their being employed as a fieldworker for this study. Furthermore, the researcher obtained official permission and ethical clearance for the study from both the Drakenstein Municipality and the University of Johannesburg.

#### 4.5.4 Validity of information

To ensure the validity of the information gathered, the respondents had to be older than 18 years and, as this is a household-level study, the questionnaire could only be completed by a representative of a household and not of a business. To improve the accuracy of the data gathered, the fieldworkers were trained by the researcher before conducting the interviews.

### **4.6 Data Analysis**

The primary data collected will be analysed through quantitative data analysis techniques, such as descriptive analysis and econometric models. The descriptive analysis includes frequencies, means, medians, and correlations. To test the significance of the relationship between socio-economic determinants and the intention to recycle, and the relationship between socio-economic determinants and recycling participation, probit models will be used.

#### 4.6.1 Econometric model specification

Binary probit regression models are used for this study as the dependent variable is dichotomous (binary), meaning that the dependent variable has two possible outcomes (Li, Poskitt & Zhao, 2016:96; Meng & Schmidt, 1985:72). A probit regression

model ensures that the predicted values of the dependent variable fall inside the interval 0 and 1 (Greene, 1996:2; Gujarati, 2003:608).

Five binary probit models will be used. The first probit model will analyse the households' CSR participation status and the households' behavioural characteristics. Models II to V will focus on the actual recycling participation status of households as the dependent variable and the socio-economic determinants of the households' participation in the CSR programme to assess how and to what extent they influence households' CSR participation. The results of these models will be compared.

To obtain information on the dependent variable, the questionnaire asked households "Does your household participate in the curb side recycling project.?" If the household answers "yes" the dependent variable will be equal to 1 ( $p_i = 1$ ) and if the household answers "no" the dependent variable will be equal to 0 ( $p_i = 0$ ). The results of these models will test to what extent each of the explanatory variables (behavioural variables and socio-economic determinants) impact the probability of the households' participation in the CSR programme, as well as the significance thereof.

The probability of a household's choice to participate in the CSR programme over not choosing to participate is expressed in the following equation;

$$p_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_n X_n + U_i \quad (1)$$

The dependent variable ( $p_i$ ) represents the probability of households' participation in the CSR programme.

$\beta_0$  = is the constant term.

$\beta_1$  to  $\beta_n$  = are the coefficients to be estimated.

$X_1$  to  $X_n$  = are the socio-economic determinants (explanatory variables) that influence households' decision to participate in CSR, and

$U_i$  = is the error term.

This paper will also provide the marginal effects. The marginal effect takes the partial change in the probability into account, which provides for easier understanding (Uzunoz & Akcay, 2012:3; Williams, 2018:1) of how the behavioural and socio-

economic determinants (explanatory variables) shift the probability of household participation in the CSR programme.

The probit models are tested for multicollinearity through the Variance Inflation Factor (VIF), which tests for strong dependent relationships among the explanatory variables (Ittiravivongs, 2011:441). As a rule of thumb, the VIF should be less than ten to indicate that there is no multicollinearity present in the model (Gujarati, 2003:608). To test for goodness of fit of the data, the Hosmer and Lemeshow test is used. This test analyses how well the data fits the model. Furthermore, robust standard errors will be included to control for heteroskedasticity (Gujarati, 2003:608).

Before applying the probit regressions, two indexes are created through the Principal Component Analysis (PCA). The PCA is used to examine the empirical dimensions of the questionnaire data measured on ordinal scales (Ittiravivongs, 2011:440). Section F of the questionnaire provides statements, in a Likert scale form, on the households' perception about waste separation in the household and these statements are incorporated into the PCA to create an index that represents households' attitudes towards recycling and the social perception of households. These two indexes are then used as explanatory variables in probit regression Model I.

A PCA was also used in a similar study by Ittiravivongs (2011:439), which validated that it is an appropriate method for this study. Ittiravivongs (2011) used the PCA in a logistic regression but this paper will borrow the techniques and incorporate it into a probit model. The PCA is used as a data reduction method and is used to express multivariate data with fewer dimensions, which means that the PCA shows variation in the data. Each principal component seeks to find maximum variation and the direction in which the data is most spread out (Ittiravivongs, 2011:441; Ringnér, 2008:303). Since PCA is a data reduction method, there is a need to retain only the most appropriate components, as the goal is to attain the fewest components necessary to still explain most of the variation in the data.

PCA seeks to find identifying patterns that have something in common across variables. This differs from the Factor Analysis as this assumes the existence of a few common factors in the data, whereas the PCA does not make this assumption (Ringnér, 2008:303). Therefore, the PCA is the better option to use as it seeks to find the most efficient way to represent the data without this assumption. The PCA seeks

to maximise the variances and is therefore sensitive to scale differences in variables. For this reason, it is best to standardise the data and use correlations rather than covariances among the original variable. The PCA is performed in STATA15 to get the eigenvalues that are used in the scree plot to determine how many components should be included.

Thus, the PCA produces eigenvalues that measure the data's co-variances. A scree plot using the eigenvalues obtained through the estimation can be used to detect the natural break between these eigenvalues and helps to identify how many components should be retained and included in the PCA. Cattell (1966) first introduced scree plots, a simple tool that seeks to find the number of important components in multivariate settings. The scree plot uses a line segment plot that shows the total variances individual principal components in the data.

A component with a result above one in the scree plot should be retained as the other components explain considerably less variation in the data. Components are then rotated to simplify the structure of the loading matrix, which allows for these factors to be interpreted in the cluster of variables that are highly correlated with a particular factor (Shlens, 2014:4). Orthogonal rotation, in which factors are assumed to remain uncorrelated, is performed in this study. Such a rotation includes the Kaiser-Meyer-Olkin (KMO) statistic, which will be incorporated to test for the competence of the PCA (Shlens, 2014:3). For this study, the general rule for the KMO test recommends that eigenvalues above one should be retained (Ittiravivongs, 2011:441). The KMO statistic is included to measure the adequacy of the data as well as whether the PCA is the most appropriate tool to use. The KMO statistic takes on a value between 0 and 1, with small values indicating that overall values have little in common to warrant a PCA. The rule of thumb for the KMO measure is that a PCA will be deemed satisfactory if it has a value above 0.5 (Shlens, 2014:4).

#### 4.6.1.1 Attitude Index

This index seeks to analyse the attitudes of households towards the CSR programme. The statements included in this index are “I feel it takes too much time to separate the waste”, “I feel good about myself when I recycle”, “I think our household can recycle more” and “I feel recycling creates an inconvenience in my house.” In order to use this

data in an index, all the statements were transformed into positive statements in order to measure the relationship between households' CSR participation and households' positive attitude towards CSR. By including this index in the model, it will give a better indication of the relationship between the households' attitude and their intention to recycle as well as the relationship between the households' attitude and actual participation in the CSR programme.

#### 4.6.1.2 Subjective Norm Index

The Subjective Norm Index includes statements from Section F that give a better understanding of households' recycling behaviour based on community norms. These statements include "I play an important role in the management of waste in my community", "I encourage my friends/ colleagues to recycle" and "All household members support the recycling activities". Since all of these statements are phrased in the positive, there was no need to transform the data as was the case with the Attitude Index.

Table 4.2 provides a list of dependent and explanatory variables used in the empirical analysis, as well as their description, variable type and measurement.

Table 4.2: Dependent and explanatory variables used in the empirical analysis

Variables	Description	Type	Measurement
<b>Dependent variables</b>			
Household participation status	Participation in the CSR programme	Dummy	1 = Household participates, 0 = Household does not participate
<b>Explanatory variables</b>			
Intention	Household intention to participate in CSR programme	Dummy	1 = Intends to participate, 0 = Does not intend to participate
Attitude Index	Household attitude towards the CSR programme	Continuous (Index)	
Subjective Norm Index	View of community CSR Norm	Continuous (Index)	
Difficulty of CSR	CSR participation is difficult	Dummy	1 = Yes, 0 = No
Lack of space	Lack available space for CSR in the household	Dummy	1 = Yes, 0 = No
Social media	Household member(s) use social media	Dummy	1 = Yes, 0 = No
Gender	Gender of the household member(s) responsible for WMA	Categorical	1 = Male, 2 = Female, 3 = Both male and female
Age	The age of the household member(s) responsible for WMA	Categorical	1=11- 24, 2 = 25- 34, 3 = 35- 44, 4 = 45- 54, 5 = 55- 64 6 = 65+
Education	The education level of the household member(s) responsible for WMA	Categorical	1 = Some secondary, 2 = Secondary completed, 3 = Certificates/Diplomas, 4 = Tertiary education

Income	The household gross monthly income.	Categorical	1 = R0- R6400, 2 = R6 401- R12 800, 3 = R12 801- R25 600, 4 = R25 601- R51 200, 5 = R51 201+
Months in same dwelling	Months living in the same house	Continuous	
Household size	Number of people living in the house	Continuous	
Access to CSR bags	Access to free clear CSR bags	Dummy	1 = Yes, 0 = No
School-going children	Have school-going children in the household	Dummy	1 = Yes, 0 = No
Sufficient information available	Have sufficient information available to households on the CSR	Dummy	1 = Yes, 0 = No

#### 4.7 Summary and Conclusion

In this chapter, the research methodology structure and processes were outlined. Data was collected from 247 households in six suburbs in the Drakenstein Municipality, where the CSR programme has been in place for some time. Since this is a household-level study, it was difficult to undertake a random sampling technique as numerous members of the households initially identified for the random sampling technique were either not home or did not want to participate in the survey. A convenience sampling method was therefore used, and a quantitative research method incorporated. A questionnaire was used as the research instrument to collect the necessary data from the households. To ensure validity of information, certain limitations were put into place, such as the respondents' having to be older than 18 years of age and that only households, not businesses in the six suburbs, could complete the questionnaire. For this reason, seven questionnaires could not be used and therefore the number of households' observations used decreased to 240. This study obtained ethical

clearance from both the Drakenstein Municipality and the University of Johannesburg to ensure that this research adheres to ethical requirements of anonymity and confidentiality. A Principal Component Analysis (PCA) method was introduced and will be used to create two indexes: The Attitude Index and the Social Norm Index. To test the competency of these two indexes, a Kaiser-Meyer-Olkin (KMO) statistic will be included. These two indexes will be included as explanatory variables, along with other socio-economic determinant variables as explanatory variables in probit models. Probit models are suitable in this study since this study uses cross-sectional data and the dependent variable is dichotomous. The validity of the probit models will be tested through the Variance Inflation Factor (VIF), as well as the Hosmer and Lemeshow test.

In the next chapter, the data will be analysed in four stages. Firstly, a descriptive analysis method is used on the survey data to determine the socio-economic determinants of households' CSR behaviour and to get a better sense of the data collected. Secondly, two indexes will be created through the PCA, to represent the households' behavioural characteristics. These indexes will be included in the probit models. Thirdly, two sets of binary probit regressions will be applied to analyse the relationship between the dependent variable and explanatory variables. In the last stage, the results of the probit models will be analysed and interpreted, where after policy recommendations will be made.

## **CHAPTER 5: DATA ANALYSIS AND PRESENTATION OF FINDINGS**

### **5.1 Introduction**

In this chapter, the objective is to analyse the data collected using both descriptive and econometric techniques. The data analysis is based on the responses of 240 households. The first part of this chapter explores the descriptive statistics and the second part presents the PCA and econometric analysis of the socio-economic determinants of households' CSR behaviour.

The descriptive analysis includes the households' demographic and socio-economic characteristics, the households' participation status in CSR, the characteristics of households and household member(s) responsible for the household WMA according to participation status, factors influencing households' CSR participation status and the households' intention to participate in the CSR programme.

### **5.2 Household demographics and socio-economic characteristics**

The households' demographics and socio-economic characteristics are listed in Table 5.1 and show that most questionnaires were collected in Suburbs A, D and F, with only 5 per cent from Suburb B. The low percentage in Suburb B is due to the fact that this suburb is a gated community and fieldworkers were therefore not allowed into this area. To get a feeling of the CSR behaviour of this community, however, questionnaires were dropped off at a central point where households willing to complete the questionnaire could access them. The CSR programme was only recently introduced in this area. Of the remaining suburbs, Suburb E is somewhat smaller with fewer households and in Suburb C more households were either not home during the week of the interviews or did not wish to be interviewed, accounting for their smaller percentages. Furthermore, 80.4 per cent of the households in the sample were Afrikaans speaking and 86.2 per cent of the sample was White. The reason for this is that Drakenstein is a predominantly White, Afrikaans-speaking municipality. Table 5.1 also indicates that 95 per cent of the households who participated in the study reside in a house and that the families have lived in these dwellings for 189 months (16 years) on average with some households having lived in

the dwelling for only one month at the time of the survey and up to a maximum of 60 years in the same dwelling.

Table 5.1: Households' demographics and socio-economic characteristics

		<i>n</i>	<i>%</i>				
<b>Questionnaires per suburb</b> ( <i>n</i> = 240)	Suburb A	60	25				
	Suburb B	12	5				
	Suburb C	26	10.8				
	Suburb D	52	21.7				
	Suburb E	21	8.7				
	Suburb F	69	28.8				
<b>Language</b> ( <i>n</i> = 239)	Afrikaans	192	80.4				
	English	45	18.8				
	Portuguese	2	0.8				
<b>Racial group</b> ( <i>n</i> = 232)	White	200	86.2				
	Coloured	27	11.6				
	Other	5	2.2				
<b>Dwelling</b> ( <i>n</i> = 237)	House	225	95				
	Townhouse	7	2.9				
	Flat	5	2.1				
		<i>n</i>	<b>Mean</b>	<b>Median</b>	<b>SD</b>	<b>Min</b>	<b>Max</b>
<b>Months in dwelling</b>		212	189.9292	174	157.2614	1	720
<b>Number of household members</b>		240	3.275	3	1.4804	1	10

Source: Survey Data (2019)

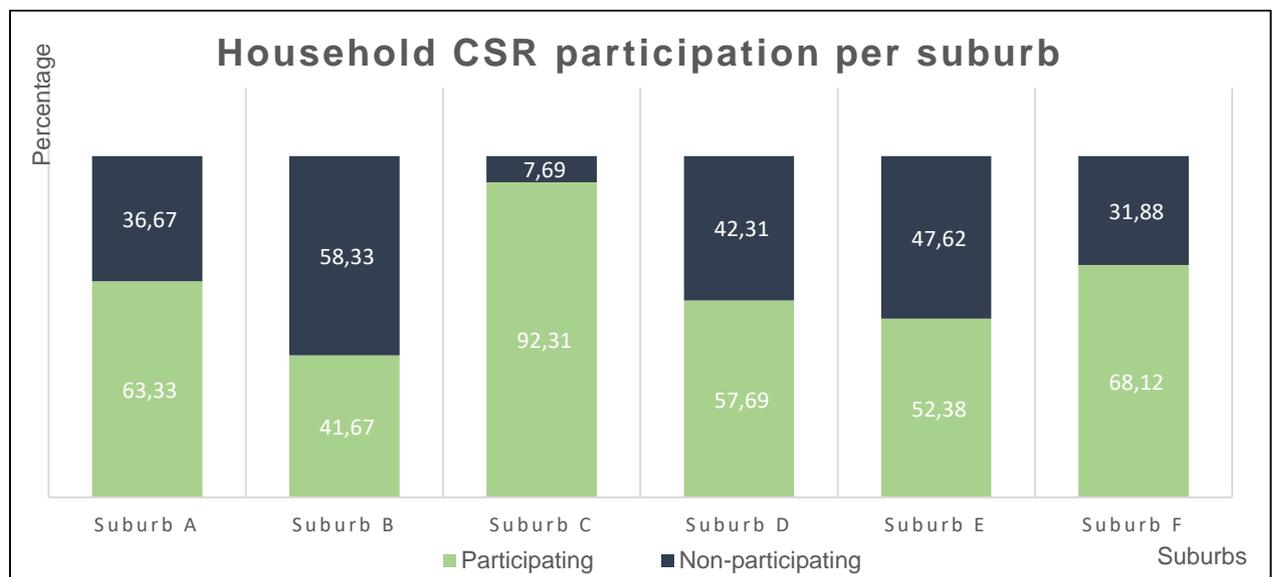
The minimum number of members in a household was one member and the maximum number of household members in a household is ten members. On average, there are three members in a household.

### 5.3 Household characteristics and curb side recycling participation status

The households' participation status was analysed by asking households, "Does your household participate in the curb side recycling programme?". Of the 240 responding households, 155 households (64.6 per cent) indicated that they participate in the CSR programme and 85 households (35.4 per cent) indicated that they did not participate in the CSR programme.

Figure 5.1 illustrates households' CSR participation status per suburb, with the highest being Suburb C with a 92.3 per cent (24 of the 26 households) CSR participation rate. This is followed by Suburb F with a 68.1 per cent CSR participation rate (47 of 69 households), while in Suburb B the CSR participation rate was the lowest at only 41.6 per cent (5 of the 12 households). The low participation rate in Suburb B may possibly be explained by the small sample size and the fact that the CSR programme is still relatively new to this gated community suburb. The higher response rate of CSR participation versus non-participation might be an indication of the positive attitude of participating households to share their eagerness and experiences towards waste management involvement.

Figure 5.1: Household participation in curb side recycling per suburb ( $n = 240$ )



Source: Survey Data (2019)

In order to fully understand CSR participation, it is important to see how households dispose of recycled products. This study will only focus on the household disposal of paper, plastic and glass. Tables 5.2, 5.3 and 5.4 show the CSR rates of these materials, respectively, for households that participate in the CSR programme.

Table 5.2: Households' paper CSR rates per suburb ( $n = 155$ )

<b>Paper</b>			
<b>Suburb</b>	<b>Participating Obs.</b>	<b><math>n^1</math></b>	<b>%</b>
A	38	26	68.42
B	5	0	-
C	24	21	87.5
D	30	22	73.33
E	11	9	81.82
F	47	37	78.72
Total	155	115	

<sup>1</sup>  $n$  = Number of households participating in the CSR programme.

Source: Survey Data (2019)

In Suburb C, 87.5 per cent of CSR-participating households (21 of 24) placed their paper in the clear CSR bags for curbside collection, whereas in Suburbs E, 81.8 per cent of CSR-participating households (9 of 11) recycled their paper. In Suburb B, none of the households that participated in the CSR programme, recycled their paper. In total, 74 per cent of households that participated in CSR (115 of the 155), placed their paper in the clear bags for curbside collection. These figures for the recycling of paper are high when compared to a study by Anyasi and Atagana (2017:1758) in Claremont, Cape Town, which found that only 23 per cent of households actively recycled their paper in 2017. Furthermore, Strydom (2018:2) estimated that in South Africa, only around 4 per cent of households living in large urban areas recycled their paper in 2010, with this figure increasing slightly to 7.2 per cent in 2015.

Table 5.3: Households' plastic CSR rates per suburb ( $n = 155$ )

Plastic			
Suburb	Participating Obs.	$n^1$	%
A	38	29	76.31
B	5	3	60
C	24	21	87.5
D	30	26	86.67
E	11	10	90.91
F	47	38	80.85
Total	155	127	

<sup>1</sup> n= Number of households participating in the CSR programme.

Source: Survey Data (2019)

A similar pattern can be observed for plastic recycling in these suburbs. In Suburb C, 87.5 per cent of CSR-participating households (21 of 24), placed their plastic items in the clear CSR bags. In Suburb B, 60 per cent of CSR-participating households (3 of 5), recycled their plastic. Collectively, 81.9 per cent of households (127 of 155 participating households), participated in plastic CSR. Based on these results, it seems that households are more aware that plastic can be recycled or that they generate more recyclable plastic than recyclable paper. These results are again similar to the results found in Claremont, where the majority of the products recycled were plastic, with a recycling rate of 34 per cent (Anyasi & Atagana, 2017:1758). Strydom and Godfrey (2016:1) also reported that the products most recycled by South African households are plastic and that plastic recycling increased from 47.3 per cent in 2010 to 52.6 per cent in 2015.

Table 5.4: Households' glass CSR rates per suburb ( $n = 155$ )

Glass			
Suburb	Participating Obs.	$n^1$	%
A	38	26	68.42
B	5	2	40
C	24	20	83.34
D	30	19	63.34
E	11	6	54.54
F	47	34	72.34
Total	155	107	

<sup>1</sup>  $n$  = Number of households participating in the CSR programme.

Source: Survey Data (2019)

The highest number of CSR-participating households who recycled their glass were in Suburb C (83.3 per cent or 20 of 24 households), whereas Suburb B had the lowest household participation (40 per cent or 2 of 5 households) in glass CSR. In total, 69 per cent (107 of the 155 CSR-participating households) recycled their glass products. These results are much higher than those found in the Claremont study, where only 26 per cent of households actively recycle their glass (Anyasi & Atagana, 2017:1758). In South Africa, Strydom and Godfrey (2016:7) found an increase in the recycling of glass from 4.7 per cent in 2010 to 8.1 per cent in 2015.

The next section deals with the characteristics of the household member(s) responsible for waste management activities (WMA) in the household, including their gender, age and level of education.

#### **5.4 Characteristics of households and household member(s) responsible for the waste management activities according to participation status**

Table 5.5 lists the characteristics of the households and household member(s) responsible for the households' WMA according to the households' CSR participation status. In cases where more than one member in the household was responsible for the WMA, the average age and average level of education are used.

Table 5.5: Characteristics of households and household member(s) responsible for waste management activities according to the CSR participation status

		Participating in CSR		Non-participating in CSR		Total	
		n	%	n	%	n	%
<b>Household CSR participation status (n = 240)</b>	CSR participation status	155	64.58	85	35.42	240	100
<b>Household member(s) responsible for WMA</b>							
<b>Gender<sup>1</sup> (n = 229)</b>	Male	31	20	36	48.65	67	29.3
	Female	69	44.52	26	35.14	95	41.4
	Male and female	55	35.48	12	16.22	67	29.3
<b>Age<sup>2</sup> (n = 220)</b>	15 to 24	3	1.99	4	5.80	7	3.2
	25 to 34	9	5.96	11	15.94	20	9
	35 to 44	17	11.26	15	21.74	32	14.6
	45 to 54	35	23.18	19	27.54	54	24.6
	55 to 64	36	23.84	12	17.39	48	21.8
	65+ (Retirement age)	51	33.77	8	11.59	59	26.8
<b>Education<sup>3</sup> (n = 197)</b>	Some secondary	3	2.22	7	11.29	10	5
	Secondary completed	37	27.41	29	46.77	66	33.5
	Certificate/diploma	26	19.26	10	16.13	36	18.3
	Tertiary education	69	51.11	16	25.81	85	43.2
<b>Household characteristics</b>							
<b>Generations in the household (n = 235)</b>	One generation	62	40.52	18	21.95	80	34
	Two generations	77	50.33	52	63.41	129	55
	Three generations	14	9.15	12	14.63	26	11
<b>Income</b>	R0 to R6 400	7	5.88	15	23.08	22	11.9

<sup>1</sup> Gender of the household member(s) responsible for household waste management activities.

<sup>2</sup> Age of the household member(s) responsible for household waste management activities. In cases where more than one member was involved in waste management activities, the average age was used.

<sup>3</sup> Highest education level obtained by household member(s) responsible for household waste management activities. In cases where more than one member was involved in waste management activities, the average education level obtained, was used.

<b>(n = 184)</b>	R6 401 to R12 800	20	16.81	11	16.92	31	16.8
	R12 801 to R25 600	40	33.61	11	16.92	51	27.7
	R25 601 to R51 200	25	21.01	17	26.15	42	22.8
	R51 201+	27	22.69	11	16.92	38	20.8
		<b>n</b>	<b>Mean</b>	<b>Median</b>	<b>SD</b>	<b>Min</b>	<b>Max</b>
<b>Age</b> <b>(n = 220)</b>	Participants	151	57.34305	58	14.9513	20	92
	Non-participants	69	47.23913	47.5	15.3157	15	82.5
	Total	220	54.17409	54	15.74877	15	92

Source: Survey Data (2019)

Around two-fifths (41.4 per cent) of the 229 households indicated that female(s) in the household was responsible for the WMA (not separating but just simply putting out the waste on the curb side), while only 29.3 per cent of households indicated that male(s) in the household was responsible for the WMA. In another 29.3 per cent of households, both male and female members of the household were responsible for WMA. The high percentage of females responsible for the household WMA might be explained by the fact that they are the general homemakers and caretakers of the home who oversee the day-to-day running of household activities (Oates & McDonald, 2006:424). The majority (44.5 per cent) of the CSR participating households, are also the households where a female(s) were responsible for the WMA in the household while only 20 per cent of the households that participate in CSR had male(s) in charge of WMA.

The household members responsible for WMA in the household were, on average, 54 years of age. Of the 151 CSR-participating households, the average age of the household member(s) responsible for the WMA in the household was 57 years of age while in the 69 non-participating households, the average age of member(s) responsible for WMA was 47 years of age. The age category of household members that participated the most in the CSR programme was 65 years and older with a CSR participation rate of 33.7 per cent, whereas the age category with the highest CSR non-participation rate, was 45 years to 54 years of age, with a non-participation rate of 27.5 per cent. These results agree with the work of authors such as like Akil and Ho (2014:2) and Nixon and Saphores (2009:272) who showed that the presence of people

older than 45 years of age in the household increases the probability of household CSR participation. The younger age category (15 to 24 years of age) in this study showed lower CSR participation rates (1.9 per cent), whereas the older age category (55 to 64 years of age) have higher CSR participation rates (23.8 per cent). These descriptive results are similar to those found in past studies (Meneses & Palacio, 2005:845; Vining & Ebreo, 1990:60).

The results further highlight that households that participate in the CSR programme generally contain members who have obtained higher levels of education than those in households that do not participate in the CSR programme. Of those with a tertiary education (including degrees, honours, masters and PhD qualifications) 51.1 per cent indicated that they participated in the CSR programme. Inversely, 2.2 per cent of the households with members who have only obtained a partial secondary education (grade 8 to 11) participated in the CSR programme. Those who had completed their secondary education (grade 12/Matric) made up the largest percentage (46.7 per cent) of non-participating households. The results suggest that households whose members responsible for WMA had higher levels of education participated more in CSR, while households with less educated members responsible for WMA participated less in the CSR programme, agreeing with Ekere *et al.* (2009:3050), Jakus *et al.* (1996:103) and Saphores *et al.* (2006:272), who found evidence to suggest a positive relationship between education levels and recycling involvement.

The data further indicates that 50.3 per cent of CSR-participating households were composed of two generations, however, similar results are seen for non-participating households. The number of generations in households in these suburbs did not show distinct differences in terms of recycling behaviour.

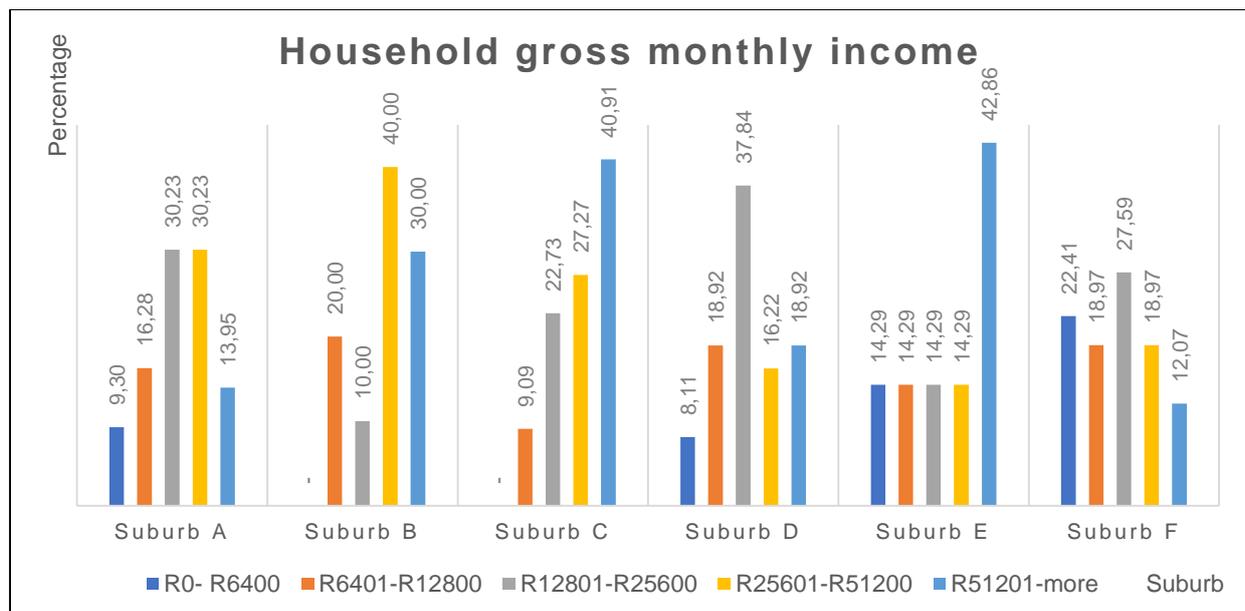
Table 5.5 also show that households' gross monthly income categories (before deductions) indicate that of the 155 CSR participating households, the largest percentage (33.6 per cent) of them earned between R12 801 and R25 600 per month; a further 22.6 per cent of the CSR-participating households earned R51 201 and more per month. When these results are compared to households that did not participate in the CSR programme, only 16.9 per cent earned between R12 801 and R25 600 per month and another 16.9 per cent earned R51 201 and more per month. However, 23 per cent of the households that did not participate in CSR earned below R6 400 per

month, whereas only 5.8 per cent of CRS participating households earned below R6 400 per month. These results show that households that participated in the CSR programme tended to earn more than the households who did not participate in the CSR programme. These results follow a similar pattern to those by authors Jakus *et al.* (1996:107) and Saphores *et al.* (2006:272), being that recyclers tend to have higher incomes than non-recyclers. One explanation for this might be that the higher the household income, the more recyclable waste the household generates (Ekere *et al.*, 2009:3050).

To give a clearer indication of income per suburb, Figure 5.2 shows the distribution of monthly gross income per suburb. From these results, it seems that Suburb F is the suburb with the poorest households, with 41.3 per cent of the responding households earning less than R12 800 monthly and 22.4 per cent earning less than R6 400 per month. The suburb with the wealthiest households appears to be Suburb C, with only 9 per cent of households earning less than R12 800 per month and no households in this suburb earning less than R6 400 per month.

Furthermore, 58.6 per cent of households in Suburb F earned more than R12 800 per month, whereas in Suburb C, 90.9 per cent of the responding households earn more than R12 800 per month. Suburb E had the highest number (42.8 per cent) of households earning R51 201 and more per month, and Suburb C following with 40.9 per cent households earning R51 201 and more per month. Suburb F had the lowest number of households (12 per cent of households) earning R51 201 and more per month.

Figure 5.2: Monthly household gross income per suburb (*n* = 184)



Source: Survey Data (2019)

To understand why households choose to participate or not participate in the CSR programme, a few key factors should be considered, such as the households' awareness of the CSR programme in their suburb, the information available to them, the months lived in the suburb, their access to free CSR bags, the presence of school-going children in the household and access to social media.

## 5.5 Factors influencing households' curb side recycling participation status

### 5.5.1 Households' awareness of the curb side recycling programme.

To determine the factors that influence households' participation status, the households' awareness of the CSR programme in their suburb is an important variable. To assess the households' awareness, the questionnaire asked, "Are you aware of the curb side recycling programme operating in your suburb?" Three quarters (75.8 per cent or 182 households) of the 240 households indicated that they were aware of the recycling programme, while 24.2 per cent (58) of households were not aware of this programme. Households in Suburb C seemed to be more concerned and aware of the waste management policies implemented by the Drakenstein Municipality than the other suburbs. Additionally, of the 182 households that were aware of this

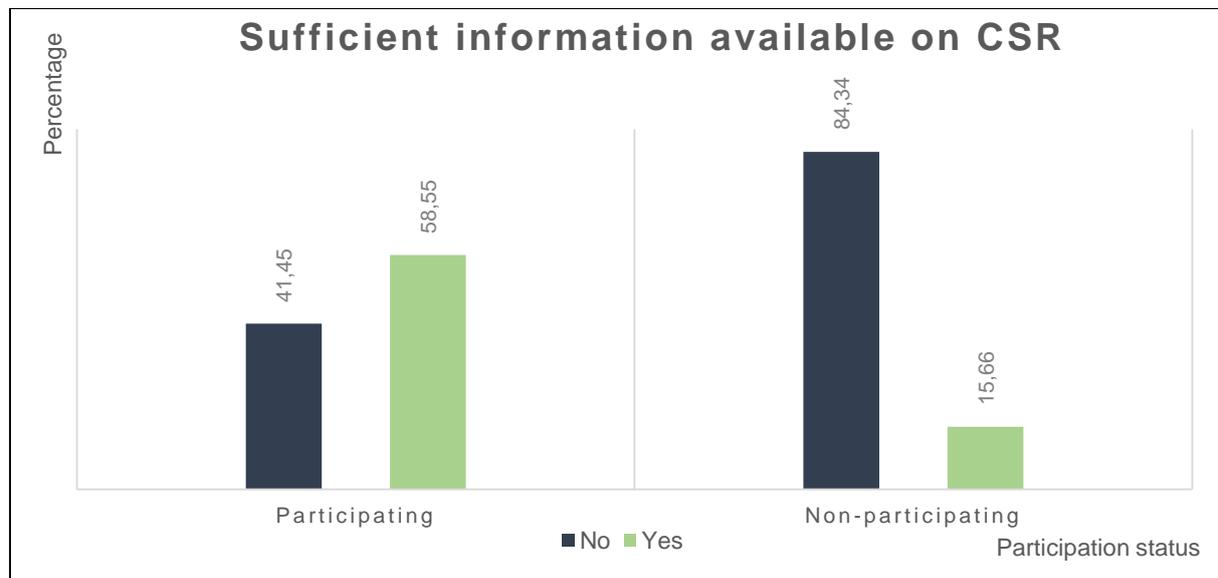
programme, 85 per cent (155) indicated that they participated in this programme, while only 14.8 per cent (27) chose not to participate. This indicates that there are other determinants that affects households' decision to participate or not to participate in the CSR programme. Non-participation may be due to a lack of sufficient information.

#### 5.5.2 Sufficient information available on the curb side recycling process.

The results show that more than half (57 per cent or 133) of all 235 households specified that they felt that they did not have sufficient information available to participate effectively in the CSR programme. According to these households, the lack of knowledge on the CSR programme and process made participating in the CSR programme more of a challenge.

Figure 5.3 compares the availability of information with the CSR participation status of all households in the sample. Of the 155 households that participated in the CSR programme, 58.5 per cent indicated that they had sufficient information on CSR. However, 41.4 per cent of the CSR-participating households felt that they did not have the sufficient amount of information they desired to participate more efficiently. Of the households that did not participate in the CSR programme, 15.8 per cent said that they had information on this programme but chose not to participate. One of the possible reasons for this could be as PBC specifies, that if households feel the process of CSR is too complicated or too much work, they will not participate in the CSR programme. Furthermore, of the households who did not participate, 84.3 per cent felt that the information available to them was not sufficient. Therefore, one of the key contributing factors to assist households in the CSR programme could be to provide them with more sufficient information.

Figure 5.3: Sufficient information available on curb side recycling and the curb side recycling participation status (*n* = 235)



Source: Survey Data (2019)

In an open-ended question, households indicated that they would like to know more about the CSR programme and process, and the extent and significance of their involvement in this programme. The households further indicated that they would like a guide that they can keep in the kitchen that shows the products that can be recycled and those that cannot. To assess the new residents in the suburbs' awareness of the CSR programme, it is important to see if there is a relationship between the households' CSR participation status and months lived in the same dwelling.

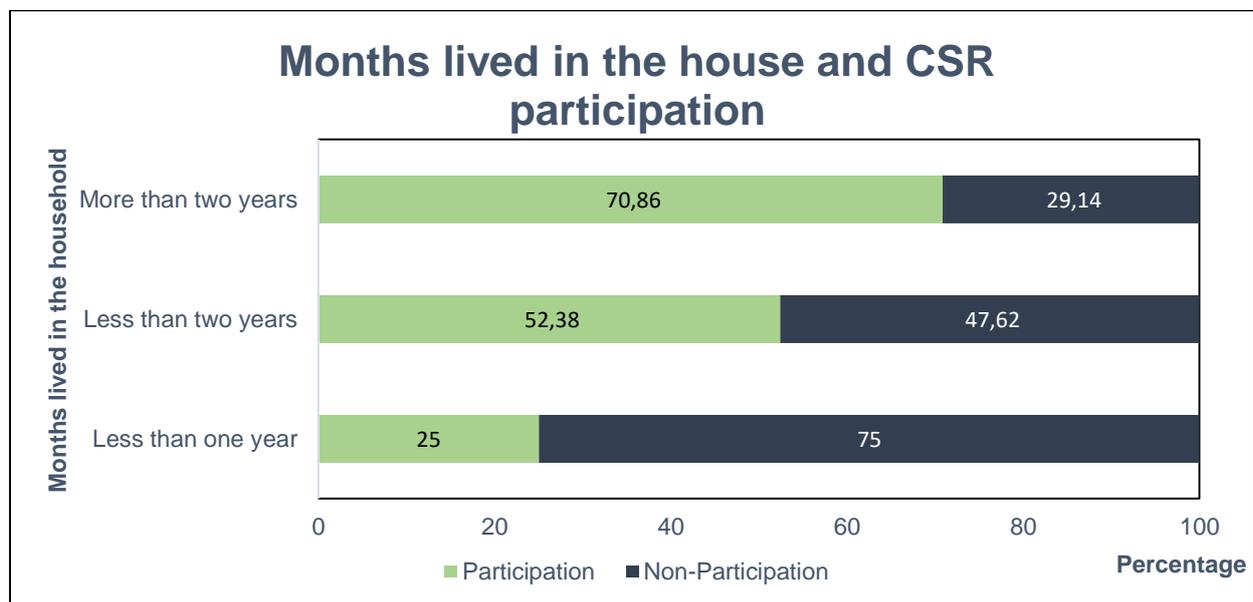
### 5.5.3 Months in same dwelling

The CSR-participating households had lived in their current dwellings for an average of 212.7 months (18 years), while non-participating households had lived in their current dwelling for an average of 146.5 months (12 years). The results further signify that the CSR participating households have lived in their dwelling, on average, 66.2 months (5.5 years) longer than non-CSR-participating households. This indicates that there could be a correlation between households' CSR participation and the months lived in their current dwellings.

Figure 5.4 measures the number of months a family has lived in their current dwelling and compares it with their CSR participation status. These results show that the

highest percentage (70.8 per cent) of households who lived in their current dwelling for more than two years were participating in the CSR programme. This percentage drops to only 25 per cent CSR participation rates for households that had moved into the suburb in the last 12 months (less than one year). The results indicate that the households who had lived longer in their current dwelling, had higher CSR participation rates. This drop might be because new families to the suburbs are not always aware of the CSR programme in the suburb or how to participate in it.

Figure 5.4: Months living in the same dwelling and the household curb side recycling participation status ( $n = 212$ )



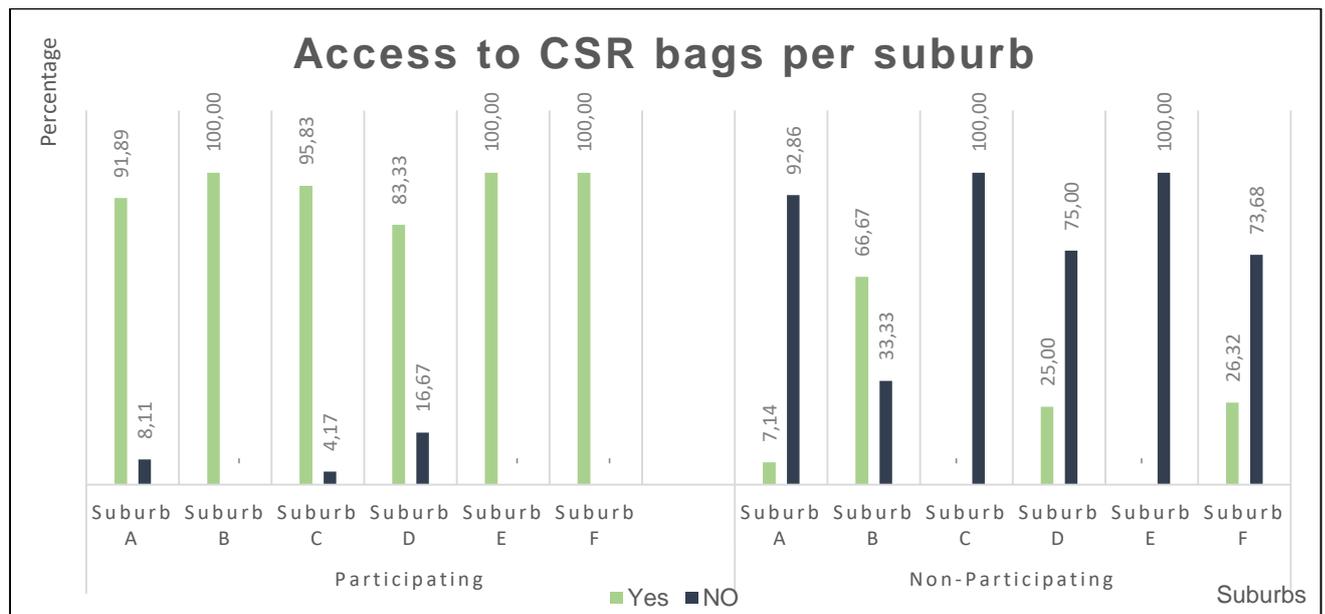
Source: Survey Data (2019)

Although awareness and information about the CSR programme is important in assisting households to participate in the CSR programme, Omran *et al.* (2009:285), found in their Malaysian study that a lack of facilities and resources drove poor recycling habits and lowered participation rates. Therefore, it is imperative to analyse the importance of households' access to the free CSR bags and the impact that access to these CSR bags have on the households' CSR participation.

### 5.5.4 Access to free curb side recycling bags

Access to free CSR bags provided by the municipality seems to play an important role in the decision to participate or not to participate in the CSR programme as illustrated in Figure 5.5.

Figure 5.5: Access to free curb side recycling bags and household curb side recycling participation status (*n* = 219)



Source: Survey Data (2019)

In Suburbs B, E and F, all CSR participating households indicated that they receive free CSR bags, weekly. In Suburb C (with the highest CSR participation rate at 92.3 per cent), 95.8 per cent of the participating households indicated that they received free CSR bags weekly. Of the 57 per cent participating households in Suburb D, 83.3 per cent of households indicated that they received free CSR bags weekly, with only 16.6 per cent not receiving the CSR bags weekly. Not receiving free CSR bags makes CSR participation challenging and discourages households from continuing to participate in the CSR programme.

All non-participating households in Suburb C and E, indicated that they did not receive the free CSR bags from the municipality. In Suburbs A, D and F, however, some non-participating households also received the free CSR bags and Suburb B, two-thirds of the non-CSR-participating households (66.6 per cent) received the free CSR bag but

still chose not to participate in the CSR programme. The question arises as to what they use these free CSR bags for and why they receive these free bags if they are not participating in the CSR programme?

Households indicated that sometimes the municipality's supply of free CSR bags ran out and, in these cases, they would provide households with free black bags. Households said that waste collectors would then confuse the CSR bag for normal waste and collect it before the recycling truck came past. This sparked frustration from the households and discouraged some households from participating in the CSR programme.

Although households' access to free CSR bags is a determining factor in households' decision to participate in CSR, past studies (Grodzinska-Jurczak *et al.*, 2003:120; Ho, 2002:11; Maddox *et al.*, 2011:2598) are of the opinion that educating school-going children will instil pro-environmental behaviour from a young age that will continue when they are adults. It is therefore important to assess the impact on households' CSR participation status if there are school-going children present in the household.

#### 5.5.5 Households with school-going children

Out of the 240 responding households, 38 per cent had school-going children, of which 8.8 per cent attended home schooling. Almost two-thirds (64.7 per cent) of the respondents with school-going children indicated that the children had done projects at school relating to waste management. Of these, 61.4 per cent indicated that these school waste management projects had a positive spillover effect into the household and encouraged them to participate in the CSR programme.

In Suburb C, where the CSR participation rate is highest (92.3 per cent), 72.7 per cent of the households had school-going children who had done waste management projects and indicated that their child's education about waste management spilled over into their household's CSR behaviour. In Suburb D, 80 per cent of households with school-going children that have done waste management projects, felt that their child's education had a positive spill over effect into the households' CSR behaviour. These results are similar to a Polish study that found that school environmental programmes have a spillover effect into the household, which impact the environmental knowledge, attitudes, and behaviours of adults (Grodzinska-Jurczak *et*

*al.*, 2003:114). In Suburb E, the suburb with the lowest CSR participation rate, none of the households indicated that their children's school projects had any impact on the households' CSR participation.

The results also suggest that the suburbs that experienced the largest spillover effects from the children's school projects are suburbs that have schools within walking distance from the households, such as in Suburbs C and D.

According to Media Dependency Theory (MDT), the use and impact of social media on the decision to participate or not to participate in the CSR programme needs to be analysed.

#### 5.5.6 The use of social media

Social media opened many platforms for knowledge sharing. A study from Singapore showed that media dependency and media attention on waste management contributed positively to pro-environmental behaviour (Ho *et al.*, 2015:81). The results of the sampled households in the Drakenstein Municipality showed that many households have access to at least one social media platform. The most popular applications (apps), used by members of the households include WhatsApp, Facebook, other news related apps, Twitter and Instagram.

Of the 230 responding households, the majority (84 per cent) of the households indicated that they made use of WhatsApp. In Suburb A, 83.3 per cent of households indicated that they used WhatsApp, while in Suburb B, all households indicated that they used WhatsApp. In Suburbs C and F, 84 per cent of households used WhatsApp and in Suburb D, 86.5 per cent of households used this app. Suburb E was the suburb with the fewest households (71.4 per cent) using this app. WhatsApp may therefore be an effective tool to use to encourage and inform households on CSR participation.

Moreover, 65 per cent of the 230 responding households indicated that they used Facebook. In Suburbs A, C and D, 65 per cent of households used Facebook, while Suburb B had the most households (75 per cent) that used Facebook. In Suburb E, 66.6 per cent of households indicated that they used Facebook, while in Suburb F, the smallest number of households (62.3 per cent) indicated that they used Facebook.

Other news-related apps, such as Maroela Media, NetNuus and News 24, were used by 21.7 per cent of the 230 responding households. In Suburb A, only 10 per cent of households used these apps, while Suburb B had the most households (41.6 per cent) that used these Apps. In Suburbs C and D, 23 per cent of households used these apps. In Suburb E, 19 per cent of households used the news-related apps and Suburb F had the lowest number (7.2 per cent) of households that used the news related apps.

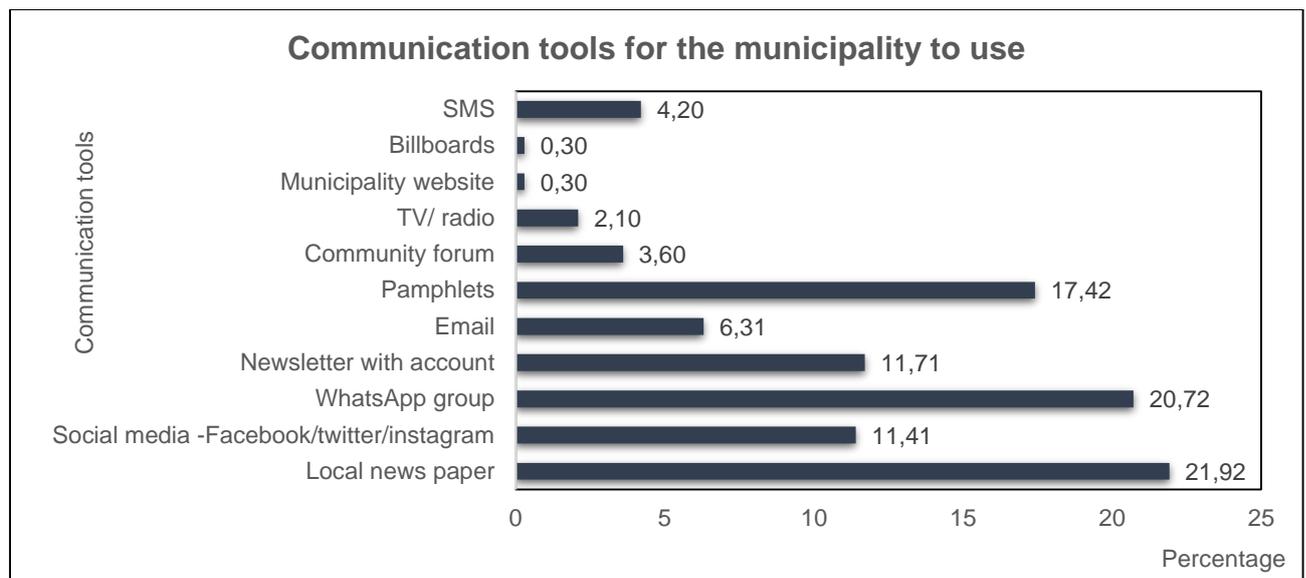
Twitter and Instagram are not as popular as WhatsApp and Facebook, with only 10.4 per cent of the 230 responding households using Twitter and only 18.3 per cent using Instagram.

To assess whether the households would like the municipality to use social media to communicate information on the CSR programme to them, the questionnaire asked, “Should the municipality use social media platforms to communicate about curbside recycling?”. Of the 230 responding households, 93 per cent (214) of households felt that the municipality should use the social media platforms available. Of these 214 households, 64 per cent of households (137) participated in the CSR programme, while 35.9 per cent of households (77) did not participate in the CSR programme. This indicates that the municipality might consider using social media platforms to keep households informed about the CSR programme and to encourage them to participate in the CSR programme.

In an open-ended question, the households were asked “What communication tool can the municipality use to communicate information regarding the curbside recycling projects and other waste management information to you?”. These results might be able to assist the municipality in how to better communicate information on the CSR programme and other waste management activities to households more effectively and efficiently.

Figure 5.6 shows the communication tools suggested by the households for the municipality to use to keep the households informed on CSR.

Figure 5.6: Communication tools that the municipality can use (*n* = 218)



Source: Survey Data (2019)

These results indicate that a variety of media platforms should be used. Only 20.7 per cent of the households indicated that the municipality should use WhatsApp. Another 21.9 per cent of households felt that the municipality should continue to use the local newspaper to convey information on the CSR programme. A variety of media should therefore be used by the municipality to remind and encourage household participation in the CSR programme and to deliver news on the CSR programme quickly and effectively.

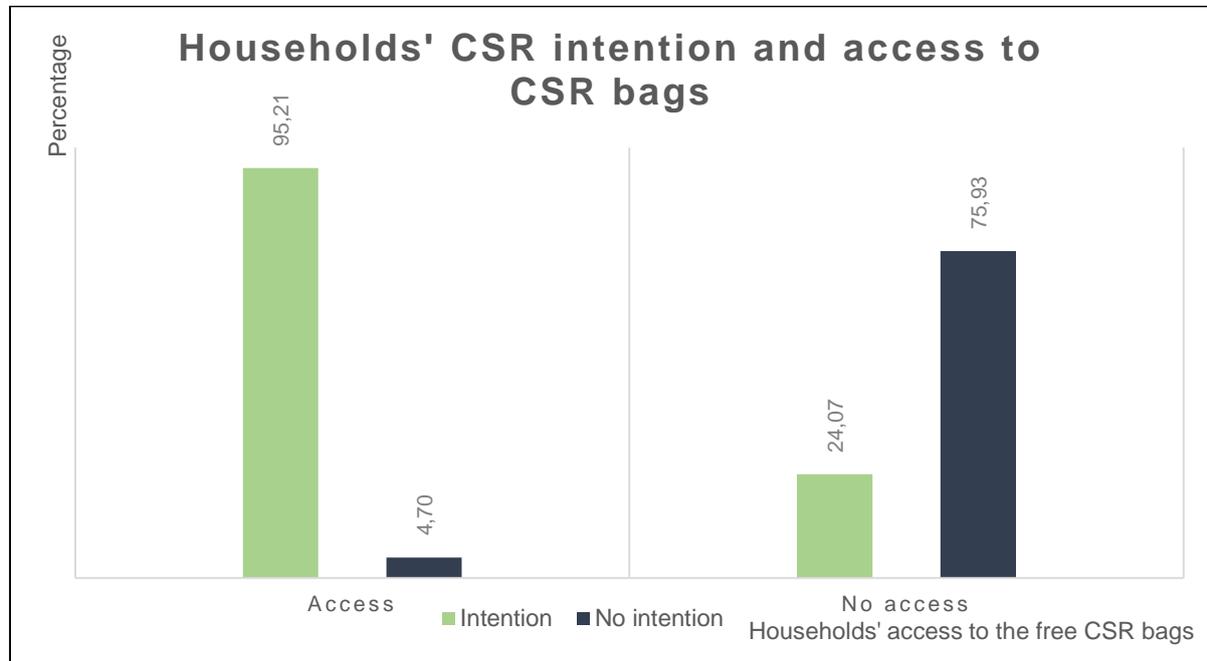
In the next section the households' intention to participate in the CSR programme will be analysed.

### 5.6 Households' intention to participate in curb side recycling

The households' intention to participate in the CSR programme was analysed by asking households, "Do you intend to recycle your household waste in the future?". Of the 217 households that responded, 90.3 per cent of households (196) indicated that they intend to recycle their recyclable household waste. Of these 196 households, 69.9 per cent (137) already participated in the CSR programme and had the intention of carrying on, while 30.1 per cent (59 of 196) of households were not currently participating in the CSR programme but had the intention of participating in the future.

Figure 5.7 illustrates the relationship between households' intention to participate in the CSR programme and households' access to free CSR bags.

Figure 5.7: Households' access to free curb side recycling bags and their intention to participate in the curb side recycling programme ( $n = 200$ )



Source: Survey Data (2019)

These results show that 95.2 per cent of the households that had access to the free CSR bags, had the intention of participating in the CSR programme and only 24.1 per cent of households who did not have access to the free CSR bags intended to participate in the CSR programme. This reiterates the importance of the households' access to weekly free CSR bags.

The Theory of Reasoned Action (TRA), by Fishbein and Ajzen (1975) predicts specific intentions and behaviours, therefore saying that individuals have the intention to perform a certain task if they have a positive evaluation of the task. It implies that if households do not receive their weekly free CSR bags, it can make participation challenging and therefore decrease their intention to participate in the CSR programme.

In the next section the results and discussion of the probit models will be presented.

## 5.7 Results of the probit models

The results of five binary probit models are presented and discussed. Model I uses the households' CSR participation status as the dependent variable and seeks to analyse the relationship between the dependent variable and the behavioural variables. Models II to V also use the households' CSR participation status as the dependent variable but seek to analyse the socio-economic determinants that influence the households' decision to participate in the CSR programme. Moreover, all the probit models incorporate the marginal effects for easier interpretation and use robust standard errors. Before the probit models are presented, the PCA results of the Attitude and Subjective Norm Indexes will be outlined. Both of these indexes are created through the PCA and are used as explanatory variables in Probit Model I.

### 5.7.1 The results of the Attitude and Subjective Norm Indexes using the Principal Component Analysis technique

PCA, which is a data reduction method, is used to create two indexes to be included in Model I, namely the Attitude Index and Subjective Norm Index. The Attitude Index measures how households feel about waste separation and the CSR process. This includes how households feel about the time it takes to separate the waste, the inconvenience it causes in the households and how the household feels about recycling. According to the PCA (Appendix B1.2), two components, namely households' feeling about the time it takes to separate the waste and households' feelings about recycling inconvenience were retained and explain 63.9 per cent of the total variance in the data. The results for the Attitude Index (Appendix B1.1) provide the correlation of the households' attitude towards CSR in the Drakenstein Municipality and show a strong correlation among the five original variables. The KMO = 0.7003 and showed modest sampling adequacy since it is greater than 0.5 and can, therefore, be used as the Attitude Index.

The Subjective Norm Index (Appendix B2.1) shows the relationship between the households' subjective norm, as measured by households' opinion on their community involvement in CSR, and the role that the household members play in the community's involvement in CSR. The matrix shows that there is a somewhat weaker correlation

among the three original variables. According to the PCA (Appendix B2.2), only one component should be retained, namely the households' view of the importance of the role they have in waste management in the community and explains 59.6 per cent of the total variance in the data. The Subjective Norm Index (Appendix B2.1) shows the correlation between the households' subjective norms. The KMO = 0.6127 also shows modest sampling adequacy and can therefore be used as an index.

#### 5.7.2 Results of the probit model for the behavioural variables

Table 5.6 presents Probit Model I, which analyses the households' behavioural factors that influence their participation or non-participation in the CSR programme. The dependent variable is the households' CSR participation status where  $p_i = 1$  indicates that the household participates in the CSR programme and  $p_i = 0$  indicates that the household does not participate in the CSR programme. Model I includes the households' intention to participate in the CSR programme, the Attitude Index, the Subjective Norm Index, the difficulty of CSR participation for households, the lack of space to participate in CSR and the use of social media by household members as explanatory variables.

Table 5.6: Results for the probit model analysing the households' curb side recycling participation status and behavioural variables

Household participation status	Model I	
	Coef.	Marginal effects
Constant	-0.1923082 (0.4305919)	
Intention	0.8848902** (0.4233457)	0.2049994**
Attitude Index	0.2144934** (0.0900082)	0.0496909**
Subjective Norm Index	0.3556082*** (0.0958426)	0.0823825***
Difficulty of CSR participation	-0.2077192 (0.4488064)	-0.04812
Lack of space for CSR	-0.9580971*** (0.2368719)	-0.2219589***
Social media	0.4411989* (0.2322069)	0.102211*
Obs	183	
Prob> <i>chi</i> <sup>2</sup>	0.0000	
Pseudo R2	0.3457	
Hosmer-Lemeshow <i>chi</i> <sup>2</sup>	9.48	
Prob > <i>chi</i> <sup>2</sup>	0.3033	
Mean VIF	1.39	

Dependent variable = Household CSR participation status (1 = Household participates in CSR, 0 = Household does not participate in CSR). Statistically significant at 0.01\*\*\*, 0.05\*\* and 0.10\*. Source: Survey Data (2019).

The intention variable indicates that if households have a positive intention to participate in the CSR programme, the probability of households' CSR participation will increase by 20.4 per cent. This variable is statistically significant at 5 per cent. These results agree with the results of Ittiravivongs' (2011:444) study in Thailand. Furthermore, these results agree with theories such as the TRA and the TPB, which state that intention has a significant and direct impact on the households' actual recycling behaviour (Ajzen, 1985; Fishbein & Ajzen, 1975).

The Attitude Index measures how households feel about waste separation and the CSR process. This includes how households feel about the time it takes to separate the waste, the inconvenience it causes in the households and how the household feels about recycling. The results show that a positive household attitude towards recycling

will increase the probability of household participation by 4.9 per cent and is statistically significant at a 5 per cent level. This is consistent with a study by Vining and Ebreo (1992:1594), who found that attitudes and recycling inconvenience are significantly related to recycling. Moreover, Barr *et al.* (2003:408) found that, for government policies on recycling to be successful, the attitude of the people is important.

The Subjective Norm Index measures a household's opinion on the community's involvement in CSR and the role that the household members play in the community's involvement in CSR. The recycling behaviour of a person is considerably influenced by the social norm and social groups with which they choose to surround themselves (Do Valle *et al.*, 2004:522). Model I shows that when households understand the importance of their role in CSR, the probability of households' CSR participation will increase by 8.2 per cent (statistically significant at 1 per cent). These results confirm the TPB and show that the greater the number of household members in the suburb responsible for the community's waste management is, the more likely household participation will be in CSR.

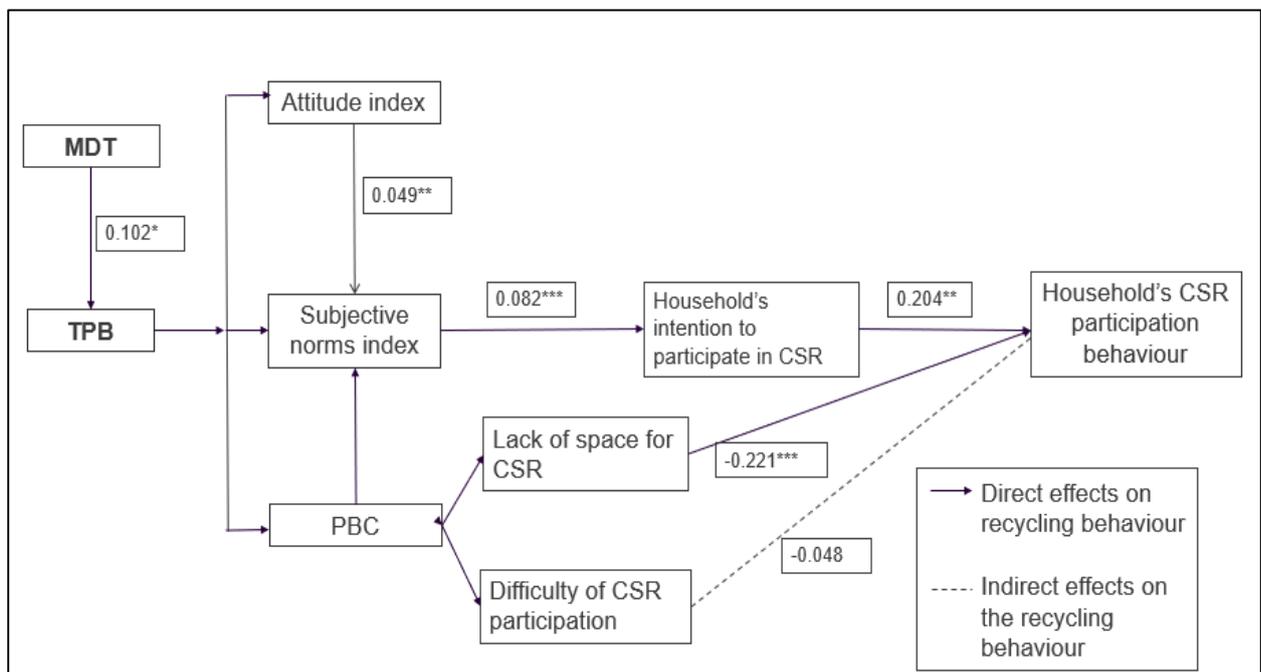
The relationship between households' CSR participation status and the difficulty of participating in the CSR programme indicates that if households find recycling to be a difficult task, it will decrease the probability of households' CSR participation by 4.8 per cent. This variable is not statistically significant, indicating that when other behavioural variables are considered, the difficulty of households' CSR participation is not a key factor. Moreover, if households feel that they do not have sufficient space to keep the dry and wet waste separate, it will decrease the probability of households participating in the CSR programme by 22.1 per cent at a 1 per cent statistically significant level. Ittiravivongs's (2011:444) study in Thailand, also indicate that a lack of space will decrease the probability of CSR participation but did not find it statistically significant.

The results support the MDT and highlight that if households use any social media platform where waste and recycling posts appear, the probability of households' participation in CSR will increase by 10.2 per cent and the result is statistically significant at a 10 per cent level. This result agrees with the Singaporean study in which it was found that media dependency and media attention on waste management

positively contributes to pro-environmental behaviour (Ho *et al.*, 2014:81). This result emphasises how important social media has become in the last decade and how useful it can be to increase the households' CSR participation.

Model I studied the households' behavioural variables and is used in Figure 5.8 which shows how each of the households' behavioural variables effect the households' actual CSR behaviour. The results found that the households' intention to participate in the CSR programme, lack of space to separate waste and the use of social media are all statistically significant variables that directly affect the households' behaviour in the Drakenstein Municipality. Moreover, Figure 5.8 indicates that difficulty of CSR participation indirectly affects the households' CSR behaviour.

Figure 5.8: Path diagram of direct and indirect prediction of households' curb side recycling behaviour (N=183).



Source: Survey Data (2019)

The six variables included in Model I explain 34.5 per cent of the variation in the households' CSR participation status. The Hosmer-Lemeshow test, which tests for goodness of fit, is significant with a probability of 0.3033. This model was also tested for multicollinearity using the mean Variance Inflation Factor (VIF) and indicates that there is no multicollinearity present among the variables since the mean VIF is 1.39.

Model I indicates that households' intention to participate in the CSR programme and lack of space for CSR, followed by the use of social media, are the major behavioural variables that impact the probability of households' CSR participation. All the variables, except for difficulty of CSR participation are statistically significant. Although the Attitude Index and Subjective Norm Index positively affects the probability of households' CSR participation, these increases are somewhat smaller than expected, which could indicate that these indexes, although important, are not the main behavioural determinants that affect CSR participation in the Drakenstein Municipality households.

### 5.7.3 Results and discussion of the probit models on the socio-economic determinants and households' curb side recycling participation

In Models II to V, the gender, age and education level of the household member(s) responsible for WMA in the household, the household gross income categories and the months lived in the same dwelling are included as the base variables. In Model II, the variables measuring the number of household members (household size) and access to free CSR bags are included to investigate whether these impacts the probability of households' CSR participation. In Model III, only the social media variable is added to the base variables to analyse the impact that the use of social media can have on the households' CSR participation. In Model IV, the presence of school-going children in the household has an impact on the households' participation in the CSR programme is added as a variable in order to determine if the presence of school-going children, encourages households to participate in the CSR programme. Model V presents the full model, including all the variables from models II to IV, with the added variable for measuring whether households' opinion on the sufficiency of information available to them on the CSR programme impacts their actual CSR participation.

The results of Models II to V in Table 5.7 highlight the importance of female participation in household WMA. When females were responsible for the WMA in a household, the probability of household participation in CSR increased by 10.9 per cent, 30.1 per cent, 29.4 per cent and 10 per cent in Models II to V, respectively, over cases in which only males were responsible for household waste management

activities. These results are in accordance with studies such as the one by Saphores *et al.* (2006:272), which uncovered strong statistically significant results indicating that females tend to participate more in recycling activities than males. In Model III, in which the social media variable is added, the increase of the female variable is the highest. This could indicate that waste management and recycling posts on social media platforms have the greatest influence in reminding females to participate in the CSR programme. The female variable is statistically significant in Models II to IV however, in Model V, when all of the variables are included, the female variable is no longer statistically significant. This would suggest that, when everything else is considered, gender may not be a key determinant for households' participation in the CSR programme. For this reason, Model V finds similar results to Gamba and Oskamp (1994:610) and Meneses and Palacio (2005:844), who found no statistically significant relationship between recycling behaviour and gender.

In households where both males and females were responsible for the WMA, the probability of household participation in CSR also increased by 3.4 per cent, 13.4 per cent, 18.3 per cent and 3.8 per cent more in Models II to V, respectively, over households in which only males were responsible for household WMA. However, when both males and females are responsible for the WMA, this was not statistically significant in Models II, III and V. Model IV, which includes the variable for school-going children, indicates that when both males and females are responsible for WMA in the households, this is statistically significant at a 10 per cent level. This could mean that CSR participation of the household will increase when school-going children are present in the household and both parents responsible for WMA in the household.

Table 5.7: Results for the probit models analysing the socio-economic determinants and households' curb side recycling participation status

Household CSR participation status	Model II		Model III		Model IV		Model V	
	Coef.	Marginal effects	Coef.	Marginal effects	Coef.	Marginal effects	Coef.	Marginal effects
Constant	-8.227148*** (1.773541)		-3.744783*** (1.133679)		-3.963564*** (1.116036)		-11.542 (2.333)	
<b>Gender</b>								
Female	0.8884413* (0.5583484)	0.1097684*	1.217587*** (0.352844)	0.301036***	1.181526*** (0.3656173)	0.294925***	0.9206114 (0.5838708)	0.100731
Male and Female	0.2425548 (0.501641)	0.0340517	0.4876305 (0.3656357)	0.1342016	0.6807668* (0.3680837)	0.183442*	0.3153694 (0.5897111)	0.038114
<b>Age</b>								
25 to 34	0.252092 (0.7710384)	0.0378964	0.281969 (0.8458719)	0.0820566	0.0483471 (0.8334413)	0.0139452	-0.6004078 (0.9577335)	-0.06979
35 to 44	0.5944587 (0.7850859)	0.0845516	0.590352 (0.8765135)	0.1699346	-0.0952059 (0.9061643)	-0.0276562	-0.9079789 (1.090894)	-0.10837
45 to 54	0.2843238 (0.678967)	0.0425277	1.003327 (0.853121)	0.2778533	0.4138447 (0.8576268)	0.1153168	-0.3289755 (0.8577982)	-0.03732
55 to 64	1.35423 (0.6375579)	0.1687409	0.9920391 (.8456955)	0.2751096	0.758127 (0.8679141)	0.2004677	1.467459 (0.7634756)	0.135008
65+ (Retirement age)	1.034086 (0.741156)	0.1363493	1.550296** (0.8430736)	0.39374***	1.460296** (0.8632165)	0.3311986	1.012945 (0.8899187)	0.099451
<b>Education</b>								
Secondary completed	2.079204** (0.7494888)	0.36714**	0.8236886 (0.6248058)	0.2271929	1.13368* (0.6843028)	0.3028156**	2.582342** (0.8505658)	0.343288**
Certificates/ Diploma	2.62968** (0.928371)	0.446629**	1.422351** (0.635703)	0.389147**	1.500344** (0.7121934)	0.4009458**	3.164709** (0.9283879)	0.4186561***
Tertiary	3.163962** (1.084496)	0.50835***	2.021117** (0.6830006)	0.520299***	2.274545* (0.7275805)	0.5699702***	3.822816** (1.080079)	0.4911378***
<b>Income</b>								
R6 401 to R12 800	1.527067 (0.7825978)	0.1685823	0.6774706 (0.6437972)	0.168838	1.014342*** (0.5840035)	0.261168***	2.496788** (1.006914)	0.274895***

R12 801 to R25 600	2.268861** (0.8769194)	0.22639*	0.6475828 (0.6288663)	0.1620947	1.021769* (0.5499725)	0.262798*	3.767503** (1.174305)	0.3552263**
R25 601 to R51 200	0.2874075 (0.7699365)	0.0428813	0.3652138 (0.6524809)	0.0947192	0.554046 (0.5582012)	0.1503349	1.628391 (1.005155)	0.202083
R51 201+	0.196462 (0.8031267)	0.0300366	0.4889376 (0.6815891)	0.1250123	1.061735* (0.6203137)	0.271469*	1.02491 (0.9508766)	0.138881
Months in same dwelling	.0047638** (0.0019367)	0.000585**	0.0023909** (0.0012076)	0.000562**	0.0028939** (0.0012115)	0.0006656**	0.0050098** (0.0020781)	0.0005491**
Household size	0.4336963** (0.160677)	0.053311**					0.5517678* (0.2176314)	0.0604744**
Access to CSR bag	3.129588*** (0.5088579)	0.38470****					3.853082*** (0.6959805)	0.4223025***
Social media			0.7212021** (0.2931898)	0.169519**			0.5878637 (0.4302542)	0.064431
School-going children					0.8507657** (0.339388)	0.1956856**	1.490444*** (0.6833891)	0.1633545**
Sufficient information available							1.193642* (0.4984061)	0.130824*
Obs	135		138		144		128	
Prob> <i>chi</i> <sup>2</sup>	0.0000		0.0000		0.0000		0.0000	
Pseudo R2	0.6205		0.3326		0.3290		0.6609	
Hosmer-Lemeshow <i>chi</i> <sup>2</sup>	10.66		13.24		10.39		1.67	
Prob > <i>chi</i> <sup>2</sup>	0.2220		0.1040		0.2385		0.9894	
Mean VIF	1.34		1.30		1.29		1.43	

Dependent variable= Household participation in CSR (1 = Household participation in CSR, 0 = No household participation in CSR). Statistically significant at 0.01\*\*\*, 0.05\*\* and 0.10\*.

The age categories variable shows that, overall, the probability of a household's CSR participation increases with the age groups of the household member(s) responsible for WMA. In Model II, the 25 to 34 age category increase the probability of households' CSR participation by 3.7 per cent, while the 55 to 64 and 65+ age categories will increase the household CSR participation by 16.8 per cent and 13.6 per cent respectively; however, the age categories are not statistically significant in Model II. In Model III, on the other hand, the 65+ (retirement) age category is statistically significant and increases the probability of household CSR participation by 39.3 per cent. This model agrees with results by Nixon and Saphores (2009:272), who found that having a retiree in the house was a significant predictor of recycling behaviour in the USA. This highlights the notion that older people are more conscious about the world they leave behind for their children and grandchildren. Furthermore, Model IV and V found that the 35 to 44 age category decreases the probability of households' CSR participation by 2.7 per cent in Model IV and 10.8 per cent in Model V, contradicting the results of Akil and Ho (2014:2), who found the average age of people more likely to separate waste in the household was 41 years of age.

Additionally, when analysing the education level of the household member(s) responsible for WMA and CSR participation in the households, Models II, IV and V found that all levels of education show statistically significant results. All four models (Models II to V), agreed that the higher the educational category obtained by the household member(s) responsible for household WMA, the higher the probability of household's CSR participation. Model V further shows that if the household members responsible for WMA have completed secondary education level, the probability of household CSR participation is 34.3 per cent greater than those household members with only some secondary education; these results are statistically significant at a 5 per cent level. If the household member(s) responsible for the WMA obtained a post-school (certificate or diploma) or a tertiary education level, the probability of household participation in CSR will increase by 41.9 per cent and 49.1 per cent, respectively, over those members with only some secondary education. These results show different results to what Gamba and Oskamp, (1994:610), Meneses and Palacio, (2005:846) and Nixon and Saphores (2009:271) found. These authors found no statistically significant relationship between recycling behaviour and education levels.

In Models II, IV and V the households' gross income categories indicate that there is a higher probability of participation in CSR from a household when they earn a gross monthly income between R6 401 to R12 800 and between R12 800 to R25 600. The probability then decreases for a household that earns a monthly income between R25 601 to R51 200 and increases again in Model III, IV and V. In Model II, households earning a gross monthly income of between R12 801 and R25 600 had a 22.6 per cent higher probability of participating in CSR, than those households earning less than R6 401 per month. This income category is statistically significant at a 10 per cent level. Moreover, Model IV shows statistical significance for households earning between R6 401 to R12 800 and R12 801 to R25 600 and finds that households within income categories will have an increased probability of CSR participation of 26.1 per cent and 26.2 per cent, respectively. These results resemble similar patterns to those found in America, where recyclers generally had a higher income than non-recyclers (Jakus *et al.*, 1997:106; Saphores *et al.*, 2006:272)

In Model V, only the first two income categories are statistically significant, contradicting the aforementioned results reported by Jakus *et al.* (1997:106) and Saphores *et al.* (2006:272). This model indicates that the probability of households' CSR participation of households earning between R12 801 and R25 600 per month will increase by 35.5 per cent as opposed to the households earning R51 201 and more per month, which will increase the probability of CSR participation by 13.8 per cent more than those who earn less than R6 400. However, this category is not statistically significant, which indicates that when all other explanatory variables are included in the model, income might not be a key determinant of households' curb side recycling behaviour.

The number of months that households have lived in their current dwelling, shows an increase in the probability of household CSR participation in all four models and is statistically significant at a 5 per cent level in all four models. This variable shows very small but significant increases. These small increases are attributed to the fact that this variable is measured in months and not years. Overall, this variable shows that for every additional month lived in the dwelling, the probability of household CSR participation will increase. This might indicate that households who are settled are more familiar with the waste removal processes in the suburb, which might increase their probability of CSR participation.

For every additional family member in the household, the probability of household CSR participation will increase by 5.3 per cent and 6 per cent in Models II and V, respectively. In both these models, this variable is statistically significant at 5 per cent level. This might mean that when there are more people present in the household to help separate the waste and to encourage one another to keep on separating the waste, the households have a higher probability of participating in the CSR programme.

Models II and V emphasise how important the households' access to free CSR bags are for increased household participation in CSR. The probability of households' CSR participation will increase by 38.5 per cent and 42.2 per cent, respectively, in Models II and V, if the households receive their free CSR bags weekly. In both models, the results are statistically significant at a 1 per cent level.

Model III confirms the MDT by indicating that social media used by households increases the probability of households' CSR participation by 16.9 per cent. These results also agree with the study by Ho *et al.* (2015:81) in Singapore on media dependency and media attention. When all variables are considered in Model V, social media still increases the probability of households' participation in CSR but is no longer statistically significant.

In the same way, the presence of school-going children in the household shows a statistically significant influence on the probability of households' participation in CSR. In Model IV and V, the presence of school-going children in the household is statistically significant at a 5 per cent level and increased the probability of households' participation in CSR by 19.5 per cent and 16.3 per cent, respectively, confirming that part of the solution lies in educating the youth in order to educate the rest of the household, as advocated by Maddox *et al.* (2011:2597). When school children learn about waste management and pro-environmental behaviour at school, this does, in fact, have a spillover effect into households.

Model V reports on the importance of sufficient information on the CSR programme and process. The results indicate that ensuring sufficient information available, to households, on the CSR programme, is a positive contributor to the households' decision to participate in the CSR programme. If households have sufficient information available to them, the probability of CSR participation increases by 13 per

cent and is statistically significant at a 10 per cent level. Ho (2002:13) explains that even if a person has a pro-environmental attitude or belief but a lack of information, this results in ineffective recycling behaviour.

The explanatory variables in Model II, including the base variables (Gender, Age, Education, Income and Months in dwelling) and Number of household members as well as the access to free CSR bags, explain 62 per cent variation in the dependent variable (participation of household in CSR), while Model III, where the social media variable was added as a variable, explains 33.2 per cent of variation in the dependent variable. Model IV, in which school going-children variable was added to the base variables, explains 32.9 per cent variation in the dependent variable. Model V, which includes all variables as well as the sufficient information variable, explains 66 per cent of the variation in the dependent variable. The mean VIF for Model II to V is 1.34, 1.30, 1.29 and 1.43, respectively, which indicates that multicollinearity is not a concern in these models. Model V seems to be the best model to use, since it takes all variables into account and explains most variation in households' CSR participation status.

## **5.8 Summary**

The objective of this chapter was to analyse the data obtained through the questionnaire using descriptive and econometric techniques. The first part of the chapter analysed the data from 240 households through descriptive statistics. The descriptive statistics focused on determinants of households' participation and non-participation in the CSR programme. The descriptive statistics showed that of the 240 responding households, 155 households participated in the CSR programme while 85 households did not participate in the CSR programme. The descriptive results revealed that in general, where females are responsible for household WMA, the probability of participating in the CSR programme was higher than that of males or where both males and females were responsible for the household's WMA. The household member(s) responsible for WMA are on average 54 years of age, with a tertiary education. Furthermore, Suburbs C and F reported the highest household CSR participation, whereas Suburbs B and E were the suburbs with the lowest percentage of CSR-participating households.

Two indexes were created, namely an Attitude Index (measuring how households feel about CSR) and a Subjective Norm Index (measuring the households' opinion of community involvement in CSR), and tested through the Keiser-Meyer-Olkin test, showing sampling adequacy. These indices were included as explanatory variables in the Probit Model I.

In Model I, the households' CSR participation status is the dependent variable and the behavioural variables are the explanatory variables. This model revealed that households' intention to participate, lack of space for CSR and the use of social media are the key behavioural variables that impact the probability of households' CSR participation.

The TPB and MDT were incorporated in Model I and showed that the Subjective Norm Index and social media are statistically significant determinants of households' intention to participate in CSR. The TPB suggests that households' intention will have a direct impact on households' decision to participate in CSR. This indicates that households' behavioural choices can be explained through the TPB and have a direct impact on their CSR participation. Furthermore, the results from Model I support the MDT and highlight that, if households use any social media platform where waste and recycling posts appear, this will increase the probability of households' participation in CSR.

Most (93 per cent or 214 of the 230) households indicated that the municipality should use media platforms to encourage, inform and remind households of their participation in CSR. In Models III and V, where social media is controlled for, the probability of household CSR participation increases and is statistically significant in Model III but not statistically significant in Model V. Social media might therefore still be a useful tool for the municipality to incorporate in order to encourage and remind households to participate in the CSR programme.

In Models IV and V, which controlled for school-going children present in the household, the probability of households' CSR participation increases and is statistically significant. For this reason, more school projects on waste management and recycling should be implemented in schools in order to increase the spillover effect of waste management knowledge into the household.

In Models II and V, households' access to free CSR bags proved to be statistically significant and showed that household participation will increase if households receive free CSR bags on a weekly basis.

When all these models are compared, Model V, which includes all explanatory variables, seems to be the best model to use as it explains most (66 per cent) of the variation in households CSR participation.

## **CHAPTER 6: SUMMARY AND CONCLUSIONS**

### **6.1 Introduction**

The aim of this minor dissertation was to analyse the socio-economic determinants that influence household CSR participation behaviour. The aim of this chapter is to present the key findings, conclusions and recommendations of the study. In the first part of this chapter, a brief overview of all previous chapters is presented. Thereafter, key findings, aimed at answering the research question and sub-questions are presented, followed by recommendations. Lastly some limitations of this study are discussed, as well as areas for further research.

### **6.2 Summary**

Chapter one, presented the background, problem statement, research question, aim and objectives, the significance of the study and briefly, the research methodology. The discussion in Chapter one showed that the past decade has seen an upsurge in research on environmental sustainability, with increasing talks on serious environmental concerns (Anyasi & Atagana, 2017:1751; Kim & Choi, 2005:592). Waste is a major environmental problem faced by many societies and is fast becoming a concern not only locally, but on an international scale as current waste management habits have serious and damaging consequences, such as limiting the lifespan of landfills. Furthermore, Chapter one revealed that the waste management goals set by NMWMS together with the NEMWA, stated that municipalities were required to initiate waste separation-at-source programmes (also called curb side recycling) at household level in all major cities and towns by 2016, however, this was not achieved by this date. Although recycling rates have increased in recent years, South Africa still lags behind other countries when it comes to waste management and recycling.

It is for this reason that the issue of households' behaviour and choice to participate or not to participate in the CSR programme is of vital importance, since households are one of the largest generators of waste. It is important to analyse and understand why households choose to behave in a particular way in terms of participating in the CSR programme, as a starting point in this study, specifically in the Drakenstein

Municipality. Therefore, this study aims to identify and analyse those socio-economic determinants that impact households' decision to participate or not to participate in the CSR programme.

Chapter two contextualised recycling processes and defined important concepts and policies of CSR in South Africa. Households are one of the largest generators of municipal solid waste and therefore it is important to understand how to assist these role-players in managing their waste. Municipal Solid Waste Management (MSWM) includes the collecting transferring and recycling of the household waste to ensure a clean and safe environment. However, for such policies to be successful, they must be fully embraced by households. MSWM still remains inadequate in South Africa. Despite the implementation of these policies by the South African Government, South Africa's recycling industry is still in its infancy stage, with recycling rates lagging behind those of developed countries. This is due to the lack of adequate facilities and appropriate municipal waste management. Furthermore, Chapter two introduced the Drakenstein Municipality in the Western Cape Province. The Wellington landfill situated in this municipality will reach its capacity by 2022 at current waste disposal rates and the authorities are therefore seeking ways to encourage households to participate in the CSR programme to decrease the amount of waste that ends up on the landfill. The CSR programme has already been instituted in selected suburbs in the Drakenstein Municipality.

Once per week the households put out their mixed waste, as well as a clear CSR bag with recyclables, for same-day collection. The household separate paper, cardboard, plastic and glass from other waste and place it into the clear CSR bags. When these bags are collected by the municipality, the household is provided with a new clear CSR bag for the following weeks recyclable waste. Chapter two highlighted some policies and laws that are already in place in South Africa to gain a higher rate of household CSR participation by 2023. This chapter is important as it provided a better understanding of how CSR can be used to assist with the limited lifespan of landfills and explained that the participation of households is important for these policies to be successful.

Chapter three contained an in-depth review of the literature, both locally and international, to give a theoretical framework on the behavioural theories that could be

applied to households and their recycling behaviour. Theories such as Fishbein and Ajzen's (1975) 'Theory of Reasoned Action' (TRA) which assumes that individuals act in a rational way under normal circumstances and that their intentions lead to actual behaviour. The assumption of a rational individual was dropped and Ajzen (1985) developed the 'Theory of Planned Behaviour' (TPB), based on three key concepts, namely, attitude, subjective norm and Perceived Behavioural Control (PBC), that may impact an individual's CSR participation. This theory suggests that households would increase their CSR participation if they had a positive attitude about recycling and the recycling process. Moreover, households would participate in the CSR programme if they thought that their community viewed CSR as a positive action (subjective norm) and if the process were easy and manageable (PBC). 'Media Dependency Theory' (Ball-Rokeach & DeFleur, 1976) uses the same concepts as TPB, but in addition, includes the impact that media (and in more recent times, social media) can have on the individual's behaviour. In other words, MDT predicts that households' CSR participation rates will increase if they read more articles relating to waste and CSR on social media platforms. The 'Theory of Achieved Motivation' (Atkinson, 1964) proposes that if individuals think that their contribution would lead to the success of the CSR programme, they would be more prone to participate in the CSR programme.

Dulany's (1968) 'Theory of Propositional Control' emphasises the value of an individual's beliefs, while Schwartz's (1977) 'Model of Altruistic Behaviour' finds that individuals' behaviours are influenced by their moral beliefs. These two theories explain that some households will not just participate in the CSR programme because it is expected of them; they will participate because they feel it is their moral responsibility to protect the environment for future generations.

Thereafter, the socio-economic determinants that could influence the households' decision to participate in the CSR programme were also identified by a review of past studies. Determinants such as intention to recycle, attitude towards recycling, subjective norm, space and inconvenience of recycling, gender, age, education, monthly household income, months lived in the same dwelling, household size, facilities and resources, the use of social media, presence of school-going children in the household and knowledge of recycling, were all studied. The relationship between these socio-economic determinants and the households' CSR participation status from past literature was analysed.

Chapter four, discussed the research design and research methods used. A questionnaire was used as the research instrument to collect data from 247 households in six suburbs in the Drakenstein Municipality. The random sampling technique was difficult to undertake, and it was therefore decided to use a convenience sampling method to collect the necessary data. A quantitative research method was incorporated that included descriptive statistics and, due to the nature and purpose of the research question, a case study design was incorporated.

To ensure the validity of information collected, respondents had to be older than 18 years of age and only household members could complete the questionnaire. For this reason, seven questionnaires could not be used, and the sample size decreased to 240 households. This study obtained ethical clearance from both the Drakenstein Municipality and the University of Johannesburg to ensure that this research adheres to the ethical requirements of anonymity and confidentiality.

The econometric techniques used were introduced. The PCA method was used to create two indexes, namely the Attitude Index and the Subjective Norm Index. The KMO statistic, used to test competence of these two indexes, was explained. Thereafter, the probit model was introduced, along with the validity tests, the VIF and the Hosmer and Lemeshow test.

Chapter five provided the results of the analysis of the 240 household questionnaires. Descriptive statistics of the household questionnaires were provided. The results of the two indexes (Attitude Index and Subjective Norm Index) created through the PCA technique were provided. These indexes were used as explanatory variables in Model I. The second part of the chapter also provided the results and discussion on the probit models that analysed the relationship between households' CSR participation status and the behavioural variables. This model found that households' intention to participate in the CSR programme, lack of space and the use of social media are the key explanatory variables using marginal effects and robust standard errors. Thereafter, the results and discussion of the four probit models that use the households' CSR participation status as the dependent variable were presented to determine the relationship between households' CSR participation status and the socio-economic determinants, and the significance of these relationships. It was found that in households where women are responsible for WMA, the probability of

household CSR participation is higher. More educated households also tend to participate more in the CSR programme. Furthermore, the results indicated that there is a positive spillover effect on households' CSR participation when school-going children are present in the home. The data also indicated how important the households' access to the free CSR bags is in order to increase the CSR participation.

### **6.3 Main findings of the study**

Only once the behaviour behind household recycling choices is understood, can the most efficient policies be put in place to encourage households to be more responsible with regards to CSR (Strydom & Godfrey, 2016:1).

The results revealed that the household's intention to participate in the CSR programme, lack of space to separate waste and the use of social media are all statistically significant variables that directly affect the households' behaviour in the Drakenstein Municipality. Although the Attitude Index and the Subjective Norm Index positively affects the probability of households participating in CSR, the smaller than expected increases could indicate that these indexes, although important, are not the main behavioural determinants that affect CSR participation in the Drakenstein Municipality households. Moreover, the difficulty of CSR participation indirectly affects the households' CSR behaviour.

The results agree with past literature that has found that households where females tend to be responsible for the household's WMA, have a higher probability of household CSR participation than when males are responsible for the WMA. The results further show that the older age categories and higher education categories tend to increase the probability of household CSR participation. In Model III, the retirement age category (65 years and older) is statistically significant and increases the probability of household participation significantly.

The presence of school-going children in the household is a statistically significant variable that increases the probability of CSR participation. Waste management and recycling programmes delivered to school-going children causes a spillover effect on a household's CSR behaviour and therefore more programmes of this nature should be implemented into the school syllabus. Moreover, the results indicate how important information on CSR is to the households. If households receive sufficient information

on the CSR programme and the process it might increase household CSR participation. The results further show that the municipality should use a variety of media platforms, such as WhatsApp and Facebook, but also traditional communication tools including the local newspaper, pamphlets, SMSes, emails and the monthly newsletter sent out with the municipal bills, to communicate information regarding the CSR programme, as well as to encourage and remind households to participate in this CSR programme.

Finally, to make participation in the CSR programme as easy as possible for households, it is important to have the right facilities and resources in place. In the Drakenstein Municipality, households receive free CSR bags on a weekly basis to keep their recycled materials separated from the normal waste collected. The results emphasise the importance of the households' access to the free CSR bags for increased household participation in the CSR programme.

Based on the findings and results of the research question and sub-questions, recommendations are provided in the next section.

#### **6.4 Recommendations**

The results of this study provide solutions to the sub-questions in Chapter one and suggest some directions and recommendations for improving household CSR participation in the Drakenstein Municipality.

The results indicate that households need sufficient information on the CSR programme and process to increase their participation in the programme. It is also important that households receive continuous reminders to keep them informed and to encourage them to participate in the CSR programme. Moreover, the data revealed that newcomers to an area are not always aware of the CSR programme and for this reason the probability of CSR participation is very low for the first two years. Regular reminders are therefore also important to make them aware of the CSR programme and how it works.

Almost all non-CSR-participating households in this study indicated that they did not have sufficient information on the CSR programme and process. Lack of sufficient information poses a barrier to households' CSR participation. Education on waste

management is therefore a key factor for increasing CSR participation rates. The results further showed that school-going children have a spillover effect into the households' CSR behaviour. A policy recommendation is therefore to educate the youth. One solution as pointed out by Maddox *et al.* (2011:2597) is to educate school-going children in order to educate the rest of their households. In order to educate the youth about the CSR programme and pro-environmental behaviours in the right way, the schools should provide the necessary education and informative materials in accordance with the specific municipality's CSR programme and processes to ensure that the information provided is effective and correct. Another way could be to start a recycling campaign, aimed at school-going children, that includes a mascot so that children can associate pro-environmental behaviour with something positive. It is important to educate the youth at an early age, so that pro-environmental thinking becomes a habit as they are the policymakers of the future.

The municipality should keep reminding households about the CSR programme through the use of a variety of media such as WhatsApp and Facebook, the local newspaper, pamphlets, emails, monthly newsletter sent out with the municipal bills and SMSes, since not all households use social media platforms. Another reminder could be a fridge magnet provided to the households, once-off, that lists all the products that should be separated into the CSR bag.

The results suggest that when households feel good about their contribution, the probability of participation will increase. This suggests that the municipality should inform households of the value of their contribution towards waste management. The TAM postulates that if households are aware that the CSR programme's success depends on households' participation, the probability of their CSR participation will be greater. Information on the value of households' participation in the CSR programme should include aspects such as their contribution to job creation and a cleaner environment, the monthly landfill space saved, and the monthly volume of recyclables collected. This information can be published in the monthly newsletter that each household receives with its bills.

The Drakenstein Municipality can encourage more households to participate in the CSR programme by ensuring that the process for participating in CSR is as easy as

possible. This can be done through the weekly pick-ups of the CSR bags and providing new bags for the following week. Providing them with efficient and effective recycling facilities, services and supporting activities will encourage households to participate. Inconvenience to households can demotivate households to participate as explained by the TPB and PBC (Ajzen, 1985:12). The results highlight the importance of the supporting facilities in the Drakenstein Municipality and show that if the municipality provides the free CSR bags on a weekly basis, it increases the probability of households participating in the CSR programme. Participants in this study complained that waste pickers steal their bags and that their CSR bags do not get replaced on a weekly basis. One solution to this problem would be to provide each household in these suburbs with a CSR bin that will be collected on the same day as the normal garbage bin. This is, of course, an expensive solution in the short run; however, in the long run, the municipality could save on the costs of providing bags on a weekly basis and eliminate the inconvenience of households not receiving CSR bags, whether stolen, not delivered or not replaced by the municipality. The bins also provide more space for more recyclable goods and are more aesthetically pleasing than the CSR bags. This might allow the municipality to collect the recyclable bins once every two weeks, saving on collection costs. However, this is a solution that requires further investigation in terms of a cost-benefit analysis.

## **6.5 Limitations of study and areas for further research**

This study has some limitations that should be taken into consideration when the results are interpreted. This study used household-level survey data and during the week of the interviews, many household members were not home during the day to complete the questionnaire. Some household members were too busy or did not want to participate in this study. In some cases, the fieldworkers could not conduct the interview in the household's preferred language. This study was limited to the suburbs in the Drakenstein Municipality where the CSR programme was already implemented before this study was conducted.

Despite these limitations, this study provided important insights into household behaviours and the socio-economic determinants in the Drakenstein Municipality that influence households' decisions to participate or not participate in the CSR

programme. It is recommended that future research might expand on the costs and benefits in the short and long run for the Drakenstein Municipality to provide CSR bins instead of CSR bags. Moreover, further research may investigate how CSR might differ among municipalities in different provinces in South Africa. Further research might also expand into investigating what households, that do not participate in the CSR programme, do with the free CSR bags that they receive from the municipality.

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## Appendix A



School of Economics and  
Econometrics  
University of Johannesburg



University of the Western  
Cape



**DST/NRF/CSIR Chair**  
in Waste and Society

**April 2019**

Dear participant

Thank you for taking time to participate in this study. We are researchers from the University of Johannesburg's School of Economics and Econometrics and are funded by the Sarchi Chair; Waste and Society at UWC. We are involved in research on households' curb side recycling. We are working on a project about the socio-economic determinants of households' curb side recycling behaviour in the Drakenstein Municipality. To this end, we wish to collect data regarding your background, education, employment history, current work and income and your opinions and views on curb side recycling (also known as separation at source). The information resulting from the study will be used to inform the Drakenstein Municipality on policies that could be implemented to assist and encourage households to part-take in curb side recycling. The results from the research might also be published in scientific journals.

**If you are older than 18, you are invited to participate in this study. Do note the following:**

1. Your participation in this study is voluntary. We will only include you in the study if you give us written consent to do so.
2. We are going to ask you some questions that will take about 30 minutes of your time.
3. You can discontinue with the questionnaire at any point without adverse consequences.
4. No personal questions or identifying particulars will be asked.
5. The questionnaire will be dealt with confidentially.

6. You have the right to ask questions about this study. If any questions arise while I am explaining this form, please ask them whenever you are ready. I will also give you time to think – please indicate if you want this time.
7. No monetary compensation is offered for your participation.
8. The original questionnaires will be stored in a secure location on the campus of the University of Johannesburg for a period of five years after which it will be destroyed.
9. Electronic datasets will be completely anonymised and stored for an indefinite period on a password protected computer.
10. Only the researchers involved in the project will have access to the raw data.
11. The dataset may possibly be utilised in future research; the same confidentiality will be applied in that instance.
12. If you have any concerns or questions related to the study in general, or the items in the questionnaire, please contact the Researcher Ms Liza Volschenk 084 227 0607 or [201303565@student.uj.ac.za](mailto:201303565@student.uj.ac.za) , Prof Kotie Viljoen 084 556 2253 [kotiev@uj.ac.za](mailto:kotiev@uj.ac.za) .

We value your cooperation in this matter.

Kind regards,

---

Ms Liza Volschenk (Researcher)

[201303565@student.uj.ac.za](mailto:201303565@student.uj.ac.za)

**SECTION A: Personal background of the respondent**

1. With which gender do you identify?

Male	1
Female	2
Other, please specify..... .....	3

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

African/Black	1
Coloured	2
White	3
Indian/Asian	4
Other, please specify..... ..... .....	5

3. What is your age?

--	--

4. What is your relationship to the household? (Father, mother, son, daughter etc.)

.....  
.....

**SECTION B: Household characteristics**

5. Which language is predominantly spoken in this household?

English	1
Sesotho	2
Sepedi	3
IsiZulu	4
IsiNdebele	5
XiTsonga	6
Afrikaans	7
Setswana	8
IsiXhosa	9
TshiVenda	10

SiSwati	11
Other, please specify..... .....	12

6. In what type of dwelling does the household live? (*Interviewer can observe*)

- House 1
- Flat 2
- Townhouse 3
- Commune 4
- Other, please specify..... 5
- .....

7. How long have you been living in this house/dwelling?

	Months	1
	Years	2

8. How many people (including yourself) live in your household?

--	--

9. Provide the **relationship in household, age and highest educational qualification** of each of the household members (*make sure it adds to the total provided above*).

	Household member	Relationship in household (e.g. father, mother) (1)	Age (2)	Highest grade completed or highest qualification (3)
1	1			
2	2			
3	3			
4	4			
5	5			
6	6			
7	7			
8	8			
9	9			
10	10			

10. Indicate the number of household members with the following status:  
(make sure it corresponds to the total provided above)

Status	Number	
Employed Full Time		1
Employed Part Time		2
Self-employed		3
Unemployed		4
Not in employment or education		5
Retired		6
Stay home spouse/partner		7
Student		8
School going children		9
Pre-school		10
Other (please specify)		11
.....		
.....		

11. In which income range does your **average monthly household income (after deductions) fall?**

No income	1
R1 - R 400	2
R401 – R800	3
R801 - R1 600	4
R1 601 - R3 200	5
R 3 201 - R6 400	6
R 6 401 - R12 800	7
R12 801 - R25 600	8
R25 601 – R51200	9
R51 201 – R102 400	10
R102 401 – R204 800	11
R204 800 or more	12

### Section C: General household waste management

12. Which of the household members listed in question 9 is responsible for the sorting/separating of waste and putting it out for collection?

Household member number (identified in Q9) who		
Sort/Separate the waste (1)	Put waste/recyclables out for collection (2)	
		1
		2
		3
		4
		5
		6

13. How do you store the waste generated by your household before it is collected?  
(May choose more than one option)

- Black plastic bags 1
- Designated bags for recycling (Orange/White/Green/Clear) 2
- Pile in the yard 3
- Wheelie bin 4
- Other, please specify 5

.....  
 .....

14. Is the black bag waste collection by the municipality usually on time (i.e. same day every week)?

Always	1
Often	2
Seldom	3
Never	4

15. Do you always know when to put out the waste?

Yes	1
No	2

16. In your household, how do you **dispose of the following materials?**

		Paper	Plastic	Old clothes	Electronics (cell phones,	Glass	Batteries	Food
		1	2	3	4	5	6	7
1	Put out in black bags for collection by municipal trucks							
2	Put out in recyclable bags provided for curb side recycling							
3	Put out in a separate bag for the waste pickers							
4	Give it away to charity							
5	Give it to a school							
6	Take it to a drop-off centre							
7	Other, please specify ..... .....							

**Section D: Household curb side recycling behaviour**

17. Are you aware of a curb side (separation at source) recycling program operating in your area?

Yes	1
No	2

18. Does your household participate in the curb side recycling project? (*If answer is No, move to question 26*)

Yes	1
No	2

**Section E (Part A): If the answer to question 21 was YES (ask the following questions).**

19. How often does your household separate the dry recyclable materials from the wet household waste?

Always	1
Often	2
Seldom	3
Never	4

20. How many bags do you recycle per week?

21. How often is the dry curb side recyclable waste collected?

More than once a week	1
Once a week	2
Once every two weeks	3
Irregular	4
Don't know	5

22. Who collects the dry curb side recyclable waste?

Municipality	1
Private company	2
Pickers	3
Don't know	4
Other (Specify)	5
.....	
.....	

23. Do you have access to free recycling bags?

Yes	1
No	2

24. What challenges do you experience separating the dry recyclable waste?

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

25. Do you have any particular concerns with the curb side recycling project?

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

**(After completion of this question go to question 30)**

**Section E (Part B): If answer to question 18 was No, ask the following questions.**

26. Have you ever received plastic bags to separate your wet and dry waste for dry waste recycling?

Yes	1
No	2
Not regularly	3

27. Why don't you participate?

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

28. Will you participate if you get more information on recycling.

Yes	1
No	2

29. If your answer is **No**, give reasons

.....

.....

.....

.....

.....

**Section F: Household Perceptions about recycling and littering (EVERYONE)**

30. Please tick the box that reflects your opinion regarding recycling practices.

		Strongly agree (1)	Agree (2)	Not sure (3)	Disagree (4)	Strongly disagree (5)
1	I feel that it takes too much time to separate the waste.					
2	I feel that recycling waste is inconvenient					
3	For me, household recycling is a difficult task.					
4	I feel good about myself when I recycle.					
5	I think our household can recycle more.					
6	I play an important role in the management of waste in my community.					
7	An economic incentive will persuade me to recycle waste.					
8	I feel that recycling creates an inconvenience in my house.					
9	I think that I know the process of recycling household waste well.					
10	I encourage my friends and/or colleagues to recycle.					
11	I intend to recycle my household waste in the future.					

31. Please tick the box that reflects your opinion regarding the recycling process.

		Strongly agree (1)	Agree (2)	Not sure (3)	Disagree (4)	Strongly disagree (5)
1	Collections of recyclables are not made frequently enough.					
2	The calendar for recyclable waste collections was not distributed to us.					
3	We do not have sufficient space to keep the dry and wet waste separate.					
4	All household members support the recycling activities.					

32. Please answer the following questions relating to litter and illegal dumping in your area.

	Very concerned (1)	Somewhat concerned (2)	Not concerned at all (3)
1. How concerned are you about litter in this area?			
2. How concerned are you about illegal dumping in this area?			

33. What do you do with your plastic shopping bags?

Reuse them to do shopping again	1
Dispose of them and buy new bags every time	2
I do not use plastic shopping bags I only use re-usable bags	3
Other (Specify)	4
.....	
.....	

34. Does it matter to you whether shopping bags are recyclable?

Yes	1
No	2

**Section G: School projects on Waste Management**

35. Do you have any school-going children living in the house?

Yes	1
No	2

36. Does any of them do home schooling?

Yes	1
No	2

*\*Only ask the next two questions if number 35 answer is YES*

37. Have they ever done any school projects on recycling or waste separation?

Yes	1
No	2

38. Would you say that this has encouraged any type of recycling in the household?

Yes	1
No	2

**Section H: Social media and waste management**

39. What communication tool can the municipality use to communicate information regarding the curb side recycling projects and other waste management information to you? (E.g. WhatsApp groups, community forum, pamphlets, local newspaper). *Can choose more than one option.*

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

40. Have you seen any article or pictures posted on these social platforms regarding waste related issues?

Yes	1
No	2

41. If yes, did this information change your attitude towards household recycling?

Yes	1
No	2

42. Should the municipality use social media platforms to communicate about curbside recycling?

Yes	1
No	2

43. Which of the following social media apps do you use?

WhatsApp	1
Facebook	2
Twitter	3
Instagram	4
News related Apps (e.g News 24, Netnuus, EWN, Maroelamedia Specify _____ _____ _____	5

44. Is sufficient information available to you on the curbside recycling project in this area?

Yes	1
No	2

45. If **No**, what information do you need?

.....

.....

.....

.....

.....

46. How can the municipality encourage more households to participate in the curbside recycling projects in this area?

	1
More education explaining how to do it	2
Empty bags	3
Incentives	4
Competitions	5
Other, please specify..... ..... ..... ..... .....	6

47. If you can pay less for refuse collection will you take the recyclables to Wellington Landfill or to a drop off centre

Yes	1
No	2

48. What is the distance you are willing to travel to drop off your recyclables?

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

**Thank you for your participation.**

For more information contact:

Ms Liza Volschenk: 084 227 0607

## Appendix B

### B1. Attitude Index

B1.1: The correlation matrix of the Attitude Index (N=212)

	F301_d	F302_d	F308_d	F304_d	F305_d
F301_d	1.0000				
F302_d	0.4481	1.0000			
F308_d	0.4089	0.5517	1.0000		
F304_d	0.2997	0.2430	0.3144	1.0000	
F305_d	-0.0961	0.0024	0.0066	0.0742	1.0000

B1.2: The Principal Component Analysis of the Attitude Index

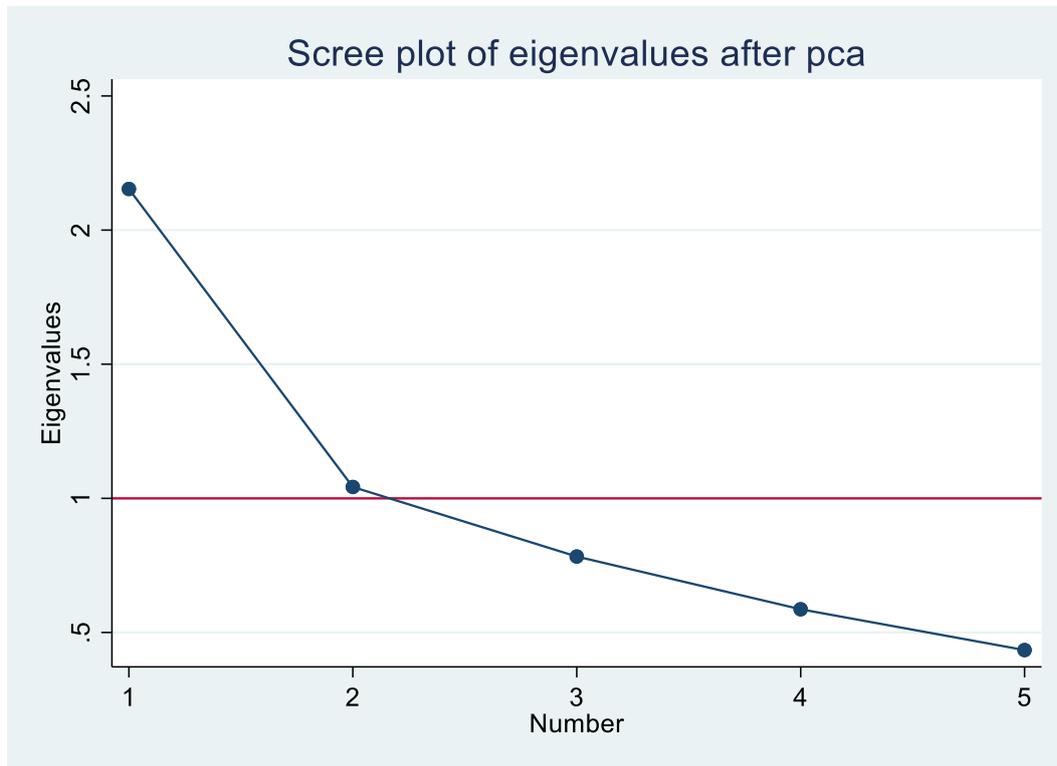
B1.2.1 Rotation: (Un-rotated=Principal)

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	2.153370	1.110980	0.4307	0.4307
Comp2	1.042390	0.259252	0.2085	0.6392
Comp3	0.783138	0.196526	0.1566	0.7958
Comp4	0.586612	0.152117	0.1173	0.9131
Comp5	0.434495	.	0.0869	1.0000

B1.2.2 Principal Components (Eigenvectors)

Variable	Comp1	Comp2	Comp3	Comp4	Comp5	Unexplained
F301_d	0.5064	-0.1921	-0.0496	0.8169	0.1923	0
F302_d	0.5402	-0.0301	0.4147	-0.1481	-0.7164	0
F308_d	0.5450	0.0236	0.2451	-0.4702	0.6491	0
F304_d	0.3931	0.2861	-0.8377	-0.1893	-0.1614	0
F305_d	-0.0126	0.9380	0.2525	0.2322	0.0493	0

### B1.3: The scree plot of the Attitude Index



### B1.4: The Principal Component analysis with the eigenvalues greater than 1 of the Attitude Index (N=212)

#### B1.4.1 Principal components (eigenvectors)

Variable	Comp1	Comp2	Unexplained
F301_d	0.5064	0.1921	0.4094
F302_d	0.5402	0.0301	0.3706
F308_d	0.5450	0.0236	0.3597
F304_d	0.3931	0.2861	0.5819
F305_d	0.0126	0.9380	0.0826

### B1.5: The rotation of the matrix of the Attitude Index

#### B1.5.1 Rotation: Orthogonal varimax (Kaiser off)

Component	Variance	Difference	Proportion	Cumulative
Comp1	2.15335	1.11094	0.4307	0.4307
Comp2	1.04241	.	0.2085	0.6392

#### B1.5.2 Rotated components

Variable	Comp1	Comp2	Unexplained
F301_d	0.5064	0.1921	0.4094
F302_d	0.5402	0.0301	0.3706
F308_d	0.5450	0.0236	0.3597
F304_d	0.3931	0.2861	0.5819
F305_d	0.0126	0.9380	0.0826

### B1.5.3 Component rotation matrix

	Comp1	Comp2
Comp1	1.0000	0.0040
Comp2	-0.004	1.0000

B1.6: The Kaiser-Meyer-Olkin measure of sampling adequacy of the Attitude Index

#### B1.6.1 Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy

Variable	KMO
F301_d	0.7399
F302_d	0.6740
F308_d	0.6906
F304_d	0.7596
F305_d	0.3504
Overall	0.7003

## B2: Subjective Norm Index

B2.1: The correlation matrix of the Subjective Norm Index (N=212)

	F306_d	F3010_d	F314_d
F306_d	1.0000		
F3010_d	0.3298	1.0000	
F314_d	0.2946	0.5422	1.0000

## B2.2: The Principal Component Analysis of the Subjective Norm Index

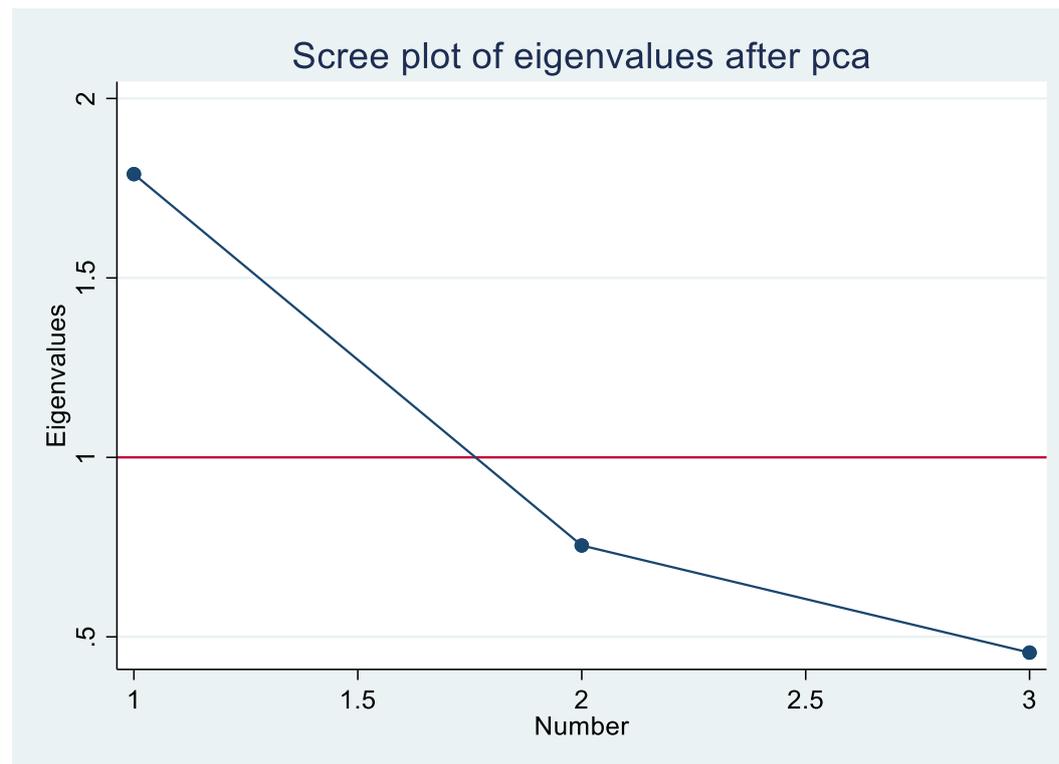
### B2.2.1 Rotation: (Un-rotated=Principal)

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	1.7893	1.03473	0.5964	0.5964
Comp2	0.754567	0.298433	0.2515	0.8480
Comp3	0.456134	.	0.1520	1.0000

### B2.2.2 Principal Components (Eigenvectors)

Variable	Comp1	Comp2	Comp3	Unexplained
F306_d	0.4884	0.8700	0.0680	0
F3010_d	0.6234	-0.2934	-0.7247	0
F314_d	0.6106	-0.3963	0.6857	0

### B2.3: The scree plot of the Subjective Norm Index



B2.4: The Principal Component analysis with the eigenvalues greater than 1 for the Subjective Norm Index (N=212)

B2.4.1 Principal components (eigenvectors)

Variable	Comp1	Unexplained
F306_d	0.4884	0.5732
F3010_d	0.6234	0.3045
F314_d	0.6106	0.3330

B2.5: The rotation of the matrix of the Subjective Norm Index

B2.5.1 Rotation: Orthogonal varimax (Kaiser off)

Component	Variance	Difference	Proportion	Cumulative
Comp1	1.7893	.	0.5964	0.5964

B2.5.2 Rotated components

Variable	Comp1	Unexplained
F306_d	0.4884	0.5732
F3010_d	0.6234	0.3045
F314_d	0.6106	0.3330

B2.5.3 Component rotation matrix

	Comp1
Comp1	1.0000

B2.6: The Kaiser-Meyer-Olkin measure of sampling adequacy of the Subjective Norm Index

Variable	KMO
F306_d	0.7472
F3010_d	0.5829
F314_d	0.5900
Overall	0.6127