Consumer attitudes towards curbside recycling of waste within the eThekwini municipality area

By

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DECLARATION OF ORIGINALITY

I declare that this dissertation is my own work and that all sources I have used or
quoted have been indicated and acknowledged by means of complete
references.

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Durban

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DEDICATION

This research dissertation is dedicated to my beautiful wife, Nancy Sandra and my two children Eugene Barrett and Justine Lisa for their belief in me. It is with your love, support, encouragement, motivation and guidance that I have been able to reach this goal.

To my late Dad and mother, Abbu and Parvathy, who installed in me the will to be successful and to constantly strive to do better.

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ABSTRACT

Consumer attitudes play an important role when it comes to waste management. Consumers, who purchase any number of packaged goods also dispose of or discard waste in large quantities. In the business sector the introduction of new technologies in the production cycle is imperative, and this technology involves discovering more cost effective methods of reducing and reusing solid waste as a resource. The challenge for the eThekwini Municipality is to discover ways to reduce the volume of waste disposed at the landfills.

This study determines the attitudes of consumers towards curbside recycling specifically within the eThekwini municipal region. This study focuses on various theories and evaluates ways in which waste prevention and reduction initiatives can be employed to protect the depletion of natural resources. Although attempts were made to choose a sample size of 400 respondents, only 212 willing respondents participated in this study. Based on the geographical location and the demographic profile of the suburbs in which the research was carried out, the actual quota of consumers required has been achieved. Five themes are measured in the study:

- ➢ Benefits of curbside recycling
- ➢ Education on recycling
- ➢ Consumer responsibility and awareness
- ➢ Implementation of legislation and policies
- ➢ Knowledge of recycling and waste management

This study highlights the fact that consumers should adopt a change in their attitudes in order to reduce the volume of solid waste being land-filled. The recommendations identified in this study outline that waste management, education, awareness programmes and legislation are all required to ensure that the benefits associated with curbside recycling are achieved.

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CHAPTER ONE   -   OVERVIEW OF CURBSIDE RECYCLING

1.1   INTRODUCTION

The multiplication factor is evident within the consumer market. The increase in disposable income encourages consumers to purchase more goods and this creates a constant demand for new products and services. The business sector's aim is to capture the consumer market share by developing and marketing new products, which results in the expansion of demand for new types of (consumer) packaged goods.

This in turn automatically generates additional solid waste. Maintaining the aesthetics of the environment, the increased demand for available land, concern for public health and pollution and maintaining economic viability are some of the concerns facing local authorities, the business sector and the general public. This phenomenon is affecting countries worldwide. The South African government has intervened and together with major role players, has sought to deal with this problem by producing the Polokwane Declaration. This document, signed at the Waste Conference in Polokwane in 2001, contained instructions to local authorities which will enable them to produce an integrated waste management plan that clearly highlights the processes and time frames required to implement appropriate waste management practices.

Waste management today, is far more complex than it was in the past. This complexity arises, not only because of the huge quantities of residuals produced by modern society, but also because of differences in the composition of the waste. The holistic approach to solid waste management is aimed at prevention, reduction, recovery and recycling. However, this study will focus on a new discipline that identifies the attitudes of consumers to the recycling of domestic solid waste.

1.2   BACKGROUND TO THE STUDY

Recycling is an important aspect of waste minimisation. This method utilises a valuable resource which has not been effectively utilised in the production and marketing sectors of the consumer market. Separation at source is the proposed method but this will entail an immense education campaign directed at the householder.

Twenty years ago, communities, along with recycling activists, struggled to start up municipal recycling projects. Today, there are more than 9 000 municipal curbside recycling projects across the United States, as well as drop-off centres, to discard recyclable materials (Heumann, 1998).

A study conducted by Grasso and McEnally (1999) indicate that in the 1980's, corporations and consumers exhibited a growing concern for the environment. Consumers used this opportunity to demonstrate social responsibility through the marketing of 'green' environmentally-friendly products. These were either made from recycled materials or were capable of being recycled. Consumers could also demonstrate social responsibility by purchasing environmentally-friendly products. In doing so, they are able to sustain their level of consumption, while at the same time minimising damage to the environment.

Rowlings (2003) explains that a commitment to recycle will be vital to future generations and to the environmental future of our country. The setting of targets for individual local authorities is a positive move forward. Indeed, the fact that authorities are compelled to take action and have specific levels of expectations will encourage further commitment to recycling. Some current targets are achievable for certain authorities. However, those that are currently at a low rate of recycling may struggle to reach their targets.

The local council is responsible for providing sites for recycling household waste. Most local councils provide recycling banks for recycling newspapers and magazines, aluminium cans, glass and textiles. These sites may simply be a collection of recycling banks at a suitable location or may be a dedicated site for household waste and recycling centre. Local authorities may also provide curbside collection schemes and some provide home composting bins for householders to compost their organic waste. A total of 58% of households in America now have some kind of curbside collection scheme. Householders are provided with special containers or bags in addition to the normal black bag or wheeled bin provided for general rubbish.

Clean, dry, materials for recycling such as paper, aluminium and plastic are separated and placed in the containers which are then collected either on the same day or on a different day to the normal refuse collection. Curbside schemes make it easy and convenient for householders to recycle, and reduce the need for separate journeys to the recycling centre. Successful schemes in many local authority areas have demonstrated that curbside collection is an effective method of increasing recycling rates and diverting waste from disposal sites (Wasteline, 2004).

It is the opinion of Barr (2004) that the problem of municipal solid waste (MSW), largely in the form of household refuse, is a significant and growing environmental problem. The limited capacity for landfill sites along with global targets for the reduction in methane emissions, ensure that alternatives to landfill are needed as a means to deal with household waste. The UK Government has sought to deal with this problem by producing a Waste Strategy that emphasises the need to deal with waste according to what is known as the 'Waste Hierarchy'. This hierarchy posits that waste should first be reduced (or prevented), second reused, third recycled (or recovered) and only finally should it be sent for disposal. Householders are seen as key actors in achieving waste reduction, reuse and recycling. However, research into household attitudes and behaviours

towards waste has been relatively sparse in the UK compared to work in North America. Research from the United States and Canada indicates that waste management behaviours (in the most part recycling behaviour) are influenced by a large range of factors.

The South African government's focus is aimed at dealing with the growing waste problem by getting the local authorities to accept ownership of proper waste management methods. The development and implementation of the Integrated Waste Management Plan in February 2006 will enhance and provide direction to methods that will be employed to recycle, reduce or reuse solid waste as a natural resource.

1.3   IMPORTANCE OF AND MOTIVATION FOR THE RESEARCH

Until recently, landfills were deemed the preferred method to manage solid waste. Although this practice is effective, the increase in the current volumes generated by the domestic, commercial and industrial sectors, is fast depleting the available airspace thus reducing the lifespan of these sites. Some of the key factors that direct local authorities when selecting suitable land to develop new sites includes identifying vast tracts of vacant land that are not located in close proximity to developments and existing residential and commercial suburbs, and that are easily accessible to the public. This process will automatically increase disposal costs substantially as construction, development and transport costs will increase.

Alternatively, new methods of managing waste must be applied, and one such method is recycling. This process is known to produce more benefits than land-filling namely: valuable materials can be separated, reengineered and reused to produce new products. Existing landfill sites will also benefit as their lifespan will increase as a result reduce waste. Costs will be reduced by not having to develop new sites and the environment will be further sustained.

According to SKC Engineers (2002) it is estimated that 1.3 million tons of municipal waste per annum is discarded by 3.5 million people in the eThekwini Municipality area alone. Approximately 57% of this waste includes materials such as glass, plastic and metal cans, which do not easily break down when disposed of.

The motivation driving this research is firstly to gain a clear understanding of the attitudes of consumers towards curbside recycling, and secondly to measure the importance which consumers' attach to this process and their willingness to participate in reduction and separation of solid waste.

1.4   CLARIFICATION OF TERMS

The terms listed below are those most common and widely used by the general public when discussing and communicating on waste management related processes. Therefore, to introduce the terminologies, a brief clarification as expressed by the waste management authorities, has been highlighted.

1.4.1 Municipal solid waste

According to the United States Environmental Protection Agency (2003) municipal solid waste is generated by residential homes, commercial facilities and institutions. This is generally classified as non-hazardous, and as society no longer has any immediate use for it, it is rejected as it is considered to be worthless or unneeded.

Tchobanoglous (2003) defines municipal solid waste as the non-hazardous waste generated by households, commercial establishments, institutions and light industrial waste. Municipal Solid Waste excludes industrial process wastes, agricultural wastes, mining wastes, and sewerage sludge.

1.4.2   Recycling

A resource recovery is a method involving the collection and treatment of waste products for use as raw material in the manufacture of the same or another product. Remanufactured products include processes such as the ground glass used in the manufacture of other new glass products, metal cans, cardboard and paper which is reengineered by melting, crushing or pulping. Recycling is the most recognised concept in solid waste management. It is, however, only one part of a larger integrated solid waste management system. Recycling can reduce the amount of material going into landfills (Tchobanoglous, 2003).

1.4.3   Curbside recycling

According to the United States environmental Protection Agency (2003), recycling is a dynamic process where materials, otherwise destined for disposal are diverted out of the waste stream. Curbside recycling is a process that involves the sorting and separation of solid Waste, includes products such as glass, paper, plastic and cans. This is done by the householders, at their residence, before it is collected by the municipality for disposal.

1.4.4   Land-filling

The term land-filling refers to the method of disposing of solid waste on land without creating nuisances or hazards to public health and safety. The process includes the filling in of excavations or the creation of a landfill site. Necessary engineering principles are applied in order to confine waste disposal sites to the smallest practical volume. This includes covering the waste with a layer of earth at the conclusion of each day's operation or at more frequent intervals if necessary (Tchobanoglous, 2003).

1.5   THE PROBLEM STATEMENT

The problem of municipal solid waste, largely in the form of household refuse, is a significant and growing environmental problem in South Africa. The limited capacity for landfill along with national government's targets for the reduction of solid waste implies that alternatives to landfill are needed as a means to deal with household waste. The South African government has sought to deal with this problem by developing the Polokwane Declaration, a document that requires local authorities to develop and implement an integrated waste management plan that must deal with the waste in their municipal area. This study aims to identify the attitudes of consumers towards curbside recycling as an alternative method to reduce the waste being sent to landfill.

1.6   THE OBJECTIVES OF THE STUDY

The objective of this study is to identify the attitudes of consumers within the eThekwini Municipal area towards curbside recycling of solid waste.

The sub objectives of the study are:

1.6.1   Sub-objective 1

To identify the key factors that influence consumers when instituting curbside recycling of solid waste with direct reference to any expected benefits.

1.6.2   Sub-objective 2

To determine whether there is a difference in consumer attitudes towards curbside recycling within education levels.

1.6.3 Sub-objective 3

To determine if there is a difference in consumer attitudes towards curbside recycling within race groups.

1.6.4 Sub-objective 4

To determine if there is a difference in consumer attitudes towards curbside recycling within residential suburbs.

1.7   RESEARCH METHODOLOGY

The direct survey method consisting of personal mall intercept interviews have been used in this study. This survey method has permitted the researcher to reduce respondent anxiety, and was necessary to determine the attitudes and behaviour of householders towards curbside recycling (Baker, 2000).

In addition, the mall intercept method is the most versatile of all methods and is more flexible in the use of cues because the interviewer is easily able to observe or interact with respondents. The questionnaire was relatively simple to administer, and the data obtained is reliable because respondents were limited to the alternatives stated. The use of fixed response questions reduced the variability in the results that may be caused by differences in interviewers (Aaker, Kumar and Day, 2004).

1.8   DELIMITATIONS AND ASSUMPTIONS

This study was limited to the consumers that reside within the boundaries of the eThekwini Municipality, which stretches from Durban Central to Cato Ridge in the West, Umkomaas in the South and Maidstone in the North. Due to the geographic location of residential areas, access routes to reach all these suburbs

were limited. In this study, eight residential suburbs were selected, Ntuzuma, Lamontville, Illovo, Phoenix, Umkomaas, Chatsworth, Westville and Amanzimtoti. The study attempted to choose a sample size of 400 respondents but unfortunately only managed to get 212 willing participants. Based on the geographical location and the demographic profile of these suburbs, the actual quota of consumers required has been achieved.

This study did not attempt to evaluate or examine the market demand for the types of waste. Only consumer perceptions were measured.

This study did not determine or predict any trends that may occur in any particular waste types.

This study was limited to consumers residing in free standing houses and semi-detached houses, duplexes and simplexes. Multi-story dwellings were excluded.

This study was limited to formal settlements that enjoy a weekly refuse removal service. Informal settlements do not have a structured waste removal service.

1.9   STRUCTURE OF THE RESEARCH

The study will be presented in following chapters:

1.9.1 Chapter One   - Overview of curbside recycling

Chapter one encapsulates an overview of the study and encompasses the background of the imperatives of understanding the attitudes of consumers towards curbside recycling. The importance of and motivation for the research and clarification of terms used in the waste industry are discussed. A brief synopsis outlining the problems associated with municipal solid waste and the objectives of the study are identified. The current waste scenario, importance of

curbside recycling, the research methodology, delimitations, assumptions and the rationale for the study is presented.

1.9.2 Chapter Two   - Review of the related literature

Chapter two incorporates a review of related literature about the proposed topic. The literature review starts by providing the waste analysis, and then goes on to discuss the role of curbside recycling within eThekwini municipality. This chapter examines the advantages and disadvantages of curbside recycling relating to pollution, environmental concerns, market demands and trends, re-engineering, economic viability, and finally, the role of regulations, education and awareness within eThekwini Municipal area.

1.9.3 Chapter Three   - The research methodology

Chapter three describes the research methodology and design employed to gather primary data for the study. The chapter explains how a respondent sample was derived and demonstrates the empirical survey undertaken. A detailed analysis of the quantative research methodology employed in the empirical analysis was undertaken.

1.9.4 Chapter Four   - Research findings

The purpose of this chapter is to present the statistical analysis of the primary data obtained through questionnaires. The data was processed into meaningful results, which the reader can interpret and understand. Various graphical representations are undertaken which indicate the different attitudes, knowledge and behaviour of consumers towards curbside recycling with the eThekwini Municipal area.

1.9.5   Chapter Five   - Conclusions and recommendations.

Chapter five outlines the findings in relation to the research theory conducted. In addition this chapter draws from the findings to make conclusions. It provides recommendations to enable curbside recycling to become a reality within the eThekwini Municipal area. The opportunities for education programmes, awareness campaigns and legislative policies are explored.

1.10   CONCLUSION

This study would attempt to construct the body of the research about the factors influencing the consumer's attitude towards curbside recycling. This study would also try to represent the value of this research to the eThekwini municipality. The objectives of this study were to investigate factors influencing curbside recycling as well as to measure the relationship between the factors and the adoption of curbside recycling programmes. A literature review based on the objectives was undertaken and is discussed in the next chapter.

CHAPTER TWO   -   LITERATURE REVIEW

2.1   INTRODUCTION

The current approach to recycling domestic waste is the most talked about topic in South Africa. In this chapter the research studies other related literature on curbside recycling. Discussions in this chapter commences by highlighting the status quo pertaining to volumes of waste generated by the consumers, environmental concerns, market demands and trends of recycled products, the waste categories available for recycling and benefits associated with waste reduction.

A view on re-engineering consumer products, pollution issues, consumer behaviour and responsibility, and the responsibility of businesses is offered, placing emphasis on the concept of curbside recycling already employed in developed countries.

Managing the recycling process, including benefits and relevance to eThekwini municipality is discussed. The chapter concludes by discussing the concept of education and awareness, and the need for regulations and legislative policies. Special emphasis is placed on the Polokwane declaration outlining the targets set by the National Government.

2.2   AN ANALYSIS OF SOLID WASTE AT ETHEKWINI MUNICIPALITY

Studies conducted by SCK Engineers (2002) for eThekwini Municipality, indicate that, subsequent to the finalisation of the demarcation of the eThekwini Municipal boundaries, an extension of the Master Plan was required to incorporate the then new municipal boundaries. This project comprised a study of the process design and operational planning of new and existing waste disposal and transfer

facilities within the new eThekwini Municipal Area, and the establishment of a Master Plan for Solid Waste Management.

The eThekwini Municipal area is located on the eastern seaboard of South Africa in the province of KwaZulu-Natal covers an area of approximately 2 301 km², with a total population of 3, 065 million. The area is divided into five Solid Waste Management Regions namely, Northern, Central, Inner West, Outer West, and Southern. These areas have been finalised and incorporated as set out in the Status Quo of Solid Waste Management for Demarcation Extensions December 2000, into the formal solid waste management structures of the eThekwini Municipality (SCK Engineers, 2002).

To assist in understanding the solid waste dynamics, it is imperative that the status quo is made known. In sections 2.2.1 to 2.2.5 the analysis of the population, volumes of waste, types of dwelling, total waste land-filled and types of waste land-filled are identified.

2.2.1 Population figures

SKC Engineers (2002) incorporated the latest projected population figures for the eThekwini Municipal Area. The database derives information from data which was collected by Statistics South Africa during the official 1996 countrywide census.

Table 2.1 highlights the increased population of the five regions of the new eThekwini Municipality boundaries, stretching from Maidstone in the North, Umkomaas in the South, Durban Central and Cato Ridge in the West. The areas cover 2 301 square kilometres with the total population figures based on the statistics equated to   3, 065 million. Within the area there are 800 534 dwellings with an average of 3.8 people per dwelling.

Table 2.1: Population of eThekwini municipal area - 2002

REGION	POPULATION	DWELLINGS	AVERAGE PERSONS / DWELLING	AREA km²
Northern	899054	226089	4.0	568
Central	548024	153258	3.6	186
Inner West	631705	177888	3.6	257
Outer West	276767	78586	3.5	712
Southern	709450	164713	4.3	578
TOTAL	**3065000**	**800534**	**3.8**	**2301**

Source: SKC Engineers (2002)

2.2.2 Domestic waste - unit waste generation

To determine the domestic waste generated in the individual settlement clusters, the population figures are multiplied by a unit waste generation figure (kg/person/day). The unit generation figure is derived from the Waste Stream Analysis carried out in 1998 and other studies of a similar nature. Studies have been carried out in the Lowveld and Escarpment District Council (1992) and Greater Pretoria Metropolitan Council (1997) areas. The unit generation is dependent on the type of domain and the dwellings associated with each settlement cluster. The unit generation figures used in this study are presented in Table 2.2. The domain is split into formal and informal households. In the formal suburbs 0.5 to 0.8 kilograms of waste is produced per person per day, and in the formal townships 0.4 kilograms is produced per person per day. In the informal suburbs and average of 0.18 kilograms of waste per person per day is produced. The total waste generated per day per person is substantial in volume especially when the daily figures are calculated in comparison with the number of people residing in these areas (SCK Engineers, 2002).

Table 2.2: Unit domestic waste generation (kg/person/day)

DOMAIN	DWELLING TYPE	WASTE GENERATION (kg/person/day)
Formal	Suburb	0.5-0.8
	Township	0.4
Informal	Infill Single	0.18
	Infill Backyard	0.18
	Rows of Rooms	0.18
	Peripheral Single	0.18
	Peripheral Cluster	0.18

Source: SCK Engineers (2002)

2.2.3 Reconciliation of estimated domestic waste generation and weighbridge results

To determine the accuracy of the estimated domestic waste generated in the eThekwini Municipal Area, using the kg/person/day values obtained from the Waste Stream Analysis 1998, reconciliation was carried out comparing the estimated values with the records of the Bisasar Road landfill weighbridge. Domestic waste reconciliation figures used in this study are presented in Table 2.3. The reconciliation was carried out on two levels. Firstly, on a suburb or area basis, using the Chatsworth transfer station in the Inner West Region as a datum. (It should be noted that these figures include commercial waste collected in the rounds in this area) Secondly, the reconciliation was carried out on the total Central Region domestic solid waste. This table analyses daily records of volumes of waste received by customers at two landfill sites, namely the Bisasar and the Chatsworth transfer station located in the south.

Estimates of the greater central areas shows that the volumes per person per day compared to the actual weighbridge records the deviation as the highest recorded at the Chatsworth transfer station of 27%. Both levels of the reconciliation provide over estimation of the waste generated. Although both are

conservative, the reconciliation over the larger spectrum of residents in the Central Region, with a 5% deviation, indicates that the waste generation figures applied are within a reasonable accuracy and are therefore acceptable (SCK Engineers, 2002).

Table 2.3: Domestic waste reconciliation

Reconciliation	Estimated Results Tons/annum	Weighbridge Results Tons/annum	Percentage Deviation
Chatsworth Area	34 528	27 128	27%
Central Region Domestic	123 478	118 174	5%

Source: SCK Engineers (2002)

2.2.4 eThekwini Municipal area - general and low hazardous waste

The total waste generated in the five Solid Waste Regions is summarised to provide an overview of the total waste transported and accepted at each of the waste disposal sites considered in the study. These waste disposal values were determined from weighbridge results provided by DSW, EnviroServ and Waste Services from their landfill sites, volumetric measurements taken at landfill sites without weighbridge facilities, and information supplied by landfill engineers Lombard and Associates regarding the hazardous waste situation in the eThekwini Municipal Area.

Based on statistics, presented in Table 2.4 an estimated 1, 16 million tons of general and low hazardous waste is land-filled per annum. All the waste types identified in the table excluding the low hazardous waste is deemed general waste and this component equated to 1 047 million tons which is 90% of the total. The low hazardous waste makes up the remaining 10% at 114 459 tons per annum. High hazardous waste figures are not included in this analysis, as this is not disposed of in the eThekwini Municipal Area.

Table 2.4: eThekwini Municipal area – total general and low hazardous waste land-filled (estimated for 2002)

Waste Type	Total tons/annum
Solid Waste	294721
DSW Collection	176633
Garden Refuse	179604
Building Rubble	45125
Mixed Loads	75356
Very Light Items	505
Light Items	165
Whole Tyres	1618
Munitech Contracts	38404
Cover Material	210157
Condemned Foods	384
Asphalt	2079
Mondi Pulp	3606
Special Waste General	3166
PSW Collection	15708
Low Hazardous	114459
TOTAL	**1161691**

Source: SCK Engineers (2002)

2.2.5 Total landfill waste acceptance

Five disposal sites currently operate within the boundaries of the eThekwini Municipality area. Three of these sites are general waste sites (GLB) located in Springfield, Tongaat and Mariannhill, and two are low hazardous sites (H:h) located in Shongweni and Silverglen. Based on the detailed breakdown as highlighted in Table 2.5, from a total of 1, 16 million tons disposed per annum, 898 918 tons disposed at the three general sites is made up of general waste equating to 77.38%. Low hazardous waste makes up 262 773 tons which equates to 22.62%. This clearly indicates that higher volumes of general waste than low hazardous waste are being disposed per annum in the eThekwini Municipal area.

Table 2.5: Landfill waste acceptance estimate for 2002

Waste Type	Total tons/ annum	La Mercy tons/annum	Bisasar Road tons/annum	Mariannhill tons/annum	Shongweni tons/annum	Bulbul Drive tons/annum
Solid Waste	294,721	68103	73170	30334	41560	81554
DSW Collection	176,633		176633			
Garden Refuse	179,604	4434	75997	73973		25200
Building Rubble	45,125	161	42299	2665		
Mixed Loads	75,356	9534	63299	2523		
Very Light Items	506	36	55	415		
Light Items	165		94	71		
Whole Tyres	1,617	6	1515	96		
Munitech Contracts	38,404		38404			
Cover Material	210,157		202770	7387		
Condemned Foods	384		370	14		
Asphalt	2,079		2079			
Mondi Pulp	3,606		3606			
Special Waste General	3,167		2847	320		
PSW Collection	15,708			15708		
Low Hazardous	114,459				51837	62622
Total	1,161,691	82274	683138	133506	93397	169376
Percentage	100%	7.08%	58.81%	11.49%	8.04%	14.58%

Source: SCK Engineers (2002)

2.2.6   Final waste reconciliation

The estimated waste generation in each region is presented in Table 2.6. A final reconciliation was carried out to compare the estimated waste generated figures with the land-filled figures. This determines whether all the waste has been accounted for in the eThekwini Municipal Area. This table analyses the volumes per annum based on the five regions that make up the eThekwini Municipal boundaries. In order to identify the ratio of waste per region, the breakdown clearly reflects that of the total of 953 101 the householders in the Central region generate the largest volume of 560 867 tons equating to 58.8% of the waste being disposed. The Inner West generates 164 871 tons which is 17.3% and the Northern region generates 150 780 tons which is 15.8%. This is a clear indication

of the concentration of waste when developing a recycling programme the areas that require targeting.

Table 2.6: Final waste reconciliation

REGION	TONS/ANNUM	%
Northern Region	150 780	15.8
Central Region	560 867	58.8
Inner West Region	164 871	17.3
Outer West Region	14 128	1.5
Southern Region	62 455	6.6
TOTAL	**953 101**	**100**

Source: SCK Engineers (2002)

2.3   ENVIRONMENTAL CONCERNS

Based on the report on the Water Research Commission (1995), the generation of substantial quantities of waste is an inevitable consequence of modern day urban living. This waste impact on the human and natural environment, with the nature and extent of the impact determined by a number of factors, including the quantity and composition of waste, the adequacy of collection services and the methods of disposal. The extent of recycling and re-use is also significant, as this affects both the quantity and the composition of the matter that needs to be absorbed into the environment.

Smit and Nasr (1992), state that the more waste that can be recycled and re-used, the less there will be to dispose of, and the less of a problem to the environment it will be. Similarly, the less that is produced, for example due to the use of less packaging material, and the lower the toxicity of discarded matter, the smaller the impact on the environment will be. Recycling, reclamation and reduction also mean lower levels of demand for new resources, thus reducing the possibility of future resource depletion.

Brown (1993), states that the process of recycling and reclamation can create its own environmental problems, since the procedures use water, energy and other materials and produce by-products that may act as pollutants. Many forms of recycling are at present not economically viable, while some make little environmental sense. However, in the long-term, waste reduction, pollution control and resource depletion are critical environmental issues, and here recycling, reclamation and reduction are important factors.

It is the opinion of Selke (1990), that when materials are not disposed of correctly they often end up as litter. Packaging materials are a very significant contributor to the litter problem. Though litter and solid waste are related, solutions to the problem of each do not necessarily have any impact on each other. Disposal and litter are not the only environmental concerns related to packaging issues of depletion of resources and energy, air, water and pollution, among others, are also important. However, the major environmental concern currently is waste disposal. Waste reduction, reuse and recycling have roles to play in finding solutions.

Selke (1990) indicates that the amount of household waste generated varies significantly from country to country, with the United States producing more municipal solid waste per capita than most other countries. Residents of New York City are estimated to produce 1.80 kg per day, per person, while those in Singapore produce 0.187, Hamburg and Hong Kong 0.85 and residents of Rome produce only 0.69 kg per day, per person. Sanitary landfills are the most popular method for the disposal of municipal solid waste. However, in a growing number of communities, and in some whole states, landfill capacity is rapidly disappearing. The siting of new landfills has become more difficult both due to technical reasons relating to geological suitability of sites, and because of vastly increased public opposition, to have a landfill site situated close residential areas.

2.4   CURBSIDE RECYCLING

Although household waste constitutes a relatively small percentage of the total amount of waste produced, it is a highly significant proportion because it contains large quantities of organic waste which can cause pollution problems, as well as materials such as glass and plastic which do not easily break down (Wasteline, 2004). Therefore, implementing curbside collection in a large city presents its share of challenges amongst householders that participate in recycling (Steuteville, Freebourne and Rockwell, 1994).

Twenty years ago, communities, along with recycling activists, struggled to start up the first municipal recycling programmes. Now, there are more that 9 000 municipal curbside recycling programmes across the United States, as well as drop off centres, where people can discard recyclable materials (Heumann, 1998).

Lofaso (1990), states that a recycling programme was scheduled to be implemented in all 59 districts in New York, by 1992. In 1990, when the programme commenced, more than 1000 tons of newspaper, metal cans and glass bottles were diverted from New York's waste stream per week through the programme. At the time, less than a third of the 59 community districts were online.

Although local authorities are responsible for providing sites for recycling household rubbish, they provide recycling banks for recycling newspapers and magazines, aluminium cans, glass and textiles. Some also provide for a wider range of materials. These sites may simply be a collection of recycling banks at a suitable location or may be a dedicated site or household waste and recycling centre. However, local authorities should focus on providing curbside collection schemes initiating home composting by providing bins for householders to compost their organic waste. This process requires that householders are

provided with special containers or bags in addition to the normal black bag or wheeled bin that is used for general rubbish. Clean, dry, separated materials for recycling such as paper, aluminium and plastic are placed in the containers which are then collected - either on the same day or on a different day to the normal refuse collection. Curbside schemes make it easy and convenient for householders to recycle, and reduce the need for separate journeys to the recycling centre. Successful schemes in many local authority areas have demonstrated that curbside collection is an effective method of increasing recycling rates and diverting waste from disposal sites (Wasteline, 2004).

The Australian Bureau of Statistics (2002) classifies household solid waste as waste from domestic premises. It includes household refuse, garden waste and other discarded materials, such as disused furniture. An important response to household waste is recycling. Household recycling has increased in Australia and by 1992 approximately 85% of people recycled some items of waste. By 2000 this had risen to about 97%. Paper, old clothing, plastic bags and glass were the items most commonly recycled. Only a small proportion of Australian households (just under 7%) recycle all the waste items that can be recycled. While recycling rates have improved, more household waste still goes to landfill than is recycled. An audit conducted in 1997 found that the average Australian household produced 15.7 kg of waste for collection each week. This comprised 11.9 kg of garbage, 3.1 kg of recyclables, 0.2 kg of contaminants and 0.5 kg of green waste. Recycling behaviour in Australia is different for different types of households (For example, one person households recycle less than all other types of households). The most common reason provided by the 93% of Australian households that did not fully recycle in 2000, was a lack of recyclable materials in their waste (around 73% of the households did not fully recycling). The next most common reason cited by households, was the absence of recycling services or facilities.

It is the opinion of Barr (2004) that the problem of municipal solid waste (MSW), largely in the form of household refuse, is also a significant and growing environmental problem in the UK. The limited capacity for landfill along with global targets for the reduction in methane emissions ensures that alternatives to landfill are needed as a means to deal with household wastes. The UK Government has sought to deal with this problem by producing a Waste Strategy that emphasises the need to deal with waste according to the 'Waste Hierarchy'. This hierarchy posits that waste should first be reduced (or prevented), second reused, third recycled (or recovered) and only finally should it be sent for disposal. Therefore, householders are seen as key actors in achieving waste reduction, reuse and recycling. However, research into household attitudes and behaviours towards waste has been relatively sparse in the UK, compared with research done in North America. Work from the United States and Canada indicates that waste management behaviours (in the most part recycling behaviour) are influenced by a large range of factors.

The U S Environmental Agency, (2004) also agree by proposing that recycling is one of the environmental success stories of the late 20th century. Recycling, including composting, diverted 68 million tons of material away from landfills and incinerators in 2001, up from 34 million tons in 1990. By 1999, more than 9,000 curbside collection programmes served roughly half of the American population. Curbside programmes, along with drop-off and buy-back centres, resulted in a diversion of about 30 percent of the nation's solid waste in 2001.

While recycling of solid waste by households is important, waste minimisation by all sectors has been seen by policy makers as the key to reducing the environmental pressures arising from solid waste going to landfill. In 1990 the Australian and New Zealand Environment and Conservation Council set a national target of a 50% reduction in the waste going to landfill by the year 2000, based on 1990 per capita levels. This target has not been met, and it is possible

that the levels of waste going to landfill have not been reduced at all (Australian Bureau of Statistics, 2002).

According to Grogan (1994), the Israeli Government has introduced a law requiring that waste in larger cities be sorted at source. In Brazil, local governments are beginning to realise the enormous value in the form of a scavenging community in helping reduce waste. While learning from each other, each nation and its local governments and industries will have to implement waste reduction systems that work for their own people.

To gauge the momentum of curbside recycling, one has to look no further than the District of Columbia. The District of Columbia situation is symbolic of what has been happening to curbside recycling in 1995, which began with some negative media coverage in the form a front page article in the Wall Street Journal, that curbside recycling is too expensive for too little benefit. Markets have improved so dramatically that programmes from coast to coast are delivering unexpected bundles of revenues to municipalities (Steuteville, 1995).

Selke (1990) acknowledges that curbside pickup programmes generally have significantly higher participation rates than other programmes. Curbside pickup based recycling operations have found that participation is increased by offering weekly rather than monthly collection and by having the collection of recyclables on the same day as normal garbage pickup. Researchers have also found that participation is greatly enhanced by providing recycling containers for each household. The containers serve two functions (especially if they are bright and easily visible) they provide convenience for storing separated recyclables and they facilitate peer pressure to reinforce recycling behaviour. If your container is not on the curb, all your neighbours will know that you are not recycling.

Telford (1994) maintains that door to door, or curbside recycling systems, collect recyclable materials separated out by the public from their household waste.

These systems are extremely popular with the public because they dispense with the need to take the recyclables to special recycling centres. Large sectors of the public have no transport available to carry out this operation and very often valuable recyclable material is lost to the landfill site. Research and practical experience have shown that door to door systems can produce high response rates from the public, and if integrated with the normal refuse collection, they can prove to be highly effective and also achieve substantial recycling tonnages.

The millennium-recycling scheme in the UK was designed to minimise inconvenience to the householder, providing a simple-to-use scheme with simple instructions, targeting all dry recyclable materials, regardless of specific product type or grade. Establishing how to generate a high volume supply of clean, dry material was a priority and the underlying concept in this approach was that, to meet medium to long term targets, any collection scheme should be designed to reflect how and why householders segregate effectively (Perrin and Barton 2001).

In a recent study in the UK, Woollam, et al., (2003), examined the interaction of public and Local Authority recycling schemes aimed at reducing waste to landfill and meeting government targets. This partnership with the public and the local authority has brought about the unique opportunity to monitor, and where appropriate, influence the decision making process for maximising the effectiveness of householder participation. This study also examined the intended and actual recycling habits of a group of householders, prior to and during the infancy of an expanding curbside scheme. The area randomly selected for the study of the curbside expansion was part of an old council estate. One of the most important behavioural choices available to those participating or not in a curbside recycling scheme is how often they put out their recyclable material. With the council collecting domestic waste weekly, the option to recycle is favourable.

Steuteville (1995) is of the opinion that curbside recycling is so much part of daily life in much of the U.S. that is easy to forget it is relatively new. Twenty-five percent of municipal programmes did not exist and 63 percent were not yet implemented in 1992, based on the data from Bio-Cycle. This is significant, because it takes up to five years for a new curbside programme to mature and take shape.

2.5   MARKET DEMAND FOR RECYCLED MATERIALS

The Water Research Commission (1995) concurs that a major factor influencing the viability of recycling is the availability of secondary materials markets. The acceptance of recyclable material by manufacturers, or other agents, is central to the continuance of recycling. If markets for certain recycled materials are not found, and the materials are subsequently disposed of, then the costs of recycling obviously have not been recovered.

In the early stages of recycling, it is most unlikely that the income generated from the sale of materials and recycling credits offered from the waste disposal authority will cover the capital expenditure and running costs necessary to operate any such scheme (Telford, 1994).

Dumpleton, (2001) elaborates that the success of any recycling initiative will largely depend upon the ability of manufacturers to accept recycled products to be economically re-engineered, and the availability of the end markets, to accept the product or packaging.

Schoonraad (2005) identifies the goal addressed in the Polokwane declaration, with the waste reduction targets set for the South African waste industry, and relates this to the increasing growth in population and consumerism and the challenges facing the waste management industry and businesses in general satisfying the needs of the customer. Therefore, would the customer be satisfied with the standards and quality of recycled products.

Although everything possible has been done with recycling household, school, or office materials, there is more to recycling than merely putting recyclables at the curb. In order to make recycling economically feasible, consumers must be prepared to buy recycled products and packaging. When consumers buy recycled products, an economic incentive for recyclable materials to be collected, manufactured, and marketed as new products is created. Buying recycled has both economic and environmental benefits. Therefore, purchasing products made from, or packaged in, recycled materials saves valuable resources to be utilised by the future generations (United States Environmental Agency, 2004).

Steuteville, Freebourne and Rockwell (1994) acknowledge that if there is any standard practice, it is allowing residents to co-mix steel, aluminum, glass and plastic containers. Two thirds of the programmes surveyed used collection crew in an attempt to keep costs low. However, larger crews do not necessarily mean higher costs per ton, as they are also employed to perform for a variety of other tasks. The Pennsylvania cities of Allentown and Philadelphia used three people per truck, partly because they have dense neighborhoods. More than one crew member is some times needed for sorting purposes, as was done in Durham County.

According to Gainer (1994), recyclables are commodities that the public do not want to relate to in exactly the same way they used to relate to garbage. The entire process of holding on to recyclables, re-manufacturing the product and distributing the finished product with a much greater value attached to the product, creates new jobs and also retains existing jobs.

The overall market demand created from May 1994 to 1995 in USA for curbside recycling can be seen in the growth of recycled newspaper, this by far is the biggest collection by weight. During this period the demand for aluminium and plastics also realised immense price gains. The ultimate measure of recycling revenues can be calculated on average by the weighted of products that can be

recycled. To position the current economic market requirement in perspective, waste management reported that the average collection and processing price for curbside recycling is expected to be relatively good for a couple of years, compared to prices that were set from 1990-1993 (Steutville, 1995).

The existence of consumer markets for recycled materials is a key part of any recycling operation. It does not benefit the industry to separate and process materials if they are not used in the production of new products. Therefore, the economic viability of recycling programmes is based on the profitability of the operation such that costs are covered. It is evident from the demand that different types of materials offer different values and this phenomena is related to new product demand in the consumer market. Newspapers and aluminium are generally the largest money generators for recycling operations and glass and plastics are of lesser value. In fact, it is claimed that nearly all recyclable materials in the municipal solid waste system have some value. Aluminium is an exception because it can be reproduced to its original state and is in constant high demand. Therefore, the economic barriers related to recycling waste include the lack of financial incentives, lack of funding to embark on research and development, and most importantly the vertical integration of industries which favours the constant use existing materials such as their controlled virgin resources. Also included is the incomplete costing of resources, where the long term social and environmental costs for the use and ongoing depletion of virgin resources are not included in prices that are paid by the industries (Selke 1990).

It is the opinion of Telford (1994) that most council departments introduce recycling initiatives by allocating a small budget to enable a scheme to start. Generally neither the ongoing financial commitment nor the expansion costs are considered at the outset. Many authorities and organisations have subsequently run into difficulties because they have become unable to meet the spiraling costs of running a recycling scheme.

In general terms, the overall objective of any waste management strategy would be the disposal of waste with the least possible cost to the community, but with due regard to the safeguarding of the environment and to the use of waste as a resource. These days it is no longer acceptable to make decisions on solid waste management merely by reference to financial costs. A range of social and environmental aspects must also be considered (Bradshaw, Southwood and Warner, 1992).

A significant proportion of the municipal waste stream which could potentially be recovered and recycled is, in fact discarded because under current market demand conditions the financial costs of recovery exceed the financial value of the recoverable material. Therefore, more often than not, financial costs of recovery exceed the financial value of the recovered materials (Bradshaw, Southwood and Warner, 1992).

Perrin and Barton (2001), argue that in the short term, curbside recycling system will lead to the collection of materials for which there is no market. These materials would have to be collected and disposed when there is no market demand. Any cost increase for waste collection and sorting should be marginal and possibly reduced if the system stimulates higher recoveries of marketable materials.

Research conducted on householders in certain Washington State regions by Morris (2002) shows that revenues from selling recovered materials and the savings from avoiding garbage collection and disposal costs are not sufficient to cover the costs of recycling. Yet, recycling has ecological and sustainability benefits that are not reflected in either recycling market revenues or avoided garbage costs. Recycling is thus a prime example of the failure of competitive markets to correctly cost and price goods and services that provide ecological and sustainability benefits. As a result, under-investment takes place in recycling and over-spending on garbage disposal. Studies show that when ecological

impacts are included, curbside recycling's overall societal benefits outweigh its costs. The challenge then, is to find policy measures that will offset the competitive, free market's failure to allocate enough resources to recycling. With information such as this in hand, recycling officials can more clearly demonstrate that the value of their programmes can be measured beyond the financial bottom line. The costs of curbside recycling tend to be lower when the amount collected per eligible household is higher, other factors remaining equal. The main reason for this result is that economies of scale are stronger when more material is picked up during each stop of the curbside recycling truck.

2.6 MARKET TRENDS WITH REGARD TO RECYCLED PRODUCTS.

The demand for products and services in the consumer market is dictated by marketing strategies employed by businesses to attract the end user. In order to develop and market a new or existing product, in the product development stage the role of packaging is vital. Marketers ensure that the packaging of their product is as attractive as possible, and this is easily achieved by using new or virgin materials. The other problem facing industries is that their current manufacturing process is not designed to accept recycled materials. Therefore, it is imperative that businesses change their focus and actively embark on using recycled materials and inform the end user of the benefits of purchasing the products manufactured from recycled materials. The market demand for recycled products and the most serious obstacle to growth in recycling is paradoxically the reason for its recent emergence related to consumer demand. If the incorporation of recycled materials leads to a product showing lower performance, poorer appearance, or higher price, consumers' attitudes must shift substantially for the product to win a market share. Most recycling directors will agree that the lack of markets for recycled products is a barrier to their programmes success. Brokers or end users of processed materials are critical to the success of recycling since they help to subsidise the overall costs of recycling programmes. However, over the past three decades, the recycling movement has fluctuated significantly with

the shifts in supply and demand. Whether it is waste paper, corrugated cardboard, glass containers or scrap metal, the supply and demand of recyclable materials varies tremendously (Rogoff and Williams, 1995).

Officials feel strongly that the commercial sector should take back the waste they generate by virtue of their distribution of goods to the final consumer. It is envisaged that commercial enterprises applying to operate within the jurisdiction of the municipality should present a recycling plan along with their application for operation. The recycling plan should contain a detailed process of how they intend to recover post-consumer materials, with appropriate incentives for householders to return the materials. Therefore, the respective commercial enterprises would then identify end user markets for such recovered materials (Bolaane, 2005).

Sections 2.6.1 to 2.6.3 address the role of the consumer, their attitudes behaviours and purchasing patterns, their understanding of the new processes related to the products produced from recycled materials and the importance related to their acceptance of these products and packaging.

Furter (2005) indicates that trends in the waste industry in South Africa that has grown to a multimillion rand business sector, representing high capital expenditure figures and a perceptible level of expertise when it comes to the collection, handling and recycling of waste.

2.6.1 Consumer behaviour

Consumer behaviour is defined as behaviour that consumers display in searching for, purchasing, using, evaluating and disposing of products and services that they expect will satisfy their needs (Schiffman and Kanuk, 2004). Consumers demonstrate these stages when making a product or service related purchase decision. This process includes what they buy, when they buy, why

they buy, where they buy it, how often they buy, how often they use it, how they evaluate it after the purchase and the impact of such evaluation on their future purchases and most importantly how they dispose of it. Therefore the transition to a sustainable future will require sweeping changes in consumer behaviour. For example, in the residential sector, individuals will need to engage in such diverse activities as source reduction. Behaviour change is central to sustainability and sustainability will only be achievable if large numbers of individuals and organisations can be persuaded to change their behaviour. Without the ability to deliver programmes that effectively change behaviour, sustainability is simply not possible. Increasing public awareness of an issue, such as recycling, will change attitudes toward an associated activity, such as sorting waste. Further, it is often assumed that once attitudes change, behaviour will change as well (Schiffman and Kanuk, 2004)

According to Polonsky (2004), manufacturers are devising 'green' product technologies and have undertaken environmental marketing activities to improve their behaviour. Therefore, extreme effort is being expended to make products manufactured from materials collected at curbside competitive with products produced from virgin resources. To a large extent, most of these new technologies make up for shortcomings in consumer attitudes or behaviour. While this behaviour is a competitive advantage, manufacturers must offer consumers environmentally responsible alternatives to conventional cosmetic products. This philosophy is directly tied to the overall corporate culture, rather than being a competitive tool. In the future it is expected that marketing will capitalise on new opportunities to swing attitudes and behaviour toward more efficient lifestyles. Therefore a number of 'green' marketing campaigns have already proven the changing attitudes of consumers.

In a study conducted by Grasso and McEnally (1999) the results demonstrate that, in the 1980's, corporations and consumers exhibited a growing concern for the environment. Consumers used this opportunity to demonstrate social

responsibility through the marketing of 'green' environmentally-friendly products which were either made from recycled materials or were products capable of being recycled. Consumers could also demonstrate social responsibility by purchasing environmentally friendly products. In doing so it enables them to sustain their level of consumption while at the same time minimising damage to the environment.

According to Charter, Elvins and Adams (2004), the marketing of products and services plays a vital role in the today's highly competitive environment where a large variety of products are available to the customers. Marketing is more customer orientated, and the business philosophy and actual marketing practice is custom-made based on the product or service demand between one company and the next. The external market drivers and internal strategies are to respond to markets that are uniquely placed to formulate strategies for greener products. However, environmental expertise and marketing expertise do not always connect. Sustainable consumption is felt by some to be a goal with uncertain boundaries and no clear definition. It has to be based on an informed choice by individuals, households, businesses and governments. Government can set the framework to encourage more sustainable consumption, but individual stakeholders have to implement it through changing their purchasing attitudes and behaviour.

With limited natural resources companies must attempt to provide for the worlds' unlimited wants. Whether these wants are reasonable or achievable is important. However, in market societies where there is freedom of choice, it has generally been accepted that consumers have the right to have their wants satisfied. Therefore, as firms face limited natural resources, they must develop new or alternative ways of satisfying the customers' unlimited wants (Polonsky, 2004).

2.6.2 Consumer awareness of the green marketing concept

According to Poulton (2003), the first rule of 'green' marketing is to focus on the customer benefits. If this is done correctly, the potential to motivate clients to choose the 'green' product over the competitor or even pay a higher premium for the more eco-friendly solutions is greater. 'Green' aspects must be the key focus of marketing strategies. Therefore, the focus must be on reinforcing the value and the quality that the environmental implementations will bring to the clients. Polonsky (2004) states that green marketing incorporates a broad range of activities, including product modification, changes to the production process, packaging changes, as well as modifying advertising. However, the majority of the people believe that 'green' marketing refers solely to the promotion or advertising of products with environmentally positive characteristics. In general 'green' marketing is a much broader concept, one that can be applied to consumer goods, industrial goods and even services.

Research indicates that in addressing 'green' issues, the marketing decision-making process has two roles, firstly in the manufacturing process and secondly, in the consumer education and awareness process. Marketing decisions based on the physical environment in the manufacturing arena hinges on the reduction and prevention of pollution (Hart, 1997).

Consumer awareness arena hinges on product, packaging, advertising and promotion Shi and Kane (1996). Therefore, being environmentally conscious involves detailed attention to a variety of issues, such as energy conservation, pollution prevention, and the avoidance of ecological degradation (Sarkis and Rasheed, 1995).

According to Drumwright (1994), the natural and physical environment, which was traditionally discussed as an external influence on managerial decision-making, is now being viewed as central to marketing and management decision-

making. Consumers are much more conscious of the need to protect the environment than they were a decade or so ago. They are expressing this through their purchasing decisions (Wheeler,1992). Shi and Kane (1997) reinforce the idea that both consumers and producers alike must understand what it means to 'go green'.

If creating consumer awareness is associated to product, packaging, advertising, promotion, marketing decision-making must be applied to product, packaging, advertising, and promotional material. This requires that companies embark on 'green' campaigns which will have to include great efforts in advertising to consumers because these efforts are very important, especially with customer awareness, and stiff competition. Companies that are proactive have an advantage over those that are slower to adopt new standards. They gain a 'greener' image in the public eye. Secondly, because adopting new standards take time and money, they have more time to develop methods for reducing pollution and can do this by developing their own schedule (Shi and Kane, 1996). Stafford and Hartman (1996) argue that companies are using their expertise to develop market-based programmes that make ecology strategically attractive to the consumers. They further add that businesses agree that finding cost effective alternatives are better than combating regulations and poor environmental images, and addressing the 'green' issues is seen to be feasible in long term strategies.

Marketers must direct their research and development and product management efforts towards developing appropriate products by addressing environmental concerns (Menon and Menon,1997).

The impact of the changes in the physical environment on the consumer must be addressed in the product, packaging, and advertising. The old saying "an ounce of prevention is worth a pound of cure" certainly applies to the ever-changing and confusing world of environmental cure regulation. Marketers must sell to an

informed and caring consumer before the tide of environmental ruin is turned, and 'green' returns to the world for good. When producing products that are made out of materials from recycled or waste produced in the manufacturing process otherwise destined for landfill, the marketer must clearly state any environmental claim that pertains to the product (Shi and Kane,1996).

Marketers and companies are moving towards greater environmental awareness and responsibility. Compared to other functional areas, environmental changes have greater relevance for the marketing activity. Greater public awareness of these issues has created two different sets of pressures on marketers to be environmentally responsible. First, public concern and secondly, the strong 'green' consumer movement, demands that producers must become more careful not to harm the environment (Sarkis and Rasheed,1995).

Based on the Polokwane declaration, Ganderton (2005) concurs that despite the fact that residents are encouraged to compost food and 'green' material, an analysis of the waste material going to landfill found that 50 % of general waste was still made up of food and other 'green' waste. Therefore, introducing special bins would encourage composting.

Bradley (1995) states that the process of environmental friendliness goes back approximately ten years, and with most developed countries it is necessary to market to a significant number of consumers who refuse to buy any products if the companies' production method is believed to damage the environment. An example of this would be furniture made from wood extracted from the rain forest. Companies have also managed to capitalise on the market to carefully include care for the environment in their marketing communications. Other companies have embarked on alternative methods, by defending their records on the effects of their products on the physical environment and have resorted to product life cycle analysis. This entails examining the environmental effects of

their products and services at every stage from their raw materials and manufacture through to distribution, consumption and disposal.

2.6.3 Consumers and their concern for the environment

Roberts (1996) indicates that consumers are moving from consumption and immediate gratification to conservation, with emphasis on efficient utilisation of resources, preserving environments, abating pollution, downsizing, recycling, and securing the world of tomorrow. Lazar et al (1994) also illustrate that consumers are buying products from companies that donate part of their proceeds from the sale of the product to environmental causes, and that they boycott fur products, or products that involve the use of animals in product testing. When the increase in the concern for the environment is takes first place then socially conscious consumer behaviour may become more popular in the future.

Surveys suggest that concern for the environment and society has mushroomed. Roberts (1996) reports that 79% of the American population consider themselves to be environmentalists and up to 67% maintain that they would be willing to pay 5 to 10% more for their for environmentally compatible products. However, in reality a large percentage of the population in America do not buy products that they claim to prefer. There is a segment of socially responsible consumers in America that is large enough in size to warrant attention.

The profile of the concerned consumer is one who has a high income, is more educated and occupies prestigious occupations. These consumers are three times more likely than other consumers to avoid buying products from companies with questionable environmental reputations, and twice as likely to buy green products (Roberts, 1996). Organisations must mirror their customers' values. Consumers not only want to know what companies produce but what these companies stand for (Judy, 1996).

The business sector needs to ensure that a closed loop system exists: this means that the stages in the production and marketing of consumer products must flow from recycling and reusing and waste minimisation initiatives. This process requires a proactive role by business in actively implementing the standards and policies outlined by the local authorities, and to initiate an education campaign to ensure that the understanding and awareness is relayed to the consumer. However, consumers must also accept the new methodologies implemented and take an interest in the protection of the environment.

2.7   CATEGORIES OF SOLID WASTE

The categories that exist in the current solid waste stream are numerous. Every new product that is produced which cannot be used again or has no further value to the consumer is classified as waste. Therefore, the number of waste product types is continually increasing. However, not all waste can be recycled, re-engineered and reused.

Jackson (1975) classifies municipal solid waste as that which is composed of a vast array of products which have lost their usefulness and have been discarded. These waste categories include domestic waste, commercial and industrial waste. Domestic wastes include such diverse products as glass bottles, cans, plastic toys, cellophane, paper, cardboard, nails, small appliances, tools, light bulbs, clothes, rubber, wood and food items. Retail businesses and institutions such as hospitals, schools, banks, restaurants and factories generate commercial and industrial wastes.

The most important waste types that can be recycled and have a market demand are highlighted in this section. It must be noted that, as with new products, the selling price of recycled materials is based on the demand and supply ratio in the market. Therefore, recyclers will only source waste that has a high resale rate and when the demand for certain waste types drops, secondary waste is once

again generated at the recycling centres. The categories of waste that can be recycled and yield a cyclical demand is highlighted in Sections 2.7.1 to 2.7.8.

2.7.1 Glass

Glass can be recycled and used in many ways. Firstly it can be used in its original form in a similar application by washing the container, applying new labelling and reusing. Secondly if the containers are damaged when collected they can be crushed and remoulded under high temperatures. However, not all glass types can be reused as the cost of remanufacture and the demand for certain types such as coloured glass is low. Bottle banks are found in many supermarket car parks and local council areas and usually have separate compartments for clear, green and brown glass. Blue glass can be put into the green bank and clear glass with coloured coatings can be put into the clear bank as the coating will burn off (Wasteline, 2004).

Glass is produced from cheap raw materials and can be recycled over and over without any deterioration in its quality. The glass container industry has achieved the highest rate of recovery of any material from the domestic waste stream (Telford, 1994). Glass containers are produced in brown (amber), green and clear (flint). Clear has the most applications and is in greatest demand. Products such as cookware and windows are considered contaminants due to their chemical composition or heat-resistant properties. Manufacturers require collected glass to be separated by colour, since the material is used to make glass of the same colour. Other secondary markets include road construction filler aggregate in storm drains, the fibreglass industry glass beads for reflective paints, and abrasives. In recent years, glass recycling has increased as a result of litter reduction, energy conservation and natural resources preservation. Although the natural resources used to manufacture glass-sand, limestone and soda ash are abundant, the long distances between each raw material results in high transportation costs. Therefore, using recycled glass also helps to conserve

oil and gas. Glass container prices are determined by colour, quality, and whether it is crushed or whole. Prices are paid depending on the material's proximity to glass manufacturers (_{Rogoff and Williams, 1995).}

2.7.2 Paper

Paper has been in constant demand as most paper producing companies prefer recycling rather than damaging the environment by cutting down trees to produce paper. This product is pulped and reused. There are also instances where paper can be reused in its original format for example when used as packaging material when transporting fragile products.

Most local authorities supply recycling banks for newspapers and magazines, as this is the most abundant type of paper in household waste. Packaging such as milk and juice cartons cannot be recycled as paper as they have a plastic lining which would contaminate the process (Wasteline, 2004).

Selke (1990) are of the opinion that, although virgin paper is produced from wood, it is also possible to manufacture paper and paperboard from recycled paper feed stocks. The most important sources of waste paper collected for recycle are newspapers, corrugated boxes and office paper. The recycling of one ton of paper saves the equivalent of seventeen trees.

Waste paper has long been the favoured 'recyclable' and there is a large and sophisticated waste recovery system for all grades of paper and board. Some products such as writing paper and corrugated cardboard already use very high percentages of recycled material (Telford, 1994).

Rogoff and Williams (1995) state that the waste paper industry contributes towards recycling. Paper is bought and sold on the basis of grade and, consequently, prices vary accordingly. Grades of paper range from low grade,

such as newspaper and corrugated cardboard, to high grade, such as writing, printing and computer paper. Mixing different grades lowers the quality by reducing the remanufacturing value. Paper and paperboard products are distinguished by their physical properties. Generally, paper products' physical properties depend on the pulping method and the fibre length, which determines strength, stiffness, opacity and printability. As the ratio of long fibres to short fibres increases, so does the strength. However, more strength also means a reduction in surface smoothness, a disadvantage in printing. Consequently, packaging materials contain long fibres while printing and writing papers include short fibres.

2.7.3 Aluminium and steel cans

Aluminium is one of the waste products that is, constantly in great demand. Manufacturers will always buy aluminium as it can easily be re-engineered with minimum costs that can be produced into new sheeting for the production of new products. This product also demands a high price per weight and no surplus waste stocks are available. Aluminium can be recognised by the fact that it does not stick to a magnet, has a very shiny silver base and is very light in weight. Steel cans also called tins as they contain a very thin layer of tin. The aim is to crush cool drink cans before recycling, by either using a can crusher or by squashing them underfoot. Aerosol cans made from steel or aluminium can be recycled in collect-a-can banks, but they must be empty and should not be crushed (Wasteline, 2004).

According to Selke (1990), the manufacture of aluminium from natural ore requires vast amounts of electrical energy. Consequently, the price of aluminium products is considerably greater than steel products. Because of this high value, and also because of the very large energy savings, which can be achieved by using recycled aluminium, the recycling of aluminium beverage cans is very important to the industries that manufacture these cans. Aluminium is the

success story of material recycling. In the United States, over 50 percent of aluminium cans produced since 1981 were recycled. In 1986 this effort amounted to 34 billion cans weighing about 650 000 tons, representing 53 percent of the total can production. The primary reason for the success of aluminium can recycling, is the effort the aluminium industry has put into setting up the required network, to successfully collect and reprocess the containers. In addition to environmental concerns, the industry had a strong monetary motive. Using recycled aluminium saves 95 percent of the energy required to make aluminium cans from ore.

The aluminium can, or used beverage can, continues to dominate the beverage can packaging market with an average share of more than 95 percent. Although most cans are baled before being shipped to processors, two of the largest recyclers of aluminium beverage cans receive loose, flattened beverage cans to inspect for contamination. Highly contaminated shipments are returned to the shipper. Mandatory recycling programmes have saturated the aluminium market with cans. As a result, the aluminium industry, which was operating at near capacity levels, could not purchase the excess aluminium and market prices dropped. The aluminium industry has established aluminum buy-back centres and provides can processing equipment and transportation to those interested in recycling (Rogoff and Williams, 1995).

Telford (1994) indicates that the aluminium can collection is supported by the Aluminium Can Recycling Association. This association has established an organisation and infrastructure to expand the collection of aluminium cans on a nationwide basis.

2.7.4 Textiles

Waste textiles can easily be recycled in many forms. The most common use is as waste cloths in the service station and automotive industry. Good textiles in

the form of clothing is either sold as second hand clothing or distributed to charitable organisations. However, small volumes of fabric, which cannot be reproduced or re-matched and any extra production runs from textile factories is sold by weight and used to produce smaller linen items. Charities such as the Salvation Army, manage textile banks for unwanted clothing, which is then sold in charity shops, given to the homeless, or sent abroad. Even damaged or un-wearable clothing can be converted into items such as wiping cloths, shredded for use as filling for items such as furniture, or car insulation, or rewoven into new yarn or fabric (Wasteline, 2004). Telford (1994) states that approximately one million tones of textiles enter the domestic waste stream each year, despite having a range of alternative outlets for discarded clothes and textiles of all kinds.

2.7.5 Plastic

Plastic is a difficult material to recycle, as there are many different types of plastic, often indicated by a number, or letters such as PET or PVC stamped on the article. The variation in plastic types means that different reprocessing techniques are required. The different types of plastic, therefore, need to be collected separately or sorted after collection, as re-processors will specify which type of plastic they will accept. Plastic in household waste is often food packaging and therefore too contaminated to be recycled effectively. Plastic is a light, bulky part of household waste and therefore it is difficult to store and transport sufficient quantities of plastic to make recycling economically viable (Wasteline, 2004).

Rogoff and Williams (1995) highlight the need for and value of recycling plastics, as plastic resins are made by combining synthetic materials such as oil and natural gas in a polymerising process. The molecular structure of each resin gives the material its unique end-result qualities. Today, an estimated 200 types of resins are used to produce plastic products. Polyethylene terephthalate (PET) is a strong, lightweight form of poly-ester used for soft drink and liquor bottles

and other food and non-food containers. Recycled PET is used to make soft drink bottles, other containers, fibre-fill in jackets and sleeping bags and carpet fibres. The two types of high-density polyethylene (HDPE) bottle grade materials include homo-polymer and co-polymer. With a stiffer molecular structure, the homo-polymer HDPE (blow molded) material is used for dairy, water and juice bottles. The co-polymer HDPE (injection molded) has a more flexible molecular structure and is chemically more resistant to bottle contents such as detergents and household cleaners. These HDPE types are incompatible and cannot be mixed together. Polyvinyl chloride (PVC) is flexible, chemically-resistant and costs less than the other materials. It is mainly used in flexible bags and piping materials, however it has also been used for food jars and bottles. Poly-vinyl chloride has limited thermal stability and quickly degrades when processed. Collected plastics require trained workers to manually sort the plastics by material type and color. Recycling programmes across the United States of America have produced a glut of reusable PET and HDPE plastics for the plastic resin markets. As a result, prices for recyclable plastics have fallen over the past several years.

Anderson, Kelly and Rattray (1995) indicate that public interest in plastic recycling which has grown significantly over the past decade, found that municipalities have frequently responded by adding plastic bottles to curbside collection programmes. Officials are finding that, due to low weight to volume ratio, high density polyethylene (HDPE) and polyethylene terephthalate (PET) are considerably more expensive to collect and process than other materials on a rand for rand basis.

Telford (1994) shows that the sheer variety of plastic polymers used in packaging presents formidable difficulties when separating them from the domestic waste stream for recycling. Plastic containers and films are also light bulky, which means that low weights of recovered materials, need disproportionately large containers for storage and transportation. However, as plastics are now

becoming more widely recycled, many firms are holding trials, or have completed trials, to see whether or not polyethylene used for bulk delivery wrapping can be effectively recycled.

2.7.6   Organic waste

Organic household waste includes food and garden waste. This waste type creates a problem if it is sent to landfill, due to its bulky nature and the difficulty in separating it from other waste once mixed. Organic waste will biodegrade easily and produce methane, a greenhouse gas responsible for global warming. The best way to dispose of organic waste is to compost it, either through a centralised composting scheme or by composting at home. Householders may be able to separate kitchen waste for a curbside collection scheme (Wasteline, 2004). Organic waste is a key component of composting. As with other forms of recycling this can take place at source, on the property of the householder, or in a composting plant prior to disposal (Water Research Commission, 1995).

2.7.7   Furniture

Households and offices often discard unwanted furniture rather than seeking ways of reusing and or redistributing these materials. Furniture products are regularly discarded in perfectly good condition and in many cases a simple repair or a coat of paint is all that is required. Furniture is a bulky waste and disposal to landfill represents an unsustainable drain on resources. Annually in excess of 12 million acres of tropical rainforest are destroyed and less than 1% of tropical timber comes from sustainable sources. A network of furniture recycling projects exists across the UK, consisting of small-scale local projects which take unwanted household furniture and items, and pass it onto community groups, low-income families and other groups in need (Wasteline, 2004).

In the United Kingdom over 23 million household appliances and pieces of furniture are being discarded each year, this weighs half a million tons. Because of high costs 38% of the consumers rarely or never get products repaired. Almost 10% of household appliances and furniture discarded as waste still function and most of them are less than five years old (Anonymous, 2001).

2.7.8 Mixed waste

Packaging such as Tetra packs and chips packets is often made up of a mixture of materials including paper, plastic and metal, and this makes recycling difficult. There is a lack of facilities and technology for recycling mixed packaging waste and the materials are difficult to separate out without contamination. This separation process is currently being tested but the initial cost could be high. Packaging is a very visible form of waste, making up around one-third of the average household dustbin. Packaging often necessary to protect the product, prolong its lifespan and provide essential information to the customer. However, over-packaging does occur, especially for marketing purposes. Basic foods such as bread and rice are rarely over-packaged, while convenience foods often have two or three layers of packaging and this creates additional waste types that sometimes cannot be used generating secondary waste that requires land-filling (Wasteline, 2004).

According to the Water Research Commission (1994) mixed solid waste can be separated for recycling and separation. Mixed residential or commercial waste, can be separated at source. However, the success of doing so depends on the costs and the quality of recycled materials.

2.8   THE BENEFITS OF WASTE REDUCTION

According to the United States Environmental Agency (2004), source reduction, often called waste prevention, means consuming and throwing away less.

Source reduction includes purchasing durable, long-lasting goods and seeking products and packaging that are as free of toxins as possible. It can be as complex as redesigning a product to use less raw material in production, have a longer life, or be used again after its original use is completed. Source reduction actually prevents the generation of waste. Therefore, it is the most ideal method of waste management and goes a long way toward protecting the environment.

Skinner (1994) emphasises that waste reduction activities help to minimise the rate of waste generation. Waste reduction comprises four aspects, namely toxic reduction, reduction in volume, changes in product formation and changes in behaviour.

- Toxic reduction:
  This process is when the nature of waste is changed by reducing a manufacturer's use of toxic materials in consumer goods.

- Reduction in volume:
  Involves the use of fewer materials initially, in consumer goods.

- Changes in the product formation:
  Is when the production of goods that can be recycled more easily, such as changing from multi-material to one-material packaging.

- Changes in behaviour:
  Include when a number of economic factors can contribute to the reduction of waste. In the production process, consumers and commercial enterprises can use their purchasing power to create a demand for low waste products or items produced from recycled materials. Governments can also influence consumers through education and information dissemination.

There have been a number of changes in packaging that have resulted in waste reduction, although the motivation for these changes have largely been based on economic factors rather than solid waste oriented. The first method is when metal cans, glass bottles, and plastic bottles have been reduced in weight and in volume, in successful attempts to use less material in the package and thereby save in material cost. The second method is to increase the average lifetime of durable and semi-durable goods, thereby reducing discards and replacement needs. The third method is to produce re-useable products instead of single use disposable products and also to increase the number of times that items are reused. This is applicable to re-useable packages such as refillable beverage bottles and re-useable milk crates. The fourth method of waste reduction is to directly reduce the consumption of material goods by persuading people to moderate their needs and wants. This may well be the option with the greatest potential for waste reduction, but it is probably the one to least likely to have any significant impact, since it would involve a radical change in lifestyle and a possible reduction in sales and profits for the producer (Selke, 1990).

2.9   WASTE RECYCLING

Recycling occurs when material from the waste stream is recovered and serves as a raw material for the manufacture of new products. Recycling is not therefore merely the separation of materials from the solid waste stream but in fact only occurs when such materials are incorporated into products that enter the market place. Source recycling involves the separation of recyclable materials by the waste generator (the householder or business) and separately collecting and transporting these materials to recycling markets. This system has the advantage that materials are not contaminated by other wastes. However, there is a great need for household co-operation, as the waste generator is required to separate the wastes correctly and store them in separate form (Water Research Commission, 1995).

According to Wasteline (2004), the first step is to try and reduce the amount of waste that is produced. After that the aim is to try and reuse the waste as much as possible. After reducing and reusing waste, recycling is the next step. Almost half of the contents of our dustbins could potentially be recycled. In addition, composting is an alternative method as more than 30% of vegetable peelings and other organic waste is used in this process that is disposed. Despite this potential to recycle or compost around 68% of the waste, only 12% is recycled or composted. A total of 77% of municipal waste is land filled and 9% is incinerated to produce energy. Recycling is the processing by which waste products provide the raw material to make new products.

Transporting materials to a recycling bank or putting them out for the local authority to collect, is not recycling, although they have been collected for recycling. The recycling process, as a whole, is completed when products are bought that have been produced from the recycled materials. Recycling reduces the demand for raw materials. Recovering materials from old products reduces the need for or reducing the extraction of additional raw materials from the earth. This is important because the vast majority of resources that are used in manufacturing products and to provide services cannot be replaced. The use of these resources cannot go on indefinitely as there is not an endless supply of them. Recycling reduces the amount of waste going to landfill or incineration neither of which are an ideal solution. Land-filling and incineration can harm the environment if not properly managed. Many landfill sites are nearly full and local authorities are rapidly running out of suitable land, close to where the rubbish is produced, for new sites. Most importantly, when we bury or burn our rubbish we are losing valuable natural resources (Wasteline, 2004).

The United States Environmental Agency (2004), states that recycling turns materials that would otherwise become waste into valuable resources and generates a host of environmental, financial, and social benefits. After collection,

materials such as glass, metal, plastics, and paper are separated and sent to facilities that can process them into new materials or products.

In a study undertaken by the eThekwini Municipality (1999), to determine the level of domestic recycling in the DMA, it was found that low income groups practiced recycling as a means of job creation and generation of income. Low to middle income groups displayed complacency and many lacked any interest in recycling. The middle to upper income groups practiced recycling out of concern for the environment and as part of fund-raising efforts. It was also found that the provision of additional accessible collection centres, as well as information and education programmes help promote recycling.

Based on a survey on recycling, Steuteville, Freebourne and Rockwell (1994) concur that the sheer variety of methods to extract bottles, newspapers and other materials out of waste stream is one of the most significant aspects of the explosion of recycling programmes in the last five or six years. Some use bins, others bags. Some co-collect refuse and recyclables. The extent of co-mixing and source separation, variable rates for refuse and the variety of recyclables collected are features that give programmes their individual characteristics. More than 100 million tons of paper is recycled per annum worldwide, with the U.S. supplying 50 percent of the waste paper. The paper industry has already met its self-imposed goal of 40 percent recovery. America is recovering 100 million tons of recyclables commodities and setting new recovery records for a number of commodities each year. The steel industry reported 48 percent recovery for cans and 62 percent for home appliances in 1993. The paper industry claims 62.5 percent recovery of corrugated cardboard and 58 percent recovery of old newsprint during 1993. The plastic industry reported recovering one billion tons of plastic packaging for 1993.

The public sector, including waste disposal and collection authorities, and the like, are facing considerable challenges in complying with their obligations

concerning waste disposal and recovery, as identified by the EU waste programme. In particular, the emphasis is on recycling and recovery (Garbutt and Borrie 2003).

By the year 2015, there will be more waste going to landfill than at present. The reality is that even with all the recycling efforts, the high costs of dealing with refuse are related to the waste crisis. A well resourced programme of waste prevention is needed to redress the balance. It should not depend on the creation of markets for recycling materials, but should rather be the beginning of recycling solution that tackles the causes rather than the symptoms of a wasteful society. It is imperative to acknowledge that domestic waste is merely a major problem. With every ton of domestic waste there are another 25 invisible tons generated by manufacturing and extraction (Harrison, 2003).

Grogan (1995) explains that the basic theory of waste is simple if the waste stream is reduced, then the useful life of the landfill system can be extended. It does not really matter how much landfill capacity exists. Land-filling valuable and recyclable resources will be devastating as the use of natural resources will also be increased.

The avoidance of disposal by recovering materials from the waste stream, means that the volume of solid waste going to the landfills can be reduced by separation of components from the stream of solid waste (Selke, 1990).

Recycling is an important factor in improving the efficiency in society's use of the limited resources of the world. It is, however, important that recycling is not considered to be a goal in itself, but only a means of reaching a paramount environmental goal. Neither should recycling lead to the neglect of waste prevention. Recycling of waste requires an increased responsibility on the part of the producer. Experience shows that the establishment of a successful recycling operation requires that the producers take responsibility for the recycling of the

product and ensure that there is a market for the recycled materials (Bradshaw, Southwood and Warner, 1992).

According to Bruyns (2004), in 1984, 1.4 million tons of virgin material was used to produce packaging in South Africa and that this had increased by 70% to 2.4 million tons by last year. In contrast, 486 000 tons of recycled products were processed in 1984, a figure that more than doubled to 1.3 million tons in 2002. The recycling industry is now worth R1.3 billion a year and employs some 40 000 people, mostly on an informal basis, to collect used products such as paper, cans, glass and plastics.

Macozama (2001) explains that waste minimisation is a strategy that has been adopted as a long term goal of South Africa's National Waste Management Strategy. This will assist to alleviate South Africa's waste management problems. Central to this strategy are the sustainability principles of conserving natural resources and the prevention of environmental degradation. Waste reduction, recovery, reuse and recycling will be the main areas of activity in achieving this goal. Communities need to change their lifestyles in order to control and reduce their waste.

Rowlings (2003) emphasises that a commitment to recycling will be vital to future generations and to the environmental future of our country. The setting of targets for individual local authorities is a positive move forward. Indeed, the fact that authorities are compelled to take action and have specific levels of expectations will encourage their further commitment to recycling. Some current targets are achievable for certain authorities. However, those that are currently at a low rate of recycling may struggle to reach their targets.

A report by the Danish Corporation for Environment and Development (1999) indicates that there is insufficient awareness and understanding of the benefits and techniques associated with the implementation of waste minimisation and

recycling. The current approach to general waste in South Africa is common to most developing countries, with the emphasis predominantly on disposal by landfill. Based on studies by the United States Environment Protection Agency (2003), collected recyclables can be reprocessed and made into new products. Recycling decreases the amount of materials otherwise destined for disposal as well as the need for virgin materials.

Recycling is perhaps the most positively perceived of all waste management practices. The type and quantity of recyclables generated by householders may vary depending upon the consumption patterns of a particular nation or area. As part of the restructuring of waste services, it will become a priority to reduce the waste stream. A large quantity of packaging materials, paper, cardboard, bottles and cans is being disposed of at landfills and these take up unnecessary landfill space (Tchobanoglous, 2003).

2.10   RE-ENGINEERING WASTE PRODUCTS

Many products made from recycled materials can be made to the equivalent standards of similar products made from raw materials. This is vital if the recycled products are to compete with the new products in the market place. Similarly, the recyclate (recovered material used as a substitute for raw material) used to make the product, needs to compete with virgin material on the basis of quality, consistency, availability and performance, as well as price. New technology is constantly improving the quality of recycled material, and design and process improvements have resulted in very high grades of recycled products being produced. For instance, recycled paper is now available at similar standards to high quality virgin paper and will function equivalently in printers and photocopiers (Wasteline, 2004).

In the view of Selke (1990), recycling involves using materials which are at the end of their useful lives as the feed stocks for the manufacture of new products.

This differentiates from reuse by the reprocessing and re-manufacture operations. Within recycling a further hierarchy can be defined. Primary recycling is the use of recycled products to make the same or similar products. Examples include the use of aluminium cans to make new aluminium cans and glass bottles to make new glass bottles. This is at least a partially closed loop process and it can, and should, be regarded as having a higher value than secondary recycling. Secondary recycling is the use of recycled materials to make new products with less stringent specifications than the original. This allows for down-grading of the material to suit its possibly diminished properties, and hence is of lower value than primary recycling.

Brown (1993) highlights that much emphasis is currently being placed on the "four R's" of waste management.

- ➢ Reduction   -   avoiding unnecessary waste generation.
- ➢ Reuse   -   using objects, devices or substances over again.
- ➢ Recycling   -   using waste material in the place of virgin material to manufacture new products.
- ➢ Recovery   -   extracting energy or material resources from otherwise discarded mixed wastes.

These same four terms are identified for coping with present-day waste management problems. Motivation to adopt these techniques is still largely economic - the costs of waste disposal are rising. The four R's have become the four part mantra of environmentally responsible resource use, and form the cornerstone of newly developing integrated waste management strategies worldwide. But past, present, or future - regardless of how successful attempts at waste reduction, reuse, recycling and recovery might be once an object or substance has been deemed worthless by a particular society, its disposal inevitably follows.

Re-using items by repairing them, donating them to charity and community groups, or selling them also reduces waste consumers should be taught to reuse (a mayonnaise jar can be washed out and used to store peanuts). Use a product more than once, either for the same purpose or for a different purpose. Reusing, when possible, is preferable to recycling because the item does not need to be reprocessed before it can be used again. Collected recyclables can be reprocessed and reused in their existing states or they can be made into new products. Recycling decreases the amount of materials otherwise destined for disposal and also reduces the need for virgin materials. The type and quantity of recyclables generated by householders vary depending upon the consumption patterns of a particular nation or area (United States Environmental Protection Agency, 2003).

According to Telford (1994), many other materials can be removed from the household waste stream, not necessarily for recycling, but for reuse. Types of materials collected for reuse are books, cameras, cards, china, glassware, coins, jewellery, plants, records, toys and spectacles.

2.11   POLLUTION

One of the challenges the new democratic South African government has to deal with is the mounting problem associated with pollution control and waste management. The social effects of South Africa's industrial waste generation demonstrate that poorer communities have had to bear the brunt of the cost associated with the negative impact of waste generation. It is generally acknowledged that the previously disenfranchised majority had to bear an inequitable burden of the social cost of pollution and waste management (Glazewski, 2003).

Bradshaw, Southwood and Warner (1992) propose that pollution is a form of waste and a symptom of inefficiency in industrial production. Reduction in the

volume of waste that is generated encourages the promotion of reuse and recycling of waste and waste minimisation. Industry needs to realise that in the long run, non-polluting processes will be the most economical, allowing the greatest operating flexibility, and producing the highest quality products. In the long run, non-polluting products will be the most profitable and the most marketable and such products will be most competitive.

Consumer products are fundamental to the wealth of a region. However, the pollution created by the rising consumption patterns of products used by consumers is the origin of most environmental problems and is responsible for the depletion of natural resources. What is needed is a growth model that promotes a higher quality of life through wealth creation and competitiveness on the basis of products and the use of fewer resources, which will have lower risks on the environment, will prevent pollution and still deliver the required services (Shayler and Holloway, 2003).

2.12   REGULATIONS AND POLICIES

According to Lofaso (1993), there is a need for recycling to be facilitated through legislation because producers often find raw materials cheaper than recyclables for the production process. German legislation includes a Packaging Ordinance aimed at ensuring that the producers of packaged products take responsibility for the disposal of the packaging. Germany also passed a Draft Used Paper Ordinance in July 1993. This ordinance essentially states that paper manufactures, publishers, printers, distributors and retailers will be obliged to take back used graphic paper free of charge to the consumer. Industry, distributors and retailers must accept waste paper returned by consumers.

In their efforts to solve the growing municipal solid waste problem, an increasing amount of attention in the United States is turning to legislative remedies. This legislation can be in the form classified taxes or the banning of certain products

or procedures. However, it is classified, there is a lot of legislation being proposed, and an increasing amount being passed (Selke, 1990).

The 1990s have seen the introduction of more environmental legislation than any other decade. The largest area of change has been introduced in London included new statutory requirements such as the duty of care on handlers of waste and the requirements for waste collection authorities to produce waste recycling plans and to introduce waste policies (Telford, 1994).

The view of Bradshaw, Southwood and Warner (1992), is that the problems associated with legislating waste have increased in the past decade, despite the fact that the past 20 years have seen (in all industrialised countries) an enormous quantity of waste legislation appeared. It seems that no country can claim to have resolved the waste problem.

The main aim of a waste policy is the prevention of waste generation. The second aim must be to promote, as far as possible, the reuse and recycling of waste. Finally, a waste policy must take the necessary steps to ensure that waste is eliminated, without harm to man or the environment (Bradshaw, Southwood and Warner, 1992).

Perrin and Barton (2001) state in their research based on UK practices, that the introduction of the government's waste strategy will ultimately require local authorities to change the way they approach household recycling. New mandatory targets will require local authorities to double their recycling rates and will require a serious rethink about the infrastructure of collecting and recycling household waste.

In South Africa The National Waste Management Strategy is the driving force that has been implemented to ensure that proper waste management techniques are applied. The National Waste Management Strategy was undertaken by the

provincial government and the focus highlights the management hierarchy and waste reduction (Ball, et al 2005).

Furter (2005) focused his research on the bylaws related to solid waste, and the current scenario poses questions about the intentions of the promulgated legislation. New opportunities and public private partnerships will be the deciding factor in effecting waste management.

2.13 AWARENESS AND EDUCATION PROGRAMMES

Public participation and education is the benchmark of the success of any recycling scheme. In recognition of this, the trend in recycling policies and legislation is geared towards promoting public participation in recycling with public education as the main driver. These initiatives by and large do not recognise the importance of grasping the perceptions and attitudes of the consumer towards waste recycling schemes. Although participation in recycling initiatives in developed countries is voluntary, economic gain encourages participation. The general consensus among professionals and researchers is that recycling reduces the total amount of waste that is disposed of and conserves the natural resources. However education and awareness is fundamental to the success of the process (Bolaane, 2005).

Macozama (2001) concurs that legislation alone clearly will not get people to change their practices. Laws must be coupled with education and environmental awareness creation. People need to be empowered on the legislative process and the role of the generator and the service provider. More importantly, best practices need to be showcased and incentives provided for people to get involved. Probably the most important intervention at community level is empowering communities with knowledge. A lot of the behaviour and attitudes prevailing in low income communities are because people are just not aware of the implications of their actions. Priority should be given to information

dissemination. Communities need to understand what waste is, how it is generated, where it belongs, who is responsible for it and what purpose their contribution would serve. There needs to be a change in the public perception about waste.

Lofaso (1990) concurs that central to household co-operation with recycling programmes, is awareness creation and education. The responsibility for this generally falls upon the authorities. New York City has applied this process with some success. Source recycling or curbside programme began in the city in 1990, and the districts that were selected for recycling were alerted and educated. Flyers explaining recycling procedures, posters and meetings are all methods to create awareness within a community.

Telford (1994) believes that it is essential to ensure that the recycling message is relayed, to each of the particular audiences targeted, in such a manner that they appreciate the benefits associated, not only with their own particular group, but also with other groups. Although recycling is a relatively new area, it is one which must play an essential part in the future of waste management if energy resources and raw materials are to be conserved and the environment, to be protected. There are a number of methods which one can employ to address to the target audience, including local authority journals. The distribution of leaflets, the use of local free paper, radio and television reports. Education on recycling should not simply be the province of the waste collection authority. Education authorities can play a crucial role, especially perhaps where the most important audience to reach is school children. School children are a key group because they are both responsive and influential, they influence other family members and they represent the adult consumers and waste creators of tomorrow. They can be encouraged to adopt practices which avoid waste and facilitate recycling, the long term future will be considerably more promising.

In Curitiba, Brazil, over 70 percent of the community now participates in the recycling programme and its success is largely due to a city wide environmental education programme which highlights the benefits of recycling. Approximately 150 tons of recyclable materials are collected daily. This represents 3 000 cubic meters, and the paper recycling alone saves the equivalent of 1 200 trees a day (Muller, 1992).

Selke (1990) contends that solid waste is currently the most serious environmental problem in the world. Therefore, the willingness to address these problems and to make changes in practices to help alleviate this problem, must be a high priority for government. Solutions to the solid waste problem will demand lifestyle changes. Some of these changes will be as simple as learning to separate the recyclables from the rest of the discards. The most critical change involves accepting the reality that communities must face that waste disposal facilities are required, and they will inevitably be located in close proximity to some residential areas as the availability of large tracts of land suitable for land-filling becomes less.

Perrin and Barton (2001) state that household recycling is a voluntary activity providing householders with the power to determine if local authorities and the packaging industry meet their mandatory targets. Recycling is a service industry, householders are customers and the scheme should be designed and maintained accordingly. In essence, householders have to accept the type of refuse collection service provided, but can choose whether or not to use the recycling service with little impact on themselves.

Insufficient awareness and understanding of the benefits and techniques associated with the implementation of waste minimisation and cleaner production approaches exists in South Africa. Similarly, the practice of waste recycling is not generally considered to be essential or standard part of waste management in South Africa, and major initiatives must be implemented. Education and

awareness will assist in promoting more widespread adoption of recycling practices, including waste separation (Danish Corporation for Environment and Development, 1999).

2.14   CONCLUSION

Recycling is the most recognised concept in solid waste management today. However, it is only one part of a larger integrated solid waste management system. Recycling can reduce the amount of material going into landfills. The concept is simple: recycling helps convert materials that would otherwise become waste into valuable resources. Collecting used bottles, cans and newspapers and taking them to the curb or to a collection facility is just the first in a chain of events that generates a host of environmental, social, financial and marketing returns. Recycling is the act of recovering a waste material and processing into another useful product. All three activities collection, processing, and procurement or reuse of the recovered materials, must be completed in order to make recycling programmes effective.

The willingness of consumers to participate is vital especially when recycling can be handled at the curbside for collections. Curbside recycling collection is similar to solid waste collection in which a collection vehicle drives from house to house collecting materials that residents have placed at the curb. Collected materials will then be delivered to a materials recovery facility or recycling centre for processing to meet cleanliness standards and separation specifications for new markets. Furthermore it is evident the literature reviewed that success in changing attitudes and behaviour of consumers is based on a number of factors. These include, concern for the environment, understanding the market demands, education and awareness campaigns, and adhering to industry regulations.

The related literature gave a clearer understanding of the dynamics of curbside recycling and its importance. It is proven from the various studies worldwide that sustaining the environment is paramount and all role players must immediately

implement methods to prevent further losses and depletion of the limited natural resources.

The next chapter will focus on the research methodology employed in this study.

CHAPTER THREE -   RESEARCH METHODOLOGY

3.1   INTRODUCTION

The literature review in Chapter 2 explored the trends and attitudes of consumers towards curbside recycling. This Chapter focuses on the research methodology, standards and techniques that were applied to obtain representative data from a sampling of consumers in the eThekwini municipal area. Great care was taken in ensuring that the target population was properly representative. Judgemental sampling was used to choose the sampling units (5 shopping centres) and stratified convenience sampling was used in selecting the respondents (80 in each of the five shopping centres). Data was collected using questionnaires administered during the personal interviews.

Prior to finalising the questionnaire a pilot test was used to test face validity and to evaluate the questionnaire. The data from the completed questionnaires were analysed using the SPSS computer program and the results were presented using frequencies, percentages, bar charts, pie charts and tables.

3.2   THE RESEARCH DESIGN

A quantitative approach to the analysis was chosen as in this type of research, cause and effect relationships can more easily be identified and the research is more structured and controlled with this approach.

Internal validity was checked against the related literature review to measure the accuracy of the measurement instrument which had been chosen. A representative sample of the population was chosen to ensure external validity. Attempts have been made to select as large a sample as possible. To ensure reliability within this process, attempts were made to prepare a well designed questionnaire and the interviewers were properly trained. Face validity was

checked by pre-testing. A pilot study was conducted and the results have been scrutinised by a statistician.

Thus, the research, marked by a clear statement of the problem and detailed information needs, as was shown previous chapters, corresponds to descriptive research. Finally, the 'five Ws' of research specific to descriptive design, have been identified (Malhotra, 1999): Who? (consumers), When? (currently), Where? (eThekwini Municipal area), Why? (to investigate attitudes towards curbside recycling), Way? (by identifying consumers' demographic characteristics and attitudes towards curbside recycling).

As the respondents were considered at a fixed point in time, the research used a cross-sectional methodology (Bailey, 1987). "The cross-sectional study is the most frequently used descriptive design in marketing research. Cross-sectional designs involve the collection of information from any given sample of population elements only once" (Malhotra, 1999).

To reduce question design error, the study took note of the following points:

➢ Questions were not leading.
➢ Questions were not vague.
➢ Questions only enquired one response at a time.
➢ Questions were clear, simple and understandable to the respondent.
➢ The questionnaire was not long.
➢ Questions and the questionnaire structure was adapted based on the related literature related to this topic.

3.3   DEFINITION OF THE TARGET POPULATION

The population of interest is called the target population. The data required for the study should only be gathered from objects in the population of interest.

Properly defining the target population is a vital step in the design of the research project (Crask, et al., 1995). The sampling population was defined as (customers of all races that purchase consumer products who reside in the eThekwini Municipality area). The rationale behind in selecting this sampling population is that these individuals are customers who generate solid waste that can be recycled.

3.4   THE MEASURING INSTRUMENT

The questionnaire, which is outlined in Appendix 2, consists of an introductory letter and a demographic section consisting mostly of categorical variables, some measured on a nominal scale and some measured on an ordinal scale. The first section measures level of the importance attached to recycling, the second section measures knowledge with respect to waste disposal and recycling, the third section measures attitudes with respect to waste disposal and recycling and finally the fourth section measures behaviour with respect to waste disposal and recycling.

The Hout Bay questionnaire was used as a template from which this measuring instrument was designed. Although a number of the original questions were used, significant changes were made. It was felt that the original questionnaire would be too long for the intercept survey technique as respondents would not co-operate when requested to answer a long questionnaire at shopping centres. Secondly, it was felt that a few questions were difficult to understand and these were modified accordingly. Thirdly, it was important in this study to measure four dimensions, which the previous questionnaire did not do. The four dimensions that were established were:-

- ➢ Level of Importance
- ➢ Knowledge
- ➢ Attitude

➢ Behaviour

The Level of Importance dimension was adapted directly from the Hout Bay questionnaire. However, with Question One it was felt that this question was too long to read hence this question was reconstructed to ensure simple and clear understanding. The Knowledge dimension was derived directly from the literature review where factual information was obtained. The Attitude and Behavioral questions were also adapted directly from the Hout Bay questionnaire, and adapted to suit the requirements of the study.

3.5   SAMPLING METHOD

In this study, stratified convenience sampling was used as each respondent was chosen according to their willingness to participate in the survey. "Convenience sampling is a non-probability sampling technique that attempts to obtain a sample of convenient elements. The selection of sampling units is left primarily to the interviewer" (Malhotra, 1999).

The participants were identified and interviewed at five shopping centres which were chosen based on their potentially different socio demographic profiles. A larger sample size could and should have been chosen for the study. However, this was not possible as most consumers that visited the selected shopping centres were reluctant to interrupt their shopping to take part in the survey.

Judgemental sampling was used to choose shopping centres. According to Malhotra (1999), judgemental sampling is a form of convenience sampling in which the population elements are purposefully selected based on the judgement of the researcher.

According to Struwig and Stead (2001) convenience sampling is chosen purely on the basis of availability. Respondents are selected because they are

accessible and articulate. Convenience sampling is the least expensive and least time consuming of all sampling techniques. The sample elements are easily accessible, easy to measure, and co-operative. Therefore for this study convenience sampling was used to select the respondents who were to be interviewed.

3.6   SAMPLE SIZE

Eighty respondents from five shopping centres (Pavilion, Gateway Theatre of Shopping, Phoenix Plaza, Workshop and Amanzimtoti centre) were interviewed. The study would have liked to choose 80 respondents in each shopping centre to obtain a sample size of 400 but unfortunately only managed to obtain 212 willing participants.

The sample size was considered large enough for the study. The view is backed by Struwig and Stead (2001) who state that if the sampling process has been correctly followed then sample sizes of 150 to 200 can provide an acceptable reflection of the population.

3.7   DATA COLLECTION

The interviews were conducted in five large shopping centres located in the eThekwini Municipal area. (Pavilion, Gateway Theatre of Shopping, Phoenix Plaza, Workshop and Amanzimtoti Centre). In order to achieve a representative sample, it was necessary to interview consumers in different areas to achieve a heterogeneous population to ensure a wide spread of potential responses to the study.

To administer the questionnaire, assistant education officers from the eThekwini Municipalities Education and Waste Minimisation section were used. Interviews were conducted at different times of the day and on different days of the week.

Each day was divided into three time allocations: the morning, lunch time and afternoon.

The plan specified in detail, the process used to administer the questionnaires, according to the suburb and name of shopping centre. The number of questionnaires, which were completed in each shopping centre, was indicated by the figure in bold on each batch.

The preliminary analytical steps of editing, coding and tabulating the data that are common to most studies, were used in this study. This process is normally applied to clean up the data set for any possible interviewer or capturing errors and to eliminate all surveys that have been incorrectly completed. All the questionnaires were pre-coded and no open-ended questions were used. This reduced any possible coding problems.

3.8 PRE-TESTING

Survey pre-testing involved administering the questionnaire to a small sample of respondents to determine if the questions were understandable and if the survey procedures worked (Crask, et al.,1995).

Pre-testing the questionnaire was important to ensure that the respondents interpreted the questions correctly and to evaluate the quality of the data collected. The questionnaire was submitted to the supervisor and the statistician to check whether the questions would provide the type of data that would answer the research questions.

The pre-test questionnaire was evaluated using 20 respondents by selecting four respondents from each suburb (North, South, West and Central regions). This allowed the researcher to identify any problems which might exist with the

questionnaire and to ensure that the householders could easily understand both the questions and the purpose of the study.

3.9   DATA ANALYSIS

A computerised statistical analysis of the data was necessary to describe and interpret the data that was obtained from the questionnaires. The results of the interviews were analysed using Statistical Programme for Social Science Version 11.5. The data was analysed in order to identify the factors that reveal the attitudes of consumers towards curbside recycling. The stages in the statistical analysis included, data preparation and capturing, tabulation of data, and then various tests were conducted to analyse the relationships that emerged.

3.9.1   Data preparation

Data preparation includes coding and editing (McDaniel and Gates, 2002). Editing is the process of ascertaining that questionnaires are filled out properly and completely. This involves checking for interviewer and respondent errors. Coding refers to the process of grouping and assigning numeric codes identifying various respondents with a particular question.

The questionnaires were pre-coded. In order to avoid coding problems, open-ended questions were not used in this study.

Questionnaires that fell outside the sample parameters were discarded, and if it appeared that a respondent had not understood the question the decision was made whether to exclude that question or the whole questionnaire. Answers were also checked for inconsistencies.

Two questions which did not comply with the requirements after this quality review, had to be discarded as it was impossible to approach the respondents

again to clear up problems. A total of 210 questionnaires were therefore analysed.

Once all the data was collected, the questionnaires were edited and checked to ensure that none of them contained missing data. The data was analysed by examining the frequency with which certain responses occurred. The results were displayed by means of pie charts or bar charts to make the frequencies easier to read. Once the data was entered into the SPSS programme it was verified for accuracy. To make the task easier the questionnaires were pre-coded. The underlying purpose of the statistical analysis was to show that certain factors have a significant influence on consumers' attitudes towards curbside recycling.

3.9.2 Interpretation of the results

Frequencies and percentages are widely used in marketing research because the relative importance of figures is revealed more clearly by these simple tools than by the original data. Frequencies and percentages are used to represent variables throughout the study (Aaker, et al., 2004). The statistical analysis was covered under the following headings:

3.9.3 Descriptive statistics

Descriptive statistics describe data in terms of measures of central tendency. Descriptive statistics are the most efficient means of summarising the characteristics of large sets of data. In statistical analysis, the analyst calculates one number or a few numbers that reveal something about the characteristics of large sets of data (McDaniel and Gates, 2002).

The following statistical methods were used:

- ➤ **Frequency**

  "A report of the number of responses that a question has received" (Aaker, et al., 2004).

- ➤ **Percentages**

  "The percentage is the proportion of respondents who answer a question a certain way, multiplied by 100" (Aaker, et al., 2004).

- ➤ **Bar charts**

  According to Kinnear and Taylor (1991) bar charts depict magnitudes of the data by the length of the various bars that have been laid out with reference to a horizontal or vertical scale.

- ➤ **Pie charts**

  Kinnear and Taylor (1991) describe a pie chart as a circle which is divided up into slices, each of which represents a portion of the total. Struwig and Stead (2001) believe the pie chart is particularly effective for depicting relative size or emphasising static comparisons since the sections are represented as part of the whole or total.

- ➤ **Inferential statistics**

  Inferential statistics is concerned with the inferences that can be made about the population indices on the basis of corresponding indices

obtained from the samples drawn randomly from the population (Welman and Kruger, 2002).

> **Chi-square test**

Chi-square distribution is the most commonly used methods of comparing proportions to establish whether the relationships mentioned above are dependent or independent of each other (McDaniel and Gates, 2002).

> **Independent sample t-test**

The independent sample t-test compares the mean values of two groups of cases, and is used to test whether the difference in means of variable in two groups of respondents is significantly different from zero (Struwig and Stead, 2001).

> **Analysis of variance**

The statistical technique used when testing two or more means is called the analysis of variance or more commonly ANOVA (Aaker, et al., 2001).

In this study the data was analysed by examining the frequency with which certain responses occurred. The results were illustrated by means of pie or bar charts and tables to make the frequencies easier to use. A chi-square was used to test the relationship between consumers' demographic characteristics. An independent sample t-test was used to test the differences between education level, race, education and suburb in terms of curbside recycling.

3.10   VALIDITY AND RELIABILITY

The validity of a scale may be defined as the extent to which differences in observed scale scores reflect the true differences between the characteristics being measured without systematic or random errors (Malhotra, 1999). For this research, the researcher has attempted to ensure face validity of the questionnaire.

3.10.1 Face validity

This refers to whether the items of the test appear to measure what the test proposes to measure. It should be ensured that the instrument addresses all essential questions and care is taken to use the most appropriate and suitable language for the respondents. Unlike content validity, face validity does not rely on the established theory for support (Struwig and Stead, 2001).

To ensure face validity and whether the instrument adequately covers the topic, a pilot study was conducted and the results were scrutinised by a statistician. An expert in the field related to education and recycling also examined the results. The results gave direction to the consistency and reflected the true differences achieved from the pilot study (Aaker, 2004).

In addition to the item-based analysis, a 'perception of knowledge score' was also obtained by adding up the various items making up knowledge and scoring an individual's knowledge out of a total and giving him/her a percentage. A behaviour- based score was also obtained by adding up the various items that make up this dimension and obtaining a 'behavioural score'.

3.10.2 Reliability

Reliability refers to the extent to which a scale produces consistent results if measurements are made repeatedly (Malhotra, 1999). Internal consistency reliability is a commonly used psychometric measure for assessing survey instruments and scales.

In accessing reliability, attitude scales were measured and the appropriate descriptive tests including mean, medians, modes and standard deviations and the appropriate inferential tests including the appropriate correlation testing were used. This ensured a high degree of reliability of the questionnaire. In addition Aaker (2004) stated that "reliability can be classified according to whether an instrument measures stable results over time".

3.11   ETHICS

The aim of ethics in research is to ensure that no one is harmed or suffers adverse consequences from the research activities (Cooper and Schindler, 2001). Central to the concept of research is the safeguarding of respondents' rights. The researcher has done the following to ensure that the respondents' rights are protected.

- ➤ Consent was sought and documentation was stored.
- ➤ Consent was sought for all reports used in the research.
- ➤ Questionnaires were coded to ensure anonymity. None of the respondents was named at any time during the research.
- ➤ Respondents were selected for their willingness to participate without compulsion, and no risk to the respondents could be identified at any stage during the research.
- ➤ Respondents were treated with respect and courtesy throughout the research process.

3.12   CONCLUSION

This chapter described the methodology and highlighted the various techniques that were employed to conduct the study.   This chapter has also shown that the methodology was designed to maximise reliability and validity, and thus the findings of the study can be accepted with a reasonable degree of confidence. This discussion of the research methodology also allows an easier understanding of the following chapter, which presents the results and analysis of the data collected.

Chapter 4 discusses the research findings.

CHAPTER FOUR - RESEARCH FINDINGS

4.1 INTRODUCTION

This chapter focuses on the research conducted and the presentation of the results. The data collection instrument for this research study consisted of a questionnaire, which was constructed to elicit information as comprehensive as possible. A total of 212 respondents participated in the study of which 210 questionnaires were finally analysed.

Respondents were consumers selected from the shopping centres located within the eThekwini Municipal area. Appropriate frequency tables, graphs and summary statistics were used to illustrate the data. The significant findings are the focus of the discussions as reflected in the tables. The study was conducted in order to identify the attitudes of consumers towards curbside recycling. The aim of the study was to gain an insight of the factors that influence the attitudes towards curbside recycling.

Descriptive and inferential statistical techniques including the descriptive procedures were used. These impact on each of the objectives as outlined in Chapter One. The statistics analysed and presented were not limited to means, proportions and percentages. Inferential statistics were used, including ANOVA chi-square and t-tests. The statistical programme used for the analysis and presentation of the data was the statistical programme for Social Science Version 11.5 for Windows. The following four dimensions that were established were:

- ➢ Level of Importance
- ➢ Knowledge
- ➢ Attitude
- ➢ Behaviour

4.2   DESCRIPTIVE ANALYSIS

Primarily the description of various descriptive demographic statistics for the sample were illustrated using graphical techniques. Frequencies were used to indicate how often a certain response was received to a particular question. This offers general direction about the information and what it means. This section introduces the demographic profile of the respondents.

4.2.1 eThekwini regions

As reflected in Figure 4.1, 22 percent of the study participants interviewed were from the Central, 25.5 percent from the North, 28 percent from the South and 24.5 percent from the West. This indicates that all regions were almost equally represented in the sample size for this research. This, however, should not be taken as an indication that attitudes of respondents towards curbside recycling in all four regions are similar.

Figure 4.1. Respondents per eThekwini regions
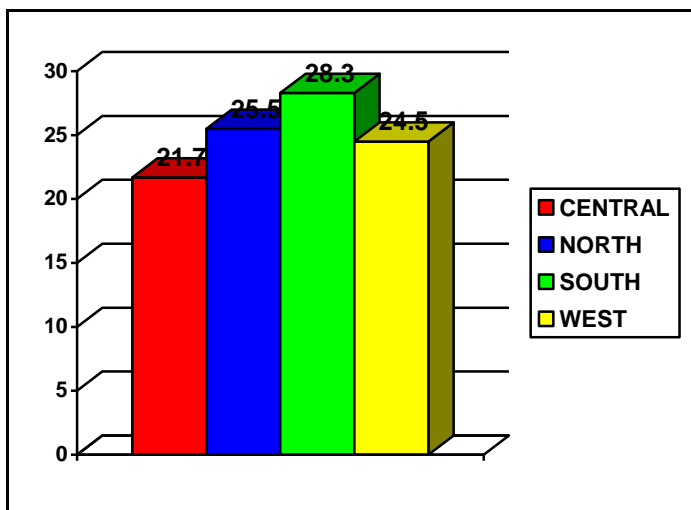
4.2.2 Race

Figure 4.2 shows the sample composition of respondents by race. 43 percent being Black, 29 percent white, 27 percent Indian and 1% of Coloured. These results show that the largest percent was made up of Black people that reside within the eThekwini Municipal area. This spread of the population of groups indicates that race could be a factor that affects the consumer's attitude towards the adoption of curbside recycling.

Figure 4.2 Race of respondents
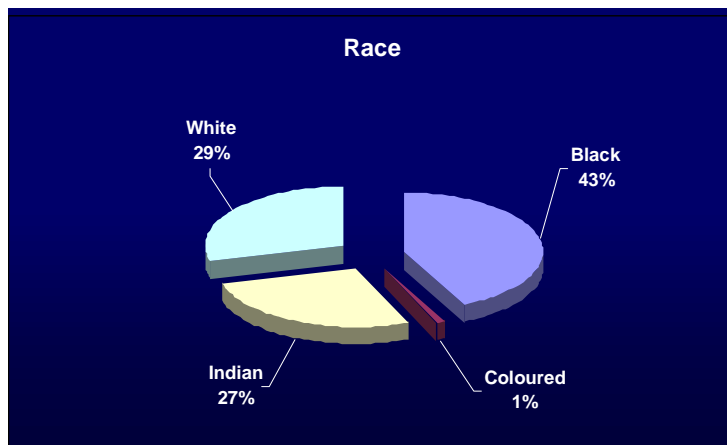
4.2.3 Gender

As reflected in Figure 4.3, 57 percent of the study participants were female and 43 percent were male. Both genders were nearly equally represented in the sample size of this study. However, this should not be taken as an indication that both male and female respondents have the same attitude towards curbside recycling.

Figure 4.3 Gender of respondents
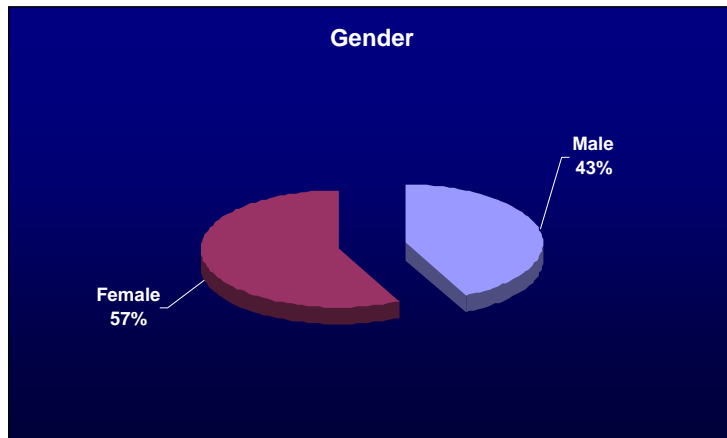
4.2.4 Age

Figure 4.4 illustrates the composition of the sample in terms of age. It emerged that 17 percent of respondents were under 25 years of age, with 21 percent in the of 26 to 30 age group, 23 percent in the 31 to 35 age group, 13 percent in the 36 to 40 age group, and 26 percent in the 41 to 66 age category. The demographic profiles of the study participants shows that the 26 to 35 age group is dominant.

Figure 4.4 Age of respondents

Allan Robert Abbu
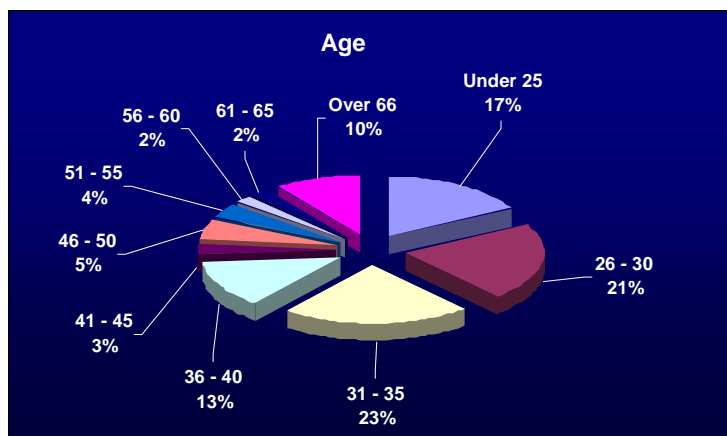
4.2.5 Education level

Figure 4.5 illustrates that the education level of the participants varied widely, with 53 percent of the respondents have a matric qualification, with 20 percent having a diploma or degree, 14 percent having a post graduate diploma or degree and 13 percent having a primary school education.

Figure 4.5 Education level
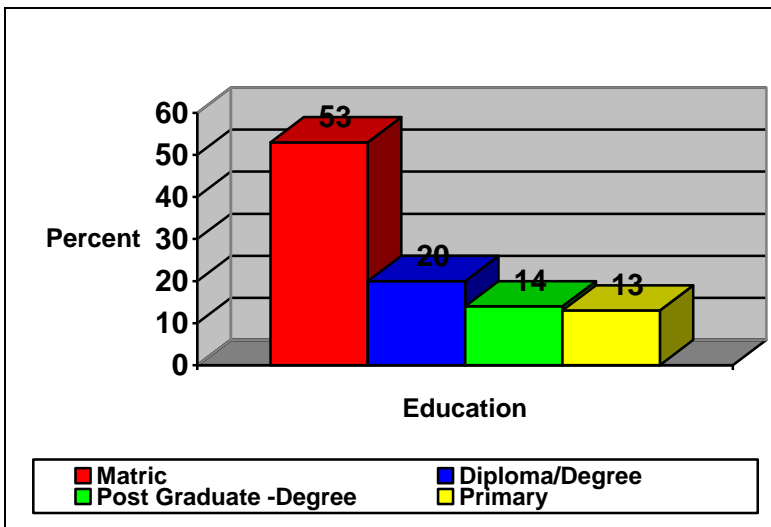
4.2.6 Income

Figure 4.6 shows the respondents' monthly income levels. 47 percent of the respondents earn less that R3000, 21% earn between R3000 to R5999, 10 percent between R6000 to R8999, 13 percent earn between R9000 to R11999 and 9 percent of the respondents earned between R12000 and R20999. None of the respondents' that were interviewed earn a monthly salary in excess of R21000. It is envisaged that consumers who earn a high income, dispose larger volumes of domestic waste. However, it should not be taken as an indicator that the level of income determines the attitudes towards curbside recycling.

Figure 4.6 Monthly income
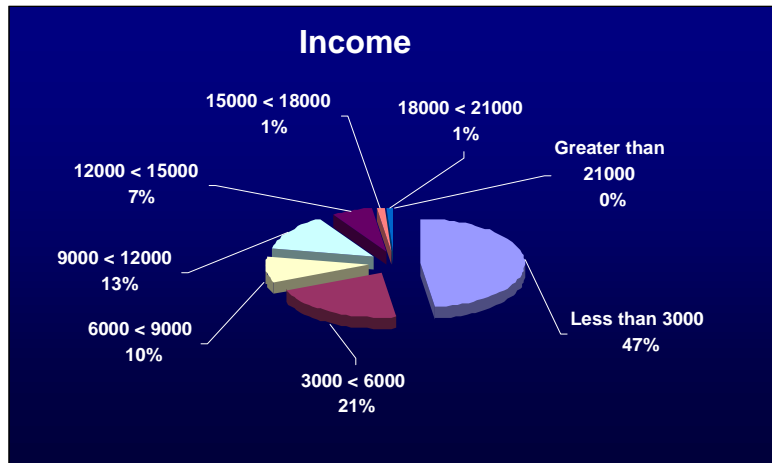
4.2.7 Affiliate to a conservation society

Figure 4.7 denotes that only 15 percent of respondents are members of a conservation society, and perhaps it can be expected that these particular respondents will be more aware of the importance of curbside recycling than the 85 percent.

Figure 4.7 Affiliate to a conservation society
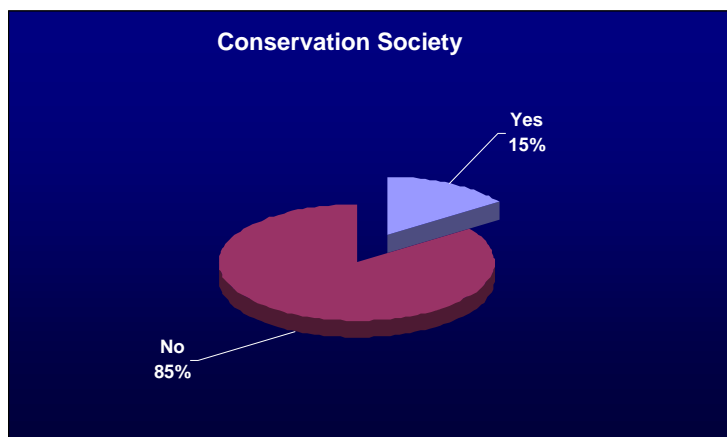
4.3   RELATIVE IMPORTANCE OF RECYCLING

The relative importance to consumers of curbside recycling in comparison to crime, public transport, traffic, street lighting, housing and protection of the environment was reviewed. The objective of this question was to investigate the respondents perception of how important environmental issues were in comparison to other issues.

4.3.1   Importance of recycling

In the context of this question the rating of 1 was ranked as an issue of most importance and 6 was ranked as an issue of least importance. Figure 4.8 represents the mean values for each category as scored by the respondents. Crime scored 2.44, with public transport 2.95, traffic 2.98, street lighting 3.06, housing 3.40 and protection of the environment 3.83. Respondents rated crime and public transport as the two most important issues and the protection of the environment is the least important. This is an indication that the consumers are concerned about the level of crime and the availability of public transport but shows that their attitudes towards recycling as part of the protection of the environment is a low priority issue in their lives.

These findings differ with the opinions of Bradshaw, Southwood and Warner (1992) that recycling is an important factor in improving the efficiency of society's use of the limited resources of the world. It is, however, important that recycling is not considered to be a goal in itself, but only a means of reaching a paramount environmental goal. Neither should recycling lead to the neglect of waste prevention. Recycling of waste requires an increased responsibility on the part of the producer. Experience shows that the establishment of a successful recycling operation requires that the producers take responsibility for the recycling of the product and ensure that there is a market for the recycled materials.

Figure 4.8: Importance of recycling
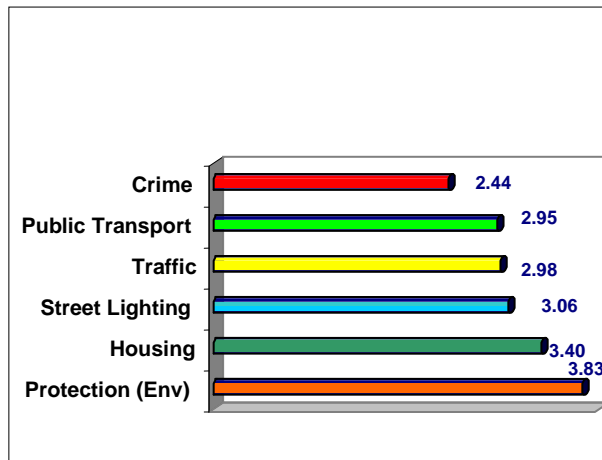
4.4   RELATIVE KNOWLEDGE OF WASTE MANAGEMENT

The purpose of these statements was to rate respondents' knowledge of waste management, and in particular knowledge of curbside recycling. A response of "1" which correlated with a "strongly agree" answer, revealed that the respondent had a low knowledge of waste management issues. On the other hand, a response of "7" which correlated with a "strongly disagree" answer indicated that the respondent was knowledgeable about waste management issues indicating respondents are knowledgeable. One question "Whatever happens to domestic garbage once it has been collected from households is the municipalities' problem" was reversed as it was rated with a negative leaning.

4.4.1   Knowledge of waste management

Figure 4.9 represents the relative level of mean knowledge pertaining to waste management as understood by the respondents. 'Recycling results in the saving of raw materials' scored 5.65, with 'householders should recycle' scored 5.42, 'specialists can prevent environmental damage' scored 4.95, and 'the present method of dealing with waste is appropriate' scored 4.80, with 'waste rots within five years at 4.13. 'Bisasar landfill receives 3000 tons of waste daily' scored

4.06, and 'collected waste is the municipalities problem' scored 3.48. The respondents were required to rate their understanding with respect to recycling and waste management.

Mean values that are close to 7 indicate that respondents are knowledgeable about waste management. The results from the respondents' opinions reflect mean values in the middle with a range of between 3 and 5. This is of a concern as indications are that the respondents have insufficient levels of knowledge with respect to waste management and in particular their attitudes towards curbside recycling.

Figure 4.9: Knowledge of waste management
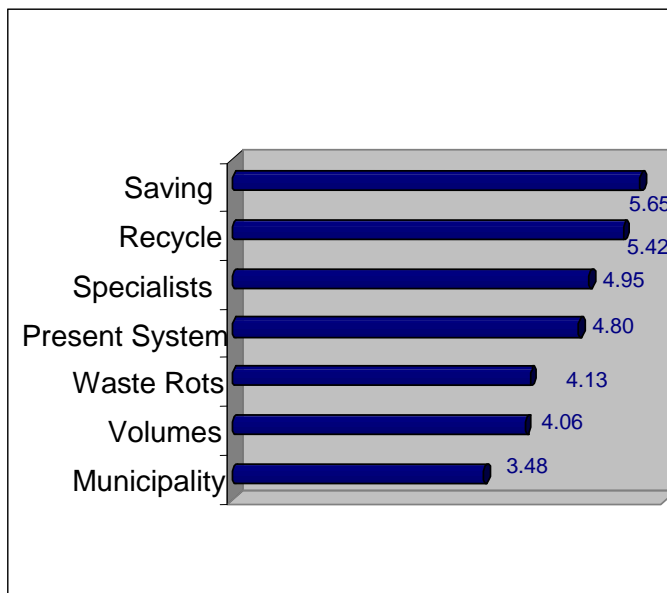
4.4.2 Saving energy

Figure 4.10 identifies the general knowledge of respondents about saving energy by recycling only. 7 percent of the respondent's agreed with the statement that one recycled Coke bottle will (save enough energy to provide an average home with enough electricity for four hours), while 82 percent did not know and 11 percent disagreed with the statement. The statement is in fact true however the

answers given are an indication that respondents have a very low level of knowledge of the impact of recycling. This indicates that the respondents' knowledge could be a factor that affects the success or failure of the adoption of a curbside recycling scheme.

4.4.3 Waste volumes

Figure 4.11 reflects the knowledge of respondents pertaining to the estimated percentage of household waste that is collected from the eThekwini Municipal area. The correct answer is between 60 to 70 percent of household waste is from the eThekwini Municipal area. 22 percent of the study participants answered this question correctly. This is an indication that the respondents level of knowledge with respect waste management are revealed to be low. Therefore, knowledge is a factor that affects the success or failure of the adoption of a curbside recycling scheme.

Figure 4.10 Saving energy
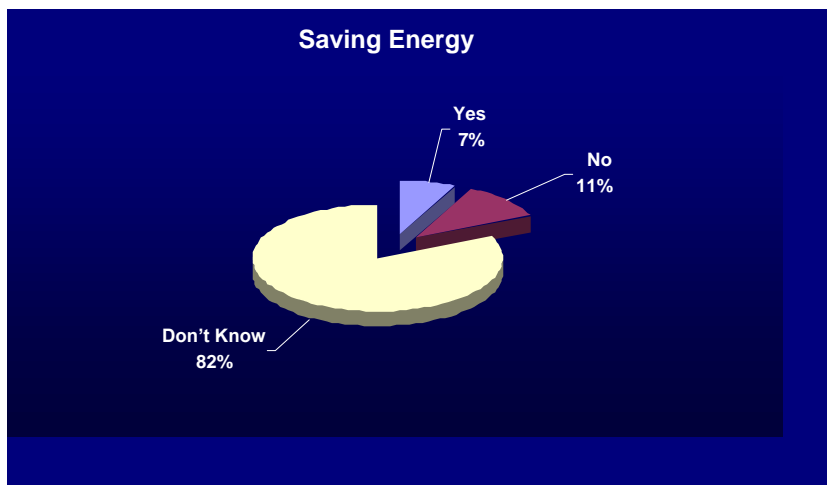
Figure 4.11 Volumes of household waste
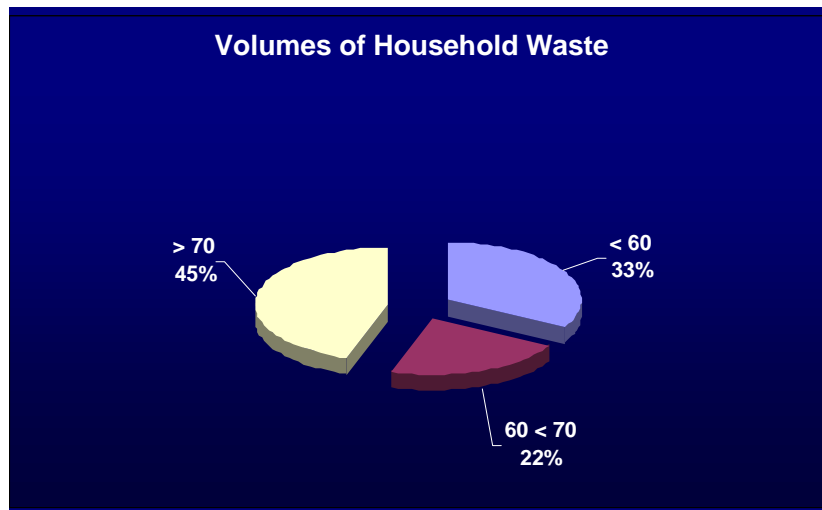
4.4.4   **Revenue generated from waste**

Figure 4.12 reflects revenue that can be generated from recycling household waste. 15 percent of the study participants were correct that the approximate revenue between R30 and R44 could be generated from recycling household waste, while 45 percent of the respondents indicated a lower figure than the approximate values and 40 percent indicated a higher value than the approximate value that could be generated. These reasons show that the respondents have a low level of knowledge relating to the value to be generated from curbside recycling. This indicates that respondents' knowledge could be a factor that could affects the adoption or not of a curbside recycling scheme.

These findings are in keeping with a report by the Danish Corporation for Environment and Development (1999) which indicates that there is insufficient awareness and knowledge of the benefits and techniques associated with the implementation of waste management, minimisation and recycling. The current approach to general waste in South Africa is common to most developing countries, with the emphasis predominantly on disposal by landfill.

Figure 4.12 Revenue generated from waste
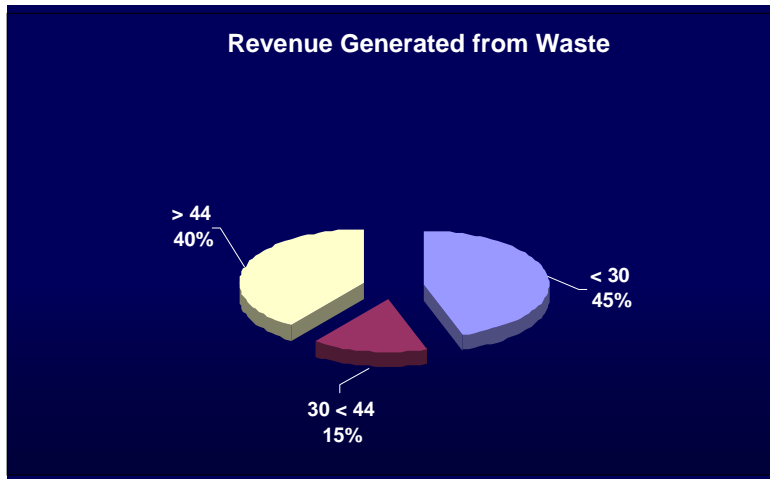
4.5   ATTITUDE TOWARDS CURBSIDE RECYCLING

This section reports on the attitudes of respondents towards curbside recycling. The objective was to quantify the percentage of respondents who had a positive attitude towards waste management. The respondents were asked to rate each statement with 'yes' 'no' or 'don't know'. The descriptive results are outlined in the following sections.

4.5.1. Recycling is a waste of time

Figure 4.13 reflects respondents' attitudes towards recycling and shows that 69 percent of the respondents agreed that recycling is beneficial to the environment and is not a waste of time. A further 13 percent indicated that recycling does benefit the environment and is not a waste of time while 18 percent did not know whether recycling was of benefit to the environment or not. Therefore, this result suggests that the study participants' attitude towards curbside recycling is positive and that the majority of them would consider adopting.

Figure 4.13 Recycling is a waste of time
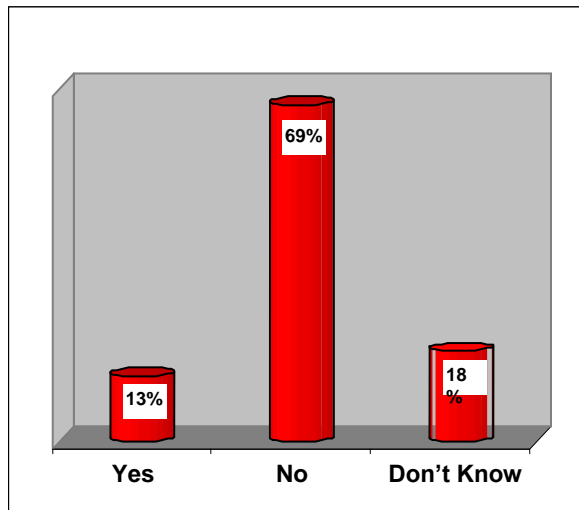
4.5.2 Recycling will change the domestic waste disposal system

Figure 4.14 reflects the attitudes of the study participants towards the above statement and shows that 74 percent agree that the introduction of curbside recycling would change the domestic waste disposal system. Only 2% of the respondents said it would not change and 23% did not know if recycling would make a difference to the present domestic waste disposal system. This indicates that the majority of the respondents have a positive attitude towards adopting a curbside recycling scheme.

4.5.3 Consumers prepared to sort waste

The results presented in Figure 4.15 illustrate the attitudes of the study participants towards the sorting of waste into separate containers. The majority of 76 percent of respondents indicate that they were prepared to sort waste and 12 percent said did not know whether they would sort waste. A further 12 percent said they were not prepared to sort waste. This indicates that the majority of respondents are willing to sort waste at home. Therefore, the attitudes are positive and a curbside recycling scheme can be adopted.

Figure 4.14 Recycling will Change the domestic waste disposal
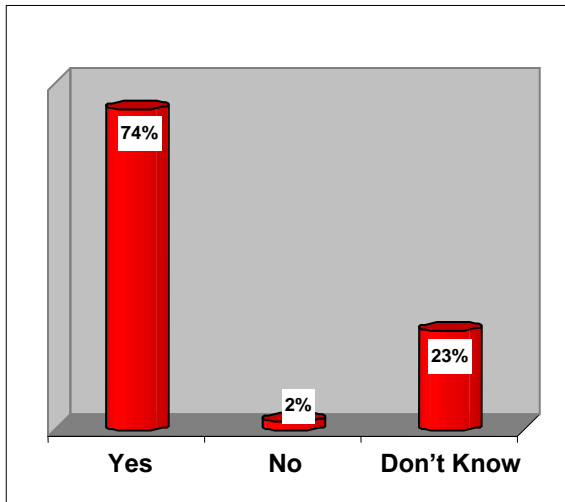
Figure 4.15 Prepared to sort waste into containers
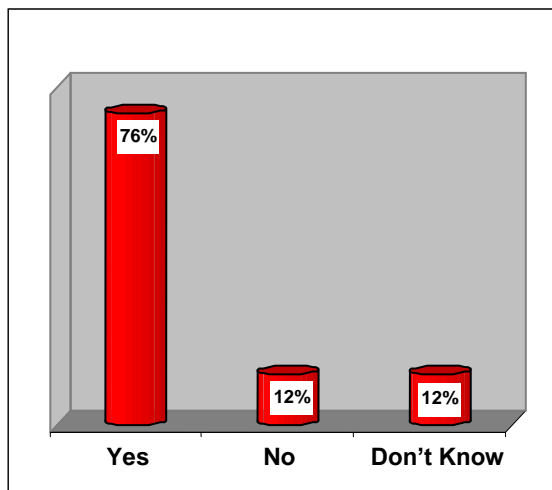
4.5.4 Recycled waste taken to a drop-off centre

Figure 4.16 reflects interesting results with 74 percent of the respondents indicating that they were willing to take recycled waste to a drop-off centre. Only 14 percent indicated that they were not willing to take recycled waste to a drop-off centre. This confirms that respondents would be prepared to adopt a curbside recycling process and were also willing to transport the recyclable materials to a drop-off centre.

Figure 4.16 Recycled wastes taken to a drop-off centre
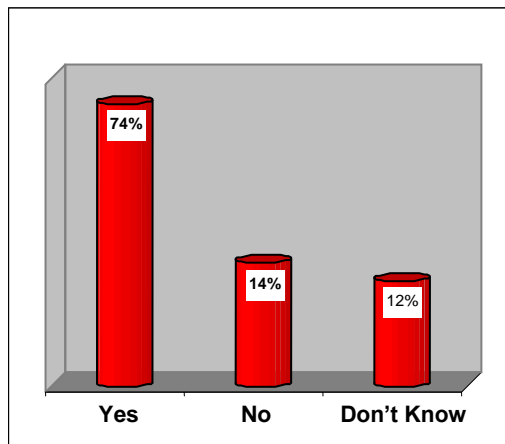
4.5.5. Recycled waste collected

As shown in Figure 4.17, 55% of the respondents would rather have their recycled waste collected by someone else and 34% would not like to have their recycled waste collected by someone else. A further 11% indicated that they did know what they wanted to do with their recycled waste. This, however, could be taken as an indication that the study participants' attitudes towards curbside recycling is positive and that collection schemes could be adopted.

Bolaane (2005) concurs with these findings that consumer attitude and participation is the benchmark of the success of any recycling scheme. In recognition of this, the trend in recycling policies and legislation is geared towards promoting consumer participation in recycling with public education as the main driver. These initiatives by and large recognise the importance of grasping the perceptions and attitudes of the consumer towards waste recycling schemes. Although participation in recycling initiatives in developed countries is voluntary, economic gain encourages participation. However consumer attitudes and behaviour is fundamental to the success of the recycling process.

Figure 4.17 Recycled wastes collected
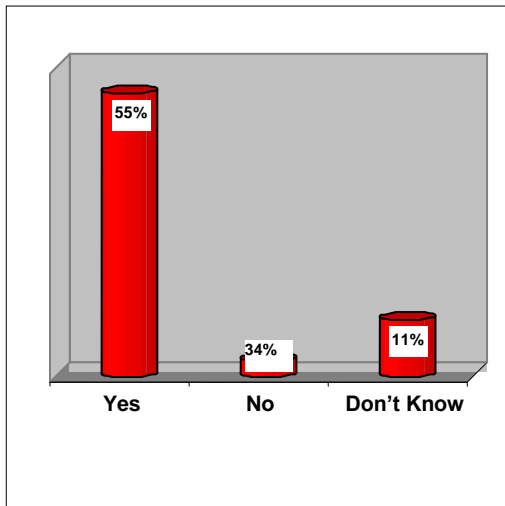
4.5.6 Education required to recycle waste

Figure 4.18 indicate that 86% of the respondents would like to be educated on how to sort domestic waste to assist in the recycling process. Only 7% of the respondents would not like education on sorting domestic waste. This indicates that the respondents would like to be trained in order to embark on a curbside recycling scheme. This is a positive attitude displayed by the majority of the study participants.

Figure 4.18 Education required to recycle waste
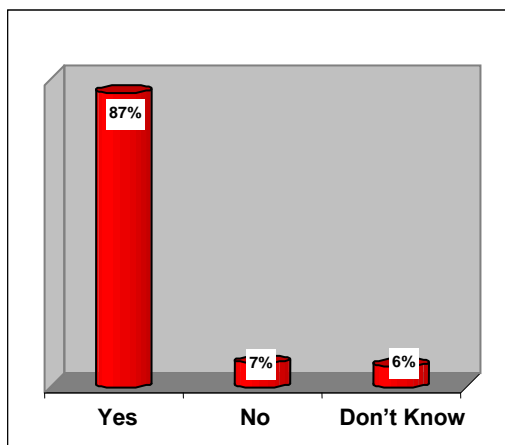
4.5.7 Education required on types of recyclable waste

Figure 4.19 shows that 89 percent of the study participants would like to be educated on the various types of waste products that can be recycled, with only 6 percent indicating that they would not like to be educated. This reveals that respondents are generally positive about recycling and are willing to be educated in order to adopt a curbside recycling process.

Figure 4.19 Education required on types of recyclable waste
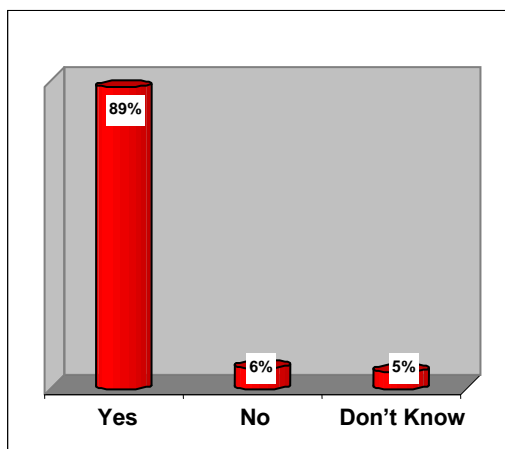
4.5.8 Education required to sell recycled waste

As reflected in Figure 4.20, 84 percent of respondents would like to be told where they could sell the recycled waste products, with 7 percent indicating that they do not want to be educated. The remaining 6 percent said they did not know whether they wanted to be educated.

4.5.9 Satisfied with new laws on plastic bags

Figure 4.21 denotes that 69 percent of the study participants were satisfied with the new laws regarding reusing of plastic bags, with 15 percent of the respondents not being satisfied with the law and 16 percent who did not know

whether they were satisfied. The high percent of respondents' with positive attitudes to recycling is a positive factor. They perceive that policies implemented to encourage recycling are beneficial to the adoption of a curbside recycling process.

These findings are in keeping with Curitiba, Brazil, where over 70 percent of the community now participates in the recycling programme and its success is largely due to a city wide environmental education programme which highlights the benefits of recycling. Approximately 150 tons of recyclable materials are collected daily. This represents 3 000 cubic meters, and paper recycling alone saves the equivalent of 1 200 trees a day (Muller, 1992).

Figure 4.20 Education required to sell recycled waste
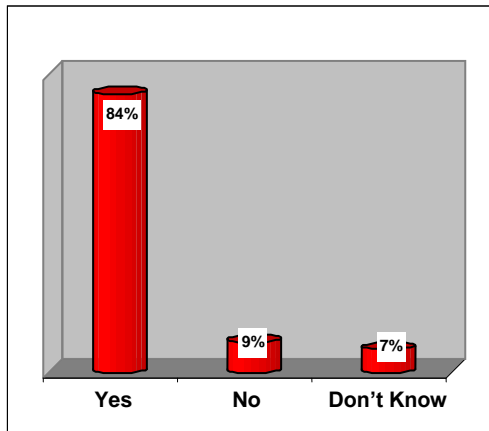
Figure 4.21 Satisfied with new laws on plastic bags
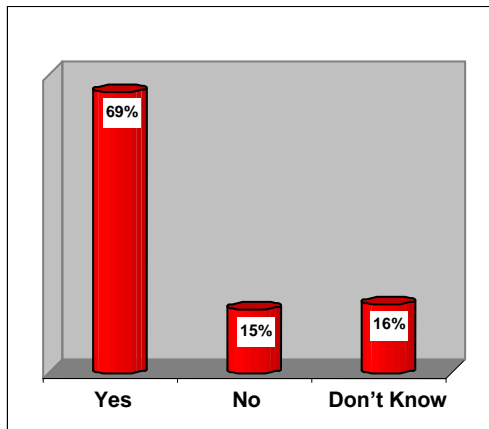
4.6 CONCLUDING REMARKS

Further investigation of all of the aforementioned responses is necessary to determine whether significant differences exist between education levels, race groups and regions. Appropriate statistical analyses such as the chi-square test will be applied to measure any differences between those who responded positively and those who responded negatively.

The "Don't know" answers were discarded because it was not possible to determine whether such a response was either positive or negative. On average, the "Don't know" responses only accounted for 10 % of the total number of responses.

4.7 INFERENTIAL ANALYSIS

Inferential statistics is concerned with inferences that can be made about the population indices on the basis of corresponding indices obtained from the samples drawn randomly from the population (Welman and Kruger, 2002).

Three types of tests were selected to determine the relationships between the adoption of curbside recycling and demographics, consumer knowledge and attitude. The tests conducted were analysis of variance, independent sample t-tests and chi-square tests.

The relationship between consumer demographic characteristics and knowledge about the adoption of curbside recycling was tested, by using the analysis of variance and the independent sample t-test. The reason for using the t-test was that this test compares the means for two groups of cases, and is used to test whether differences in means of one variable in two groups of respondents is significantly different from zero.

Attitudes towards curbside recycling were analysed by using a chi-square test, which was tested between education, race and finally region. The reason for using this test was that it assists the researcher to determine the significance of the relationship between nominal variables.

4.8   KNOWLEDGE OF CURBSIDE RECYCLING

"The cognitive or knowledge component represents a person's information about an object. This information includes awareness of the existence of the object, beliefs about the characteristics or attributes of the object, and judgements about the relative importance of each of the attributes" (Aaker, Kumar and Day, 2001). Knowledge about solid waste as regarded by consumers in comparison to curbside recycling are reviewed. The objective of this question was to investigate the consumer's relative knowledge about solid.

4.8.1   Knowledge of curbside recycling and education levels

This section describes the analysis of variance mean scores and t-tests conducted between education levels and knowledge variables. The discussions are centered on the following two statements, as they reflect significant values.

➢ The present way of dealing with domestic garbage is appropriate.
➢ The Bisasar Road Landfill site receives an average 3000 tons of waste daily.

Table 4.1 reflects the sample significance values of 0.001 and 0.000, illustrating that the p values are below 0.05. Therefore, this test is considered significant at the 0.005 level indicating that there is a significant difference between knowledge and the education levels of consumers.

The mean scores for consumers that have a diploma or degree (5.7442) and (5.4048) is higher as reflected in Table 4.2 indicating that educated consumers are knowledgeable about solid waste.

For the statement 'The present way of dealing with domestic garbage is appropriate' Table 4.3 shows the significance value of 0.007 for those with a primary school education and a diploma or degree a score of 0.034, for those with a matric and a diploma or a degree and a value of 0.012, for those with a matric and a post graduate diploma or degree. The t-values ifor the statement 'The Bisasar Road landfill site receives on average 3000 tons of waste daily', reflects the significance values of 0.003 for those with a primary school education and a Diploma or Degree and a value of 0.000, for those with a matric and a Diploma or Degree. Therefore, because of the significant difference between knowledge and education levels, it is accepted that consumers with higher education levels are more knowledgeable about solid waste and recycling.

Table 4.1   ANOVA - Knowledge and educational levels

Variables	Sig
The present way of dealing with domestic garbage is appropriate.	**0.001**
Almost all our domestic garbage in our landfills rots within 5 years.	0.061
Specialists are able to prevent domestic garbage from causing environmental damage.	0.186
Householders should reduce the amount of domestic garbage through proactively recycling.	0.062
Whatever happens to domestic garbage once it has been collected from households is the municipality's problem.	0.059
Recycling results in the saving of raw materials.	0.438
The Bisasar Road landfill site receives on average 3000 tons of waste daily.	**0.000**

Table 4.2   Statistical means - knowledge and educational levels

Variables	Primary School	Matric	Diploma/Degree	Post graduate Diploma/Degree
The present way of dealing with domestic garbage is appropriate.	4.0769	4.8818	5.7442	**3.6552**
The Bisasar Road landfill site receives on average 3000 tons of waste daily.	**3.5600**	**3.7545**	**5.4048**	**3.7586**

Table 4.3   T-Test Knowledge and Educational Levels

Variable	Educational levels	Sig
The present way of dealing with domestic garbage is appropriate.	Primary School and Matric	0.116
	Primary School and Diploma/Degree	**0.007**
	Primary School and Post Graduate Diploma/Degree	0.522
	Matric and Diploma/Degree	**0.034**
	Matric and Post Graduate Diploma/ Degree	**0.012**
Variable	**Educational levels**	**Sig**
The Bisasar Road landfill site receives on average 3000 tons of waste daily.	Primary School and Matric	0.721
	Primary School and Diploma/Degree	**0.003**
	Primary School and Post Graduate Diploma/Degree	0.747
	Matric and Diploma/Degree	**0.000**
	Matric and Post Graduate Diploma/ Degree	0.992

4.8.2 Correlation between knowledge of curbside recycling and race group

Discussions on the relationship between the above two variable are based on the responses to the following statements, as they reflect significant values.

> ➤ The present way of dealing with domestic garbage is appropriate.

> ➤ Almost all our domestic garbage in our landfills rots within 5 years.

> ➤ Whatever happens to domestic garbage once it has been collected from households is the municipality's problem.

> ➤ The Bisasar Road Landfill site receives an average 3000 tons of waste daily.

The analysis of variance as set out in Table 4.4 shows the sample significance values of 0.002, 0.012, 0.012 and 0.000, illustrating that the p values are below 0.05. Therefore, this test is considered significant at the 0.005 level indicating that there is a significant relationship between knowledge of curbside recycling with race groups.

The mean scores on the four selected statements as illustrated in Table 4.5 reveal the following differences Indians scored 5.6111 and 5.8600; Whites scored 5.0172 and 4.9298; these scores indicate that the Indian race group have the highest level while the Black race group have the lowest level of knowledge regarding waste management.

Table 4.6 shows the observed t-values across two statements, for the statement "The present way of dealing with domestic garbage is appropriate" Blacks and Indians 0.000. For the statement "Almost all our domestic garbage in our landfills rots within 5 years", Blacks and Whites scored 0.001. Table 4.7 shows the observed t-values for the statement "The Bisasar Road landfill site receives on average 3000 tons of waste daily", Blacks and Whites scored 0.000, these scores indicate there is a significant difference between levels of knowledge and race groups. Therefore, it is accepted that the level of knowledge amongst race groups differ regarding waste management.

Table 4.4   ANOVA - Knowledge and Race Groups

Variables	Sig
The present way of dealing with domestic garbage is appropriate.	**.002**
Almost all our domestic garbage in our landfills rots within 5 years.	**.012**
Specialists are able to prevent domestic garbage from causing environmental damage.	.444
Householders should reduce the amount of domestic garbage through proactively recycling.	.387
Whatever happens to domestic garbage once it has been collected from households is the municipality's problem.	**.012**
Recycling results in the saving of raw materials.	.735
The Bisasar Road landfill site receives on average 3000 tons of waste daily.	**.000**

Table 4.5   Statistical means - knowledge and race groups

Variables	Black	Coloured	Indian	White
The present way of dealing with domestic garbage is appropriate.	4.090	4.6667	**5.6111**	5.0172
Almost all our domestic garbage in our landfills rots within 5 years.	3.6310	5.0000	4.3077	**4.7586**
Whatever happens to domestic garbage once it has been collected from households is the municipality's problem.	4.3412	2.0000	5.3846	**4.2982**
The Bisasar Road landfill site receives on average 3000 tons of waste daily.	**3.4118**	**3.3333**	**5.8600**	4.9298

Table 4.6   **T-Test knowledge and race groups**

Variables	Race groups	Sig
The present way of dealing with domestic garbage is appropriate.	Blacks and Coloureds	.692
	Blacks and Indians	**.000**
	Blacks and Whites	.026
	Coloureds and Indians	.431
	Coloureds and Whites	.808
Variables	**Race groups**	**Sig**
Almost all our domestic garbage in our landfills rots within 5 years.	Blacks and Coloureds	.258
	Blacks and Indians	.067
	Blacks and Whites	**.001**
	Coloureds and Indians	.582
	Coloureds and Whites	.840

Table 4.7   **T-Test knowledge and race groups**

Variables	Race groups	Sig
Whatever happens to domestic garbage once it has been collected from households is the municipality's problem.	Blacks and Coloureds	.035
	Blacks and Indians	.014
	Blacks and Whites	.919
	Coloureds and Indians	**.010**
	Coloureds and Whites	.102
Variables	**Race groups**	**Sig**
The Bisasar Road landfill site receives on average 3000 tons of waste daily.	Blacks and Coloureds	.945
	Blacks and Indians	**.009**
	Blacks and Whites	**.000**
	Coloureds and Indians	.444
	Coloureds and Whites	.240

4.8.3 Correlation between knowledge of curbside recycling and regional suburbs

The discussion in this section are related to regional suburbs is centered on the following statements, as they reflect significant values.

> ➤ The present way of dealing with domestic garbage is appropriate.

> ➤ Almost all our domestic garbage in our landfills rots within 5 years.

> ➤ Householders should reduce the amount of domestic garbage through proactively recycling.

> ➤ Whatever happens to domestic garbage once it has been collected from households is the municipality's problem.

> ➤ Recycling results in the saving of raw materials.

> ➤ The Bisasar Road Landfill site receives on an average 3000 tons of waste daily.

The analysis of variance as set out in Table 4.8 shows the sample significance values of 0.000 and 0.000, 0.001, 0.000, 0.001 and 0.000 illustrating that the p values are below 0.05. Therefore, this test is considered significant at the 0.005 level indicating that there is a significant relationship between knowledge and regional suburbs.

The mean scores on the six selected statements as illustrated in Table 4.9 reveal the following differences. North scored 6.1321, 6.3077, 5.8846 and 6.3878, is significantly higher than those for the West, South and Central areas. These scores indicate that regional differences in the level of knowledge about solid waste and recycling occur.

Table 4.10 shows the observed t-values across two statements, for the statement "The present way of dealing with domestic garbage is appropriate" North and West scored 0.001, North and South scored 0.001, North and Central scored 0.000 North and Central, West and Central scored 0.000. For the statement "Almost all our domestic garbage in our landfills rots within 5 years" North and Central scored 0.007.

Table 4.8   ANOVA - Knowledge and regional suburbs

Variables	Sig
The present way of dealing with domestic garbage is appropriate.	**.000**
Almost all our domestic garbage in our landfills rots within 5 years.	**.000**
Specialists are able to prevent domestic garbage from causing environmental damage.	**.850**
Householders should reduce the amount of domestic garbage through proactively recycling.	**.001**
Whatever happens to domestic garbage once it has been collected from households is the municipalities problem.	**.000**
Recycling results in the saving of raw materials.	**.001**
The Bisasar Road landfill site receives on average 3000 tons of waste daily.	**.000**

Table 4.9   Statistical Means knowledge and regional suburbs

Variables	North	West	South	Central
The present way of dealing with domestic garbage is appropriate.	6.1321	5.0192	4.6379	**3.2174**
Almost all our domestic garbage in our landfills rots within 5 years.	4.0588	4.2157	5.0345	**2.9556**
Householders should reduce the amount of domestic garbage through proactively recycling.	6.3077	5.1600	4.7895	**5.4783**
Whatever happens to domestic garbage once it has been collected from households is the municipalities problem.	5.8846	3.7059	4.8596	**3.4444**
Recycling results in the saving of raw materials.	6.3878	5.0833	5.1724	**6.0976**
The Bisasar Road landfill site receives on average 3000 tons of waste daily.	4.1132	4.2353	4.8772	**2.8043**

Table 4.10   T-Test knowledge and regional suburbs

Variables	Regional suburbs	Sig
The present way of dealing with domestic garbage is appropriate.	North and West	**.001**
	North and South	**.001**
	North and Central	**.000**
	West and South	.381
	West and Central	**.000**
	South and Central	**.006**
Variables	Regional suburbs	Sig
Almost all our domestic garbage in our landfills rots within 5 years.	North and West	.688
	North and South	.031
	Northnd Central	**.007**
	West and South	.028
	West and Central	**.000**
	South and Central	**.000**

Table 4.11 illustrates the observed t-values for the statement, "Householders should reduce the amount of domestic garbage through proactively recycling" reflects the significance values of 0.000 North and South. The t-values for the statement, "Recycling results in the saving of raw materials" reflects the significance values of 0.002 North and South. The t-values for the statement, "The Bisasar Road landfill site receives on average 3000 tons of waste daily", reflects the significance values of 0.001 North and Central. Therefore, the significant differences between knowledge and regional suburbs indicate that regional differences occur in relation to knowledge about solid waste and recycling and that this knowledge is higher in the Northern suburbs than other regions.

Table 4.11   T-Test knowledge and regional suburbs

Variables	Regional suburbs	Sig
Householders should reduce the amount of domestic garbage through proactively recycling.	North and West	**.002**
	North and South	**.000**
	North and Central	.022
	West and South	.393
	West and Central	.445
	South and Central	.117
Variables	Regional suburbs	Sig
Whatever happens to domestic garbage once it has been collected from households is the municipality's problem.	North and West	**.000**
	North and South	.022
	North and Central	**.000**
	West and South	**.008**
	West and Central	.568
	South and Central	**.006**
Variables	Regional suburbs	Sig
Recycling results in the saving of raw materials.	North and West	**.000**
	North and South	**.002**
	North and Central	.342
	West and South	.843
	West and Central	.012
	South and Central	.029
Variables	Regional suburbs	Sig
The Bisasar Road landfill site receives on average 3000 tons of waste daily.	North and West	.752
	North and South	.114
	North and Central	**.001**
	West and South	.128
	West and Central	**.000**
	South and Central	**.000**

4.9   ATTITUDE TOWARDS CURBSIDE RECYCLING

According to Aaker, Kumar and Day, 2001 "Attitude is psychological constructs, a way of conceptualising the intangible. Attitude is a construct and cannot really be observed or measured directly because their existence is inferred from their consequences". Attitude towards curbside recycling as regarded by consumers are reviewed. The objective of these statements was to investigate the respondents' positive or negative attitudes about solid waste and recycling. .

The statistician that analysed this study indicated that "construct attitude" has been renamed as "general attitude" which is made up of three dimensions. These three dimensions are knowledge, affective attitude and behaviour. The measurement scales and tests used to quantify these dimensions are interval scale (ANOVA and Independent t-tests), nominal scale (chi-squares) and ordinal scales (descriptive statistics). Therefore, the chi-square tests on attitude are measured using a nominal scale.

4.9.1   Attitude towards curbside recycling associated with education levels

The significance value of 0.021 for the statement "I would like to be educated on where I could go and sell my domestic waste" which is less than 0.05 (Table 4.12), implies that the chi-square is significant and indicates there is a significant relationship between education levels and attitude. The data suggests that education could have an impact on curbside recycling. Additionally, the results imply that income could be the motivating element in a persons attitude towards recycling.

Table 4.12   Chi-Square results of Attitude by educational levels

Variables	Sig
People who recycle to assist the environment are wasting their time.	0.901
By recycling the public can play a role in changing the present system of domestic garbage disposal.	0.426
I am prepared to sort recyclable garbage into different containers.	0.104
To be taken to a drop off centre by myself.	0.318
To be collected by someone else.	0.252
I would like to be educated on how to sort my domestic garbage to aid in the recycling process.	0.065
I would like to be educated on what products can be recycled.	0.139
I would like to be educated on where I could go and sell my domestic waste.	**0.021**
I am satisfied with the new laws regarding plastic bags.	0.098

4.9.2 Attitude towards curbside recycling associated with race groups

The significance values which are not less than 0.05 (Table 4.13), implies that no significant relationships exist between the variables and the different race groups. The data suggests that the race group of a person does not have an impact on their attitude towards curbside recycling.

Table 4.13   Chi Square results of attitude by race groups

Variables	Sig
People who recycle to assist the environment are wasting their time.	.662
By recycling the public can play a role in changing the present system of domestic garbage disposal.	.778
I am prepared to sort recyclable garbage into different containers.	.705
To be taken to a drop off centre by myself.	.200
To be collected by someone else.	.482
I would like to be educated on how to sort my domestic garbage to aid in the recycling process.	.880
I would like to be educated on what products can be recycled.	.754
I would like to be educated on where I could go and sell my domestic waste.	.986
I am satisfied with the new laws regarding plastic bags.	.973

4.9.3 Attitude towards curbside recycling associated with regional suburbs

The chi-square is significant (p 0.000, 0.001, 0.000 and 0.002) as shown in Table 4.14 indicates that there is a significant relationship between regions and curbside recycling. The data suggests that the different regions or suburbs ahev different attitudes towards curbside recycling. It is accepted that regional differences occur.

Table 4.14   Chi Square results of attitude by regional suburbs

Variables	Sig
People who recycle to assist the environment are wasting their time.	**.000**
By recycling the public can play a role in changing the present system of domestic garbage disposal.	**.001**
I am prepared to sort recyclable garbage into different containers.	.014
To be taken to a drop off centre by myself.	**.000**
To be collected by someone else.	.429
I would like to be educated on how to sort my domestic garbage to aid in the recycling process.	.053
I would like to be educated on what products can be recycled.	.143
I would like to be educated on where I could go and sell my domestic waste.	.127
I am satisfied with the new laws regarding plastic bags.	**.002**

4.10   BEHAVIOUR ASSOCIATED WITH RECYCLING

"The intention or action component refers to a person's expectations of future behaviour towards an object, it incorporates the information about a respondent's ability or willingness to pay for the object or otherwise take action" (Aaker, Kumar and Day, 2001:273).

Behaviour is measured using the ordinal scale. Question 27 (a-h) measured respondents' behaviour associated with recycling. Because respondents were only given 4 choices in their answers, inferential testing techniques could be

efficiently applied. Therefore, descriptive statistics have been applied and the mean scores were converted into percentages for easier understanding.

4.10.1 Behaviour towards curbside recycling

Table 4.15 reveals that 55 percent of the respondents would actively sort domestic waste into different containers at home. 53 percent would encourage others to recycle. 46 percent of the respondents would deliberately try to purchase a recycled paper product. 39 percent would buy groceries in re-useable containers in order to lessen the amount of waste put out. 38 percent of the respondents would deliberately buy products, which will enable them to dispose less waste. 38 percent would buy plastic bags when they went shopping, and 31 percent would re-use an empty glass jar instead of throwing it away.

The descriptive results indicate that the respondents' behaviour towards curbside recycling. It is evident that when significant effort is required to actively recycle waste, the scores are lower. The respondents acknowledge that it is important to recycle waste, however indications are that the respondents are not prepared to make an effort to be part of the recycling process, especially if this becomes inconvenient for them.

4.10.2 Correlation between behaviour and education levels

Table 4.16 shows that 57 percent of respondents that have primary school education said that they would actively sort waste into different containers at home. 63 percent of the same sample indicate that they would encourage others to recycle, while 56 percent will deliberately purchase a recycled paper product. 47 percent said they would buy groceries in re-useable containers and would deliberately buy products in order to dispose less waste, while 42 percent indicate they will buy plastic bags when they go shopping. The least interest was

shown in re-using glass jars instead of throwing it away, an activity that only 38 percent said they would participate in.

Table 4.15   Behaviour dimension towards recycling

Variables	N	Mean	Percent
Actively sort domestic waste into different containers at my home.	209	3.2392	**55.75**
Encourage others to recycle.	209	3.1483	**53.50**
Deliberately try to purchase a recycled paper product.	204	2.8775	**46.75**
Buy groceries in re-useable containers in order to lessen the amount of waste put out.	209	2.5837	**39.50**
Deliberately buy products which will cause you to dispose less waste.	209	2.5550	**38.75**
Buy plastic bags when I go shopping.	209	2.5215	**38.00**
Re-use an empty glass jar instead of throwing it away	208	2.2596	**31.25**

Table 4.16   Behaviour related to primary education

Variables	N	Mean	Percent
Actively sort domestic waste into different containers at my home.	27	3.296	**57.40**
Encourage others to recycle.	27	3.518	**62.95**
Deliberately try to purchase a recycled paper product.	27	3.222	**55.55**
Buy groceries in re-useable containers in order to lessen the amount of waste put out.	27	2.851	**46.27**
Deliberately buy products which will cause you to dispose less waste.	27	2.889	**47.22**
Buy plastic bags when I go shopping.	27	2.666	**41.65**
Re-use an empty glass jar instead of throwing it away	**27**	2.518	**37.95**

Table 4.17 shows that 56 percent of the consumers who have matric level of education said they would actively sort their waste into different containers at home, with 51 percent indicating that they would encourage others to recycle, and would deliberately purchase a recycled paper product. 42 percent said that they would buy groceries in re-useable bags and would deliberately buy products that will assist in disposing less waste, with 35 percent indicating that they would buy plastic bags when they go shopping. The least interest was shown in re-

using an empty glass jar instead of throwing it away, an activity that only 32 percent said they would participate in.

Table 4.17   Behaviour related to matric education

Variables	N	Mean	Percent
Actively sort domestic waste into different containers at my home.	109	3.229	**55.72**
Encourage others to recycle.	109	3.036	**50.90**
Deliberately try to purchase a recycled paper product.	107	3.028	**50.70**
Buy groceries in re-useable containers in order to lessen the amount of waste put out.	109	2.678	**41.95**
Deliberately buy products which will cause you to dispose of less waste.	110	2.654	**41.35**
Buy plastic bags when I go shopping.	109	2.403	**35.07**
Re-use an empty glass jar instead of throwing it away.	108	2.277	**31.92**

Table 4.18 shows that 54 percent of the respondents that have a diploma or a degree said they would actively sort domestic waste into different containers at home, while 55 percent would encourage others to recycle, while 48 percent said they would buy plastic bags when they go shopping, while 35 percent would deliberately try to purchase recycled paper product and 31 percent indicated that they would buy groceries in re-useable bags, while 29 percent would deliberately buy products that will reduce disposal of waste. The least interest was shown in re-using an empty glass jar instead of throwing it away, an activity that only 27 percent said they would participate in.

Table 4.19 reflects that 51 percent of the respondents with a post graduate diploma or a degree would encourage others to recycle outcome of, while 48 percent would actively sort waste into different containers at home, while 41 percent would deliberately try to purchase recycled paper products and 36 percent indicated that they would buy groceries in re-useable bags and deliberately buy products that will reduce disposal of waste. The least interest was shown in buying plastic bags when they go shopping and re-using an empty

glass jar instead of throwing it away, an activity that only 32 percent said they would participate in.

The data indicates that the behaviour displayed by respondents in relation to their level of education reflects a positive behaviour towards curbside recycling. Indications are that respondents could participate when a curbside recycling process if implemented.

Table 4.18   Behaviour related to diploma or degree

Variables	N	Mean	Percent
Actively sort domestic waste into different containers at my home.	43	3.148	**53.70**
Encourage others to recycle.	43	3.232	**55.80**
Deliberately try to purchase a recycled paper product.	40	2.400	**35.00**
Buy groceries in re-useable containers in order to lessen the amount of waste put out.	43	2.255	**31.37**
Deliberately buy products which will cause you to dispose of less waste.	42	2.142	**28.55**
Buy plastic bags when I go shopping.	43	2.930	**48.25**
Re-use an empty glass jar instead of throwing it away.	43	2.069	**26.72**

Table 4.19   Behaviour related to post graduate diploma or degree

Variables	N	Mean	Percent
Actively sort domestic waste into different containers at my home	29	2.931	**48.27**
Encourage others to recycle	29	3.069	**51.72**
Deliberately try to purchase a recycled paper product	29	2.665	**41.62**
Buy groceries in re-useable containers in order to lessen the amount of waste put out	29	2.413	**35.32**
Deliberately buy products which will cause you to dispose less waste	29	2.448	**36.20**
Buy plastic bags when I go shopping	29	2.275	**31.87**
Re-use an empty glass jar instead of throwing it away	**29**	**2.275**	**31.87**

4.10.3 Correlation between Behaviour related to curbside recycling and race groups

These statements probed consumer behaviour towards curbside recycling and their willingness to participate in the process. Table 4.20 reveals that 65 percent of the consumers said they would encourage others to recycle, while 53 percent indicated that they would actively sort domestic their domestic waste into different containers at home, while 50 percent said they would buy groceries in re-useable containers, while 46 percent said they would deliberately try to purchase a recycled paper product. A further 40 percent stated that they would buy products that will help reduce disposal of waste and 37 percent and 31 percent of the consumers indicated that they would re-use an empty glass jar instead of throwing it away and would buy plastic bags when they go shopping. Consumers generally showed positive behaviour towards curbside recycling could therefore be expected to actively participate in the process. However, the data will be further analysed to understand if certain race groups have a more positive behaviour.

4.10.4 Correlation between behaviour related to race groups

The data presented in Table 4.21 illustrates that 58 percent of Black respondents indicated that they would actively sort domestic waste into different containers at home, and encourage others to recycle, while 51 percent indicated that they would deliberately try to purchase a recycled paper product, while 42 percent indicated that they would buy groceries in re-useable containers and buy products that will reduce disposal of waste and 35 and 34 percent said that they would buy plastic bags when they go shopping and re-use an empty jar instead of throwing it away.

Table 4.20   Behaviour related to race groups

	N	Mean	Percent
Actively sort domestic waste into different containers at my home.	8	3.125	**53.12**
Encourage others to recycle.	8	3.625	**65.62**
Deliberately try to purchase a recycled paper product.	8	2.875	**46.87**
Buy groceries in re-useable containers in order to lessen the amount of waste put out.	8	3.000	**50.00**
Deliberately buy products which will cause you to dispose less waste.	8	2.625	**40.62**
Buy plastic bags when I go shopping.	8	2.250	**31.25**
Re-use an empty glass jar instead of throwing it away	8	2.500	**37.50**

Table 4.21   Behaviour related with the Black group

	N	Mean	Percent
Actively sort domestic waste into different containers at my home	87	3.321	**58.02**
Encourage others to recycle	87	3.320	**58.00**
Deliberately try to purchase a recycled paper product	87	3.057	**51.42**
Buy groceries in re-useable containers in order to lessen the amount of waste put out	87	2.701	**42.52**
Deliberately buy products which will cause you to dispose less waste	86	2.662	**41.55**
Buy plastic bags when I go shopping	87	2.436	**35.90**
Re-use an empty glass jar instead of throwing it away	87	2.356	**33.90**

Table 4.22 shows that 56 percent of the Indian respondents indicated that they would actively sort domestic waste into different containers at home, while 53 percent would encourage others to recycle, while 51 percent would deliberately try to purchase a recycled paper product. A further 44 percent said that they would buy groceries in re-useable bags and buy products that will reduce disposal of waste. The least interest was shown in buying plastic bags when they go shopping and re-using an empty glass jar instead of throwing it away, an activity that only 37 and 34 percent said they would participate in.

Table 4.23 reveals that 75 percent of the coloured respondents said they would deliberately try to purchase a recycled paper product, while 67 percent indicate

that that they would actively sort domestic waste into different containers at home and encourage others to recycle. A further 42 percent indicated that they would deliberately buy products to reduce disposal of waste, buy shopping bags when they go shopping and re-use an empty glass jar instead of throwing it away. 33 percent indicated that they will buy groceries in re-useable containers.

Table 4.24 shows that 53 percent of the White respondents said that they would actively sort domestic waste into different containers at home, while 49 percent indicated that they will encourage others to recycle, while 43 percent will buy plastic bags when they go shopping and 35 percent indicating that they will deliberately try to purchase a recycled paper product. The least interest was shown in buying groceries in re-useable containers and buying products to reduce the disposal of waste, an activity that only 30 and 25 percent said they would participate in.

The data reveals that the Black, Coloured and Indian respondents demonstrate a strong positive behaviour towards curbside recycling. however, with the White respondents displaying a low behaviour towards curbside recycling.

Table 4.22   Behaviour related with the Indian group

	N	Mean	Percent
Actively sort domestic waste into different containers at my home.	53	3.245	**56.12**
Encourage others to recycle.	53	3.132	**53.30**
Deliberately try to purchase a recycled paper product.	50	3.060	**51.50**
Buy groceries in re-useable containers in order to lessen the amount of waste put out.	53	2.754	**43.85**
Deliberately buy products which will cause you to dispose less waste.	54	2.759	**43.97**
Buy plastic bags when I go shopping.	53	2.471	**36.77**
Re-use an empty glass jar instead of throwing it away.	52	2.342	**33.55**

Table 4.23   Behaviour related with the Coloured group

	N	Mean	Percent
Actively sort domestic waste into different containers at my home.	3	3.666	**66.65**
Encourage others to recycle.	3	3.666	**66.65**
Deliberately try to purchase a recycled paper product.	2	4.000	**75.00**
Buy groceries in re-useable containers in order to lessen the amount of waste put out.	3	2.333	**33.32**
Deliberately buy products which will cause you to dispose less waste.	3	2.666	**41.65**
Buy plastic bags when I go shopping.	3	2.666	**41.65**
Re-use an empty glass jar instead of throwing it away.	3	2.666	**41.65**

Table 4.24   Behaviour related with the White group

	N	Mean	Percent
Actively sort domestic waste into different containers at my home.	58	3.103	**52.57**
Encourage others to recycle.	58	2.982	**49.55**
Deliberately try to purchase a recycled paper product.	57	2.403	**35.07**
Buy groceries in re-useable containers in order to lessen the amount of waste put out.	58	2.206	**30.15**
Deliberately buy products which will cause you to dispose less waste.	58	2.189	**29.72**
Buy plastic bags when I go shopping.	58	2.724	**43.10**
Re-use an empty glass jar instead of throwing it away.	58	1.982	**24.55**

4.10.5 Behaviour related respondents from the Northern region

These statements illustrate the behaviour of respondents towards curbside recycling and the willingness to participate in the process. The data in Table 4.25 illustrate that 56 percent of the consumers in the Northern suburbs would deliberately try to purchase a recycled paper product, while 53 percent indicated that they would actively sort domestic waste into different containers at home, 49 percent said that they would encourage others to recycle, while 46 percent indicated that they would deliberately buy products to reduce disposal of waste. 44 percent indicated that they would buy groceries in re-useable containers. A

further 30 and 29 percent indicated that they would buy plastic bags when they go shopping and would re-use an empty glass jar instead of throwing it away. The data indicates that consumers residing in the Northern region exhibit a positive behaviour towards curbside recycling and indications are that they could actively participate if curbside recycling is implemented.

Table 4.25   Behaviour related to the Northern region

	N	Mean	Percent
Actively sort domestic waste into different containers at my home.	52	3.019	**50.47**
Encourage others to recycle.	52	2.980	**49.50**
Deliberately try to purchase a recycled paper product.	52	3.250	**56.25**
Buy groceries in re-useable containers in order to lessen the amount of waste put out.	52	2.788	**44.70**
Deliberately buy products which will cause you to dispose less waste.	53	2.849	**46.22**
Buy plastic bags when I go shopping.	53	2.226	**30.65**
Re-use an empty glass jar instead of throwing it away	52	2.153	**28.82**

4.10.6 Behaviour related to respondents from the Western region

Table 4.26 reveals that 50 percent of the consumers in the Western region would actively sort domestic waste into different containers at home and 44 percent would encourage others to recycle, while 37 and 36 percent of the respondents indicated that they would deliberately buy a recycled paper product, buy groceries in re-useable containers and buy products that reduce disposal of waste. However, 31 percent and 28 percent of the respondents said that they would buy plastic bags when they go shopping and would re-use an empty glass jar instead of throwing it away. The data indicates that respondents residing in the Western region exhibit a positive behaviour towards curbside recycling and this indicates that they would actively participate in the process.

Table 4.26   Behaviour related to the Western region

	N	Mean	Percent
Actively sort domestic waste into different containers at my home.	52	3.019	**50.47**
Encourage others to recycle.	52	2.750	**43.75**
Deliberately try to purchase a recycled paper product.	49	2.489	**37.22**
Buy groceries in re-useable containers in order to lessen the amount of waste put out.	52	2.423	**35.57**
Deliberately buy products which will cause you to dispose less waste.	52	2.442	**36.05**
Buy plastic bags when I go shopping.	51	2.254	**31.35**
Re-use an empty glass jar instead of throwing it away.	52	2.115	**27.87**

4.10.7 Behaviour related to respondents from the Southern region

Table 4.27 shows that 57 percent of the respondents in the Southern region would actively sort domestic waste into different containers at home and would encourage others to recycle, while 46 percent said that they would buy plastic bags when they go shopping. A further 43 percent indicated that they would deliberately purchase a recycled paper product. The least interest was shown in buying groceries in re-useable containers, deliberately buy products to reduce disposal of waste and re-use an empty glass jar instead of throwing it away an activity that only 36 and 31 percent said they would participate in. The data indicates that consumers in the Southern region exhibit a positive behaviour towards curbside recycling and indicates that they would actively participate in the recycling process when implemented

Table 4.27   Behaviour related the Southern region

	N	Mean	Percent
Actively sort domestic waste into different containers at my home.	59	3.254	**56.35**
Encourage others to recycle.	59	3.271	**56.77**
Deliberately try to purchase a recycled paper product.	58	2.706	**42.65**
Buy groceries in re-useable containers in order to lessen the amount of waste put out.	59	2.440	**36.00**
Deliberately buy products which will cause you to dispose less waste.	59	2.220	**30.50**
Buy plastic bags when I go shopping.	59	2.864	**46.60**
Re-use an empty glass jar instead of throwing it away	59	2.254	**31.35**

4.10.8 Behaviour related to respondents from the Central region

Table 4.28 illustrates that 67 percent of the consumers within the Central region would actively sort domestic waste into different containers at home, while 66 percent indicated that they would encourage others to recycle and 52 percent indicated that they would deliberately try to purchase a recycled paper product. A further 44 percent indicated that they would deliberately buy products to reduce disposal of waste, while 43 percent indicated that they would buy groceries in re-useable containers and buy plastic bags when they go shopping. The least interest was shown in re-using an empty glass jar instead of throwing it away an activity that 39 percent indicated that they would participate in. The data indicates that respondents residing in the Central region also exhibit a positive behaviour towards curbside recycling and also indications that they would actively participate in the recycling process when implemented.

Table 4.28   Behaviour related to the Central region

	N	Mean	Percent
Actively sort domestic waste into different containers at my home	46	3.717	**67.92**
Encourage others to recycle	46	3.630	**65.75**
Deliberately try to purchase a recycled paper product	45	3.088	**52.20**
Buy groceries in re-useable containers in order to lessen the amount of waste put out	46	2.717	**42.92**
Deliberately buy products which will cause you to dispose less waste	45	2.777	**44.42**
Buy plastic bags when I go shopping	46	2.717	**42.92**
Re-use an empty glass jar instead of throwing it away	45	2.555	**38.87**

4.11   CONCLUSION

This chapter details the results of the statistical analysis and establishes consumers' attitudes towards curbside recycling within the eThekwini Municipality. It also identifies those factors which may influence the successful adoption of a curbside recycling process. These factors encompass consumer demographic characteristics, consumer knowledge, attitudes, and behaviour.

This chapter also presents the results of the detailed data analysis in the form of charts and tables which help to profile consumer waste management practice and recycling expectations of respondents. The relationship between consumer demographic characteristics and knowledge about the adoption of curbside recycling was tested by using the analysis of variance and the independent sample t-test. A chi-square test was used to test consumer attitudes towards curbside recycling in relation to education, race and then finally region.

This study describes the demographics of the survey participants, and confirms that demographics (race, gender, age education and income levels) have an impact on the adoption of curbside recycling. The results from this study also revealed that the sample group ranged between 25 to 40 years old, have a

monthly income less than R9000, are educated to a matric or tertiary qualification and rated the protection of the environment as a low priority in their lives. However, a small percent (15 %) of the group actively belong to a conservation society or group.

Most of the attitudinal factors including knowledge of solid waste, attitude and behaviour towards curbside recycling are positive, which indicated that the consumers want to actively put recycling into practice, and are willing to make an effort to actively participate in recycling programmes.

According to the Australian Bureau of Statistics (2002) these findings are in keeping with previous studies conducted in Australia which indicate that curbside recycling schemes make it easy and convenient for householders to recycle. Steuteville (1995) reports that to gauge the momentum of curbside recycling one has to look no further than the District of Columbia. The District of Columbia is symbolic of a successful recycling scheme that is delivering unexpected revenues to municipalities. Many local authorities have demonstrated that curbside collection is an effective method of increasing recycling rates and diverting waste from disposal sites (Wasteline, 2004).

Based on these findings, conclusions and recommendations will be made in the next chapter in terms of the way forward for curbside recycling.

CHAPTER FIVE   -   CONCLUSIONS AND RECOMMENDATIONS

5.1   INTRODUCTION

This chapter presents concluding statements and recommendations, based on the findings of the study under review. The purpose of the study was to identify the attitudes of consumers towards curbside recycling of waste within the eThekwini Municipality area. An overview of consumer attitudes, based on the study results, will follow.

An analysis of the results of the study in respect of the objectives identified in Chapter One is revealed. Attempts to validate the results by determining their significance is presented alongside the recommendations.

5.2   SYNOPSIS OF THE CHAPTERS

A brief synopsis of the different chapters presented in this study is outlined below:-

5.2.1   Chapter One

Chapter One reviewed the main aim related to the study and identified the objectives. The significance of the research study and clarification of terms used in the waste industry are discussed. The current waste management process, importance of curbside recycling, the research methodology, delimitations, assumptions and the rationale for the study is presented. Based on the conclusions practical recommendations are made in line with the objectives.

The following objectives were identified:-

> ➢ To identify the key factors that influence consumers when instituting curbside recycling of solid waste with direct reference to benefits expected.

> ➢ To determine if there is a difference in consumer attitudes towards curbside recycling within education levels.

> ➢ To determine if there is a difference in consumer attitudes towards curbside recycling within race groups.

> ➢ To determine if there is a difference in consumer attitudes towards curbside recycling within residential suburbs.

5.2.2 Chapter Two

Chapter Two reviewed the related literature on consumer attitudes towards curbside recycling. Constructive suggestions for developing a good waste management system were revealed. Comparisons were identified and various approaches towards curbside recycling as applied in other major cities around the world were discussed.

Findings revealed that most countries have already designed and implemented mechanisms to encourage consumers to participate in curbside programmes. In the commercial sector, industries are actively embarking on new initiatives to recycle and reuse waste as a valuable resource and prevent the depletion of natural resources. Businesses initiated the use of recycled products in their production lines and have developed marketing efforts to encouraged consumers to use packaging produced from recycled waste.

The findings in the literature review also revealed the demand created for waste products and supply for waste in terms of the profits from recycling is derived

from the waste product needs created by the industries. Therefore, higher tariffs are set for waste types that are in greater demand, such as cardboard, paper, plastic and cans which can be cost effectively recycled and re-engineered into new products.

5.2.3 Chapter Three

Chapter Three described the research methodology and the research design employed to collect the primary data. This chapter also explained methods utilised in attaining the respondent sample. There is a detailed analysis of the research design used and the process that was undertaken.

Although, attempts were made to choose a sample size of 400 respondents, only 212 willing respondents participated in this study. The final data was edited, coded and analysed. Descriptive and inferential statistics were used to analyse the data. A statistician conducted the statistical analysis of the completed questionnaires. This data was analysed using the SPSS computer programme.

5.2.4 Chapter Four

Chapter Four presents the results obtained from the primary data. A variety of graphs and tables are used to show the attitudes and perceptions of consumers towards curbside recycling within the eThekwini Municipality. Descriptive demographic statistics for the sample, are illustrated using numerous techniques.

The relationship between consumer demographic characteristics and knowledge about the adoption of curbside recycling was tested by using the analysis of variance and the independent sample t-test. Chi-square test was used to test the correlation between consumer attitudes towards curbside recycling and education, race and region.

5.3   OVERVIEW OF THE RESULTS

Results indicate that 71% of respondents are less than 40 and 10% are older than 66 years of age. In terms of the level of education, 86% of the respondents are qualified with a matric certificate or higher qualification. The responses on earning levels indicate that 79% of respondents earned less than R9000 per month and only 2% earned an income above R15000 per month.

The data indicated that only 15% of the respondents belonged to a conservation society. To summarise, the respondents are educated, earn a low income and are members of a relatively young group, with little or no interest in belonging to a conservation society.

Most attitudinal factors including knowledge of solid waste and attitudes and behaviour towards curbside recycling are positive, which indicated that the consumers want to actively put recycling into practice, and are willing to make an effort to actively participate in the recycling programmes.

5.3.1   Composition by race and gender

The sample segmentation of gender and race groups of respondents are evenly spread. However, an exception was the Coloured race group which only made up 1% of respondents that were interviewed. The research findings related to consumers' knowledge levels across the categories linked to race groups, show that knowledge about recycling is the lowest amongst the Coloured, and Black respondents, followed by a low level of knowledge amongst Indian and finally high level of knowledge amongst Whites.

5.3.2 Composition by regional suburbs

The data illustrated in the graphs and charts, as discussed in Chapter Four show that representation of respondents interviewed is evenly spread across the boundaries of eThekwini Municiaplity, which covers the Northern, Western, Central and Southern suburbs.

5.4 BENEFITS OF CURBSIDE RECYCLING

The high level of positive attitudes toward curbside recycling and waste management amongst the respondents shows that consumers can play a key role in assisting the waste management authority by embarking on recycling initiatives. The results also show that the respondents are prepared to recycle and sort domestic waste, would also prefer the recycled waste to be collected rather than having to take it to collection sites themselves.

The results indicate that consumer education is required on how to recycle waste, what products can be recyclable, and where recycled products can be sold. Another aspect of the results is that the respondents are satisfied with regards to the recent laws passed on reusing plastic bags.

5.5 EDUCATION AND AWARENESS

The sample composition by education levels indicates that a high percentage of respondents are educated to at least matric level. The results illustrate that the majority of respondents have a matric, a degree, and/or post graduate diploma. However, a small percent of the respondents have a primary school education.

Based on the independent t-tests indications are that the higher the education level consumers demonstrate that they are knowledgeable about curbside recycling.

5.6   CONSUMERS KNOWLEDGE AND RESPONSIBILITY

The results indicate that crime and transport are viewed as the most important issue to the respondents and the environment as the least important. This clearly indicates that by ranking the environment at this level the consumers do not feel they want to take responsibility for the environment.

The results also revealed that many consumers have insufficient knowledge with respect to waste management, and in particular recycling. Interestingly according to the results the knowledge levels are generally average, the attitude levels are positive, and the levels of behaviour are positive. Behaviour in the context of the questions refers to the specific practice of actively taking part in the recycling process, which includes sorting domestic waste before disposal and purposely buying recyclable products.

Results also indicate consumers are simply not recycling. Respondents based their decision on the inconvenience involved in sorting domestic waste, problems associated with purchasing recyclable products, and time constraints related to transporting the sorted waste to a recycling centre. Irrespective of their reasons the consumers portray their willingness to recycle. The data also reveals that the respondents would rather hand over the responsibility for recycling to the municipality. A further concern is that only a few consumers are actively involved in conservation, as is evidenced by the small number of respondents who are members of a conservation society.

5.7   CONCLUDING REMARKS

Good waste management is a universal issue with diverse problem and solution dynamics unique to each country, especially across developed and developing regions. The most common problem is population growth which means the world generates much more waste than in the past. This in itself is creating

environmental devastation and putting a strain on the present waste management systems. These same environmental devastation need to be reviewed and re-assessed, especially in KwaZulu-Natal. However, it is also apparent that this is a universal problem and a concerted effort by government, business, community forums and the general public requires a co-ordinated process if the problem is going to be effectively dealt with.

The government of South Africa, in realising the serious nature of the situation, has launched the "White Paper" in which they request that the public's willingness to recycle waste be researched. The findings of this preliminary survey highlighted this problem. Together with the "White Paper" at the waste conference held in Polokwane in 2001, government also launched the Polokwane Declaration. The Polokwane Declaration sets clear challenges, that all waste types which are currently land-filled must be reduced by 50% by the year 2012, and thereafter reduced to zero waste to landfill by the year 2022.

Consumers are aware that recycling is necessary, but they do not possess the knowledge to realise just how serious the waste generation problem is and furthermore do not realise exactly just how beneficial the recycling process actually is. Further to this, consumers also seem to have a generally positive attitude toward the recycling process. This is identified in the results of the study that respondents want to be educated on recycling, and are willing to sort their waste. Respondents also would like to be making a positive contribution to the recycling effort. However, there is a distinct difference between wanting or thinking about undertaking recycling and actually recycling.

5.8   RECOMMENDATIONS

The results indicate the need for ongoing education programmes on the effects of proper waste management and the alternative required to support waste minimisation. The most popular of these waste minimisation techniques is

recycling, a procedure which should be both encouraged and, to a degree, enforced by law. Not only should certain levels or categories of recycling be enforced, but consumers' attitudes and practices should be monitored on an ongoing basis.

Waste management can be influenced by the marketing environment and consumer behaviour. The consumer-generated need for the recycled product is based on the demand created by the industry. The place or distribution is associated to the consumer request for recycled products in a particular suburb. Price is an indicator dictated by the demand created by the industry for waste product types that is available for recycling and re-engineering into new consumer products. Promotional activities and awareness towards recycling is paramount in communicating the value of purchasing recycled products.

Given the positive attitudes of consumers towards curbside recycling the following recommendations are highlighted as key strategies that could be utilised when implementing curbside recycling programmes within the eThekwini municipality. The recommendations proposed by the researcher are based on the findings discussed in Chapter Four of this study.

The objective of the study was to identify the attitudes of consumers within the eThekwini Municipality area towards curbside recycling of solid waste. Arising from the evidence and discussion of results, the following recommendations are proposed:

5.8.1   Benefits of curbside recycling

Good curbside recycling schemes are important because they make consumers think about the amount of the waste they are generating. This will have a positive effect because consumers will look for alternative methods of disposal or other possibilities such as smart shopping for recyclable packages. The benefits

associated with curbside recycling encourages consumers to purchase products and packaging that can be reused, that does not generate additional waste and is produced from recycled waste and is environmentally preferable. This will result in products being able to be bio-degradable and used in home composting.

It is clear that many leading nations reuse and recycle and offer incentives to consumers to reduce the volume of waste generated within their countries. Some products (such as beverage cans, bottles and plastic containers) can be continually recycled and reused. Introducing an exchange scheme alongside curbside recycling could generate added benefits. Products can be deposited on the curb and these can be collected by other consumers who have a need for the product.

Although many interesting initiatives have been identified and introduced this provides a good guideline on the various possibilities and cost effective measures that can be easily implemented.

5.8.2 Education and awareness

Consumer awareness and education programmes can help raise the levels of understanding in relation to waste issues. As such, education can play a very significant role in motivating consumers to change their behaviour. The marketing of waste prevention and recycling initiatives is important to ensure success. Therefore smart shopping is vital when consumers make purchase decisions.

The results of the study highlight the fact that the respondents are educated and therefore the introduction of various education programmes will be easy to implement.

Aspects which could be included in an education programme are:

> ➢ Centralised contact help line on waste management and recycling processes.

> ➢ Booklet and a web site providing information on recycling guidelines, location of drop-off centres, types of domestic waste that can be sorted, recycling initiative clubs, how to smart shop with regards to recyclable products, re-use tips, statistics with regards to waste and recycling, how to earn income from recycling and success stories on recycling in other areas and /or countries.

> ➢ Promotional campaigns at shopping malls and schools, where there are displays of products and packaging re-engineered from waste, thereby introducing the values of waste, and the benefits of preserving the natural resources.

> ➢ Waste workshops to assist in the curbside recycling process and help resolve waste problems.

> ➢ The recycling logo should be displayed on product packaging, especially when products are produced from recycled waste.

> ➢ Simple money saving tips for shoppers on how to stop producing waste and buy re-useable and long lasting products.

Education is the first and most important process in ensuring that consumers identify waste as a valuable resource.

5.8.3 Consumers' knowledge and responsibility

Knowledge of the environment, recycling, value of waste and consumer participation is vital for the success of any plan. Systematic efforts are necessary to make consumers aware and be responsive to the programme. This is achieved through a process of improved perception which is possible through ongoing education as outlined.

In addition to this, knowledge, awareness and consumer responsibility must be

directed to improved behaviour and accept responsibility.

➢ The development of a waste strategy to clarify that the responsibility rests with the consumer, indicating that the need for source separation, a better distribution of household waste management costs and improved collection systems must be adapted to local needs.

➢ The introduction of home composting will demonstrate an ability to deliver impressive waste minimisation targets. Through this scheme, municipalities experienced increased consumer enthusiasm for at-source separation.

➢ The adoption of consumer and producer responsibility. This will encourage the focus towards cost saving, better knowledge of recycling and the management of the end-of-life products.

➢ Responsibility of consumers as an extension to curbside recycling, where consumers are entitled to take the products back to the place where they bought them at the end of their useful life.

➢ Sort the waste at source and deliver it to the recycling centres.

➢ Waste disposal firms and waste haulers have a legal obligation to make sure that waste products are carried from the generation points to the treatment plants.

➢ Waste disposal firms have an extra responsibility in educating and informing consumers and producers on ways to separate waste and to ensure that waste is handled in an environmentally sound manner.

South Africa needs to initiate various programmes targeting the entire population, to ensure that the management of the environment is the responsibility of everyone. Companies must actively introduce and develop programmes suitable to the culture and dynamics. The advantage of this arrangement will show that the focus of responsibility will shift from the municipalities to the generators of waste.

5.8.4 Legislative focus

New legislation to provide an optimal waste management system has been successfully implemented in South Africa. However, new bylaws must be introduced which has been done in other parts of the world including, laws on flow control of waste, producer responsibility and new taxes.

Another initiative to curb waste increases will be to introduce a specific tax for those municipalities in which household waste generation rates exceed a specified level. The tax is aimed at encouraging municipalities to reduce waste in their area of responsibility.

As seen in most developed countries, stringent forms of legislation on all aspects of waste management processes, must be applied, measured and monitored regularly.

In South Africa, the stringent parameters set out in the "White Paper" to measure the recycling progress by introducing taxes to business and municipalities that do not abide with the policies outlined to ensure that the targets outlined in the Polokwane Declaration is achieved. Monitoring systems should also be introduced to measure waste disposed at landfills in South Africa,

5.9   SUMMARY

The data indicate that knowledge is a contributing factor. Curbside recycling is topical and relevant to the present times especially in South Africa. The results of the study present some insight into the research problem that require attention and give some guidance to find a way forward.

This research study concentrated on the main objective which was to establish consumer attitudes to curbside recycling within the eThekwini Municipality area.

This objective was measured through four themes or sub-objectives:-

➢ The first sub-objective was to identify the key factors that influence consumers when instituting curbside recycling of solid waste with direct reference to benefits expected. This objective was achieved. The study indicated a positive attitude amongst respondents.

➢ The second sub-objective was to determine if there is a difference in consumer attitudes towards curbside recycling in relation to education levels. This objective was also achieved. The study revealed that most of the respondents are educated and have a better knowledge about the values attached to recycling.

➢ The third sub-objective was to determine if there is a difference in consumer attitudes towards curbside recycling within race groups. This objective was also achieved. The study indicated that the Coloured and Black respondents demonstrate low knowledge and attitudes, in contrast to Indian and White respondents.

➢ The fourth sub-objective was to determine if there is a difference in consumer attitudes towards curbside recycling within residential suburbs. Although this objective was also achieved, the study showed that respondents shopping patterns varied as most shopped outside their area of residence.

Arising out of the discussion, it can be concluded that consumer attitudes towards curbside recycling is positive and if such a system were introduced it will be successful if implemented. However, to ensure that curbside recycling within the eThekwini Municipality is sustained customers must accept responsibility for the protection the natural environment. In addition, municipalities must introduce new legislative policies. Business together with the local authorities must

implement curbside education and consumer awareness programmes designed to impart knowledge.

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Appendix - 1

<div align="center">24 March 2005</div>

Sir/Madam

I am studying for my Master's Degree in Technology Marketing at the Durban Institute of Technology. The research project is a study to identify the factors influencing consumer attitudes towards curbside recycling of waste within the eThekwini municipality area.

Your assistance will be greatly appreciated, and will help towards the completion of this study. The questionnaire, once completed will be completely confidential and the information supplied is kept anonymous. Respondents will be protected when information is analysed.

Please note that there are no correct or wrong responses to the items or questions in the questionnaire. Through your responses, you will be making a valuable contribution to the study and the understanding of the present willingness of the public to participate in waste disposal initiatives.

Please complete the questionnaire as honestly and as accurately as possible.

I would like to take this opportunity to thank you in advance for your co-operation.

Yours faithfully
A. R. Abbu
Masters Student
Durban Institute of Technology
Student No: 19703776

Appendix - 2

QUESTIONNAIRE

SECTION A

Please indicate your answer with an X in the appropriate box.

1.   **Are you from any of the suburbs below, if "Yes" tick one appropriate suburb or else terminate the interview.**

Lamontville	Ntuzuma
Phoenix	Chatsworth
Westville	Amanzimtoti
Illovo	Umkomaas

2.   **Race Group**

Black	Coloured	Indian	White

3.   **Gender**

Male	Female

4.   **Age**

Under 25	26 – 30	31 – 35	36 – 40	41 - 45
46 – 50	51 – 55	56 –60	61 – 65	66 and Older

5.   **Level Of Education**

Primary School	Matric
Diploma/Degree	Post Graduate Diploma/Degree

6.   **Income per Month (R000's)**

Less Than 3000	3000 <6000	6000 <9000	9000 <12000
12000 <15000	15000 <18000	18000 <21000	Greater than 21000

7.   **Position In Household**

Owner	Owners Spouse	Child of Owner	Renting	Other

8.   **Do you belong to any Conservation Society**

Yes	No

SECTION B

9. Rank the following problem areas in order of importance to you i.e: the issue of most importance should get a ranking value of 1 and the issue of least importance should get a ranking value of 7.

	Ranking						
Traffic Congestion	1	2	3	4	5	6	7
Availability of Public Transport							
Lack of Street Lighting							
Amount of Crime							
Availability of Housing							
Lack of protection of the environment through more effective recycling methods.							

Directions: please complete the following questionnaire pertaining to your degree of agreement or disagreement. If you have a very high degree of agreement with that particular item, please mark 7 and if you have a very low agreement level then please mark 1

		Strongly Agree	Disagree				Strongly	
10	The present way of dealing with domestic garbage is Appropriate.	1	2	3	4	5	6	7
11	Almost all our domestic garbage in our landfills rots within Five years.	1	2	3	4	5	6	7
12	Specialists are able to prevent domestic garbage from causing environmental damage.	1	2	3	4	5	6	7
13	Householders should reduce the amount of domestic garbage through proactively recycling.	1	2	3	4	5	6	7
14	Whatever happens to domestic garbage once it has been collected from households is the municipality's problem.	1	2	3	4	5	6	7
15	Recycling results in the saving of raw materials.	1	2	3	4	5	6	7
16	The Bisasar Road Landfill site receives on average 3000 tons of waste daily.	1	2	3	4	5	6	7

17. One recycled coke bottle will allow the average home enough electricity for 4 hours.

Yes	No	Don't Know

18. My estimate of the percentage of household waste collected from Durban is
_____%

19. My estimate of how much money I can make per month (in Rands) from my personal waste is:

0 – 14	15 - 29	30 - 44	45 - 59	60 - 74	75 - 89	90 - 104	>105

20. People who recycle to assist the environment are wasting their time.

Yes	No	Don't Know

21. By Recycling the public can play a role in changing the present system of domestic garbage disposal.

Yes	No	Don't Know

22. I am prepared to sort recyclable garbage into different containers.

Yes	No	Don't Know

Select answer either "A" or "B"

A)To be taken to a drop-off centre by myself

Yes	No	Don't Know

B)To be collected by someone else

Yes	No	Don't Know

23. I would like to be educated on how to sort my domestic garbage to aid in the recycling process.

Yes	No	Don't Know

24. I would like to be educated on what products can be recycled.

Yes	No	Don't Know

25. I would like to be educated on where I could go and sell my domestic waste.

Yes	No	Don't Know

26. I am satisfied with the new laws regarding plastic bags.

Yes	No	Don't Know

27. How frequently do you do the following:-

a) Deliberately buy products which will cause you to dispose of less waste.

Always	Usually	Seldom	Never

b) Buy groceries in reusable containers in order to lesson the amount of waste put out.

Always	Usually	Seldom	Never

c) Deliberately try to purchase a recycled paper product.

Always	Usually	Seldom	Never

d) Re-use an empty glass jar instead of throwing it away (eg: for making jam)

Always	Usually	Seldom	Never

e) Buy plastic bags when I go shopping.

Always	Usually	Seldom	Never

g) Actively sort domestic garbage into different containers at my home.

Always	Usually	Seldom	Never

h) Encourage others to recycle.

Always	Usually	Seldom	Never

Allan Robert Abbu

Appendix - 3

POLOKWANE, NORTHERN PROVINCE, SOUTH AFRICA

26-28 SEPTEMBER 2001

1. *Preamble:*

WE THE REPRESENTATIVES of government at national, provincial and local level; civil society and business community,

PARTICIPATING in the first National Waste Summit, hosted by Department of Environmental Affairs and Tourism and held in Pietersburg, September 26-28, 2001

RECOGNIZING that waste Management is a priority for all South Africans, and the need for urgent action to reduce, reuse, and recycle waste in order to protect the environment;

FURTHER RECOGNIZING that we can achieve the vision and the goal contained in this declaration, namely,

Vision

To implement a waste management system which contributes to sustainable development and a measurable improvement in the quality of life, by harnessing the energy and commitment of all South Africans for the effective reduction of waste.

Goal

Reduce waste generation and disposal by 50% and 25% respectively by 2012 and develop a plan for ZERO WASTE by 2022.

REAFFIRM our commitment to the Integrated Pollution and Waste Management Policy, the National Waste Management Strategy and the principles of waste minimization, reuse, and recycling for sustainable development.

RECOMMIT ourselves to the objectives of the integrated pollution and waste management policy.

EMPHASIZE the essential role of efficient management of waste in sustainable development and the protection of human health and the environment.

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ACKNOWLEDGE the responsibility as South Africans to work together in our shared vision for zero waste by 2022 based on an implementation and evaluation approach.

SHARE grave concern about environmental degradation, which has significant economic and social impact.

DETERMINED to undertake initiatives that will promote appropriate and efficient use of natural resources, and to protect the people of South Africa and the environment.

2. Do hereby declare that government, business and civil society need to join in common efforts toward the accomplishment of the goal for reduction of waste generation and disposal by 50% and 25% respectively by 2012 and engage in the following actions:

(1) Prioritization of Waste Management.

(2) Implementation of the National Waste Management Strategy.

(3) Development and implementation of a Legislative and Regulatory Framework to promote waste avoidance, prevention, reduction, re-use and recycle.

(4) Provision of efficient and effective collection and disposal facilities.

(5) Establishment and enforcement of targets for waste reduction and recycling.

(6) Setting benchmarks towards achieving the 2012 target.

(7) Disseminate information on the status and trends on waste reduction in the country.

(8) Introduce mandatory waste audit processes.

(9) Explore the use of economic instruments to support waste management initiatives.

(10) Develop and provide the public with educative resources necessary to allow participation in the waste elimination process on an informed basis.

(11) Develop Intergovernmental Capacity.

(12) Develop Waste Information and Monitoring Systems.

(13) Establish systems that ensure that physical and financial responsibility for waste is borne by the product producers.

(14) Effectively manage waste disposal/reprocessing facilities, thereby avoiding the need to establish new, or expand existing facilities.

(15) Promote employment and economic empowerment opportunities, in particular in Small, Medium and Micro Enterprises, through increased product reuse and material recycling.

(16) Promote clean technology and clean production.

2.1 While acknowledging the progress made so far, we the participants, agree that much still remains to be done in order to accomplish the objectives of the white paper, and to build on progress to date to meet those objectives.

We therefore commit ourselves as:

2.1.1 National, Provincial and Local Government

(1) To develop and implement a comprehensive legislative and regulatory framework by June 2002.

(2) Implement the NWMS.

(3) To build capacity within all spheres of government.

(4) Promote strong intergovernmental coordination and cooperation.

(5) To develop an Information Management System by April 2002.

(6) Explore and support appropriate economic instruments to support the NWMS.

(7) To set up a Multi Stakeholder forum consisting of national, provincial, local government, business and civil society.

(8) Promote and Implement sustainable poverty relief projects.

(9) To provide comprehensive waste management services.

(10) To explore the establishment of a National Waste Fund.

(11) To develop compliance monitoring mechanism.

(12) To develop comprehensive communication strategies including mounting campaigns.

2.1.2 Civil Society

(1) Build capacity including community to community empowerment and raise environmental awareness.

(2) Develop skills in advocacy and lobbying.

(3) Streamline administration services that deliver effective environmental waste management services.

(4) Participate actively in regulatory mechanisms through monitoring and contributing in effective management of disposal sites.

(5) Promote and support waste reduction, re-use and recycling.

(6) Promote and Participate in safe and healthy waste recovery methods.

(7) Collaborate with government and relevant stakeholders.

(8) Actively engage in Public Private Partnerships to mobilize resources to implement innovative waste management programmes.

2.1.3 Business Community

(1) Representatives from business commit themselves to a process of engagement with government and civil society with a view of agreeing to a range of joint ventures, which would showcase the potential of partnership between government and business to achieve sustainable waste management.

(2) Utilize cleaner production technologies and methods of production.

(3) Comply with legislation, regulation and standards.

(4) Meet waste reduction targets and in addition make voluntary commitments to exceed the targets.

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(5) Strengthen relationship between government, business to business and civil society by improving and promoting transparency.

(6) Manufacture more safer environmentally friendly products.

(7) Contribute towards improved networking and information sharing.

(8) Engage in programmes that promote responsible advertisement and labeling of products.

(9) Promotion of sustainable Public & Private Partnership in order to improve Waste Management service delivery. The Partnerships will be based on shared responsibility, social responsibility, accountability, competency, reliable service provision and compliance with norms and standards.

(10) Promotion of recycling opportunities which are sustainable and engage in activities that will grow the recycling industry by 30% by 2012.

THIS JOINT DECLARATION IS PREMISED ON THE PATRIOTISM WHICH ALL SOUTH AFRICANS OUGHT TO EMBRACE.

ADOPTED AT THE FIRST NATIONAL WASTE SUMMIT 26-28 SEPTEMBER 2001.

PARTIES

1. GOVERNMENT OF SOUTH AFRICA REPRESENTED BY THE DEPUTY MINISTER REJOICE MABUDAFHASI, DEPUTY MINISTER OF ENVIRONMENTAL AFFAIRS AND TOURISM

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2. BUSINESS COMMUNITY REPRESENTED BY JOHN DES LIGNERIS

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3. CIVIL SOCIETY REPRESENTED BY MS MASANA E. MOTUBATSE