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To ascertain the implementation of the plastic carrier bags regulations at the local government sphere in Gauteng Province

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To ascertain the implementation of the plastic carrier bags regulations at the local government sphere in Gauteng Province



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A Research report submitted to the Faculty of Science, University of Witwatersrand, in partial fulfillment of the requirements for the degree of Master of Science.

School of Animal, Plant and Environmental Sciences
September 2011

DECLARATION

I declare that this report is my own, unaided work. It is being submitted for the Degree of Master of Science in the University of the Witwatersrand, Johannesburg. It has never been submitted for any degree or examination in any other University.

Sizakele J. Ndzhukula

Date: 22 September 2011

ABSTRACT

There has been a genuine problem with plastic carrier bags (PCBs) pollution since the 1970's. A literature review revealed that very few scientific studies have been undertaken globally on PCB. The South African Government promulgated regulations to reduce numbers, encourage reuse and recycling of plastic bags in 2003. The regulations introduced a charge for PCBs. This study looked at the handling and disposal of PCB after 2003 in Gauteng Province, South Africa; and looked at the movement of PCB from major retailers and informal traders to consumers and recycling and recovery. The study excluded the manufacturers and distributors of PCB. It began with the retailers and informal traders being the source of PCB and extended to consumers during their grocery shopping in large retail stores and purchases from informal traders. The study also looked at the individual waste collectors operating in landfill sites, residential and industrial areas to establish the level of recycling of PCB. Buyisa-e-Bag (B-e-B) was at the end of the collection of PCB pathway where it was supposed to provide leadership in the recovery of the bags. Semi-structured interviews were used to collate data on recycling approach with specific focus on PCB and understanding of the legislation.

A total of one hundred consumers were interviewed in the shopping malls. Consumers did not know much about the regulations hence they could not explain the reason they have to pay for PCB. Ninety one percent of consumers did not reuse bags for shopping and 68% reused PCB at home to store waste before it is disposed of. Eighty informal traders were interviewed: all indicated that they did not charge for PCB. Forty chain supermarkets managers were interviewed from the shopping centres covered by the study. The retailers were affected by the PCB regulations; they reduced the number of grocery packers and increased security to prevent theft. Nevertheless, they complied with the regulations by selling only the thick bags. Twenty landfill and recycling facilities

managers formed part of the study. All landfill managers encouraged general waste recycling to prolong lifespan of the site. Fifty individual recyclers were interviewed in the landfill sites, recycling facilities and on the road side while pushing their trolleys. They found it economically impractical to collect PCBs.

Awareness of plastic litter has increased and less is visible though this was not measured. Legal compliance with regulations and specifications needed to be actively driven by all the relevant parties. PCBs are fully recyclable; hence more public awareness is required aimed at preventing the contamination of bags which deters re-claimers from collecting them.

B-e-B has not met most of the objectives of their formation and has since been placed under administration by DEAT. Inadequate communication and collective bargaining between the key role parties resulted in the delays in getting the recycling projects off the ground. Major retailers complied with the Government regulations. Informal traders and consumers were generally unaware of regulations and consequences of PCB use. Consumers bought new PCB and in most cases, failed to reuse them for shopping. Recycling of PCBs is not carried out effectively as it is not economically worthwhile. This requires further research to explore the potential uses of PCBs at the end of their lifecycle.

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DEDICATION

I dedicate this work to my family and particularly my husband, Vusi Ndzhukula, for his continued support and understanding during the course of my research. To my daughter, Nyeleti and my son, Nkateko Ndzhukula, for allowing me space to do my work without interruption.

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LIST OF ABBREVIATIONS

B-e-B: Buyisa-e-Bag
CEE- ERU: Centre for Environment Education & Ecofriendly Reuse & Recycling Unit
DEAT: Department of Environmental Affairs
DTI: Department of Trade and Industry
EU: European Union
GDARD: Gauteng Department of Agriculture and Rural Development
HDPE: High Density Polyethylene
KEBS: Kenyan Bureau of Standards
LDPE: Low Density Polyethylene
MoEF: Ministry of Environment and Forestry
MOU: Memorandum of Understanding
NMA: Namibian Manufacturers Association
NEMA: National Environmental Management Act, act 107 of 1998.
NEMA: National Environmental Management Authority (Kenya)
PCB: Plastic carrier bag
PFSA: Plastic Federation of South Africa
PMG: Parliament Monitoring Group
SABS: South African Bureau of Standards
SADC: Southern African Development Community
SMME: Small Medium and Micro Enterprise
UNEP: United Nations Environment Programme
VCB: Vest Type Carriers Bag

CHAPTER 1

INTRODUCTION

1.1. Background

This is a policy evaluative study to assess the implementation of the plastic carrier bag regulations in minimizing plastic littering in South Africa. Plastic carrier bags (PCB) have been a growing concern in South Africa with regards to environmental pollution. Prior to 2003, PCBs were widely used by consumers, mainly to carry groceries, and were poorly managed after use because they were readily available in retail stores. Consumers were given unlimited numbers of PCB during shopping (Nantso Holdings, 2007). There was no incentive to keep a bag after use. This resulted in widespread littering throughout the country. A significant number of these plastic bags ended up as wind-blown litter found on fences, in trees and the open veld. This phenomenon meant that plastic bags became a nuisance and negatively affected the aesthetic quality of the environment in South Africa (Nantso Holdings, 2007).

The plastic bags are not biodegradable, when deposited into the soil; they block the porosity of the soil; cause problems with groundwater recharge and disturb the soil microbe activity (Shah, Hasan, Hameed, Ahmed, 2008). The International Rice Research Institute (IRRI) has found that plastic bags have harmful effects on the soil, water and air. In the fields; when plastic bags are deposited in high quantities; cause soil infertility (CSS Forum, 2007). Plastic in the environment is regarded more as nuisance than a hazard, since the material is biologically quite inert, it takes much longer to release pollutants into the environment compared to other polluting waste materials on land (in.answers.yahoo.com, 2008).

About 3,500 pieces of plastic per square kilometer of sea surface were recorded off the southern coast of South Africa (Hugo, 2004). Other surveys conducted from the Eastern Cape to Cape Town showed plastic waste increasing by about 90% since 1999. Plastic waste found on urban beaches is mainly land-based, originating from packaging while that on rural beaches originates from ships such as those involved in the fishing industry. On average, about 7% (by total weight) of urban waste in South Africa consists of plastic (Hugo, 2004). Plastic litter has a number of negative impacts such as aesthetic poverty, killing of marine life and livestock; increase waste management costs, clogging of storm-water drains, persistence and accumulation in the environment (Nhamo 2008).

Animals and sea creatures gets entangled, hurt and killed every day by discarded plastic bags that clog their intestines and lead to slow starvation. Because plastic bags take time to break down, every year our seas become 'home' to more and more bags that find their way there through the sewers and waterways (Edwards, 2000, Thompson *et al.* 2009).

Plastic shopping bags have a large environmental impact which requires individuals and countries to adopt greener policies to minimize their use by the society. There is one ecological area where ordinary people can make an extraordinary contribution, and that is in their shopping habits, specifically in their use of plastic shopping bags. This ever present item has a huge environmental impact and a switch to a more eco friendly shopping habit can have a large beneficial effect on greenhouse gas emissions and fossil fuel usage (answerbag.com, 2010, Barnes *et al.* 2009). Plastic bags may have some benefits to landfills such as stabilizing qualities, leachate minimization, and trapping of methane in soil (Nhamo 2008). However, the very problem with plastic bag waste emanates from some of their advantages (Chan-Halbrendta *et al.* 2009).

Re-using plastics has a number of advantages, such as (i) conservation of fossil fuels since plastic production uses 4–8% of global oil production, i.e. 4% as feedstock and 4% during conversion (Perdon, 2004; JCR, 2006); (ii) reduction of energy and management of solid waste, and (iii) reduction of carbon-dioxide, nitrogen-oxides and sulphur-dioxide emissions. Production is energy intensive with 0.48 Mega Joules of energy required to make one high density polyethylene (HDPE) plastic bag. Fossil fuels are extracted and processed to provide the energy required for production which contributes to climate change (Al-Salem *et al.* 2009, Hopewell *et al.* 2009).

The combination of long life and high levels of consumption mean that plastic bags can place pressure on landfill capacity. The lightweight properties of the plastic bag allows it to escape from rubbish bins, landfill and move around the natural environment causing a variety of problems (CleanUp.org, 2009). The useful life of the single-use plastic bag is relatively short. It is impossible to quantify length of use, but it has been suggested that the average plastic bag is used for as little as 12 minutes. It was discovered that over 50% of all plastic produced in India is used for packaging, most of which is discarded once used. India has a genuine problem with waste management particularly plastics and this adds to waste management problems (Edwards, 2000 & Siddique *et al.* 2008). Whilst the plastic bag has a short useful life, it has a substantial environmental impact (CleanUp.org, 2009). Reusable shopping bags are better for the environment. Retailers had used the issuing of plastic bags at the tills as a method of controlling shoplifting.

PCBs were introduced in South Africa in the 1970's to be a cost-effective and environmentally friendly alternative to paper (soyouwanna.com/carrier-bags, 2011). The

PCBs soon flooded the country without control and later became a problem for the authorities to manage. It was only in 2003 that the South African Government acted against the uncontrolled spread of the plastic bags through the introduction of the legislation.

The promulgation of the regulations was intended to introduce compulsory specifications on manufactured plastic carrier bags. The specifications aimed at addressing the thickness of plastic carrier bags, amount of printing allowed on a bag and quality of ink to be used. They prohibited the manufacture of plastic shopping bags of less than 30 µm in thickness at first and later at 80 µm. There was a Memorandum of Understanding (MOU) between the National Department of Environmental Affairs (DEA) and relevant stakeholders to outline the different responsibilities and obligations of each party e.g. Organized Labour and Organized Business (Nantso Holdings, 2007).

The South African government charges an environmental levy of 4c a bag as from June 2009, increased from 3c a bag introduced in 2003. The purpose of the levy is to generate funds for projects related to recycling PCB and other recyclables to feed back to the respective manufacturing industries.

Buyisa-e-Bag (B-e-B) is a Section 21 Company established by Government with the mandate to create jobs, alleviate poverty and empower the youth through recycling initiatives country-wide. Buyisa-e-Bag is funded by National Treasury with a portion of the revenue collected from the plastic bag levy. Their initiatives include but not limited to the establishment of buy back centres, clean up campaigns, promotion of recycling through the school programs and youth empowerment initiatives (Buyisaebag.co.za, 2011).

1.2. Current progress

Towards the end of 2001, the Plastics Federation of South Africa (PFSA) undertook a comprehensive national survey on plastics recycling. The study, which surveyed 123 collectors, was done to gauge the level of recycling activities in the country so as to influence the regulations that were being formulated to close the gaps identified from the recyclers (PFSA, 2001). Of the 123 collectors, 54 were in Gauteng Province, 28 in KwaZulu-Natal, 19 in the Western Cape, eight apiece in Eastern Cape and the North West Province and five others in the remaining provinces, except for the Northern Cape. Previously disadvantaged individuals owned only 18 recycling companies (PFSA, 2001).

One interesting finding from the PFSA study is the proposition of the strategy to improve the reclaiming of waste before it is deposited in landfills, the strategy is being implemented in many landfill sites to scavenge and reclaim valuable material. This process can be improved to be user friendly and provide the benefit of reclaiming waste (PFSA, 2001).

A packaging value chain of a plastic carrier bag start from the raw material and suppliers, it goes through to converters and distributors, customers, disposal by consumers, waste collectors and then to recyclers. The process goes back to the beginning where the raw material is processed and fed back to the converters (Nhamo, 2008). There is a demand for high density polyethylene (HDPE) and low density polyethylene (LDPE) recycling in most provinces throughout South Africa, a good indicator for recycling potential (Nhamo, 2008). The polymers mentioned above are properties of PCB, given that PCBs are not recycled to supply the demand, recyclers will need to look at other plastics to source the HDPE and LDPE needed.

PCBs are manufactured in private enterprises regulated by the Department of Environmental Affairs with the help of Department of Trade and Industry (DTI) and South African Bureau of Standards (SABS) doing compliance monitoring. Plastic bag manufacturers are obliged to comply with the specifications. Bags samples are randomly collected for analysis by SABS without prior notification to the manufacturer. Authorities are also investing money in recycling initiatives which are managed by Buyisa-e-Bag.

To date, it is not known if there are organisations that have been prosecuted for manufacturing non-compliant bags. There have been some cases with regulating printing on plastic shopping bags in South Africa. The amount of ink on the bag affects the quality of the bag for recycling; hence there is a legal limit. However, even if plastic is recycled, its products suffer from poor quality, which affects product demand, and in turn results in viability problems. Some of the common products made from recycled plastic include outdoor furniture, refuse bins and toys (PFSA, 2001). The single largest limitation to plastic recycling relates to high transportation costs associated with delivering the feedstock to recycling depots. This study also revealed that plastic recycling is limited as collectors and recyclers first select waste products such as paper and board, glass and metal that give high sale value (PFSA, 2001, Thanh *et al.* 2010). Mixed general waste collected from households, industry and retailers is disposed of in the landfill sites. It is in the landfill site where waste scavenging takes place as shown in Figure 1.

It has been almost eight years since the regulations were promulgated and this is perceived as the right time to assess the effectiveness of the regulations and their implementation. It is also important to check whether the increased thickness made any significant contribution in the reduction, reusing and recycling of the plastic bags.



Figure 1: Packaging plastic being recycled in a landfill site.

CHAPTER 2

2. LITERATURE REVIEW

2.1. Information on plastic bags

2.1.1. Chemical composition of the plastic carrier bag (PCB) and its effect on the environment

The polyolefines (ethylene, propylene and butylene polymers) are semicrystalline thermoplasts. Generally speaking, they have good chemical resistance, high toughness and tensile strength as well as good electrical insulating properties. They can be processed by means of virtually any technique, are relatively cheap and because of the above-mentioned properties, they have a widespread use. Today, they can be considered as the most important group of polymers by weight (PFSA, 2007).

2.1.2. Chemistry and manufacture of plastic carrier bags

The structure of polyethylene consists of branched linear macromolecules produced mainly by two processes, namely high and low pressure polymerization. Polymers based on ethylene are manufactured in large quantities and in many different grades. A large range of modifications can be done by co-polymerization and poly-blending so that only typical polyethylene properties can be obtained (PFSA, 2007). As a result of their formation, PCBs have been used substantially and have proved versatile for use in a range of types and forms (Andrady & Neal, 2009).

Plastic bags are derived from petrochemical feedstock, which in turn originates from oil, natural gas and coal. The ethylene and propylene are polymerised into polyethylene and polypropylene in a powder form. In the granulation plant, additives and fillers are added to the powder and the compound is then granulated and bagged – ready to be sold to a converter as virgin material (PFSA, 2007). The manufacturing process of PCB starts

when the plastic materials are collected from different sources such as households, landfill sites and industries and are then sorted by type and colour of plastic. Once sorted, plastics are baled, especially bags, and transported to the plastic recycler. The recycler will open the baled plastics and feed them into a granulater that will reduce the size of the incoming material into flakes or granules. The granules are put through a washing plant to remove labels, residual contents and even soil, if collected from garbage dumps. After drying the granules, they are fed into an extruder. The extruder melts down the dry granules. The molten plastics are then forced through a multi-hole screen in the form of strings. The strings are water-cooled in a bath and chopped up into pellets by a revolving cutter. The pellets are bagged and sold to a factory that uses them to produce a new plastics article" (PFSA, 2007).

2.1.3. Degradation of plastic bags.

"Complete biodegradation of the thick plastic requires oxygen, heat, bacteria and adequate moisture, not all these conditions will be available in the landfill site which means that biodegradation will not be successful. Thick PCB polyethylene is photodegradable, that means they require ultraviolet light in order to be degraded and break up into smaller and smaller pieces which become incorporated in the soil with no harmful effects. The photodegradable plastic degrades quicker than the biodegradable plastic" (PFSA, 2007, Clappa & Swanston 2009). Buried thick PCBs i.e. in a landfill site will take much longer to degrade due to inadequate sunlight than those on the surface.

2.2. INTERNATIONAL EXPERIENCE

The use of PCB to carry shopping items is common in the world and so are issues around disposal and environmental impacts. There are a number of approaches instituted to address the PCB litter and waste internationally. The packaging waste management policy instruments range from self-regulation through economic to command and control (Wilson, 1995, Chen, 2006).

Literature was reviewed from authority's websites, non-profit organizations, published papers, articles and research work undertaken on this and related topics. The literature review revealed that there is a lack of scientific research work done on this topic; looking at the material sourced from the published papers. It shows the understanding of the subject is very shallow and requires more scientific research to increase knowledge. Internet provided a lot of references in a form of reports, media statements and notices from government departments and private institutions from around the world where legislations on PCBs were promulgated. There was a lot of scientific research done of waste management in general but that fell outside the scope of this study.

Management of PCB has been identified as a challenge in a number of countries in the African continent as well as abroad Table 1. This has resulted to numerous pieces of legislation being promulgated to manage the problem for the benefit of the environment. Some states charged the environmental levy for the bags and some proposed to move away from the plastic bag to paper bag. Enforcing compliance to the promulgated legislations is an ongoing challenge for the government which eventually renders the legislation redundant. In this chapter, the above mentioned scenario will be investigated in detail for each country covered by this study.

Table 1: Countries or cities that have taken action against PCB as in 2007

Africa	Asia Pacific	Europe	Americas
Botswana	Australia	Denmark	Brazil
Eritrea	Bangladesh	Finland	Canada
Cameroon	Bhutan	Germany	USA
Ghana	China	France	
Kenya	Hong Kong	Ireland	
South Africa	Indonesia	Holland	
Rwanda	Japan	Switzerland	
Tanzania	Nepal	Italy	
Somalia	New Zealand	Scotland	
Uganda	Pakistan	Sweden	
Zanzibar	Taiwan	United Kingdom	
	Papua New Guinea	Channel Islands	
	Samoa		

(CleanUp Australia – Plastic bags World Report, 2007).

2.2.1. Comparison of literature

The literature review is presented in table format (Tables 2 & 3); for more details please refer to the full text below. The literature review concentrated on three countries abroad (India, China and Ireland) Table 2 and three countries in Africa (South Africa (SA), Namibia and Kenya) Table 3. When selecting the countries, the scale of each country was looked at. For instance Ireland is a small country compared to India; this provided an interesting contrast on the implementation of legislation and the results. The development of the country was another aspect that informed the selection of the countries, e.g. Ireland is a developed country compared to the other countries chosen. The level of regulation in a country was also considered e.g. Ireland and China are highly regulated versus India and other African countries where legislations were promulgated but difficult to implement and enforce.

Table 2: A comparative literature review on legislation, action and the results – International perspective

India	Ireland	China
Legislation	**Legislation**	**Legislation**
In 2008, the promulgated "the Delhi Degradable Plastic Bag and Garbage (Control) (Amendment) Act". In 2009, promulgated law "prohibiting the use of all kinds of PCB in Four and Five Star Hotels and Hospitals".	In 2001, the PCB regulations were promulgated and levy is introduced. Both instruments aimed at reducing litter impact of disposable plastic bags and as a waste prevention measure.	In 2008, the State Council decided to "prohibit free PCB and banned retailers from adding the price to products" and banned the production of ultra thin bags.
Actions	**Actions**	**Actions**
In 2009, more than 15 States banned thin plastic bags for environmental impacts, e.g. sacred cows dying and flooding problems in heritage and tourist destinations.	Introduction of the Regulations, levy and charging for bags was well publicized through television campaigns, posters and leaflets	In 2008, the State called for the return to the cloth bags and shopping baskets.
PCB industry not willing to accept the responsibility of waste they generate.	In 2002, Ireland became the first country to charge for a plastic bag.	Customers must buy thick plastic bags if they don't have cloth bags.
	Authorities worked together in managing the introduction of levy which created understanding and received buy-in from stakeholders	Public response to the ban of PCB caused the government to create environmental awareness and improve surveillance programs.
Results	**Results**	**Results**
Polyloom waste recycling technology was introduced to fast track the recycling of plastic bags. The polyloom is a plastic weaving handloom that helps reuse and recycle discarded plastic bags.	Promulgated Waste Management (Packaging) Regulations in 2007 that were aimed at reducing plastic packaging weight by 22.5%.	
No levy was introduced; however, the pharmaceutical and hospital industry hired a group of women to manufacture the cotton bags to replace the plastic bag.	Formation of Repak Packaging of Ireland to facilitate producer responsibility in the area of packaging and packaging waste recovery and recycling.	
Success	**Success**	**Success**
Difficult to establish	The formation of the Environment Fund where all levy revenue is channeled to; enabled the recycling, reuse and reduce plastic bags initiatives.	Supermarkets in Beijing running campaigns on cloth bags over the plastic bags, consumers embraced the cloth bags approach which a reduced production and sale of plastic bags.
	Ireland achieved the 90% reduction in the consumption of bags by 2004.	There were a number of "No Plastic Day" campaigns ran by various supermarkets to discourage the consumption of plastic bags.

2.2.2. Indian experience

India is located in southern Asia with an estimated population of 1.15 billion people. With such a large population, it is expected that consumption of various resources and commodities would lead to high generation and disposal of waste. Waste management was largely unknown in India and this has caused a massive environmental problem (Edwards, 2000). Material waste has only recently become an issue in India after the introduction of non-biodegradable plastic that largely created the problem. The growth of the plastic industry led to the increase of plastic litter. In the mid-1980s the government of India increased the national production of plastic so that India would be self-sufficient in petrochemical products and be able to compete in the global plastics market. *"Over 50% of all plastic produced in India is used for packaging, most of which is discarded once used"* (Edwards, 2000, Siddique *et al.* 2008).

[1] Legislation has been summarized in Table 2. Early in 2009 the Government further prohibited the use of plastic in some organisations (Edwards, 2000). The enactment of these of legislations was an attempt from the authorities to manage the spread of PCB in the country.

The Environment Ministry has since banned the manufacture and use of PCB less than 8 inches X 12 inches in size and 20 µm in thicknesses. All plastic manufacturers had to be registered to enable government regulation. Various states e.g. Goa, Kerala, and Punjab have increased the minimum thickness of PCB to even higher limits of 40, 50, or 70 microns. Other states have followed this example.

[1] The Government of Delhi issued a notification in November 2008 titled "the Delhi Degradable Plastic Bag (Manufacturing, Sale and Usage) and Garbage (Control) (Amendment) Act, 2008". Early in 2009 the Government with support from the Central Government under Section 5 of the Environment (Protection) Act, 1986 prohibiting the use of all kinds of plastic bags in Five Star and Four Star Hotels, Hospitals with 100 or more beds.

Besides its environmental and social impacts, one more reason for the ban is that cows, which are sacred in India, often asphyxiate from trying to eat the bags (CleanUp.org, 2010). West Bengal Pollution Control Board (WBPCB) has banned use of PCB in ecologically fragile areas such as heritage and tourist sites. This action has created public awareness through training and workshops for plastic waste management such as banning of PCB and the adoption of alternative cloth or jute bags (WBPCB, 2006). The banning of thin PCB brought about the formation of a women's cooperative with St Stephen's Hospital in Sunder Nagri as a result of the hospital looking to source alternatives to PCB. The women are paid to sew cloth bags for the pharmacy to package pharmaceuticals for distribution to patients (CleanUp.org, 2010). This approach is environmentally friendly and uplifts women through employment opportunities created (Table 2).

The history of plastic recycling in India

The plastic task force was formed in May 1996 by the Ministry of Environment and Forests (MoEF) when it became increasingly clear that management and disposal of PCB was a national problem which required a national solution. The task force proposed that the plastics industry should take responsibility for its waste. One of the recommendations made was the adoption of a 'buy-back' system as a pilot project in major cities (Edwards, 2000).The PCB industry felt that PCB are designed for and used by the consumers for convenient shopping hence the safe disposal and recycling of the plastic bag after use is entirely the responsibility of the local authorities and consumers themselves (Edwards, 2000).

Plastic economics in India

The Indian government and the plastics industry claim that India has the highest rate of plastic recovery in the world, between 40% and 80% of all plastics produced. However, be this as it may, the waste problem persists because the rag pickers don't collect PCB for simple reasons of economics. Although plastic fetches about 12 rupees per kilogram in the waste market, it takes between 450 and 800 flimsy polythene bags to make up a kilogram and if they are soiled the price drops. This makes PCB an extremely unattractive material even to the poorest rag picker (Edwards, 2000).

Waste Recycling Technology

"The Centre for Environment Education (CEE) introduced polyloom a plastic weaving handloom for weaving discarded plastic bags (polybags) into useful items. CEE has established an 'Ecofriendly Reuse and Recycling Unit' (CEE-ERU) especially for recycling of paper scraps and PCB" (Edwards, 2000). Today, the use of polyloom has been taken up by many women's self-help groups who gather raw material either by door to door collection or buying from rag pickers. This provides them livelihood while taking the PCB away from the environment (Edwards, 2000).

2.2.3. The Irish experience

The Irish experience is a direct response to the requirements of the European Union Directives on Packaging and Packaging Waste of 1994 and another Directive on Landfill of 1999 (www.repak.ie, 2011, Essels *et al.* 2001). Before the implementation of the Plastic Shopping Bag Levy in March 2002, the people of Ireland were properly informed of the imminent changes through the television campaigns and the distribution of posters and leaflets to all retailers to help them in providing information on the levy to the

customers (environ.ie/en/Environment/Waste, 2011). The leaflets were made available through the local authorities and the Department of Environment and Local Government. There was a direct communication from Revenue Commissioners to the retailers regarding their obligations. Local authorities and the Environment Protection Agency took responsibility for monitoring compliance (environ.ie/en/Environment/Waste; 2011). Local authorities started benefiting from the Environment Fund with budgets allocated for the enforcement of the waste laws and litter prevention initiatives.

Ireland has a population estimated at 3 797 257 people. In 2001 the Plastic Bag Levy Regulations were introduced to reduce litter impact of disposable PCB and as a waste prevention measure. The levy of 15 cents was introduced per plastic bag manufactured; they were sold for 70c and above to shoppers. Plastics designed for reuse were exempted. In 2002, the Republic of Ireland became the first country in the world to charge for PCB - a policy which cut usage by 90% almost overnight. Although the scheme has been beneficial for the environment, the measure was initially introduced to reduce litter (news.bbc.co.uk, 2011, Convery & Ferreira, 2006).

Repak Packaging in Ireland

Repak is a packaging compliance scheme set up in 1997 under Ireland's Waste Packaging Regulations (1997 to 2003) to facilitate producer responsibility in the area of packaging and packaging waste recovery and recycling. The core functions of Repak, to mention a few, are to raise and disburse funds from industry and other sources to defray the cost of recovery and recycling of packaging waste; to undertake educational and awareness programmes aimed at schools, consumers, industry and local government and to advise members on techniques to optimize packaging, prevent and minimise packaging waste (www.repak.ie, 2011, Essels *et al.* 2001).

[2]The regulations imposed obligations on major packaging to take back their packaging waste directly or join a national collection scheme run by Repak Ltd, (Department of Environment and Local Government 2003), (Ofira *et al.* 2009). The regulations also provided for limits on the concentration levels of certain heavy metals in packaging (www.repak.ie, 2011).

"In 2003; the Waste Management (Environment Fund) (Prescribed Payments) Regulations enabled the environment funds to be spent on:

- Protection of environment and/or sustainable development undertaken in Ireland or on international or trans-national basis;
- Initiatives for the prevention, reduction, recovery, recycling or reuse;
- Meeting national mandatory and voluntary contributions to national and international organisations concerned with the protection of the environment and or sustainable development" (Lamb & Thompson 2005).

2.2.4. Chinese experience

China has a population estimated at just over 1.3 billion people. In 2008, the Chinese State Council took a decision that, all supermarkets, department stores and shops in China would be prohibited from giving free plastic bags. Stores had to clearly mark the price of plastic shopping bags and are banned from adding that price to the price of

[2] The promulgation of Waste Management (Packaging) Regulations, 2007 repealed previous regulations and it was intended to facilitate the achievement of the targets for the recovery of packaging waste established by Directive 94/62/EC so that the compliance requirements relating to plastic have been met:

1. a minimum of 60% of packaging waste by weight is recovered; and
2. a minimum of 55% of packaging waste by weight is recycled in total, including material specific recycling targets as follows: 22.5% by weight for plastics.

products. The production, sale and use of ultra-thin plastic bags less than 25 μm thick was also banned (chinadaily.com.cn, 2011).

The Chinese Government placed a ban on the production, distribution and use of high density polyethylene (HDPE) plastic bags in January 2008. The government called for "a return to cloth bags and shopping baskets which was much more drastic than other countries". Customers who forget to bring their own bags could buy the thicker bags. This ban, however, did not include the widespread use of cardboard shopping bags at clothing stores or the use of plastic bags at restaurants for takeout food. Since the ban, there has been 10% reduction of plastic bags thrown away. The steady flow of some three billion ultra thin shopping bags into landfills across in China will soon slow down (CleanUp.org, 2007).

The Chinese government had the challenging task of changing people's behavior and their biggest problem was to convince supermarkets on how to implement the ban. They needed to do massive surveillance, perhaps also use the stick and carrot approach. Investing in massive education/awareness programs also assisted in getting the message across. The reason China has never had a good environmental record is because the government has not invested enough in environmental surveillance. China has also tried voluntary measures to reduce plastic bag consumption. A voluntary 'No plastic bag day' scheme in 2006 led to a 40% reduction in plastic bag use over a 24 hour period (CleanUp.org, 2007).

According to current government statistics, Hong Kong uses up to 23 million plastic bags a day or 3 bags per person. Hong Kong proposed to impose a 50 cent levy on every plastic bag sold at the retailers such as supermarkets, convenience stores and personal

health and beauty stores (Shanghai, Rosnick 2010). Commenting on the ban in China, a spokesperson for the Hong Kong Environmental Protection Department said:

"….. our proposed environmental levy on plastic shopping bags is to reduce the indiscriminate use of plastic shopping bags through a direct economic disincentive" (Guardian, 2011)

Asian housewives buy fresh food and produce daily from ‘‘wet markets" where uncooked food is displayed loose and then packaged in new ‘‘vest" shape carrier bags similar to many HDPE bags in Western countries. These vest-type bags are usually thinner and smaller in size than their Western supermarket counterparts (Chung, 2008). The situation in Hong Kong is not different from the South African experience where fresh fruits and vegetables are purchased on a daily basis by most consumers at vegetables markets or on the road side. Each and every purchase of this nature adds another free thin plastic bag on the pathway to the environment.

2.3. African Continent Experience

Literature review has been presented in a table format in Table 3; for more details please refer to the full text below.

Table 3: A comparative literature review on legislation, action and the results – African Continent

African continent overview of legislation promulgated, actions, results and success stories.		
South Africa	**Kenya (Nairobi)**	**Namibia**
Legislation	**Legislation**	**Legislation**
Promulgation of Plastic bags regulations in 2003, Development of plastic bag specifications.	Finance Bill 2007, Kenya Gazette Supplement No. 60 (Bills No. 26) promulgated in 2007, banning the importation and use of the thinnest bags and imposed a 120% tax on thicker ones.	No specific national environmental legislation is in place. Municipalities have their own specific waste management policies.
Actions	**Actions**	**Actions**
Introduction of plastic bag levy in 2003.	In 2007, consultation on the standard with all stakeholders and it was unanimously agreed upon by in the industry. Jan 2011, The NEMA issued a Directive to Kenya Bureau of Standards (KBS) to ensure compliance by the manufacturers through inspection.	Recycling of other recyclable material is in progress. Plastic bags not recycled. Swakopmund Municipality has formed a forum that is looking to introduce the plastic bag levy and create awareness around the environmental impacts of plastic bag pollution.
Establishment of Buyisa- e-Bag in 2004 to 2005.	The Directive aimed to ban the manufacturing, use and distribution of flimsy plastic bags.	
Inadequate awareness campaigns regarding PCB regulations and recycling opportunities.	Revise upwards the standard gauge of plastic bags and wrappers from 30 µm to 60 µm.	
Inadequate enforcement of the legislation, still a lot of non-compliant bags in the country.		
Results	**Results**	**Results**
Construction of nine buy- back centres in most provinces in the country.	Negotiations were in progress between the government, KBS and the plastic bag manufacturers as of Jan 2011.	None as yet.
Insufficient national recycling initiatives from the authorities, only individual efforts of recycling and reuse PCB.		
Success	**Success**	**Success**
Buy back centres are a success story due to the amount of recycling taking place and employment opportunities created.	None as yet.	None as yet.
Legal plastic bag manufacturers comply with the regulations and specifications.		

2.3.1. Namibia

Namibia is located in the west of southern Africa with a population of 2.1 million people which makes Namibia one of the least populated countries in the world with 390m^2 per capita (Yoav, 2010). Namibia is currently in a process of drafting their national environmental management policy. Each municipality has its own laws and regulations based on current problems and future plans (Yoav, 2010).

While recycling has been an option in Namibia for some years, for the most part, it required individuals to deliver their waste to the relevant recycling company. In late 2008, a number of partners from the private sector came together to start a recycling initiative that brought recycling to the community. The first steps of this new initiative have been taken in Windhoek (Yoav, 2010). The Namibian Manufacturers Association (NMA), which represents members such as Plastic Packaging, Namibia Polymer Recycling Company and the City of Windhoek Solid Waste Management Department negotiated with shopping centres to introduce recycling stations in their car parks. This initiative brought recycling to the people and made it obvious and easy for communities to participate. The response was overwhelming at Maerua Mall in Windhoek such that the recycling bins had to be emptied on a daily basis as opposed to bi-monthly planned. To make more stations available to people, ten schools in Windhoek have also set up recycling stations (Wolfgang Schenck, 2009).

The management of PCB is not yet a national issue in Namibia, so far only the Swakopmund Municipality has come up with measures to raise awareness on the impacts of plastic carrier bags. A forum of relevant stakeholders has been established recently and consists of representatives from Rössing Uranium, Plastic Packaging, Spar Swakopmund, Pick ‘n Pay, Woermann Brock and Shoprite. Currently less than 1% of all

plastic bags are recycled because it costs more to recycle a plastic bag than to manufacture one (Swakopmunder Lightbeams, 2009).

The task force has started doing work with the Swakopmund Municipality where they are embarking upon Recycling Project: Lighthouse. The recycling is aimed at achieving the following objectives (Swakopmunder Lightbeams, 2009):

- "To produce a by-law that will guide the implementation of a levy per plastic shopping bag issued.
- To reduce the negative effects of plastic bags and other pollutants on the environment.
- To raise awareness amongst the public of Swakopmund.
- To encourage the public to recycle.
- To implement the necessary measures to promote recycling.
- To get the buy-in of all retail shops.
- To use 50% of the funds generated through the sales of plastic bags as a donation towards the Environmental Fund that will be managed by the Council.
- To design and manufacture recycling depots and to place them at suitable areas in Swakopmund (Swakopmunder Lightbeams, 2009)".

The plastic bag management is still at an infancy stage in Namibia and requires the support of all the relevant stakeholders to make it a success.

2.3.2. Kenya (Nairobi)

The population of Kenya is approximately 39,982,595. Research on plastic bags in Kenya revealed that plastic bags are cheap, useful, and very plentiful, and that is exactly

the problem (en.wikinews.org, 2011). The report from United Nations Environment Program (UNEP) in 2005 proposed an environmental policy package comprising seven instruments to manage plastic bag waste, to be introduced gradually over a two to three year period in Kenya:

- A ban on plastic shopping bags that are less than 30 µm in thickness
- Consumer awareness and anti-littering campaign
- Promotion of voluntary schemes such as a national code of practice for retailers
- A plastic bag levy collected from suppliers
- Support for development of environmentally-friendly alternative bags
- Support for development of an effective plastic bags recycling system
- Support for development of a managed disposal system to cater for the plastic bags that will enter the waste stream irrespective of the measures taken (UNEP, 2005).

A report issued in 2005 highlighted issues already pointed out in other countries such as plastic bag pollution, the need to ban bags less than 30 µm in thickness, imposed a levy on thick bags, and suggested instigation of awareness programs on recycling and use of alternative or reusable bags for their shopping needs (UNEP, 2005). The formulation of effective institutional structures is of great significance in ensuring that legislations and by-laws promulgated are enforced to address pollution issues. A culture of reuse and reduction needs to be promoted to achieve behavioural changes (Bahri, 2005).

[3]The introduction of the 30 µm gauge and excise duty was aimed at striking a balance between industry, environmental conservation and sustainable development. The ban on the manufacture, importation and distribution of PCB of less than 30 µm is still in force; however manufacturers and the Nairobi City Council are in contention over a by-law which applied to Nairobi. The Kenya Bureau of Standards has gone ahead and developed a Kenya Standard – KS. NO. 1794 – Plastic Carrier Bags, this sets 30 µm as the minimum thickness standard. The standard was effective from January 2008. The manufacturers are unhappy with the imposition of 120% excise duty on imports and feel that is too much (Table 3) (nema.go.ke, 2011).

However, in January 2011, National Environmental Management Authority (NEMA) directed Kenyan Bureau of Standards (KEBS) to revise upwards the standard gauge of plastic bags and wrappers from 30 µm to 60 µm, the East African Community Standard. KEBS is to further ensure that the industry is in compliance with the new gauge through factory inspection and ports of entry surveillance and monitoring to prevent entry of plastic bags and wrappers below the gazetted microns. This directive is aimed at excluding any plastic that cannot be recycled or reused, encourage the manufacturing of heavier plastic bags, which do not easily fly around thus preventing littering, and encouraging re-use and recycling (nema.go.ke, 2011). Currently, the manufacturers are yet to comply with the new standard because they are still negotiating with the NEMA. On the ground, the issues have not changed, plastic bag pollution continues and

[3] In 2007, the Minister for Finance promulgated a Finance Bill, 2007, and gazetted it under Kenya Gazette Supplement No. 60 (Bills No. 26) which among other things proposed:
(i) Banning the manufacture and importation of plastic bags of less than 30 µm;
(ii) Imposition of 120% excise duty on all sacks and bags including cones of polymers of ethylene, other plastics sacks and bags used for packing goods.

manufacturers are making money while delaying the implementation of the new standard.

2.3.3. South Africa

The South African population is estimated at 49 320 150. Plastic bag regulations were promulgated in May 2003. These regulations resulted in an agreement between government, organized labour and private sector; this improved the extent to which South Africa's former "national flower" (PCB) is now used in a more responsible manner. This agreement provided for: minimum thickness of plastic shopping bags; disclosure and transparency with regard to cost of these bags; stipulated the type and amount of ink to be used on the bags; agreed on the need to promote a market in recycled materials; provided for a levy on plastic bags; prevented importation of non-compliant bags and committed itself to promoting the aims of the Proudly South African Campaign (DEAT media statement, 2004).

The implementation of this Memorandum of Understanding was a first and critical step to link waste minimization; improved environmental performance and creation of jobs and new enterprises. In order to ensure that the environmental and economic benefits are maintained, the agreement provided for the establishment of a Section 21 Company called Buyisa-e-Bag (B-e-B) to encourage reuse, collection and recycling of plastic bags, as well as establish small medium and micro enterprises (SMME) thereby encouraging job creation in the collector sector. B-e-B is funded from State coffers through a plastic carrier bag levy (currently 4c per bag) charged when purchasing each carrier bag. B-e-B’s mandate is to put systems in place to stimulate PCB recycling systems in South Africa on behalf of government.

The agreement stipulates that in order to sustain the activities of Buyisa-e-Bag, government will enforce a plastic bag levy. To this end, National Treasury has amended the Customs and Excise Act to give effect to the plastic bag levy. The levy is accessed by DEAT through an application for funding for B-e-B and SABS (compliance monitoring section) so that it can be invested back into the industry. SABS undertakes compliance monitoring to manufacturers and takes samples (PCB), if the bag complies, the manufacturer will not incur the sampling and analysis cost, however, if it does not comply, the manufacturer or the retailer is "*liable to pay all the costs and in addition pay a fine that will be determined by the South African Bureau of Standards".*

Government intervention

The government has the responsibility of ensuring that the levy is managed and disbursed properly and that the aims are implemented. The study undertaken in 2007 by DEAT was reviewed and it revealed that there was a communication gap between the leading stakeholders in this project. There was a need to form a working committee in all provinces where the buy back centres were to be constructed. The committee was supposed to incorporate members from the local, provincial authorities and B-e-B. The acquisition of land; permit to operate, and time frame for the construction of the centres were going to be discussed at these meetings to allow the implementation plan to run smoothly.

The process followed currently is that B-e-B identifies land, approaches the responsible municipality and if the two parties reach an agreement, B-e-B leases the land. The permit to operate a recycling facility is applied for (DEAT media statement, 2006). This

approach is problematic because of the delays experienced in the granting of permit hence the delays in the construction of centres.

2.4. Problem statement

The present study looks at the impact of handling and disposal of PCB after 2003. It also looks at the consumption of plastic bags from all aspects looking from the retailers through to the recycling activities in Gauteng Province. Is this legislation having an impact on the problem at ground level?

2.5. Hypotheses

- The promulgation of the PCB regulations brought about some changes in the behaviour of consumers;
- The consumers did not understand the regulations;
- The implementation of the regulations resulted in the reuse and recycling of strong plastic bags.

2.6. Objectives of this study

The efficient management and recycling of PCB has a great potential to create employment opportunities and minimize environmental impacts. The objectives are as follows:

- To establish the extent of the impact caused by the regulations on the shopkeepers (retailers) and informal traders;
- To establish the level of understanding of the regulations by the consumers;
- To find out from the landfill site managers if the plastic bags numbers have decreased in the landfill sites after the regulations and whether the PCB are collected and recycled or not from the landfill sites;
- To determine whether the individual waste collectors are interested in collecting PCB for recycling or not.
- To find out what Buyisa-e-bag is doing regarding the identification and support for initiatives aimed at stimulating the collection and recycling of plastic carrier bags.

CHAPTER 3

3. MATERIALS AND METHODOLOGY

3.1. The pathway of plastic bags from the shopkeepers to recycling areas.

The study looked at the movement of PCB from the shopkeepers through to the recycling and recovery as shown in Figure 2. Both legal and illegal types of bags were encountered in this study. When the plastic bag regulations were promulgated in 2003, the government gazetted the plastic bags specifications with which the producers had to comply. There are companies within the industry that modified their processes to ensure compliance. The legal manufacturers such as Nampak Polyfol, Transpaco, Aadil Plastics, and Premier Plastics etc. are well known in the industry and produce quality products. There is evidence that non-compliant bags are available in our society; these bags may be imported. The manufacturers of PCB have a huge role to play in ensuring legal compliance with plastic bag regulations. The study excluded the manufacturers and distributors of PCB.

The retailers and informal traders can change consumer shopping behaviour and reduce the demand and dependence on PCB. The pathway of a PCB begin with retailers and informal traders where consumers buy grocery and other items, they buy new PCB and fail to reuse them. At home; consumers use PCB to store waste before it is disposed of. When the waste gets to the landfill, the manager ensures that dumping; scavenging and covering of waste goes according to plan while taking care of safety of all participants. The study also looked at the individual collectors operating in landfill sites to establish the level of recycling of PCB as well as with individual collectors operating in residential and industrial areas. Buyisa-e-Bag is at the end of the PCB pathway where the bag must be collected and be introduced back into the system. Various initiatives and mechanisms

for waste recycling must be put in place to ensure the recovery of PCB and other recyclables. The recycling system currently used in areas that were visited was also studied with specific focus on PCB.

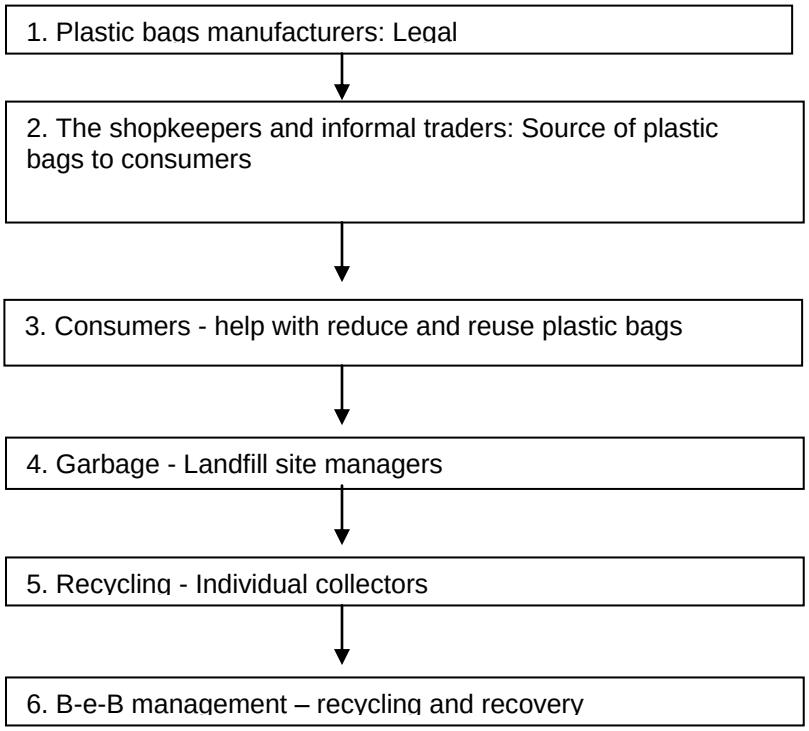

Figure 2: The pathway of PCB from the source – shopkeepers/informal traders to recycling areas.

Through the use of interviews and questionnaires designed for each group of interviewees, this study looked at the mobility of PCB from shopkeepers and traders through to recycling by different stakeholders. The shopkeepers were the source of PCB to the consumers. This group of people plays a vital role in promoting the use of legal or illegal PCB in their business. This study included the chain supermarkets and individual traders to get a broader picture of what is happening with the PCB mobility between the shopkeepers and consumers.

Consumers were interviewed in shopping malls after their grocery shopping in order to establish the behavioural trend of adopting reuse and recycling principles. The consumers were studied from four different shopping malls that were chosen for the study in the Gauteng Province.

The survey around the recovery of PCB in the landfill sites was done through the involvement of landfill site managers. They had a crucial role to play in ensuring that most valuable waste is recovered before it is buried by creating conducive environment for waste collectors to operate efficiently.

Individual collector in this case refers to the people who operate individually or in pairs to collect specific items in residential and industrial areas. Individual collectors were targeted in this study to establish the types of waste they collect and recycle for monetary gain with the domino effect of reducing quantities of waste being disposed of.
The number of participants was chosen based on the availability and willingness to participate in the study. The participants' representative sample was a minimum of ten in each category e.g. from each shopping mall.

The last section of the study looked at the progress made by Buyisa-e-Bag in driving the recovery of PCB through recycling initiatives they were mandated to establish country wide.

3.2.1. Study sites

The study was conducted in the smallest and yet most populated Gauteng Province. Gauteng is the centre of finance and industry with a highly sophisticated and diverse economy including the transportation and communication and manufacturing (GEDA 3, 2008). The study areas and target groups were selected on availability and willingness to participate, convenience, access to the sites as well as cost curtailment due to insufficient funding for the project (Figure 3 & 4).

3.2.2. Shopping Malls

Interviews with the consumers, retail store managers and some informal traders were done in the shopping malls. Consumers were stopped on their way out of the shop or in the parking area and the store managers and informal traders were interviewed while on duty.

These shopping malls were chosen based on convenient access and ensuring coverage of diverse group of respondents from the study areas, Figure 3 shows the locality of all shopping malls selected for the study.

- Midway Mall is located in Bramley and is surrounded by Kew, Lyndhurst and Savoy residential areas. These areas can be described as middle class areas looking at the houses, local schools, and cars driven by the local residents. These areas have always provided job opportunities for the majority of people from the nearest Township, Alexander.
- Maponya Mall is situated in Pimville, Soweto; it is surrounded by townships such as Klipspruit, Mofolo, Dube, and Dhlamini. Soweto is one of the oldest and largest re-settlement areas in South Africa built in the 60's by the apartheid

government to segregate non-white residents. Most people who reside in this township belong to the lower to middle class

- The Pan African shopping mall is situated in Alexander north of Johannesburg; this is one of South Africa's poor townships surrounded by Wynberg, Kew, Marlboro and Tsutsumani areas. Alexander is notorious for high population density and inadequate resources to meet the residents' basic needs.
- The Menlyn Mall is situated in the eastern side of Tshwane surrounded by suburbs such as Lynwood, Ashlea, Menlyn, and Newlands. This mall is located in the high class area with modern houses and entertainment areas, the streets area always clean and gardens well cared for. The presence of security guards in some streets and police vehicles is an indication of an area well managed.

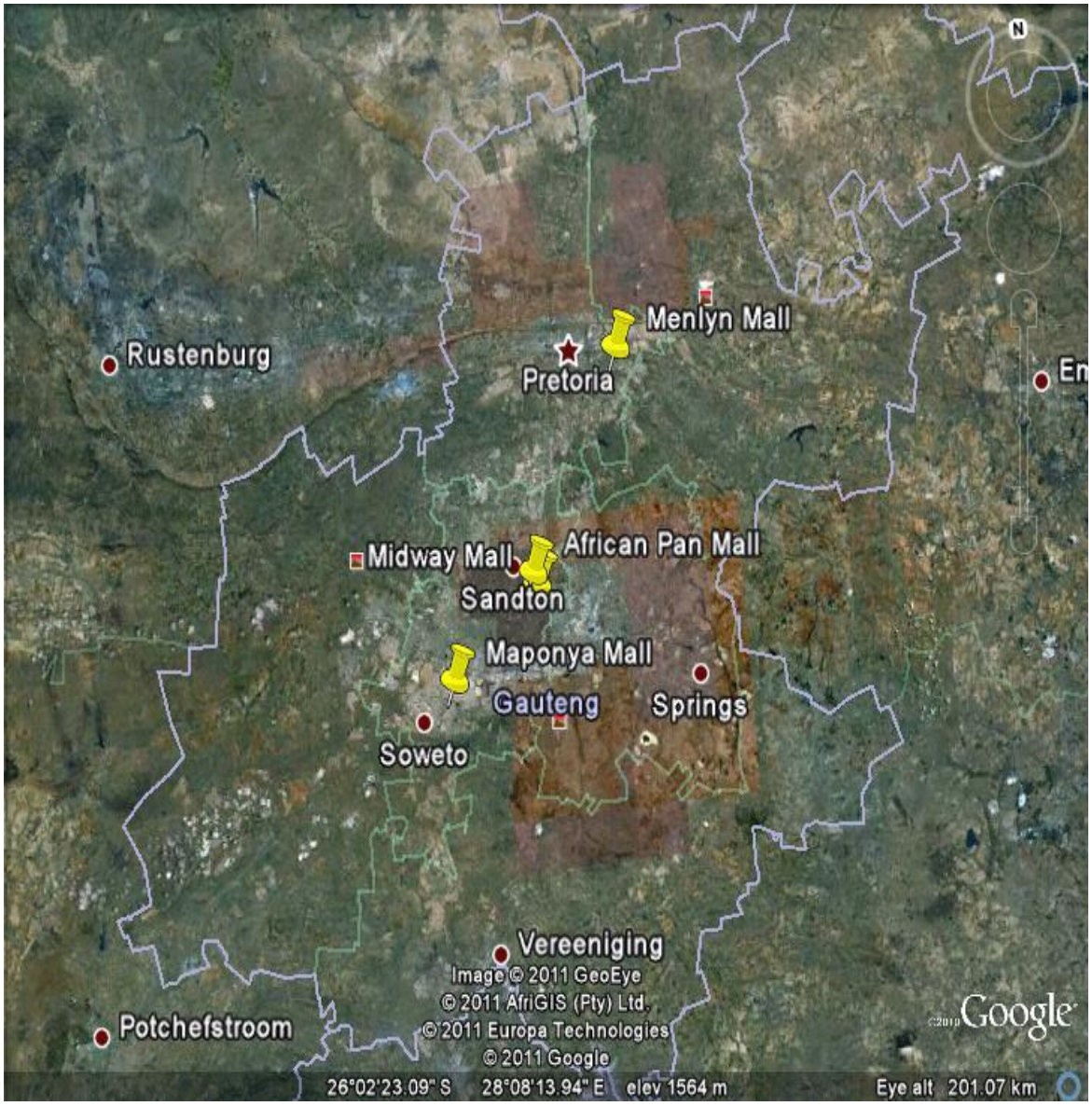

Figure 3: Gauteng map depicting all shopping malls selected for the study.

Retailers

Retailers that were covered by the study included the big chain supermarkets such as Pick 'n Pay, Spar, Super Spar, Checkers Hyper; Shoprite Checkers, Game, Woolworths Food and Mica Hardware. They were all selected from shopping malls listed on Page 32 within Gauteng Province. The retailers were selected because of their popularity countrywide and they play a pivotal role in distributing the PCB to the consumers in

larger quantities. These stores only sold the legally compliant PCB after the promulgation of the regulations. They also supported the memorandum of understanding signed by government and business as well as other key stakeholders. A total of 40 people were interviewed in the form of managers and front desk managers to get responses for the questionnaire. Ten people participated in each shopping mall.

3.2.3. Informal traders

A total of 80 informal traders were interviewed during the study, they were selected from the shopping malls and surrounding areas. The interviewer aimed at having 20 informal traders interviewed per area, if few were present in the shopping mall, the interviewer went to the vicinity to locate more. Informal traders were interviewed directly as they mostly operated individually. They operated as street vendors, spaza shop owners, ran mobile containers and any other small non-chain stores. The informal traders were selling fruits, vegetables, clothes and take away food. They were selected for this study as they play an important role in supporting or not supporting the compliance requirements of the PCB regulations.

3.2.4. Consumers

Twenty five consumer respondents were interviewed from each shopping mall, making a total of 100 questionnaires completed. The consumers were selected randomly; willingness to participate in the study and age were used as criteria to include or exclude participants from the study. Adults from twenty years and above were targeted group of people because they would remember the shopping experience before and after the regulations came into being. They can provide a comparative assessment of progress made if any by the authorities and all other stakeholders involved. The consumers were

targeted for the study as they play a crucial role in the consumption and disposal or recycling of PCB. The consumers are the vehicle that move PCB around; they increase the demand through higher consumption hence they formed part of the study to establish their understanding of this problem. They also add to the challenge of littering and careless disposal of PCB faced by the authorities.

3.2.5. Landfill sites

The study was undertaken in three areas; Ekurhuleni, City of Johannesburg, and City of Tshwane Metropolitan Municipality landfill sites. Due to the high population and the number of industries in these areas, the volume of waste generated is very high. This places a huge burden to the authorities to provide waste management services and safe disposal.

Six landfill sites were visited and one manager per site was interviewed. The landfill site managers were not always available for interview; nevertheless, their alternate managers assisted with responses during the survey. The interview was done in the office or on site which helped the author in terms of understanding the process followed on site. The author was escorted by the manager or the security guard to the site to meet individual collectors that were operating on site.

The reduction of waste from the source is an important strategy to minimize waste quantities at source while ensuring that only the non-recyclable waste goes to the landfill site. This is where individual collectors play a pivotal role in recovering waste at homes or in the organizations recycling yards. The individual collector in this study refers to the two sets of people; those that push trolleys on the side of the road and those that pick waste at the landfill site. These people were identified because they are situated towards

the end of the chain of movement for PCB. If the demand for the recycled PCB was high, the collectors would collect them for recycling purposes. That would reduce the quantities as well as environmental and social impacts.

The following landfill sites were studied in Gauteng Province, see Figure 4:

- The Robinson Deep landfill is located in the Springfield area south west of Johannesburg City centre and Goudkoppies is located near Pimville in Soweto, both landfill sites are managed by Pikitup on behalf of City of Johannesburg. Both sites are aesthetically displeasing due to land pollution, especially where waste is not managed properly. These sites also emit noxious and unpleasant odors; (pikitup.co.za; Goudkoppies Landfill site, 2010).

- In Ekurhuleni, the Weltevreden and Rooikraal land fill sites are managed directly by Ekurhuleni Metropolitan Municipality and receive waste from Brakpan, Boksburg, Benoni, Wadeville and other surrounding areas. Both landfill sites mentioned above have the operating lifespan projected up to the year 2032. The projected lifespan objective will be realized by the Ekurhuleni municipality if the quantity of waste disposed can be reduced through various measures such as recycling, reusing and reducing waste generation and disposal.

- In Tshwane, the Kwaggasrand and Onderstepoort landfill sites are directly managed by the Tshwane Metropolitan Municipality and they receive waste from areas around Pretoria North and Pretoria West (Onderstepoort, Attridgeville, Laudium, Garsfontein and surrounding areas), Figure 4 depicts the locality of all sites in relation to the Gauteng Province border.

For the interview in the landfill sites, the interviewer got access permission from the appropriate municipality to visit their landfill sites. The only entrance requirement was adherence to their minimum personal protective clothing which was a hard hat and steel capped boots. Appointments were setup with the responsible manager for the field visit. The interviewer was requested to go through a site specific health, safety and environmental induction to familiarize herself with the site operations before a site walkabout was approved. When the interview with the manager was finished, individual collectors were met on site.

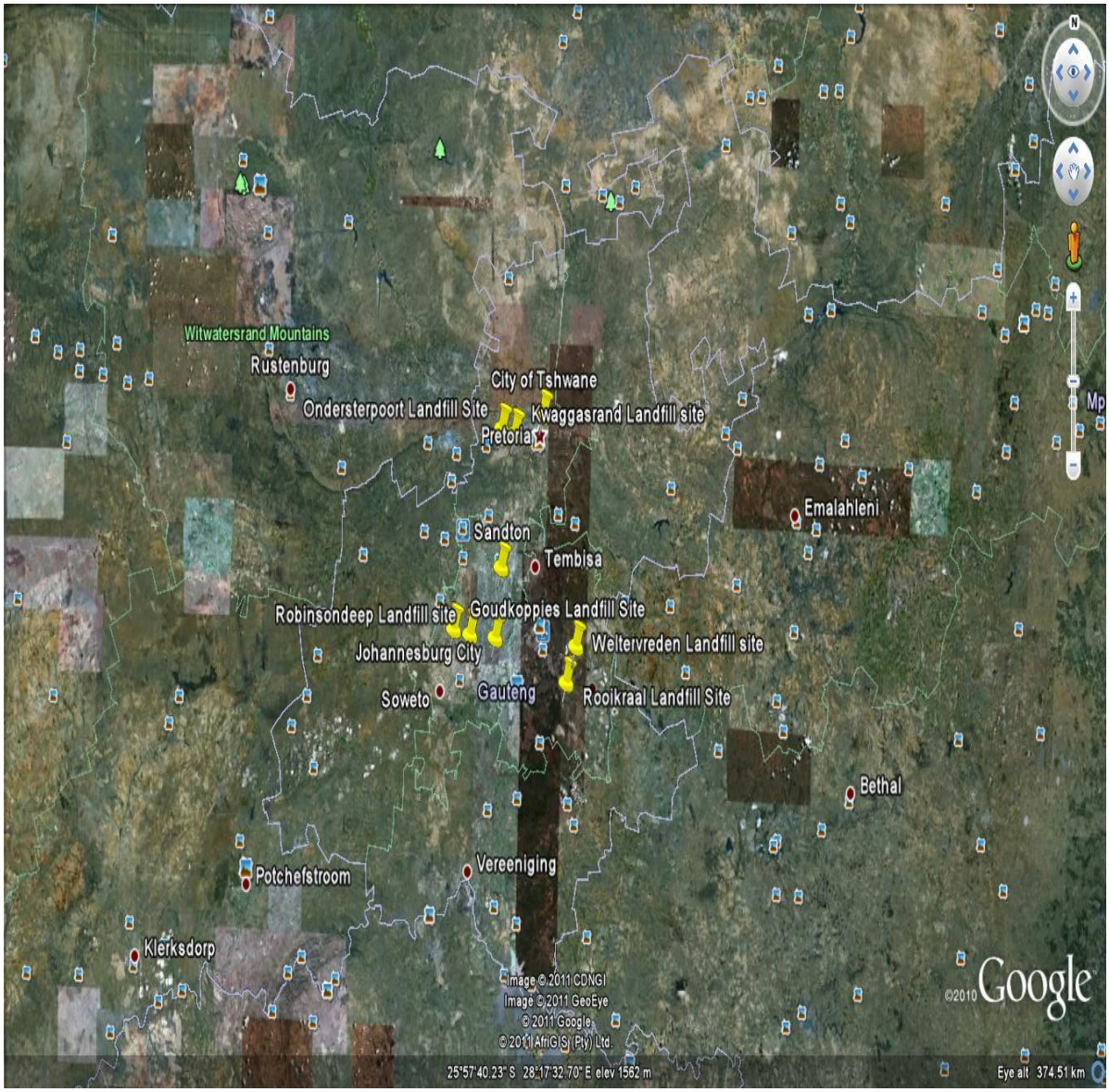

Figure 4: Gauteng map with landfill sites covered by the study.

The survey around the recovery of PCB in the landfill sites was done through the involvement of landfill site managers. They had a crucial role to play in ensuring that most valuable waste is recovered before it is land filled.

3.3. Recycling

3.3.1. Individual collectors

Individual collectors were targeted in this study to establish the type of waste they collect and recycle for monetary gain with the domino effect of reducing quantities of waste being disposed of. Individual collection in residential or industrial areas is done by means of waste material being collected from the source so that there are fewer quantities taken to the landfill and it also saves disposal costs. The choice of the recyclable material is driven by the availability, proximity to their homes and recycling stations as well as the value of the material.

The interviews with individual collectors were done at the landfill sites, on the road side and in the recycling facilities. It was not fruitful to chat on the road due to the noise from passing vehicles and the fact that the waste collector had to focus on pushing the trolley, the interview was the last thing they wanted. Discussion in the recycling facility was more productive. The same approach was used in the landfill sites, the discussions with the collectors were undertaken in between dumping of the truck loads, and while the refuse was being covered. The collectors were more willing to talk about their hardship while working on site and they digressed a lot during the discussion which meant that the interviewer had to constantly guide the discussion back to the question asked in order to get the value out of the interview. This was the most chaotic encounter because the interviewer attracted attention from other collectors who were curious to know what the discussion was about; they came in numbers and crowded the space while throwing in answers to the questions not directed at them.

3.3.2. Plastic carrier bag re-users

There were PCB re-users that had created businesses using recycled bags. There was a company called Rooikop cc based in Johannesburg that was running a successful business using PCB. A group of women in KwaZulu-Natal made a living out of collecting used bags and make different products which they sold into their local markets.

3.3.3. Buyisa-e-Bag

In the case of Buyisa-e-Bag, the interviewer attempted to set up a meeting with the appropriate personnel after a receptionist advised of the right person to assist with the responses for the questionnaire. This person was not available for the meeting hence it was suggested that the questionnaire must be sent through email; it was attended to and returned eventually. B-e-B was not receptive to the idea of a questionnaire judging by amount of time it took to respond and numerous calls and emails sent to B-e-B without response. It took five months to respond to the questionnaire with only six questions.

Molefi Recycling is one B-e-B centre which was visited during the study; it is a buy back centre operating from Soweto in Pimville. This centre is running effectively and professional with latest technology and equipments. It was against this backdrop that this study intended to probe further on the progress made by B-e-B on their roles and responsibilities listed in the MOU which would affect the recycling of PCB and skills upgrade in the sector.

3.4. Data gathering

The questionnaires were used to collect data from the retail shop managers, informal traders, consumers, individual collectors, landfill site managers and Buyisa-e-Bag. The copies of all the questionnaires and human ethics approval letter are attached as Appendix 1-7 (pages 90 – 97). Data gathering was done face to face through the questionnaire designed for each target group except for Buyisa-e-Bag who requested the questionnaire to be sent through email. The details of the consent form were explained to the respondents participating in the study to create an understanding of the project and explain their rights before the interview commenced. The author was responsible for completing the questionnaire during the interview and this assisted in fast tracking the process. Not all interviewees could have filled in the questionnaires and it was decided that all should be treated in the same way.

3.5. Questionnaires and documents used for this study

The questionnaires were used with the following group of people:

- Appendix 1 - Retailers
- Appendix 2 - Informal traders
- Appendix 3 - Consumers
- Appendix 4 - Landfill site managers
- Appendix 5 - Individual waste collectors
- Appendix 6 - Buyisa-e-Bag
- Appendix 7 – Clearance certificate

The consent form and the permission letter was compiled and submitted for approval to the project supervisor and the Human Ethics Committee (Non-medical) before the

interviews were conducted in the field. The material mentioned above was approved and issued with a clearance certificate and the reference number R14/49 as indicated in Appendix 7.

3.6. Limitations of the study

- Lack of funding for the project
- Access to information required for the study from major retailers
- B-e-B lack of response on progress made on collection and job creation

CHAPTER 4

4. RESULTS

4.1. Retailers

This group of interviewees was more organized and readily available to assist with interviews; what was common among this group was their unwillingness to divulge the sales figures and the trends of plastic bag consumption before and after regulations fearing that they could compromise their business. The retailers in general felt that the introduction of plastic bags regulations was not properly managed by government hence the customers reacted negatively to the changes around the availability and access to plastic carrier bags. Responses to questionnaire are analysed below.

- **What is your view on the consumption of plastic bags before and after the plastic bags regulations?**

Out of 40 people interviewed, the responses received were all similar which reflected that the retailers interviewed went through the same experiences as far as the customer's responses to the regulations requirements are concerned. Twenty one retailers stated that the consumption of bags significantly decreased after the regulations. They have seen a gradual increase in consumption over the years since the promulgation and it is now stable. Nineteen retailers stated that the consumers still use the PCB irrespective of the cost involved. The continuation of this behaviour is as a result of inadequate transport system where customers travel longer distances with heavy groceries and they need a reliable carrier bag to withstand the challenge. The consumers lack of planning and discipline causes them to buy new bags all the time because they fail to care for the old bags so that they can reuse them.

- **How were you affected by the plastic bags regulations?**

The customers' response to the introduction of the regulations caught the retail industry by surprise. There was a sudden change of behaviour among customers when they resisted change from a free plastic bags system. The demand for grocery packers dropped considerably such that there was no need for them due to the changes in the operation process. The consumers largely brought their own bags and packed their own groceries which made the packers redundant, as a result, most of them lost their jobs. There were delays in the queues due to such changes in their operations.

All retailers interviewed stated that for about three to six months after the regulations, their stock of carrier bags moved very slowly due to the negative responses from the consumers. One retailer mentioned that

"plastic bag was the most selling item in the shop on a daily basis"

as they were given free to consumers. Another retailer added that

"plastic bags were always available at a price, they were never available for free even before the regulations" just that their

"cost was never known to the customer, prices per item sold in the shop were inflated to some degree to cover the cost of a bag".

A total of fourteen retailers stated that they had to increase security in their stores to guard against theft and shoplifting as customers brought all sorts of bags to carry groceries. Eighty retailers stated that they had high stock of plastic bags that was not sold due to customer "boycott". Twenty-four managers said that they had to cut down on the number of packers at the till due to redundancy. Only four retailers were of the view that the introduction of the regulations increased their administration because they have to account for the number of bags sold and the payment of the levy (Figure 5).

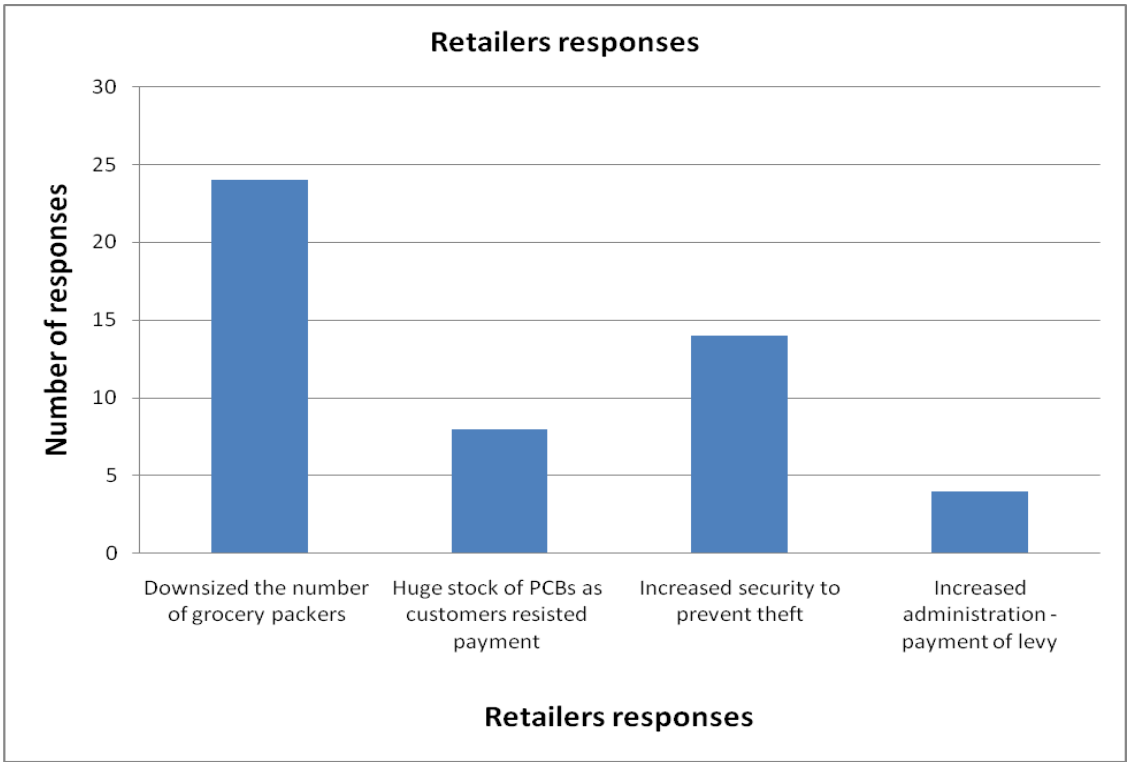

Figure 5: Impact of regulations on retailers

- **Do you encourage your customers to reuse their plastic bags or eco/green bags?**

This question also received one sided response as not a single retailer encouraged their customers to re-use plastic or cotton green bags. Eleven responded saying that they do not encourage the customers to reuse their bags as that was outside their scope of work. Twenty retailers mentioned that they advertise cotton bags like any other product on the shelves, no special attention is given to the bags, customers buy them because they know about the bags and they need them. Nine retailers stated that plastic bags are sold only on customer's approval or request. The packer asks the customer if they would like to have a plastic bag or not.

4.2. Informal traders

A total of 80 interviewees participated in this questionnaire survey done in Tshwane and Johannesburg areas. The informal traders interviewed were selling fruits, vegetables, clothes and take away food. The criteria used in selecting them for interview was their availability and willingness to participate in the study. What was common amongst this group was the fact that many of them had limited skills in local language and were non South Africans, however, they had no idea what plastic bag regulations were all about. Twenty people were selected from each mall and surrounding trading areas to make the total of 80 informal traders.

A general observation across all informal traders was that they all traded with thin plastic bags that do not comply with the plastic bag regulations in terms of the thickness requirements. There were no branding labels on the thin bags which were of different colours and had an unpleasant odour that was exuded from the bags when handling it. Informal traders are known to support the market that supplies the consumers with non-compliant thin PCB. This was evident looking at the type of PCB they use for their trading.

- **Do you charge for plastic carrier bags?**

All 80 respondents indicated that they do not charge customers for the bag. This situation is similar to what the big retailers did before the plastic carrier bag regulations were promulgated in 2003. The cost of the bag was not known to the consumer. The informal traders stated that

"they add the cost of the bag and transport to the cost of the product they sell". This is partly because their business is not directly regulated and they never spoke about

charging for the bag in any of their discussions. The informal traders also were afraid they would

"loose their customers if they start charging for the bags separately because the practice will not be applied across the board".

- **Where do you buy plastic carrier bags?**

There were specific areas where they bought PCB for their businesses. The shopping areas ranged from no name shops to bigger wholesalers where a variety of small businesses sourced their stocks.

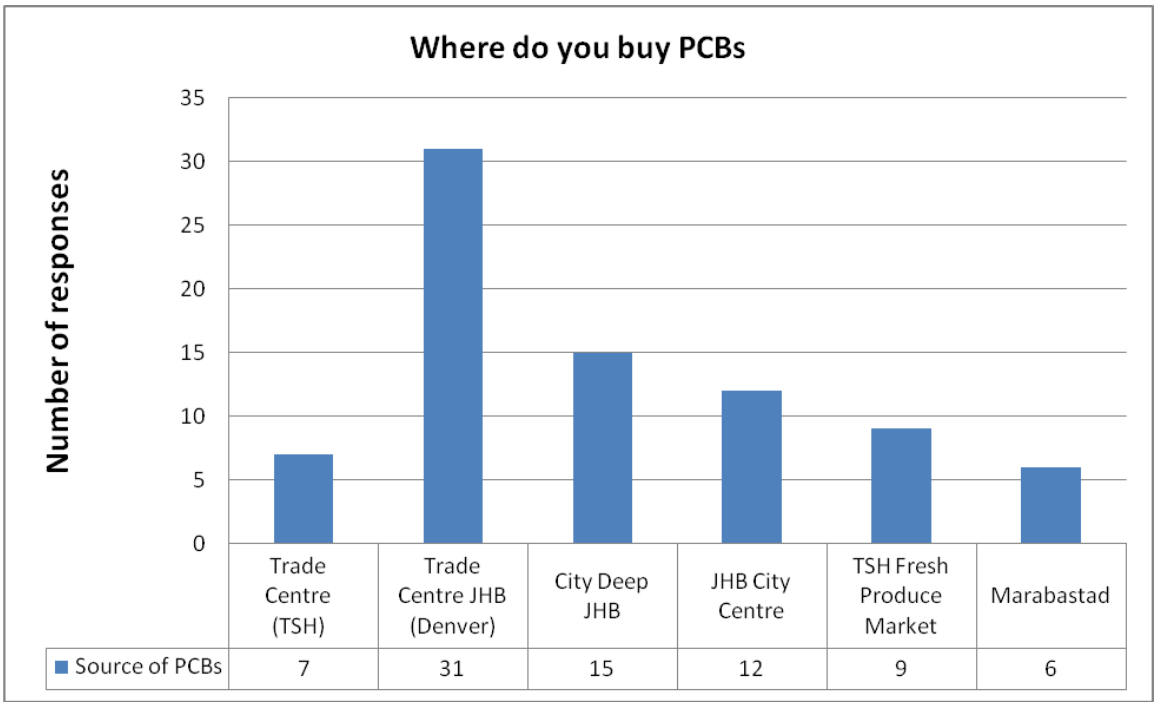

Figure 6: Number of people using specific shopping areas in Johannesburg (JHB) and Tshwane (TSH)

Depending on where the trading takes place, the informal traders may use the local suppliers to get PCB closest to where they source their stock to avoid unnecessary travel Figure 6.

- **How much do you pay for a batch of plastic carrier bags?**

The traders bought a batch of 100 or 200 thin bags depending on the turnover of products sold. The traders who sold fruits and vegetables were more inclined to buy 200 bags as they used more bags than someone selling non-perishable stuff such as clothes. Out of 80 interviewees, 26 bought 200 12 litre bags per batch and 54 bought 100 eight litre bags per batch. Further breakdown of the shopping areas, number of people as well as cost is shown in Figure 7 and 8 below.

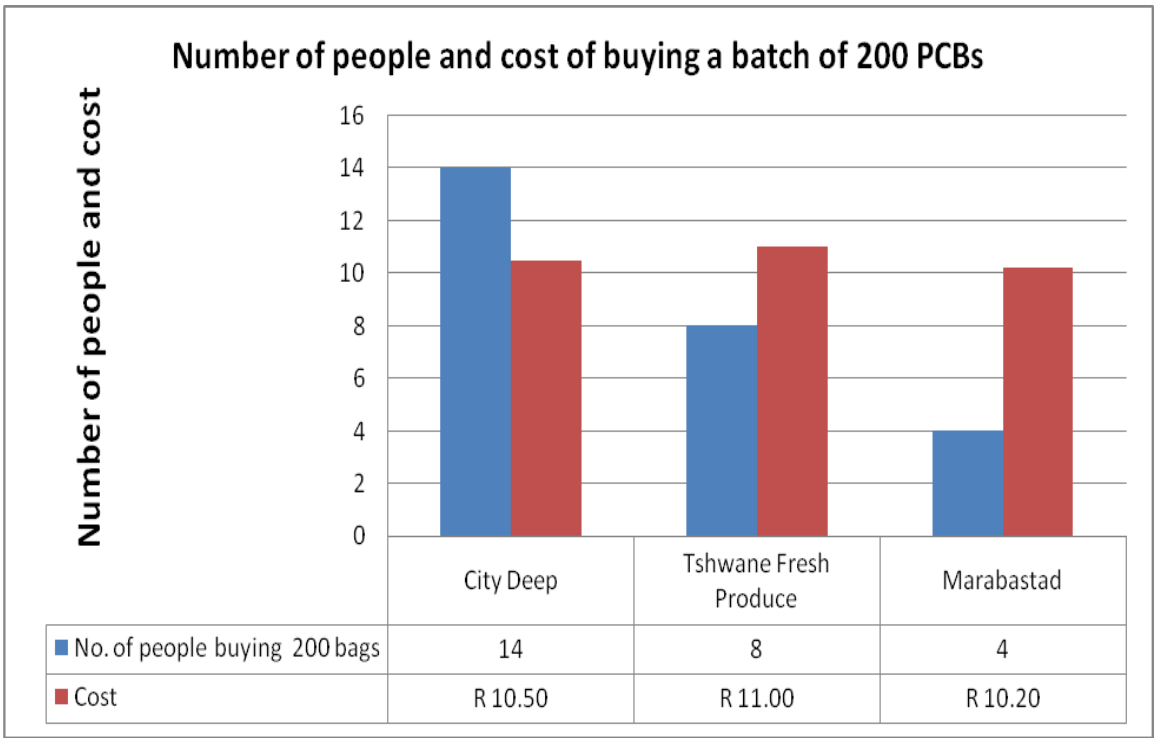

Figure 7: Number of informal traders purchasing 200 bags per batch

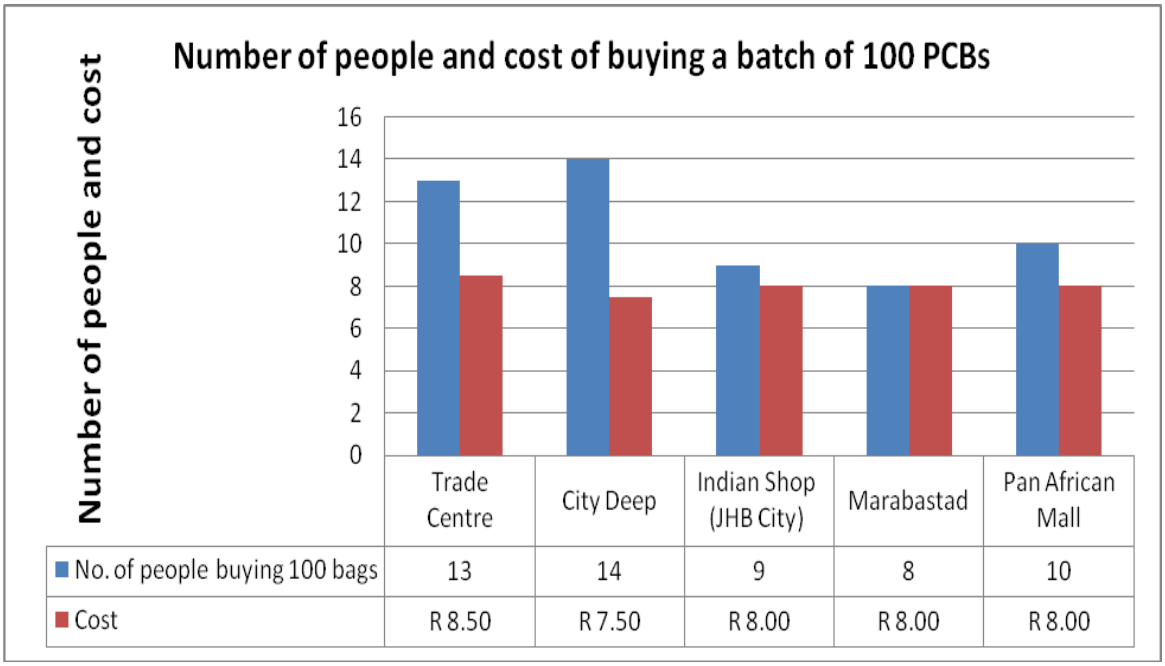

Figure 8: Number of informal traders purchasing 100 bags per batch

- **Do you reuse plastic bags?**

The answers were a testimony to the fact that plastic bags regulations are not a familiar topic among informal traders. An overwhelming majority of 77 interviewees stated that they do not re-use the thick bags when they go for their grocery shopping. They use the bags from their business to avoid paying for the new bags. They cited that these bags get torn after one use because they use public transport to commute and buy many smaller items on one trip, as a result, they cannot be re-used. Three people mentioned that they do reuse plastic bags because they use two bags at a time which provides more strength to withstand the impact from carrying heavy grocery on public transport, consequently, two bags used as one last longer which is what they require from quality thick bags.

4.3. Consumer responses

It was a bit challenging to get consumer's attention for an interview; they were either in a hurry or lost interest when they realized that there were questions to be answered. The consumers were drawn from all races to get a broader perspective of the understanding of the plastic bags regulations. The interviewer had to use Wits University clothing merchandise to gain recognition and support from the interviewees. Consumers were asked five questions using the questionnaire in Appendix 3 and the responses were noted down by the interviewer. A separate sheet was used for each interview. Some consumers stopped and chatted with the interviewer while some preferred to have the interview in the comfort of their vehicles.

The consumers' responses to the following questions are discussed hereunder:

- **Do you have any idea why you are paying for plastic carrier bags?**

This question raised concerns from the consumers, judging by their facial expression and immediate utterances; it became evident that they were not clear in their minds as to why they are paying for the bags. One hundred consumers were interviewed and 11 of them indicated that they had

"no idea as to why they were paying for the bags".

Even those that gave some response to the question were incorrect (as discussed below) though closer to the truth.

The largest number of responses to the abovementioned question were related to the cost of living and the fact that there is nothing acquired for free in South Africa hence 79 out of 100 interviewees gave the response such as

"because everything else cost money that is why we are paying for the PCB"

An interesting comment mentioned here was that a

"*person will only value what they pay for*"

and

"*perhaps the retailers want consumers to value plastic bags and reuse them*" but the concern is that they

"*still break after being used once or twice*".

Only ten interviewees gave responses that linked government to the payment for PCB. They stated that

"it has to do with government regulating the sale of plastic bags".

Unfortunately they demonstrated a shallow understanding on the subject as they could not expand as to why government wants to regulate the sale of plastic bags.

- **What is your understanding of the plastic bag regulations?**

Out of one hundred interviewees, not a single person responded positively to the question. Eighty two responses received stated that

"they had no understanding of the regulations"

and they did not even know that they existed and what was expected out of them as consumers. Ten consumers responded saying

"they never heard of the regulations hence they don't understand them".

Eight consumers interviewed responded by asking questions like

"what is contained in the regulations, when were they published (is it recent or a while back), and am I expected to know these regulations".

- **When you go shopping, do you carry your own bag/s or you buy bags from the shop every time?**

It was observed during the interview that some consumers chose to buy new plastic bags as they do not see the behaviour as extravagant due to plastic bag prices being cheaper than the goods purchased (Table 4)

Table 4 responses: When you go shopping, do you carry your own or you buy new bags every time?

No. of consumers	Responses
6	No, don't carry own bags, depends on the quantities of the grocery.
2	Yes, I carry my own bags, depends on the quantities of the grocery.
7	Yes and no, sometimes I carry and sometimes I don't, also depend on the number of grocery items I bought.
73	Yes, always buy new bag, irrespective of the price, it's the cheapest item.
3	Yes, I always buy for hygienic, looks presentable and respectful.
9	Yes, I always buy new bag for various uses at home.

The above responses suggest that plastic bags are still sold more than they are recycled and reused.

- **Do you reuse plastic carrier bags?**

This question was aimed at establishing whether the plastic bags bought are used once or are reused either at home or for grocery shopping or not reused at all. Seventy eight stated that

"*the PCB is never reused due to the quality".*

Fourteen respondents stated that

"they use the carrier bags as bin liners at home and at work".

Only eight mentioned that they

"reuse the bags for variety of activities until the bag is worn out and can't be used"

when they dispose of it in the normal refuse bins, Figure 9.

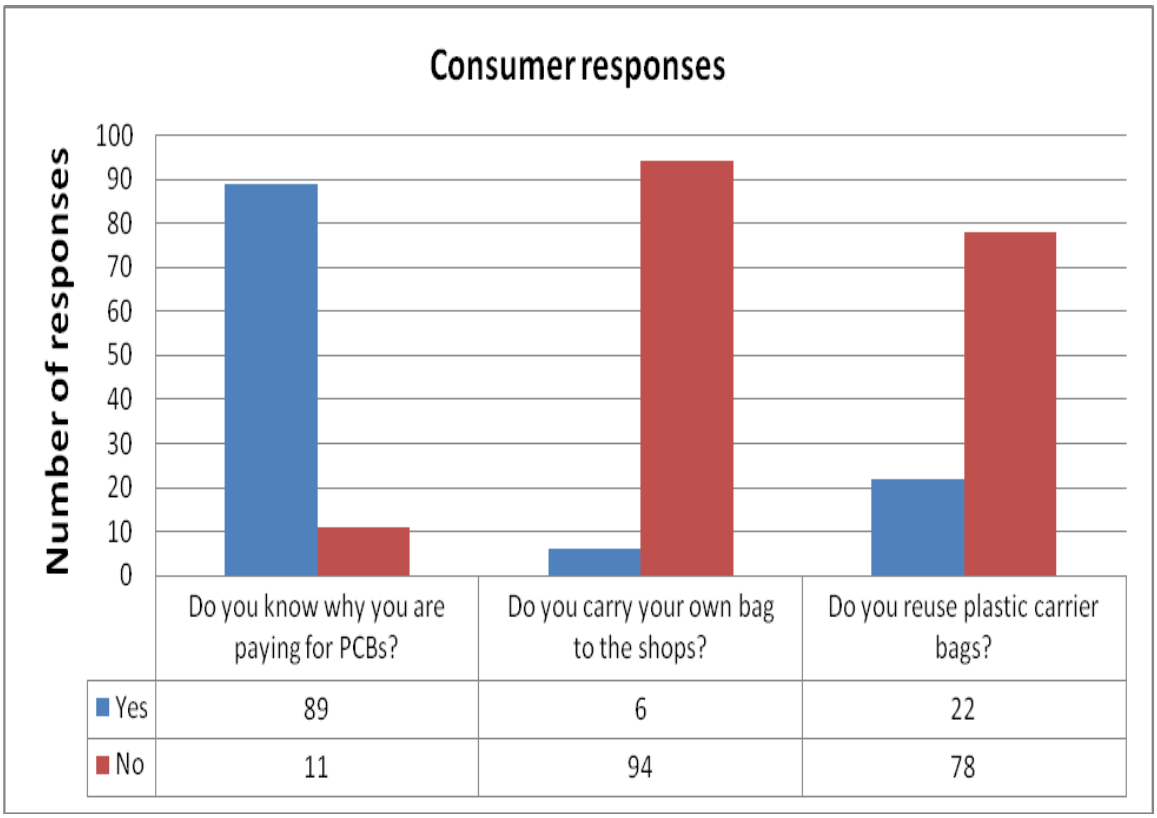

Figure 9: Consumer responses on the question of reuse of carrier bag

- **Do you know of a recycling company called Buyisa-e-Bag and do you understand how they operate?**

The responses received from all the consumers indicated that they had no knowledge of what B-e-B is all about, judging by the responses received such as

"I have no idea who B-e-B is and have never heard of such a company.

4.4. Landfill site managers

Six landfill sites were selected for the study in the Gauteng Province. Landfill site manager in this case refers to the person employed and given the authority by the responsible municipality to oversee the waste management activities.

Most valuable waste material that escapes the recycling or reuse system from the source gets collected in the landfill site for reuse or recycling. Landfill sites have attracted a lot of reclaimers or scavengers who survive by reclaiming and selling valuable material to the recycling organisations. Some landfill sites are so overcrowded that the reclaiming process is a nightmare to the management of the landfill. During the study; it was obvious that the scavenging activities are not regulated by the responsible municipalities.

- **Do you allow recycling activities to be conducted in your landfill site?**

All landfill site managers gave a positive response to this question saying that they do allow recycling activities to be undertaken in their landfill sites. These managers also stated that they were carrying out an instruction from their superiors. They also stated that recycling reduces the quantities of waste that must be covered on a daily basis which in turn prolongs the life span of the landfill site. This feedback indicated that recycling is a common practice in all landfill sites visited. The reasons given by six managers were that reclaiming waste creates jobs and sustain lives; Figure 10 below.

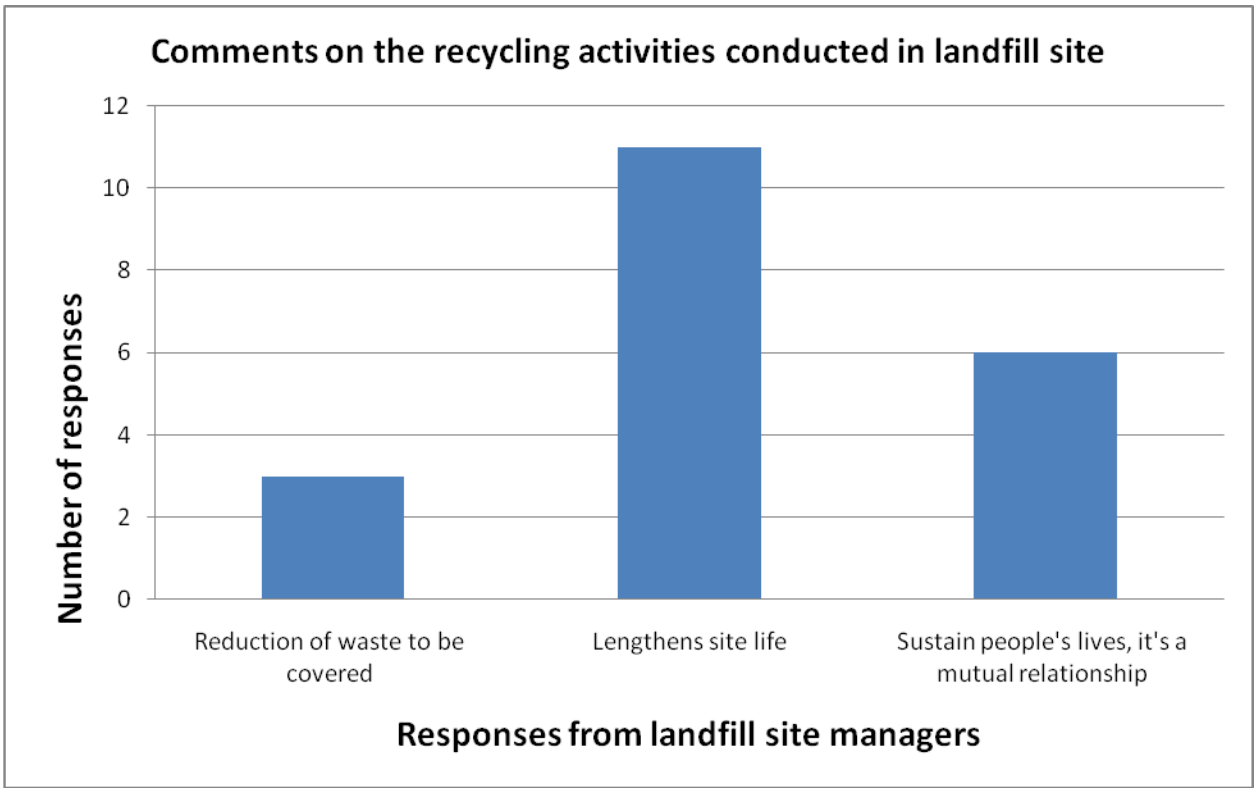

Figure 10: Additional comments provided by landfill site managers

- **How are these activities managed in your sites?**

There was so much variety in a manner in which this question was answered, it was clear that there is no official management plan in place to manage these activities. Only four managers stated that they separate the waste disposal cell from the recycling cell through the proper demarcation of recycling areas. Two managers stated that they allow reclaimers about 10 to 15 minutes (after the refuse truck has offloaded its load of waste) to scavenge whatever they can get before the material is covered with soil or rubble. There are a few security guards that watch the reclaimers while the truck dump waste to prevent them from rushing while waste is being offloaded.

- **What is good about recycling and what are the problems associated with it, if any?**

Waste collectors can be likened to the vultures in the landfill sites due to the role they play in reducing material that otherwise would have been dumped. All six managers mentioned that recycling creates employment opportunities and reduces waste quantities at the same time prolonging the lifespan of the site. Scavenging of waste also provide an opportunity to reuse the material back in the production process thus decreasing the pressure on natural resources.

The major challenge about waste reclaiming comes when the reclaimers start fighting for valuable material during the open scavenging process and crowd control becomes a task and could be life threatening to reclaimers, guards and employees.

- **Do you or anyone else train the people who come to collect waste?**

This question indicated that there was an agreement across all the sites that no formal training is given to the reclaimers. The managers assume that when the reclaimers join the team, they already know what they want to collect for recycling and they learn as they go along.

- **Are there more plastic bags than there used to be?**

The responses indicated that the plastic bag numbers have really decreased in the waste brought in as well as in surrounding areas. Another observation made by the managers was that PCB are not a preferred item for collection and recycling due to the fact that there is little monetary value attached to them which does not make them worth to collecting.

4.5. Individual collectors

They push trolleys or wheelie-bins along the road looking for their recyclable materials in the trash bins. All participants in this study relied solely on recycling activities to earn a living. This situation put much pressure on the reclaimers to travel long distances in their search for recyclable material. The collector becomes desperate to sell their material and as a result they get exploited by the recycling companies. The reclaimers complain that the individuals at the recycling companies reduce the amount of money paid per kilogram of material recycled. The job is physically challenging and the risks are high as a result of their working conditions.

Sixty two participants were interviewed for the study; the interview was done during their search for material on the road side and also in the recycling stations for safety and personal security reasons. Another group of collectors was interviewed from the landfill sites where they operate. Ten to thirteen people were interviewed from each group. The willingness to participate in the study was used as selection criterion.

- **What kind of waste do you recycle and why?**

The availability and demand for the material was provided as the reason for the choice of material, 35 interviewees chose copper, metal and glass. Twenty one people preferred plastic bottles as they were readily available in most households and in industries. Only six collectors opted for aluminium where they collected different types of tins for recycling.

- **How do you benefit from recycling the waste type you recycle?**

The general feeling from all individual collectors is that there is a lot to gain from operating individually and recycling the right material that pays better. All collectors indicated that they benefited from the recycling activities which help them earn a living to support their families though the income is very small. There was also a view that this job keeps them away from participating in criminal activities.

- **How far do you travel to sell your recycled material?**

The distances provided in Figure 11 are close estimates as the participants were not sure of the exact distances they walked.

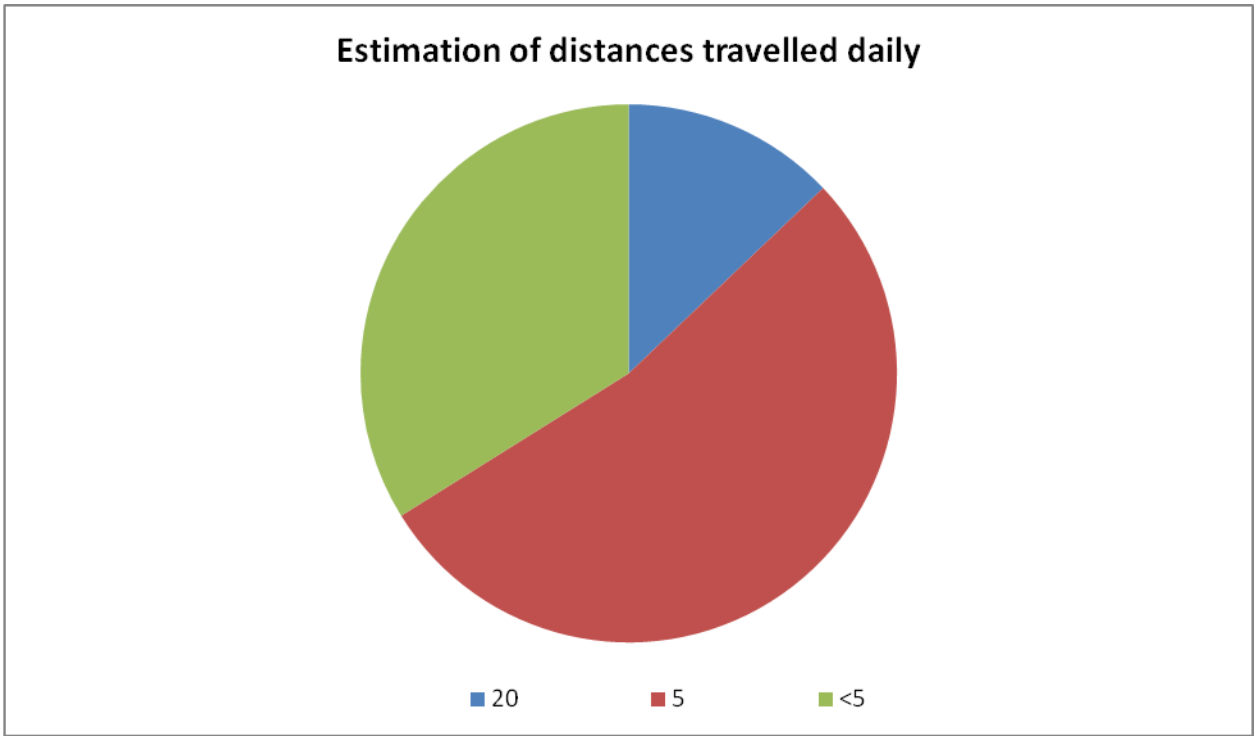

Figure 11: Estimated distances walked by waste collectors per day.

Those collectors that walked less than five kilometers a day were sick, weak and could not walk long distances or collected from the landfill site.

- **How often do you undertake recycling per week?**

The responses to this question varied from daily, every second day to only during the busy days such as weekends. Thirty five participants that focused on copper, metal and glass stated that they are on the road on a daily basis in different places looking for their material. Sixteen participants chose the plastic bottles or aluminium and they went out to search for their material every second day to allow for accumulation of material. Eleven people stated that they target different entertainment areas and they look for aluminium and plastic bottles from Thursday to Monday because that is when there is adequate material to collect to make it worthwhile.

- **Is there a demand for recycled plastic carrier bags?**

This question did not elicit the excitement anticipated. The response indicated that PCB does not feature on the list of recyclable material due to lack of demand and lowest payment received per kilogram. What was mentioned by 53 participants was that it would take them almost a week to accumulate a kilogram of PCB and only be paid R2.40c for their efforts. The other concerns were that the material does not guarantee income as one would collect PCB but struggle to sell them because the recycling stations are not interested in the plastic bags. The remaining nine participants did not know whether there was a demand or not because they were not interested in PCB at all. They only collected clear packaging plastic because of demand.

4.6. Buyisa e Bag

Buyisa-e-Bag (B-e-B) formed an integral part of the study as their feedback determined the efficiency of the recycling initiatives implemented. As a Government funded

organisation tasked with the roll out of plastic bags awareness and recycling initiatives, B-e-B had a daunting task to achieve their mandate against all odds. The roll out of the community projects was held back due to the delay in the issuance of environmental licenses to operate recycling centres as well as insufficient support from the local authorities.

A questionnaire was sent out to B-e-B through email and responses were provided as indicated below. The responses were used in the report as received from B-e-B. Very little new information was provided that had not already been found on their website and other media sources.

- **What is the role of your organization regarding recycling of plastic carrier bag?**

B-e-B assists by establishing new buy back centres and supporting the existing ones. Buy back centres are facilities created to recover recyclables from different sources including but not limited to drop-off centres, shopping malls, townships, inner-city, residential areas, local schools & recreational facilities, taxi ranks, collectors & agents, garden refuse sites and landfill sites. Since the inception, B-e-B has constructed nine buy back centres (Table 5) at an estimated cost of R1.8 million per centre in provinces such as Gauteng, Mpumalanga, Eastern Cape, North West and KwaZulu Natal. Only one buy back centre is located within the city, while the rest are located on the periphery. It would be expected that more centres be established in highly populated areas where waste is generated in large quantities to ensure reuse, reduce and safe disposal. The following is the list of centres already built by B-e-B, (buyisaebag.co.za, 2011).

Table 5: Shows the distribution of buy back centres constructed by Buyisa-e-Bag.

Area	**Coordinates (S)**	**Coordinates (E)**
Delmas	S 26 05’ 52”,	E 28 42’22”
Evaton	S 26 32’ 29”,	E 27 51’28”
Kagiso	S 26 10’ 15”,	E 27 47’23”
Molefi	S 26 12’ 57”,	E 27 51’07”
Vuka	S 26 09’ 20”,	E 28 25’20”
Phokeng	S 25 37’ 10.4”,	E27 12’ 33.5
Mhluzi	S 25 45’ 59”,	E29 25’ 26”
Hammanskraal	S 25 24’ 17”,	E28 17’ 7”
Mbombela	S25 27’ 48”,	E30 59’ 21”

The support that B-e-B provide is as follows

- Building of structures;
- Supply function resources such as;
- Baling machines;
- Electronic Weighing Scales;
- Trolleys;
- Cages;
- Containers;
- Personal Protective Equipments;
- Formalise informal collector; and
- To assist through School Education and Awareness programmes.

B-e-B’s support to the new and or existing buy back centres was evident from Molefi buy back centre that was visited by the interviewer in Pimville Soweto; the centre collects all sorts of recyclable material except PCB. This centre is one of their success stories judging by the process organisation whereby material is deposited, sorted, crushed or baled and stored ready to be loaded to the converters. The technology used in this site ensures that the process is effective and efficient.

These projects uplift communities by providing local entrepreneurs with the expertise and resources that enables them to run their businesses successfully. Each centre creates between 15 and 30 permanent jobs and more than 100 collectors benefit directly by selling their recyclable waste material to local centres. These centres are largely located in rural areas where job opportunities are limited and they aim to make recycling of plastic bag and other packaging material convenient for communities and recyclers.

- **What is the responsibility of your organization regarding the recycling of plastic carrier bag as waste material?**
- Is to establish and support recycling initiatives;
- Educate public about the importance of recycling;
- Raise environmental awareness;
- Promote the concept of reduce, re-use and recycling (RRR);
- Promote environmental responsibility by encouraging recycling;
- Create job opportunities and alleviate poverty;
- Ensure that the amount of recyclables going to landfill sites is reduced drastically or all recyclables generated are channeled to recycling facilities instead of landfill sites.

- **What systems and mechanisms has your organization put in place as per its roles and responsibilities in the recycling of plastic carrier bags?**

B-e-B has involved municipalities and different key stakeholders. The success requires active involvement of the local municipalities to ensure the provision of land to be utilised for the construction of buy back centres. Dedicated compassionate recycling entrepreneurs must liaise with municipalities to ensure that all necessary documentation with regard to the Buyisa-e-Bag criteria for assistance is collated and forwarded to

Buyisa-e-Bag for consideration. Potential beneficiaries are identified and or people in the recycling business but struggling to get their businesses going; are also assisted with their needs to get off the ground.

- **What are the challenges and constraints in fulfilling your roles and responsibilities?**

Amongst a range of challenges and constraints experienced the list below will highlight the plight B-e-B is faced with on a continuous basis. The list of challenges is as follows:

- Land identification;
- Sometimes municipality cannot give us the land to implement the projects;
- Sometimes land could be identified but the council fails to approve it;
- Sometimes council approved the land and later change its resolution;
- Delay in building plans approval;
- Some municipalities take more than a year to approve the plans, and construction cannot commence before the plans are approved;
- Contract between B-e-B and the municipality;
- Before construction can commence the contract between the municipality and B-e-B must be signed, however it takes most municipalities more than ten months to sign;
- Some municipality are not willing to enter into this contract which delays the projects further in the jurisdiction;
- Zoning and rezoning of land identified for buy back centres.

- **Major recycling activities are taking place in landfill sites (sometimes illegally), in your view, can this be done differently**

B-e-B thinks that the current recycling system can be done much better through the promotion of separation at source as this will add much value to the recyclables. It will also reduce waste management costs to the municipalities and also minimize accidents occurring at landfill sites as a result of moving vehicles/machinery. For separation at source to work efficiently and effectively, municipalities must be willing to take part. Individuals can also use local drop off centres to reduce the amount of waste/recyclables which end at the landfill sites

- **Are there any discussions with the South African Local Government Association (SALGA) or any other institution around the issues of separation of waste from the source/generator?**

B-e-B has already started this initiative of waste separation at source with the Gauteng Department of Agriculture and Rural Development (GDARD) and other local municipalities. It needs lots of environmental awareness campaign to be rolled out efficiently and effectively.

CHAPTER 5

5. DISCUSSION

5.1. Introduction of plastic bags regulations

The then Minister of Environmental Affairs and Tourism, Valli Moosa, promulgated the PCB regulations with an intention of regulating the plastic bags industry and reducing the number of plastic bags readily available to the consumers and littered in the environment (Nantso Holdings, 2007). By this action, South Africa joined a number of countries that have taken action against the spread of plastic carrier bags as seen in Table 1. Kenyan Government took an approach of an environmental policy package comprising of seven instruments to manage plastic bag waste which included collection of levy from suppliers, development of an environmentally friendly alternative bags, consumer awareness and anti-littering campaigns etc (UNEP, 2005).

The introduction of PCB regulations and the changes around the packing of groceries caught the consumers by surprise as all people interviewed indicated that they were not aware of the regulations. The sequence of events shows government, organized labour and organized business coming together and having a memorandum of understanding which was followed by the promulgation of the regulations. It is not clear at which stage government created awareness to the consumers about the imminent changes that were going to affect them negatively during their shopping. When the regulations were drafted, the public was given a chance to comment on the regulations before they are gazette. The issue here is that the people who needed to be aware and participate in the process of finalizing the regulations, were not properly engaged. This is always a challenge for the government to clearly communicate the impacts of new legislations and policies being drafted to the public before they are gazetted unless the interested and

affected stakeholders speaks out and engage the public on the discussions. The Protection of Information Bill that government wanted to gazette in 2010 was delayed for further investigation because the public got involved. The Bill had to be user friendly for the people on the ground.

5.2. Reaction of consumers

As a result of inadequate engagements stated in Table 3, the consumers resisted the change by refusing to buy the plastic bags. Most of them brought their own bags and packed their groceries which made the packers redundant; consequently, many of the packers lost their jobs. The South African experience contrast with that of the Irish where government made a great effort to create awareness on the introduction of regulations. There were radio and television adverts, posters and leaflets distributed to cover most part of the population (environ.ie/en/Environments/Waste, 2011). In South Africa thicker carrier bags were introduced in the market to encourage people to reuse them. These cost more and consumers had to pay.

One retailer stated that

"it took between six to eight months after the introduction of regulations to get the consumers used to the system of buying PCBs; gradually; the sales started picking up".

The introduction of the cotton bags in this manner was not planned, but it happened anyway. During the time when customers were not buying PCB, retailers saw a gap in the market and started manufacturing and importing reusable cotton and strong fibre bags to meet the demand of the consumers. The strategy worked well as the customers at the time bought the eco bags more than they bought plastic bags.

There were business and financial repercussions from this legislation in the South African market. The PCB's sales went down; as a result, some manufacturers had to shut down some of their branches because they could not cope with the rising stock levels and low demand in the South African market (Nantso Holdings 2007). Manufacturers could not export the PCB meeting legal requirements to the southern African market as they were too expensive for the SADC region at the time. South Africa (SA) was the first to introduce the compulsory specifications and the PCBs produced in SA were of high quality and standard compared to the quality that was used in the neighboring countries. The thin bags were specifically produced for the countries like Namibia, Swaziland and Lesotho however, the market was not big enough to sustain the operations of the big manufacturers, and hence Nampak closed the branch in Cape Town (Nantso Holdings 2007).

5.3. The current situation

Consumers have accepted the reality of compliant plastic bags being sold to them by the retailers. The acceptance of the situation indicated growth and stability in the plastic manufacturing and distribution industry due to the rise in demand and supply of PCB. The demand for grocery packers increased which translated to job opportunities. This situation indicated success for the manufacturers, however, with no proper PCB recycling system in place; it means that many of those PCB are probably discarded and littered to the environment. If SA is to meet the requirements of the regulations, it will need to adopt a few strategies like the one in Namibia where recycling was taken to the people in shopping centres parking areas and local schools; the areas most frequented by people in large numbers (Schenck, 2009). More awareness (print, television, posters, pamphlets, internet etc) around these campaigns should be created to stimulate positive response from the public.

In most retail shops, one packer services at least two cashiers sometimes even three compared to one packer per cashier situation prior the regulations. The cashier has to confirm with the consumer if he/she needs a PCB compared to the period prior the regulations, the bags were given to customers in numbers regardless of the quantity of groceries bought. The number of PCB dispatched was a non issue which resulted to flooding our communities and environment with bags which had no value. The retailers state that the

"bags are sold according to their monthly projections, the demand is steady during the month and only peak during week ends and month ends".

The regulations have not stopped the manufacturing or importation of non-compliant bags, all informal traders interviewed still use thin non-compliant bags and the authorities should be aware of this situation because it is not hidden from the public (Nantso Holdings, 2007). The reactive management of risks and issues associated with the promulgation of regulations is a huge drawback to the successful implementation of the regulations. (Lamb & Thompson, 2005) reveals that Ireland's PCB regulations were successful because more funds from the PCB levy were set aside to advance environmental protection and enforcement programs which is something that South Africa has not implemented effectively.

5.4. Plastic bags manufacturers

The manufacturing of compliant thick bags is a regulated activity that is continuously under the monitoring of the South African Bureau of Standards (SABS). SABS was tasked with compliance monitoring of the product in all ports of entry into the country and by visits to the manufacturers. Generally, the compliant manufacturers supply large retail

shops that has a reputation to protect hence they would only buy compliant bags. For instance, Transpaco Flexibles is one of the largest manufacturers of compliant PCB that operate from four different manufacturing sites located in Gauteng (2), Western Cape and Mpumalanga (Transpaco, 2011).

Interviews have shown that there are suppliers of thin bags and it would appear that there is no compliance monitoring of these suppliers. SABS undertakes unannounced compliance monitoring visits to the complaint PCB manufacturers on a regular basis to take PCB samples for analysis. The same effort and resources can be invested to compliance monitoring of the non-compliant bags suppliers. It will be difficult to monitor compliance of illegal manufacturers because they do not market or advertise their products as the compliant manufacturers do. If one looks at a PCB from one of the retail shops, the name and contact details of the manufacturer are provided on the bag, this makes the product traceable and legitimate.

There is a need for PCB manufacturing industry to investigate and come up with innovative ideas to produce plastic in an environmentally friendly and cost effective manner. Globally, greener products are encouraged and it should be every producer's responsibility to adapt their business to current situations affecting their business. The literature review revealed that PCBs are bad for the environment looking at the amount and type of non-renewable materials such as oil, electricity (coal) etc. used during the production; nevertheless, they have sustained lives for many years and contributed to the growth of economy in a number of countries (PFSA, 2007).

5.5. Retailers

The retailers in general felt that the introduction of plastic bags regulations caused the consumer "boycott" and was an indication of a situation poorly managed by all stakeholders concerned.

Financially, the retailers had to

"spend money on improving security inside the shops when consumers brought their own bags which was another cost incurred out of budget". The security included

"on line cameras and additional guards to patrol the shops floors to check on the consumers".

Currently there is no matching effort to that found in Windhoek where plastic bags recycling depots are placed on the supermarkets parking lots. This would alert consumers to the initiative, help reduce litter and create enthusiasm, awareness and support (Schenck, 2009).

The loss of experienced labour through retrenchment was another blow to the retail industry which was inevitable. Cosatu was concerned about the potential "disastrous" implications of the regulations to the labour market. When the retailers started retrenching some staff from the packing department; it was

"a difficult situation to deal with because the employees were on full time employment"

and the organized labour unions did not take the retrenchment issue well. Their fears had come to reality; Cosatu wrote in their website that a warning was given to the government that these regulations will result in:

- over 70 000 jobs loss (including jobs in the plastic conversion industry and in retail - specifically packers);

- An adverse effect on women in the vest type carrier bag (VCB) industry, given that most packers are women, who are less likely to be re-employed than men, being generally less skilled and less mobile;
- A negative impact on rural areas, where many VCB workers have dependents, over 380 000 of whom would lose income from workers who lost their jobs;
- A rise in the cost of packaging for consumers, most of whom can ill afford the increase;
- Potential relocation of companies to neighbouring countries and the entry of 'illegal' bags through porous borders (van Meelis, 2002).

This situation affects the poorer people even more because of travel on public transport; they have to replace their bags more frequently than someone driving. When looking at the number of illegal PCB found in South Africa (SA), one can only wonder what is happening at our ports of entry, the likelihood of these non-compliant bags being imported is quite high. The question is; how do these bags enter into the country and why have they been accepted without action? If they are manufactured locally, why are the manufacturers not apprehended?

In trying to avert the looming retrenchment, meetings were held between the two parties; however, the sales figures indicated that there was no need for the packers at the time (van Meelis, 2002). Unions put pressure on government to create jobs as promised in the MOU through the plastic bag recycling initiatives to be rolled out by Buyisa-e-Bag.

The retail industry has complied with the regulations and specifications right from the beginning as they were part of the discussions from the time when the regulations were drafted. This industry bought into the idea of thick and compliant bags and was able to

prepare their manufacturers to improve their production process in order to meet the legal requirements. The improvement of the production costs meant that the manufacturers

"incurred cost of buying new or upgrading equipments and training their workforce and this came with a lot of downtime which was not planned" (Nantso Holdings, 2007).

5.6. Informal traders

Informal traders operate individually in most areas with no affiliation to any organisation to encourage self regulation and with little or no accountability. They were not affected by the fact that they used non-compliant bags in their business. It became evident that the implementation of the regulations and compliance monitoring in this sector would be very difficult.

Informal traders could not comprehend legal issues that affected their business and they could not be bothered about the legal parameters within which they had to operate. This was apparent in their non-committal and casual responses to the questionnaires that they were only interested in getting their business going. There was not a single informal trader who was found using the compliant bags among all the traders interviewed, their business was not affected by the introduction of the regulations.

The reuse of the compliant bags from other sources by the informal traders was very minimal judging by their response in the questionnaire. Only three informal traders bought new plastic bags when they went grocery shopping and they buy two bags and use them as one to gain the strength they require from a quality thick bag. The majority of the informal traders use the thin bags from their business when they do grocery shopping to save costs of buying new bags when they already have the bags. The

practice of taking their own bags was informed by the need to save costs; not compliance with the regulations. There is a need to educate this group of traders if the thin bags market is to be suppressed successfully and introduce regulation, compliance monitoring and enforcement at this level.

5.7. Consumer's behaviour

The consumer behaviour was observed with an intention to assess the extent to which it is aligned with government's drive towards reusing, reducing and recycling initiatives. It was aimed at understanding consumers' habits during shopping and to establish whether those habits were based on conscious decisions or lack of planning when they go shopping.

There was no correlation between consumers shopping behaviour and the requirements of the plastic bag regulations because of lack of understanding of the regulations. Some consumers bought plastic bags irrespective of the price or amount of groceries, because a plastic bag is affordable. This response exposed the ignorance of these consumers with regards to understanding of the plastic bags environmental impacts, promulgated regulations and saving money. A minor group of consumers always bought plastic bags because of their own appearance and because they want to look neat and presentable. Some consumers bought new plastic bags as they do not perceive the behaviour as extravagant due to low prices which ranged from 20c to 45c per PCB.

It has been established from the survey that the promulgation of the regulations was not adequately publicized to the community to create sufficient understanding. It was not surprising to find that there were consumers who stated that

"they never heard of the regulations hence they don't understand them". This feedback came from the consumers of mixed races and different residential communities both affluent and middle class. The background of the consumer did not seem to have an influence on this issue. If these regulations were properly publicized, people would probably participate enthusiastically as they did in Ireland.

5.8. Landfill site managers

The landfill site managers allowed salvaging of recyclable material to take place in their landfill site as they were instructed to do so. They were never told how to train collectors to collect the material effectively. A proper waste collection plan would have been very useful to guide the recycling proceedings so that it is done in a manner that is effective to all parties involved.

Currently, safety of the reclaimers as well as the guards cannot be guaranteed due to the chaos that erupts when each truck offloads waste material, it's a survival of the fittest situation wherein the faster and stronger collectors will collect more than the rest of the reclaimers. In most cases, the mobile equipment covers the material while they are still busy collecting,

"the whistle is blown twice as a warning and the third time, the collectors must evacuate the area" this is because of time constraints as waste is being covered or compressed.

The waste reclaiming process was observed in all the landfill sites visited and there was not a single instance where a plastic carrier bag was collected due to inadequate demand and amount of bags to be collected per kilogram (Ferrara and Missios, 2005). Amongst the plastics, only bottles and clear packaging plastics were collected.

5.9. Individual collectors

The interaction with waste collectors in the field revealed that the choice of material collected was informed by the monetary value of the material per kilogram. The second most important determining factor was the supply and demand for the material. The collectors were willing to walk an estimated distance of

"twenty kilometers per day to collect the most valuable material such as copper, metal and bottles".

These collectors were younger; estimated to be between age twenty to forty years, they were healthy and had strength to push trolleys over such a distance.

The older and the physically weak collectors tended to collect closer to their homes and recycling facilities; this excluded them from accessing the valuable recyclables. It was observed across all the recycling facilities visited that the most preferred recyclables were copper, plastic bottles, metal, aluminium, cardboard boxes and glass. One of the reason plastic bottles were preferred was because they were readily available in most households and in industrial organisation where they are used for bulk liquid storage.

One individual collector operating in a landfill site stated that

"sorting of waste before it gets to a landfill would improve their working conditions, instead of going through a pile of mixed waste, they go through recyclables already sorted in different categories e.g. paper/cardboard boxes, plastics, glass and metal".

The down side to this latter comment is that once waste is sorted, it will go straight to the recycling facility, not to the landfill site and this action will push the landfill site collectors out of business.

5.10. Buyisa-e-Bag

Buyisa-e-Bag found it difficult initially to break new grounds in the recycling industry faced with the real time challenges of limited skills and resources. It has taken much longer to implement their business plans and to sufficiently create environmental awareness around the recycling of PCB in order to meet its objectives (Nantso Holdings, 2007). It appears B-e-B did not have a strategy to implement the recycling of PCB because their understanding of the plastic bag industry was inadequate. Understanding of the potential uses for the PCB at the end of its life could have helped B-e-B to focus on specific areas where there is a need for plastic bag, initiate recycling projects and provide support.

The plastic bag levy was increased to 4c a bag in 2009 which mainly increased the national coffers, not much can be said on the improvements on the ground. Awareness initiatives in place currently are so localized (schools) such that they do not have the intended impact to the consumers who play a major role in the consumption and disposal of bags. The people who pay the levy are yet to see any improvement in their operations as a result of the levies paid to government (Finweek English Edition, 2010). Ireland's model was very successful because the Repak Packaging undertook intensive educational and awareness programs aimed at schools, consumers, industry and local government (www.repak.ie, 2011). Their message was vigorous and focused onto the right target market.

Recycling of plastics require a special skill to handle due to the sensitivity of the polymer that degenerates quickly when exposed to harsh weather conditions and oxidation whereby free oxygen attacks the polymer chains (Plastic recycling in SA & B-e-B, 2005). Proper storage areas for the plastics are a necessity in order to ensure that quality waste

material is recycled and used to produce quality pellets. Pellets are a finished raw material that is ready to be used as input material into the production process. The role of B-e-B as indicated in their response to the questionnaire is to provide assistance in the establishment of new buy back centres and supporting the existing ones (PMG, 2008) and they would have helped the aspiring entrepreneurs to start recycling plastic bags the correct way.

Buyisa-e-Bag contribution in the construction of buy back centres in a number of provinces had been a success however they had very little impact on the recycling and reuse of plastic carrier bags. These buy back centres have no collection of plastic bags but nonetheless are funded from the plastic bag levy. Ireland established Repak Packaging who managed all the recycling of packaging material after the introduction of the regulations. They achieved a 90% reduction of bags after three years of promulgation of the regulations due to proper support systems they put in place (news.bbc.co.uk, 2011, Convery & Ferreira, 2006).

To improve the collection of recyclable plastic materials, there must be a convenient manner in which the waste is sorted from the source. To address the ongoing problem of inadequate waste separation at source, B-e-B has already initiated talks with the Gauteng Department of Agriculture and Rural Development (GDARD) and other local municipalities. Waste management is a function of the provincial authority (GDARD) and they would be interested in engaging the Department with initiatives that aims to minimize waste quantities disposed of to the landfill site. It needs lots of resources and an environmental awareness campaign to be rolled out effectively. This initiative would need to be thought out carefully to consider the number of people that sustain their lives from waste collection. These collectors may find themselves with no jobs which will

throw them even further below the poverty line and potentially lead them to criminal activities. Currently recycling system relies on poverty which means that local authorities are using unemployed people to solve the problems of waste sorting and reduction. To some extent, this is a form of exploitation.

5.11. Private enterprises

The interviewer was not aware of any formal plastic bags reuses and recycling programs supported by the authorities; enterprising people have started with individual collection of PCB for various uses. There are organisations that are coming up with ideas of doing business using used PCB such as Rooikop (Grant, 2010). Rooikop cc is situated in Craigavon Johannesburg; it opened doors in 2009 when the first batch of PCB were collected and used to make handbags. This has provided employment opportunities for a number of collectors and designers of the bags. The handbags get sold into local and international markets.

In rural areas, there are a number of unstructured and informal projects whereby unemployed women team up and collect bags from houses and use them to make hats, floor and table mats (Figure 12) which are sold mostly to the local markets. This is an indication that there is a potential to use PCB for various projects at the end of its lifecycle hence the need to educate the people not to contaminate bags to a point where they cannot be collected and recycled. It is in projects like these where Buyisa-e-Bag could assist these women through their local municipalities to establish their business and promote the recycling of PCB and reduce their disposal.



Figure 12: A hat made from recycled plastic carrier bag.

CHAPTER 6

6. CONCLUSION

This study surveyed level of compliance with government regulations across a variety of sectors and people involved in use of PCB. The degree of compliance was very variable among groups.

General compliance status across all groups

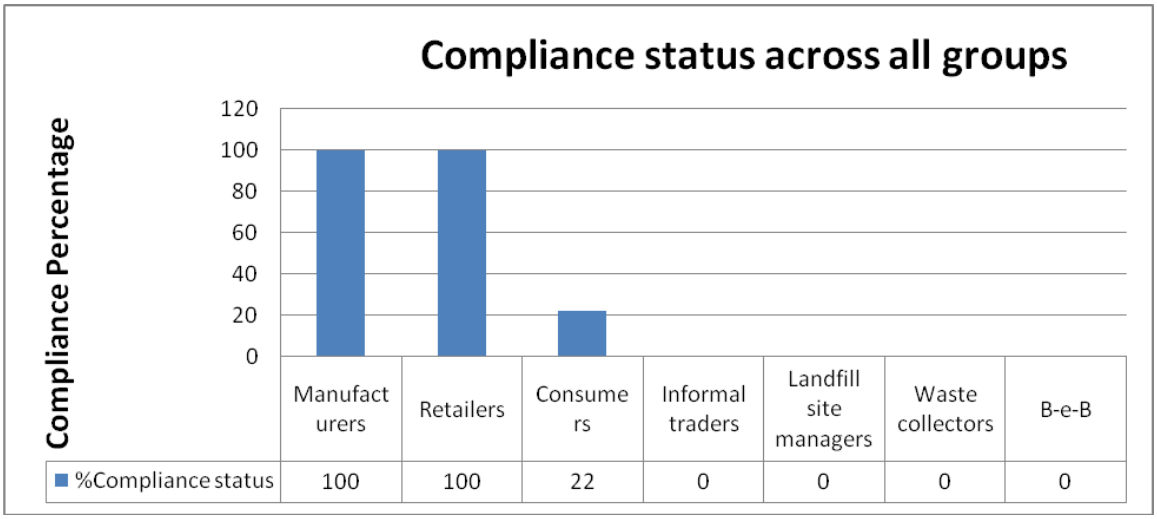

Figure 13: Compliance status across all groups.

Different categories of people interviewed show the different levels of compliance to the government PCB regulations Figure 13. The manufacturers group refers to the suppliers of compliant bags to the retailers. As a result, large retailers complied with the regulations. Only 22% reused and reduced PCB quantities in the environment. Informal traders used non-compliant bags in their businesses. Landfill site managers did not enforce the recovery and recycling of PCB in the landfill sites. Waste collectors collected material with monetary value and as a result PCBs were excluded. B-e-B did not actively drive awareness campaigns and initiatives aimed at reusing, reducing and recycling PCB.

The three initial hypotheses are variously supported or rejected by the results obtained.

Hypothesis 1: The promulgation of the PCB regulations brought about some changes in the behaviour of consumers.

Some consumers changed their shopping behavior as a result of the regulations. They started to reuse and recycle bags mostly at home. The introduction of plastic carrier bag regulations to some degree contributed positively in the reduction of PCB in the environment, this hypothesis is supported but only to a very limited extent.

Hypothesis 2: The consumers did not understand the regulations;

The results also support the fact that consumers did not understand the requirements of the regulations. They were caught by surprise when a charge for PCBs was introduced hence they “boycotted” the changes which led to the decrease in the quantities of PCBs, this aspect was not measured. B-e-B has not met most of the objectives of its formation; for this reason the consumers lack the understanding of the regulations and requirements; in this case, the hypothesis is supported.

Hypothesis 3: The implementation of the regulations resulted in the reuse and recycling of strong plastic bags.

However, the implementation of the regulations did not bring about recycling of stronger PCB due to lack of support from B-e-B. PCBs have an important role to play in the society with enterprises that rely on plastic as input material. There is potential to use, reuse and recycle PCB at the end of their life judging by the number of projects that people have initiated using carrier bags. Reuse of PCBs was partly achieved whereas the recycling was not achieved hence the hypothesis cannot be supported.

The following is recommended:

It is recommended that funds collected from levies be used to provide resources (capital and human) to enable the implementation of effective compliance monitoring and enforcement strategies as well as other programs such as educational awareness. Omission of the above makes the roll out and implementation of the regulations ineffective.

More transparency and accountability from all the responsible Government institutions on their expenditure on programs and initiatives related to the regulations is needed. The government needs to introduce ways to stimulate the recycling of PCB so that they are not contaminated before disposal.

More awareness campaigns and advertisements targeting consumers will create a better understanding of the regulations and requirements as done in Ireland. Hong Kong adopted “No plastic day campaigns” and they were successful. The South African Government can adopt the same campaigns that will also help in creating awareness around the environmental impacts of plastic bags.

It was established during the literature review that there is very limited scientific studies that have been undertaken globally on the PCBs in comparison with mainstream waste management. There is room for more scientific research on PCB to broaden understanding and explore new ideas to possibly invent a carrier bag that is environmentally friendly, cost effective and the consumers are able to identify with.

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APPENDIX 1

Plastic Carrier Bag Project Questionnaire

Interview done by Sizakele Ndzhukula: Msc. student Wits University

Retailers

Respondents' name_____

Area _____

Questions:

1. What is your view on the consumption of plastic bags before and after the plastic bags regulations in 2003?

_____

_____

_____

_____

2. How were you affected by the plastic bags regulations?

_____

_____

_____

_____

3. Do you encourage your customers to reuse their plastic bags or eco/green bags?

_____

_____

_____

_____

APPENDIX 2

Plastic Carrier Bag Project Questionnaire

Interview done by Sizakele Ndzhukula: Msc. student Wits University

Informal traders

Respondents' name: _____

Area: _____

Questions:

1. Do you charge for plastic carrier bags?

_____
_____
_____
_____

2. How much do you charge your customers per bag and why?

_____
_____
_____
_____

3. Where do you buy the plastic carrier bags?

_____
_____
_____
_____

4. How much do you pay for a batch of plastic carrier bags?

_____
_____
_____
_____

5. Do you reuse plastic bags?

_____
_____
_____
_____

APPENDIX 3

Plastic Carrier Bag Project Questionnaire

Interview done by Sizakele Ndzhukula: Msc. student Wits University

Consumers

Respondents' name: _____

Area: _____

Questions:

1. Do you have any idea why you are paying for plastic carrier bags?

_____
_____
_____
_____

2. What is your understanding of the plastic bag regulations?

_____
_____
_____
_____

3. When you go shopping, do you carry your own bag/s or you buy bags from the shop every time?

_____
_____
_____
_____

4. Do you reuse plastic carrier bags?

_____
_____
_____
_____

5. Do you know of a recycling company called Buyisa e Bag and do you understand how they operate?

_____
_____
_____
_____

APPENDIX 4

Plastic Carrier Bag Project Questionnaire

Interview done by Sizakele Ndzhukula: Msc. student Wits University

Landfill Site: _____

Respondents' name_____

Area _____

Questions:

1. Do you allow recycling activities to be conducted in your landfill site?

_____
_____
_____
_____

2. How are these activities managed in your sites?

_____
_____
_____
_____

3. What is good about recycling and what are the problems associated with it, if any?

_____
_____
_____
_____

4. Does you or anyone else train the people who come to collect waste?

_____
_____
_____
_____

5. Are there more plastic bags than there used to be?

_____
_____
_____
_____

APPENDIX 5

Plastic Carrier Bag Project Questionnaire

Interview done by Sizakele Ndzhukula: Msc. student Wits University

Individual collector

Respondents' name_____

Area _____

Questions:

1. What kind of waste do you recycle and why?

_____
_____
_____
_____

2. How do you benefit from recycling the waste type you recycle?

_____
_____
_____
_____

3. How far do you travel to sell your recycled material?

_____
_____
_____
_____

4. How often do you undertake recycling per week?

_____
_____
_____
_____

5. Is there a demand for recycled plastic carrier bags?

_____
_____

APPENDIX 6

Plastic Carrier Bag Project Questionnaire

Interview done by Sizakele Ndzhukula: Msc. student Wits University

To: Buyisa-e- Bag

1. How does B-e-B assist with the recycling of plastic carrier bag?

_____
_____
_____
_____

2. What is the **responsibility** of your organization regarding the recycling of plastic carrier bag as waste material?

_____
_____
_____
_____

3. How does B-e-B carry out its roles and responsibilities?

_____
_____
_____
_____

4. What are the challenges and constraints in fulfilling your roles and responsibilities?

_____
_____
_____
_____

5. Major recycling activities are taking place in landfill sites (**sometimes illegally**), in your view, can this be done differently?

_____
_____
_____
_____

6. Are there any discussions with the South African Local Government Association (SALGA) or any other institution around the issues of separation of waste from the source/generator?

_____

APPENDIX 6: Clearance Certificate

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Division of the Deputy Registrar (Research)

HUMAN RESEARCH ETHICS COMMITTEE (NON MEDICAL)
R14/49 Ndzhukula

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER H100 604**
PROJECT	An assessment of the status of recycling of plastic carrier bags in Gauteng province
INVESTIGATORS	Ms SJ Ndzhukula
DEPARTMENT	APES
DATE CONSIDERED	18.06.2010
DECISION OF THE COMMITTEE*	Approved Unconditionally

NOTE:

Unless otherwise specified this ethical clearance is valid for 2 years and may be renewed upon application

DATE 28.07.2010 **CHAIRPERSON** .....
(Professor R Thornton)

cc: Supervisor : Prof S Hanrahan

DECLARATION OF INVESTIGATOR(S)

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

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

.....
Signature

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES