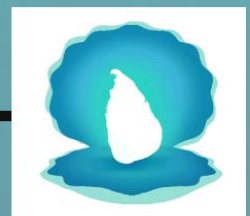


# Perception and Awareness of Polythene Bags VS Non-Polythene Bags

**Survey Analysis Report  
December, 2020**

**Authors:  
Manori Perera  
Malsha Gunasinghe**



**The Pearl Protectors**

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**An Initiative of The Pearl Protectors  
Sri Lanka**

## Acknowledgement

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The authors are grateful for The Pearl Protectors Sri Lanka. The Pearl Protectors is a volunteer-based and non-profit marine conservation organization in Sri Lanka. Established in 2018, The Pearl Protectors seek to mitigate the impacts of anthropogenic activities on the marine environment, reduce plastic pollution and promote sustainable practices through youth engagement, volunteerism, awareness and advocacy.

Projects undertaken by The Pearl Protectors over the years entail the launching of the 'Pearl Protector Approved' Accredited Standardization Certificate to promote a plastic-free dining culture; the annual construction of a Christmas tree out of discarded plastic bottles to highlight single-use plastic pollution; school education programs; ecobrick workshops; coastal cleanups; and social media campaigns to inspire action towards protecting the marine environment.

The purpose of this advocacy initiative in conducting this survey is to emphasize the impacts of plastic bags to the environment and to promote eco-friendly alternatives. The authors and contributors of the survey analysis report are volunteer researchers.

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## Abstract

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Plastic bags are a common and easiest way of carrying different products, but they pose serious environmental pollution and health problems in humans and animals. This situation is worsened in developing countries like Sri Lanka. With that background, this survey was carried out to analyze the perception and awareness of polythene bags vs non-polythene bags. It was done on two separate surveys such as perception and awareness of polythene bags vs non-polythene bags on the household level (survey one) as well as plastic bag consumption at supermarket level (survey two). Survey one was done through an online questionnaire and survey two was done through field observation. A random sampling technique was used for both surveys. Results of survey one reveal that the majority of respondents were young, educated people, and they were well-aware of the adverse impacts of plastic bags. On the other hand, the findings of the second survey reflect that most people tend to consume plastic bags at supermarkets rather than alternative bags. Therefore, the findings of the survey recommended that ensuring the proper plastic bag waste collection network and promoting the usage of alternative bags within the country will be a viable solution to the adverse impacts of plastic bags.

**Keywords:** Perception, Awareness, Alternative bags, Plastic bags

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## Abbreviations

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### Short Form

### Term

UHMWPE	Ultra-High-Molecular-Weight Polyethylene
ULMWPE or PE-WAX	Ultra-Low-Molecular-Weight Polyethylene
HMWPE	High-Molecular-Weight Polyethylene
HDPE	High-Density Polyethylene
HDXLPE	High-Density Cross-Linked Polyethylene
PEX or XLPE	Cross-Linked Polyethylene
MDPE	Medium-Density Polyethylene
LLDPE	Linear Low-Density Polyethylene
LDPE	Low-Density Polyethylene
VLDPE	Very-Low-Density Polyethylene
CPE	Chlorinated Polyethylene
DMS	Dimethyl Sulfide
BPA	Bisphenol-A
CEA	Central Environment Authority
MEPA	Marine Environment Protection Authority
UNEP	United Nations Environment Programme
NGO	Non-Governmental Organization



# Chapter 01

## Introduction

---

### 1.1: Background

Plastic bags were introduced to the world in the 1970s (Williamson, 2003) and were increasingly popular with consumers and retailers. They are available in large numbers and variations all over the world. Around 500 billion plastic bags are estimated to be used annually worldwide (Spokas, 2007). This widespread use is due to their affordability and ease of use. Besides, most of these bags are disposed of as waste, usually after a single-use. It is also accepted that after accumulation in the environment, plastic bags may continue for as long as 1,000 years without being affected by sunlight or potentially by microorganisms (Stevens, 2001; UNEP, 2005a).

Accumulation of plastic bag waste induces natural pollution that can be illustrated in a variety of ways. One of the problems is the disintegration of the natural beauty of the world (Anthony, 2003). The death of domestic and wild animals is another frequent problem linked to these wastes. This includes effective steps to protect organisms from eradication (EPHC, 2002; Brown, 2003; Flores, 2008; UNEP, 2006; Verghese et al., 2009a; Macur and Pudlowski, 2009; Narayan, 2001). Blocking the framework of sewerage is becoming a traditional problem in urban areas and towns of non-industrial nations (developing countries). This results in foul scents and a perfect natural habitat for mosquitoes and different vectors that could transmit many diseases, such as encephalitis, dengue fever, malaria (Ellis et al., 2005). When plastic bags are admitted to agricultural fields, water permeation and sufficient soil aeration are decreased. This results in a decline in the productivity of such fields (Njeru, 2006).

Besides in a few poor and non-industrial countries, these bags are also used to pack food products. This can cause real medical conditions as certain cancer-causing agents may be generated during synthetic processes in plastic materials (e.g. coloring agents) and food products due to temperature variations (Narayan, 2001). Modern reports indicate that the reuse of plastic bags can cause cross-contamination of food products by microorganisms (Gerba et al., 2009; Cliver, 2006; Maule, 2000). Plastic bags are also used to dispose of human and other domestic waste, which makes human health more hazardous as compared to the "open" removal of such waste materials (Njeru, 2006; Subramanian, 2000).

A few steps being taken to reduce the harmful effects of plastic bags. These initiatives include the recycling and boycott of the creation and sale of these products. Reuse was found to be irrational for economic and quality reasons (McKinney and Schoch, 2003; Miller, 2005). This has resulted

in the creation of plastic bag waste in the atmosphere and has addressed the concerns of various administrations and naturalists. The problem also prompted several nations to pass enactments banning or enforcing financial instruments, such as levies and taxes to restrict the use and manufacture of plastic bags (Convery, 2007; Hasson et al., 2007; Rayne, 2008; Clapp and Swanston, 2009; Xing, 2009; Ayalona et al., 2009). However, as such compelling, voluntary activities have not been conducted in some countries to minimize the use of plastic bags or possible environmental problems in plastic bags (UNEP, 2005b).

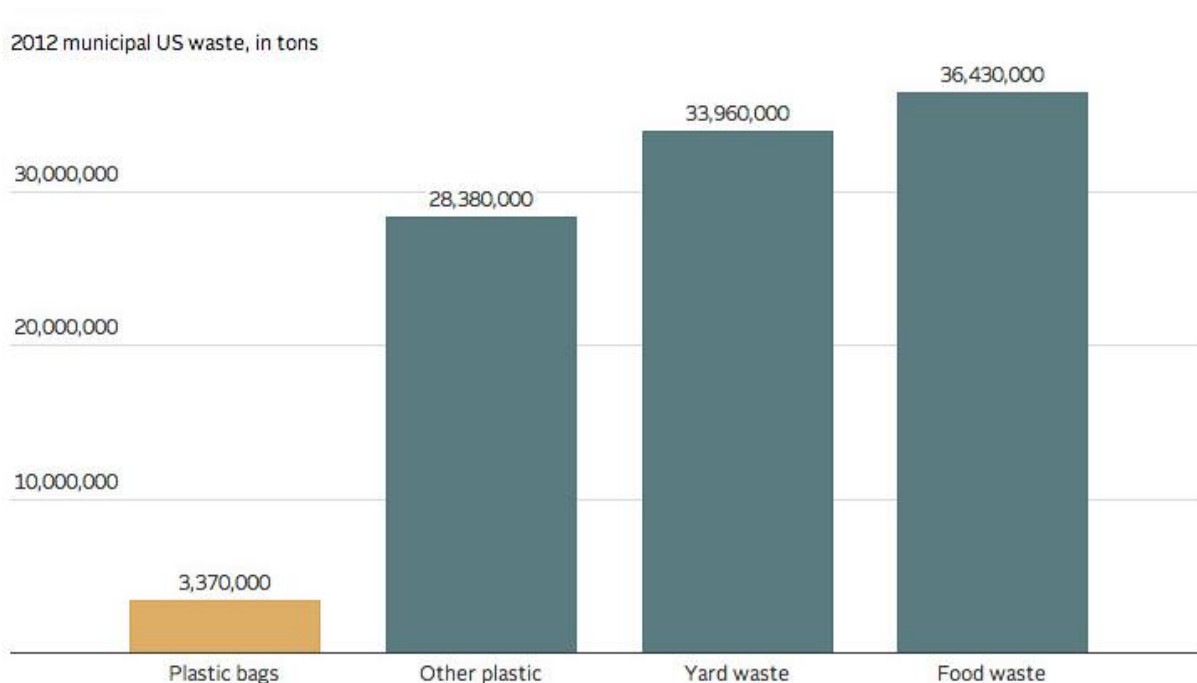


Figure 1.1: Plastic bags, compared to other types of trash  
Source - EPA

## 1.2: History of Plastic Bags

A peculiarity in the 1970s, plastic shopping bags are actually an inescapable part of the world, distributed at a rate of one trillion a year (UNEP, 2018). They emerge in the deepest depths of the oceans at the top of Mount Everest to the polar ice caps and cause some big ecological difficulties. This has arisen through a mechanism of succession.

- 1933- The most commonly used plastic, polyethylene, is created by an accident at a chemical plant in Northwick, United Kingdom. Though polyethylene had previously been

developed in tiny clusters, this was the primary unit of material that was mechanically pragmatic during the Second World War and was first used stealthily by the English army (UNEP, 2018).

- 1957: the first roll bags and sandwich bags are brought into the world (Roach J, 2003).
- 1958: Poly-dry cleaning bags contend with conventional brown paper (Roach J, 2003).
- 1965 – One-piece polyethylene shopping bag is approved by the Swedish firm Celloplast. This has been designed by the engineer, Sten Gustaf Thulin.
- The plastic bag is then quickly started to replace cloths and plastics in Europe (UNEP, 2018).
- 1966: plastic bags used in bread packing (covering) take over 25-30% of the Roach J market, 2003.
- 1979 – Historically controlling 80 percent of the demand for polythene bags in Europe, plastic bags are beginning to migrate to other countries and are widely introduced to the US. Plastic firms have begun to present their goods as better than paper and reusable bags (UNEP, 2018).
- 1982 – Safeway and Kroger, two of the largest grocery chains in the United States, joined the world of plastic bags. More retailers will follow suit, and by the end of the decade, plastic bags will have almost replaced paper worldwide (UNEP, 2018).
- 2002 –Bangladesh is the first country in the world to impose a ban on thin plastic bags after it has been discovered that they have played a crucial position in obstructing seepage frameworks during catastrophic floods. Different nations have begun to follow the same trend (UNEP, 2018).
- 2011 – Worldwide one million plastic bags are used every minute (UNEP, 2018).
- 2017-Kenya boycotts plastic bags, making them one of the newest in more than two dozen countries to ban the use of plastic bags by spending or boycotts (UNEP, 2018).

## **1.3: Objectives**

### **1.3.1: General Objective**

The general objective of this study is to analyze the perception and awareness of polythene bags (plastic Bags) vs non-polythene bags.

### **1.3.2: Specific Objectives**

The specific objectives of this study are;

- To identify the consumer behavior of polythene bags vs non-polythene bags.
- To identify the perception and awareness of polythene bags vs non-polythene bags.
- To analyze the perception and awareness of polythene bags vs non-polythene bags.
- To recommend solutions to overcome plastic bag usage.

## Chapter 02

### Literature Review

---

## 2.1: Introduction to Plastic Bags and Alternative Bags

### 2.1.1: Plastic Bags

The term 'plastics' contains organic materials such as carbon (C), hydrogen (H), nitrogen (N), chlorine (Cl), and sulphur (S), all of which have properties similar to those typically obtained from natural materials such as wood, horn, and rosin. The basic definition of a polymer is something made up of a multitude of units. When we consider polymers, they are shaped like chains. Each chain link is the "-mer" or the simplest unit usually made of carbon, hydrogen, oxygen, or possibly silicon.

Plastic bags are made using ethylene, a gas that is generated as a by-product of the processing of oil, gas, and coal. Ethylene is made of polymers (the chains of ethylene molecules). They're called polyethylene. This material, otherwise known as polyethylene or polythene, is made of pellets used by plastic manufacturers to produce a broad spectrum of applications, including plastic bags.

There are two kinds of plastic shopping bags-the lighter, filmy one that we get from markets and other food processing shops, and the heavier bags that we get from other retail outlets, including clothing stores. HDPE or high-density polyethylene bags are solid, thin, and not straight or foggy. HDPE (Ethylene polymer with densities ranging from 0.941 to 0.965 grams per cubic centimeter) is usually used in staple or shirt packing bags. LDPE (0.916 to 0.925 grams per cubic centimeter) or low-density polyethylene bags are thick and fragile and can be straight and bright in appearance. LDPE is usually found in shopping bags with adhered handles. In comparison to HDPE, LDPE cannot be recycled.

Although plastic bags may not be the most innovative use of plastic innovation, they are definitely one of the most popular. As per 'Clean Up Australia,' more than 6 billion plastic bags are used annually by Australians. If these bags were combined, the chain will be framed long enough to circulate several times around the world. Most of these bags (3.6 billion) are created using HDPE.

### **2.1.2: Alternative Bags**

In comparison to plastic bags, there is a number of alternatives. The cardboard containers in which the merchandise is packed are spared by a few stores, so consumers can use them to pack their food products. Others can sell bags of paper. Some significant retail chains are available for sale at very low costs with string or calico bags. It is possible to store these bags in vehicles and use them many times.

These have been used in Sri Lanka for centuries. The young generation was so overwhelmed by the plastic world that it only refused to recall the old eco-friendly cotton bag. It takes a little thought to get acclimated to carrying consumers' own bags, but it's an easy inclination to fall in, and it's such a relief not to have to cart food products away, and then discover a chance to pack plastic packs away.

There are certain situations under which customers cannot beat a plastic shopping bag, for example, while buying meat or "messy" products. Fortunately, there is a need for creativity to substitute polythene bags. Recently, it was detailed that the Australian supermarkets would present biodegradable bags made from tapioca starch in April 2003. These bags will closely resemble polythene bags and will break down in three months.

In case, it's known that plastic shopping bags are the most reused materials around the home. Numerous bags are reused as book and lunch bags as children go to school, as garbage bin liners, and pick up canine drops from the lawn.

In fact, plastic bags are becoming a source of prosperity. The world should also endorse the improvement of biodegradable plastic bags. What's more, this is still very interesting for all of us to recognize and know that plastic has a favored role over paper.

## **2.2: Classification of Polythene/ Polyethylene**

Plastic bags are available in a variety of materials that offer their own benefits and characteristics in comparison to scale, shape, color and, other physical characteristics. How will the customers decide on the correct decision? They must start by acclimatizing themselves to the most widely recognized plastic-type used by manufacturers of plastic bags, such as polythene (Modern Plastics Global, 2018). There are various kinds of poly plastic bags widely used today;

- Ultra-high-molecular-weight polyethylene (UHMWPE)
- Ultra-low-molecular-weight polyethylene (ULMWPE or PE-WAX)
- High-molecular-weight polyethylene (HMWPE)
- High-density polyethylene (HDPE)
- High-density cross-linked polyethylene (HDXLPE)
- Cross-linked polyethylene (PEX or XLPE)
- Medium-density polyethylene (MDPE)
- Linear low-density polyethylene (LLDPE)
- Low-density polyethylene (LDPE)
- Very-low-density polyethylene (VLDPE)
- Chlorinated polyethylene (CPE)

The most significant polyethylene grades are HDPE, LLDPE, LDPE, MDPE, and PP concerning solid volumes (Modern Plastics Global, 2018).

- **HDPE** - HDPE stands for High-Density Polyethylene, the most well-known material used for the manufacture of shopping bags made of plastic. The polymer material used for these bags is made of straight molecular chains with a beginning to end linear structure, with almost no branching. Plastic bags are made with HDPE because of the thick molecular structure. They are modestly non-transparent and light, but they are exceptionally strong. Due to their high rigidity, without falling apart, HDPE bags may usually carry their own load. They are also deeply impervious, usually simple, and food-safe, to synthetic compounds, water, and temperature. HDPE is used in the manufacture of T-shirt bags, utility packs, clothing bags, trash bags, and applications for food handling, serving, and bundling where no oxygen or CO<sub>2</sub> obstruction is needed.
- **LDPE** – LDPE stands for Low-Density Polyethylene, a common form of plastic that is used both in food packaging and in utility bags. The polymer material used for these plastic bags is produced by multiple joining lines or branches of low-density polyethylene chains distributed. LDPE plastic is thus extraordinarily lightweight and has moderate rigidity. While not as solid or stretchable as HDPE bags, its low melting point makes it suitable for use in heat-fixing applications. Moreover, its film-like simplicity makes it easier to distinguish substances. LDPE bags are daily, the bundling material of choice for cafes and other food processing firms, manufacturers and suppliers of meat, cleaners, and others.

- **LLDPE** – LLDPE stands for Linear-Low Density Polyethylene, and is commonly used in the manufacture of plastic shopping bags such as food packaging, garbage bags, and paper bags. While additionally made from polymer materials that have non-branching polyethylene chains, they do not have the same elasticity as HDPE bags and should be made in a thicker and heavier shopping bag structure. However, LLDPE bags do have moderate clarification and a slightly lower measure than LDPE bags, with no difference in intensity. This makes them a cost-effective alternative to LDPE for mass food storage/bundling and various applications where consistency is basic. They are particularly suitable for the storage of freezers or refrigerators in commercial kitchens. But they're also well-known in clothing shops.
- **MDPE** – MDPE stands for Medium-Density Polyethylene, a combination of high density and low-density polyethylene. MDPE isn't as straightforward as LDPE, but it's not as hazy as HDPE either. MDPE is less dense than HDPE, so it's not as effective. It is not ideal for mass storage or transport as well. It has a high level of chemical resistance as well. Owing to its substantial low rigidity and stretch properties, this material may not be suitable for the production of plastic shopping bags, although it continues to be used for the production of garbage bags, shrink film, and packaging film for some purchasers, such as paper towels, toilet rolls, and others.
- **PP** – PP stands for Polypropylene, which has an extremely high chemical obstruction and rigidity as well as a high melting point, making it suitable for hot filling fluid or food bundling applications. Besides, polypropylene bags are less reflective than other poly plastic bags. PP bags are used extensively in retail operations because they are food-safe, non-breathable, and have a longer shelf life compared to other types of polyethylene bags. They are widely used to store products such as ketchup, yogurt, syrups, confectionery, baked goods, medicines, etc.

## **2.3: Impacts of Plastic Bags**

### **2.3.1: Impacts on Environment**

The environment has mainly been categorized into five categories. They're oceanic, deserts, forests, meadows, and tundra. It is very sad to say that polythene indicates its harmful effects on all major types of biomes. It is estimated that around 25 million tons of plastics pollute the marine



environment as well as the terrestrial environment, of which 64 percent are synthetic plastics (Yang et al., 2011).

### **2.3.1.1: Impacts on Terrestrial Environment**

The distribution of plastic bags is exceptionally variable due to specific factors such as wind and ocean currents, urban areas, and shipping lanes. The human population in specific regions assumes an enormous function in these plastic bags as vectors for chemical contaminants such as persistent organic pollutants and heavy metals (Barnes et al., 2009). Poisonous compounds that are produced during the production process of plastic bags are another critical issue that causes negative environmental impacts. A whole host of cancer-causing, neurotoxic, and hormonal disruptive chemicals are standard ingredients and by-products of plastic bag production, and they discover their way into our environment through water, soil, and air contamination (Halsband et al., 2019).

Their unmitigated addition to the ecosystem affects all the terrestrial and oceanic life with which they come into contact. The method of making plastic bags in the plastics industry delivers an immense amount of harmful gaseous chemicals to the air, including carbon monoxide, dioxin, and hydrogen cyanide. These gasses pollute the environment. The presence of these gasses in the air to a high degree is unfavorable for both human and animal health. They can cause respiratory infections, problems with the sensory system, and decrease immunity to diseases. Chlorinated plastics can create hazardous chemical compounds in the soil, which could then be saturated into groundwater or other related water bodies, as well as into the environment. This can do serious harm to the animals that drink water.

Landfill areas contain a number of plastic bags. There are numerous microorganisms in these landfills that accelerate the biodegradation of plastic bags. At a point where biodegradable plastic bags are broken down, methane is released, which is a greenhouse gas that causes damage to the ozone layer. This leads significantly to global warming (Biello, 2013). Apart from the above effects, some researchers agree that bobbing polymer bits in the oceans could have an impact on global warming by producing a shaded canopy that makes it harder for planktons to live. There's no need to assume that the plant domain is a universal carbon sink. We are faced with a big problem of water pollution by plastic bags. We routinely dispose of plastic bags in different bodies of water, including lakes, waterways, rivers, and other bodies of water. The presence of plastic bags in water bodies alters the natural flow, limits the ability of fish to reproduce, and kills useful creatures.

### **2.3.1.2: Impacts on Marine Environment**

Plastic bags are not biodegradable but are capable of photodegrading. It is a mechanism by which plastic bags are split into smaller toxic pieces. In the 2000s, a variety of stores and organizations began using certain forms of biodegradable bags to agree on obvious environmental advantages (Wilder, 2006; Industry News and Notes, 2009).

Plastic shopping bags will wind up in streams when they are not properly disposed of, and at that stage, they end up in the ocean. In order to minimize marine plastic waste from single-use shopping bags, various jurisdictions across the globe have imposed regulations or charges on the use of plastic bags (Xanthos, and Walker, 2017). It is estimated that about 300 million plastic bags end up in the Atlantic Ocean every year (Wagner, 2018). Although these plastic shopping bags are floating on the open ocean, several marine species detect them as jellyfish. It poses important risks to marine mammals Leatherback sea turtles when they are consumed accidentally and penetrate the digestive tract of marine animals (Schuyler et al, 2014). After ingestion, the plastic material will cause unexpected deaths. When these deaths occur and the body decays, plastic returns to the atmosphere and poses more possible problems (Wagner, 2018).

Marine species are not the organisms who are harmed by the excessive removal of plastic bags. Sea birds detect these plastic and polythene bags and the sense of dimethyl sulfide (DMS) produced by algae. Plastic bags are favorable places for the growth of algae, so sea birds are wrong to eat these bags instead of the fish that eat algae (National Geographic, 2016).

Plastic bags are not favorable to the environment, but a few government studies have found them to be environmentally friendly carrying bags. As Recycled-Quebec, a Canadian recycling agency, said, "Plastic bags have a few natural and economic advantages. Their production process requires minimal material and energy because they are thin and light. Production of garbage/linear bags is avoided by the production of plastic bags as it profits at a high re-use rate (77.7 %)" (Recyc-Quebec, 2017). This is demonstrated by government studies from Denmark (DEPA, 2018) and the United Kingdom (UKEA, 2006) as well as an investigation by Clemson University (CU, 2014).

### **2.3.2. Impacts on Humans**

Studies have shown that the advancement of ulcers, asthma, obesity, and some cancers may be affected by meals consumed or heated in plastic bags. Plastic bags contain certain additives that will blend in with the food when it's cooked. Bisphenol-A (BPA) is one of these dangerous chemicals. With the support of BPA, plastics can be more versatile and durable. This makes the plastic more useful for ordinary use but it contributes to serious health risks, especially when it

interacts with food products. Animal studies have shown that high portions of BPA can potentially undermine reproductive development and the function of their bodies.

Studies have shown that people who have a high proportion of BPA in their body systems are more likely to have different medical issues, such as liver toxicity, diabetes, and heart problems. This chemical can also influence the adverse effects on the brain. Plenty of neurotoxic, cancer-causing, and hormonal disruptive chemicals may be used as additives in plastic bags. Any of these chemicals are produced as by-products of the plastic manufacturing process. When these chemicals are released into the atmosphere, they survive for a long time and end up contaminating the soil, water, and air.

The World Health Organization has said that when pregnant women are exposed to high portions of BPA and phthalates, which are toxic chemicals found in plastic bags, newborn children may have lung problems. These children are at high risk of developing asthma in their adult life.

The New York University School of Medicine has suggested that this problem contributes strongly to the epidemic of childhood diabetes and obesity. They also like kidney and heart problems. Certain chemicals used in the manufacture of plastic bags, in particular BPA, serve as estrogens. These chemicals can affect the reproductive system of women when they are accumulated for a long period. Besides, several studies have shown that this BPA can cause breast cancer in animals. This chemical can also be influenced by thyroid problems and neurological disorders in humans.

## **2.4. Methods for Disposing of Plastic Bags**

There is a vital need to discover the best possible solution for the disposal of plastic bags. There are four approaches available to dispose of them. These include thermal treatment, landfilling, recycling, and biodegradation.

### **2.4.1: Thermal Treatment**

The production of dangerous, poisonous gasses during a fire or waste incineration, such as carbon monoxide, chlorine, furans, dioxins, and  $\text{CCl}_4$ , as a result of thermal decomposition of polythene, causes breathing problems. This is ultimately achieved by incineration and pyrolysis (Nisar et al., 2011). The final results of burning are ash and exhaust gases. The carbon basement of LDPE or polyethylene has been measured to be about 6 kg of  $\text{CO}_2$  per kg of plastic (Juerg, 2015). These depleted gasses contain highly toxic products: PAHs, dioxins, and furans that cause air pollution.

Numerous examiners investigated polyethylene pyrolysis (Westerhout et al., 1997; Bockhorn et al., 1999). Plasma Pyrolysis is an effective technique to annihilate polythene in an environmentally friendly manner. This technique uses a plasma torch in the oxygen-denied area. This process takes place at a high temperature (mostly between 325°C and 850°C). During pyrolysis, the temperature ranges trigger the development of different gases. In this way, at low temperatures, most of the gasses emitted are carbon dioxide, ethylene, propylene, carbon monoxide, butadiene, and methane. At high temperatures, some extra gasses such as benzene, methane, and hydrogen are emitted by carbon dioxide, carbon monoxide, and ethylene (Ademiluyi and Adebayo, 2007).

### **2.4.2: Landfilling**

Landfill (Grover et al., 2015) has its associated limitations, as land remains inaccessible for a considerable period. The other thing is that the land might be used for cultivation and other crops or agricultural activities related to it (Webb et al., 2013). Due to the anaerobic environment, the degradation rate of polythene in landfills is greatly delayed. Polythene waste has existed in the landfills for a long period (about 500 years) and it has been stated that it would take about a long time to break down in landfill sites (Lapidos, 2007) and leave the ground barren. The second big issue in landfill sites is secondary contamination of the environment. Toxins and contaminants are supplied as leachate and gasses such as toluene, benzene, xylene ethyl, and trimethyl benzene. Other estrogen compounds such as Bisphenol A (BPA), Phthalate and, PBB (Polybrominated biphenyls) are also found in contaminants (Xu et al., 2011). These compounds are particularly harmful to human health and cause diseases associated with the reproductive system of mammals. They also appear to contain cancer-causing agents inside the body (Yang et al., 2011).

### **2.4.3: Recycling**

Numerous processes include plastic recycling which can be classified as mechanical, chemical, and thermal depolymerization (Hopewell et al., 2009). The four forms of plastic recycling are primary secondary, tertiary, and quaternary. Primary and secondary recycling forms are referred to as mechanical recycling. In tertiary recycling, a polymer is depolymerized into its chemical constituents (Fisher, 2003). Waste plastics are used to extract energy from quaternary recycling. Recycled HDPE milk bottles are used for the manufacture of bins and crates, and recovered PET packaging is used for the manufacture of PET fiber in the United Kingdom (Hopewell et al., 2009). Products such as plastic lumber and trash bags can be created by LPDE recycling. LPDE can be recycled to shape items such as plastic lumbars, garbage bags, etc. Petrochemical components of the polymer can be extracted by chemical processing, which could then be used for the replication of plastics or the manufacture of other synthetic chemicals. However, recycling is not a financially efficient process (Patel et al., 2000). Some scientists have reported that during recycling, more

toxic and more dangerous volatile organic compounds are released from virgin liquefied and plastic waste pellets than from the development of virgin plastics (Yamashita et al., 2009; He et al., 2015).

Some scientists have reported that HDPE recycling is more successful than LDPE (Hopewell et al., 2009). The recycling approach is applied only to 1% of the total plastic waste generated because it is a costly process and the rest is discharged for dumping purposes (Focal Contamination Control Board 2013). However, recycled plastics end up being more toxic than virgin plastics, as they are combined with different harmful colors, additives, and stabilizers during recycling. Furthermore, plastics cannot be recycled several times as each recycling results in a decrease in the strength of plastics. It takes about 300 years for plastics to degrade naturally on unloading grounds (Focal Contamination Control Board 2013). Plastics are also degraded by photodegradation. This produces tiny toxic pieces that ultimately pollute soil, water sources, and therefore animals (Corcoran et al., 2009). Disposal issues can also arise from non-recyclable plastic waste (e.g. plastic thermostat, multilayer plastics, etc.) (Lee et al., 1991).

#### **2.4.4: Biodegradation**

Biodegradation is characterized as the biologically catalyzed reduction of degrading materials via organisms such as microbes, parasites, and algae (EUROMAP, 2016). Microbes require biodegradation but do not need heat. Organic content can be degraded aerobically or anaerobically in two different ways. Plastics are degraded anaerobically while aerobic biodegradation occurs in landfills and sediments in composite and soil. Aerobic biodegradation contributes to the formation of water and CO<sub>2</sub> and anaerobic biodegradation results in the production of water, CO<sub>2</sub>, and methane as final products (Ferreira et al, 2005). Normally, the transformation of the long-chain polymer into CO<sub>2</sub> and water is an unpredictable process. Various microorganisms are needed for this process, one of which leads to the breakdown of polymers into smaller components, one uses monomers and discharges simple waste compounds as by-products, and one uses waste discharges. The prowess of this method is moderate and yet ecologically accepted. This technique is favorable and widely agreed upon by all (Bombelli et al., 2017). Contingent for the formulation of biodegradable polythene shopping bags, three forms in addition to one regular polythene, have been studied for their debasement capacity in marine water. It was confirmed that, after 40 weeks of launch, the surfaces of biodegradable polythene carrying bags had deteriorated less than 2%, while the degradation of regular polythene was irrelevant (Fontanella et al., 2010).

## **2.5: Consumption of Plastic Bags in Supermarkets**

Supermarkets began to offer plastic shopping bags as a replacement for paper bags in 1977. By 1996, four of the five basic food bags were made of plastic. Since 1996, more than 80% of all bags have been made of plastic. It is estimated that about 500 billion and one trillion plastic bags are burned annually around the world.

Research by the Danish Environmental Protection Agency found that a food bag would have to be reused many times to have as low an environmental impact as a typical LDPE single-use plastic bag. For example, the value of 5 means that a bag will have to be reused 5 times to address the environmental impact of a regular single-use plastic bag (Bell and Cavern, 2011). The results of the study show that specific plastic bag alternatives have a high ecological impact and would require many reuses to make them advantageous as a substitute. For instance, an organic cotton bag would need to be reused 149 times to rise to equal LDPE's greenhouse gas emissions and 20,000 when impacts, for example, eutrophication, water, and ecosystem are incorporated.

There is a selection of plastic bag replacements available. Biodegradable bags made from tapioca starch were launched by supermarkets in Australia in 2003. However, these bags closely resemble polythene bags and decompose within 3 months (Gogte, 2009). According to a study in the US, canvas bags are as common as paper bags (Camann, 2010). The study also found that a reasonable amount of purchasers would pay a small fee for alternative bags if such a scheme were implemented. The number of participants willing to pay for alternative bags other than plastic bags. According to a study in Sri Lanka, cement paper bag with corn husk as the base, cement paper bag with oil paper layering, and cement paper bag with banana tree bark at the base are additionally feasible alternatives for polythene bags (Athukorala et al, 2017; Fernando et al, 2020). The Sri Lankan Government has imposed a ban on polythene bags and lunch sheets (PBLs). Both Ceylon Polythene Manufacturers and Recycles Association and All Ceylon Canteen Owner's Association are accused of impractical and not providing imaginable substitutions.

## **2.6: Cracking Down the Plastic Bags**

A few countries are taking action against the utilization of plastic and polythene bags.

- Countries that have prohibited or made a move to weaken the use of plastic bags include Australia, Bangladesh, Ireland, Italy, South Africa, and Taiwan. Mumbai (Bombay), India, has also banned the use of plastic bags.

- Nearly 7 billion bags per year were used by the Australians, and almost 1.2 billion bags per year were sold in Ireland free of government restrictions.
- Plastic industry trade affiliations have not been able to provide estimates of plastic bag use in the US. However, research focused on the use of plastic bags in various countries have reported that the environmental organization 'Californians Against Waste' uses 84 billion plastic bags each year.
- The world's first plastic sandwich bags were presented in 1957. Supermarkets began using plastic bags in the late 1970s, and bags were introduced into the retail chains in the early 1980s.
- U.S. plastics and associated ventures typically used about 2.2 million U.S. employees and added about \$400 million to the economy in 2002, according to The Society of Plastic Production.

In Australia, about 90% of retailers have entered the Government's voluntary initiative to minimize the use of plastic bags. In September 2006, more than 354,000 bags-most of them plastic-were collected during a global coastal zone cleanup in the US and 100 different countries, as per the Ocean Conservancy. On 23 December 2002, the Environmental Protection and Heritage Council of Australia decided on a package of measures aimed at mitigating the effect of plastic bags on the environment and introduced a detailed public action strategy, including strategies for decreasing the impact of plastic bags on litter. The rules for the management of plastic bag litter have been created as a small part of the general solution to plastic bag litter issues.



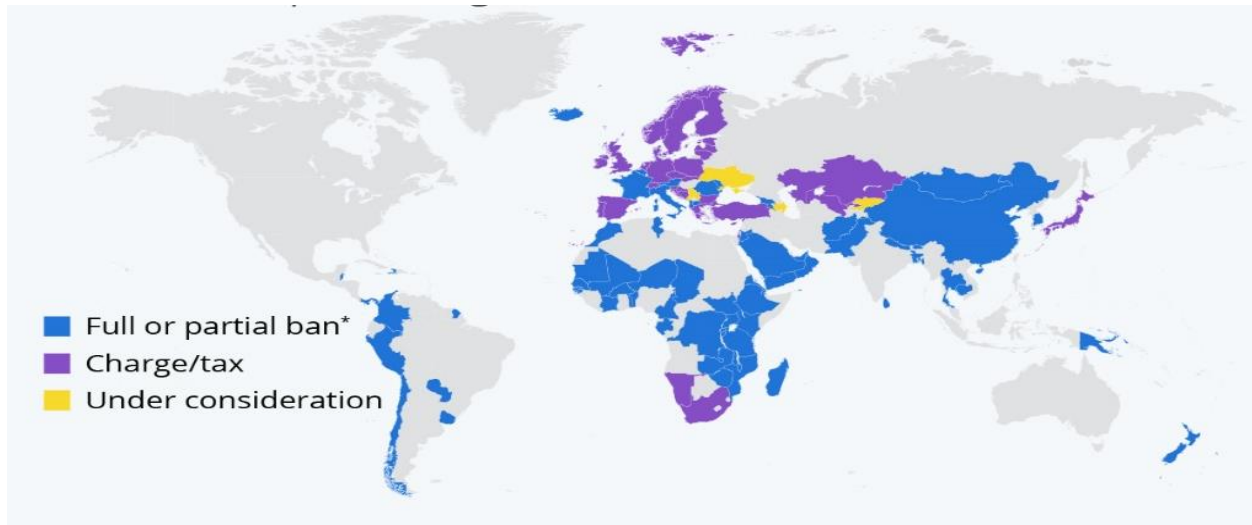


Figure 2.1: The countries banning plastic bags (National-level regulation to ban/ limit the use of plastic bags in 2020.

Sources – United Nations, Media reports.

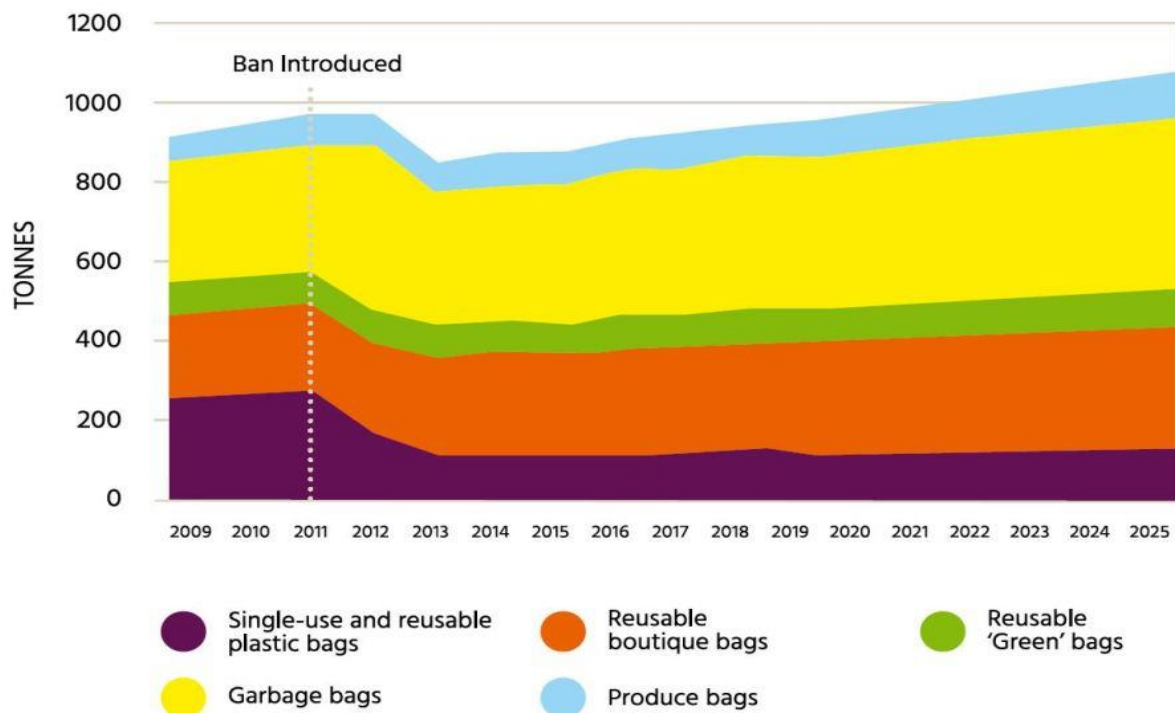


Figure 2.2: The total consumption of plastic bags before and after banning

Source – Commissioner for Sustainability and the Environment



## **2.7: Obsession of Sri Lanka with Plastic Bags**

Sri Lanka is also indifferent to the environmental, marine, and human impacts of plastic bags at a time when the world is concerned about climate change.

Despite the number of articles we read in newspapers and other media outlets, and despite the ban on some types of plastic bags from 2017 in Sri Lanka, most of us think it's hard to let go of a very convenient 'sili sili bag.' The Marine Environment Protection Authority (MEPA) reported that each Sri Lankan is expected to discard approximately 5.1 kg of single-use plastics, including plastic bottles, in 2017. Plastic bags are regularly eaten by turtles and dolphins that mislead them for food, as proposed in the 2018 UNEP report. There is evidence that during the processing of plastic transfer to animal tissue, toxic compounds are added and eventually penetrate human food chains.

## **2.8: Regulations and Law Enforcement of Plastic Bag Use in Sri Lanka**

The Government of Sri Lanka prohibited all polythene products with a thickness of fewer than 20 microns for domestic use (Gazette Number 2034/33). It also prohibits the manufacture of food wrappings, such as lunch sheets made from polythene (including high-density polyethylene, low-density polyethylene, and polypropylene), food compartments (alluding to lunch boxes), cups, plates, and spoons of extended polystyrene for in-country usage (Gazette Number 2034/34). Besides, it bans the use of bags made of high-density polyethylene (as raw material), bags of any size, with or without handles, to hold goods or items, including grocery bags widely referred to as 'silicon bags' (Gazette Number 2034/35). Excludes are made from trash cans and garbage bags with explicit lengths. It forbids the above from being available for purchase, offers for sale, offers for free, advertised, or used in Sri Lanka (Gazette Number 2034/38).

Simultaneously, this ban foreshadows the burning of plastics, affirms that no one shall openly burn or permit or permit the open burning of negation or any other commendable matter, including plastics. Notwithstanding the commendable laws, the general public is still ignorant of the kind of plastic banned and the manner in which the burning of plastic in the lawn backyard is now unlawful. This lack of awareness has led the public to use plastic bags and the manufacturers are not aware that they are not looking for alternatives. In addition, the Government has failed to authorize laws, to impose fines, or to take action against persons who breach the law.

The absence of adequate studies on the effectiveness of the guidelines, regulations, and laws has also been encouraged not to properly enforce and improve legislation in the country. It is sad to note that responsible parties, such as the Central Environmental Authority, have similarly turned a blind eye in upholding the above-mentioned regulations or conducting research to understand how successful the steps are.

## Chapter 03

### Methodology

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This research was based on two separate surveys.

### 3.1: Survey 01- Perception and Awareness of Polythene Bags VS Non-Polythene Bags

#### Data Collection

This survey is mainly based on primary data collection. A random sampling technique was used to collect primary data from households. For this purpose, an online questionnaire was shared in a pyramid scheme method to avoid any biases as this survey was intended to be conducted solely on a household basis. The questionnaire survey has two categories based on the answers provided. Therefore, if the surveyed respondent used plastic bags, the intention was to identify how the bag is discarded and if the surveyed respondent used alternative bags, the intention was to identify what challenges are faced when opting for the alternative. Data were collected from 381 respondents that consisted of 147 males and 234 females.

Variable	Categories	No.	%
Gender	Male	147	39%
	Female	234	61%
Age	Below 20	30	8%
	21-30	322	84%
	31-40	19	5%
	41-50	8	2%
	51-60	2	1%
Occupation	Studying	280	74%
	Working	96	25%
	Other	5	1%

Table 3.1: Demographic profiles of respondents of the survey

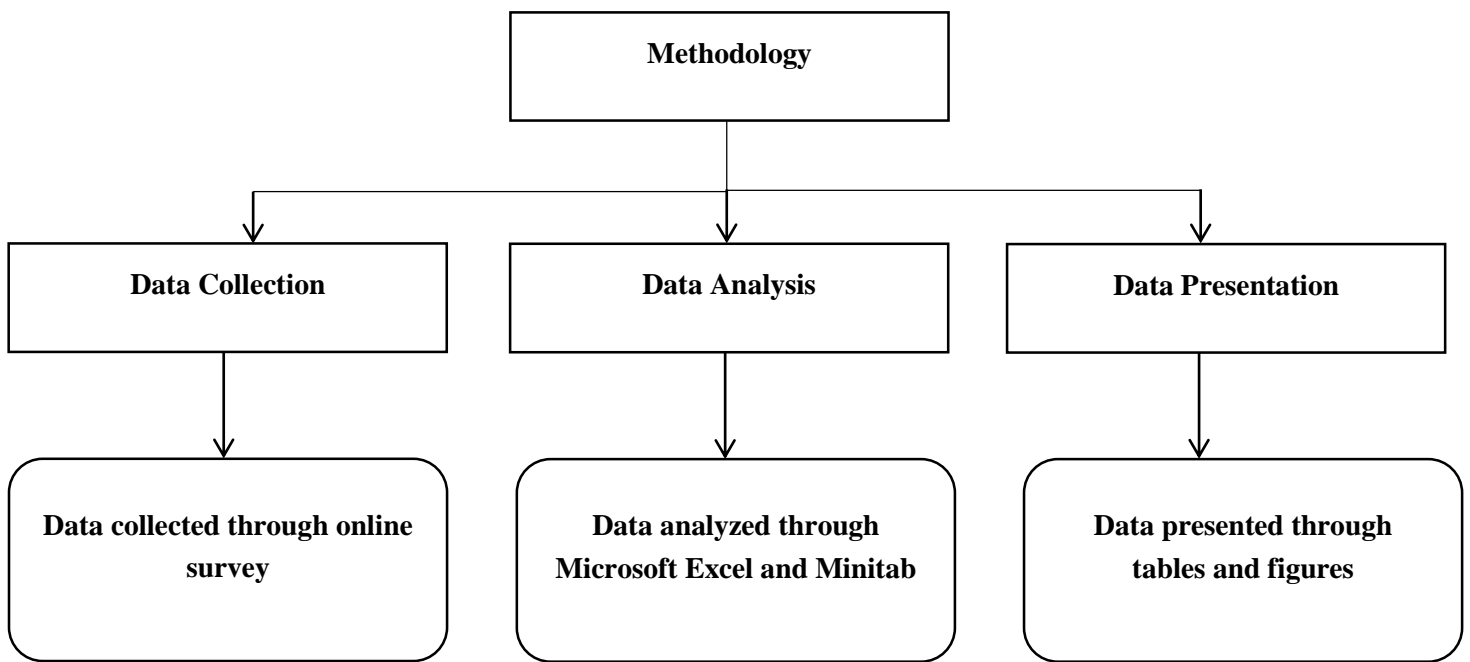
Source: Prepared by the researcher, 2020

## **Data Analysis**

Primary data were processed and analyzed through Microsoft Excel Software and Minitab.

## **Data Presentation**

Data presentation is done by tables and figures.



### 3.2: Survey 02 – Plastic Bag Consumption at Supermarkets

#### Data Collection

Data collection was mainly done by field observation. Accordingly, a convenient sampling method was used to collect primary data from 6 supermarkets within the country. Researchers were required to determine the number of polythene bags used during 1 hour at a given supermarket during a predetermined time frame. The intention was to gather data in analyzing the usage of polythene bags through supermarkets while determining the level of occurrence of polythene bag consumption.

Area	Number of Supermarkets Observed	Number of Counters Observed	Number of Customers Observed	% of Plastic Bags Used	% of Alternative Bags Used
Negombo	2	14	197	97%	3%
Anuradhapura	2	4	50	93%	7%
Avissawella	2	5	49	98%	2%
Tangalle	2	6	41	95%	5%

Table 3.2: Plastic bag and alternative bag consumption at supermarkets

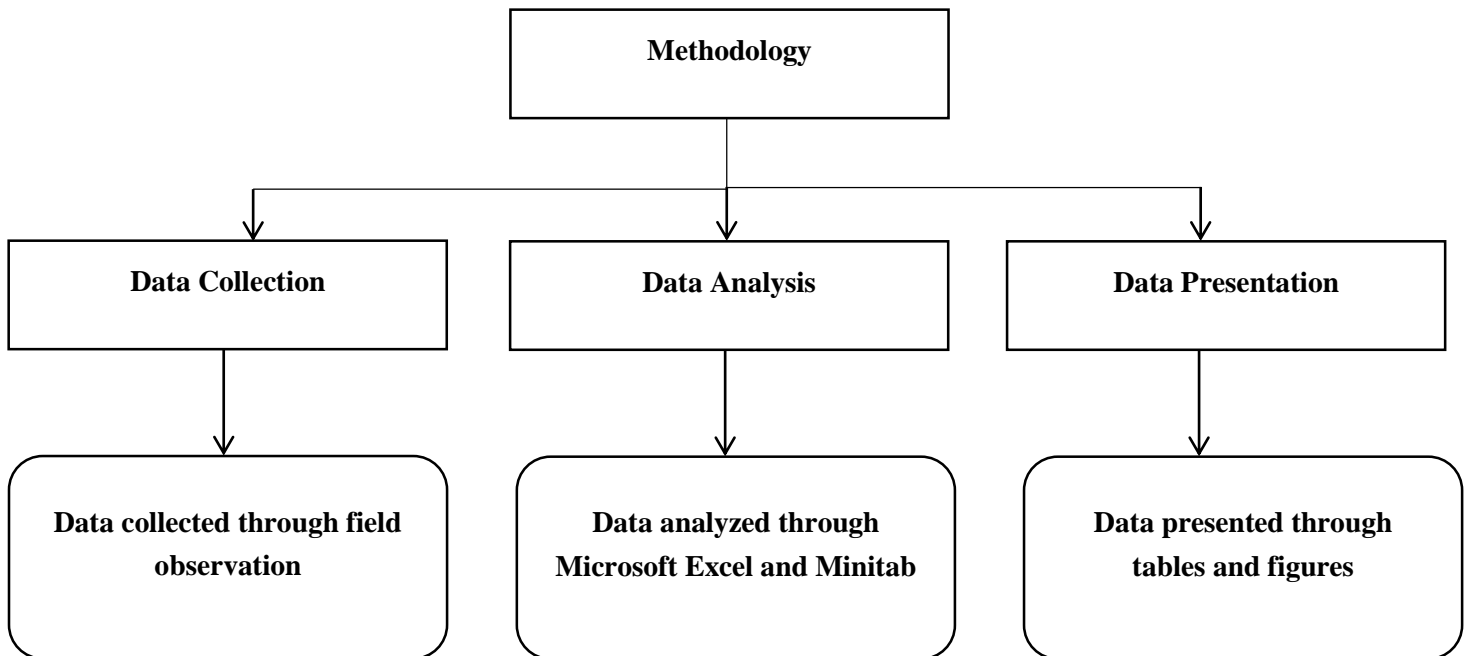
Source: Prepared by the researcher, 2020

## **Data Analysis**

Primary data were processed and analyzed through Microsoft Excel Software and Minitab.

## **Data Presentation**

Data presentation is done by tables and figures.



## Chapter 04

### Results and Discussion

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#### 4.1: Survey 01- Perception and Awareness of Polythene Bags VS Non-Polythene Bags

##### 4.1.1: Identifying the Demographic Profiles of Survey Respondents

The first questionnaire sequence focused on the identification of demographic profiles of survey respondents.

###### 4.1.1.1: Gender of Respondents

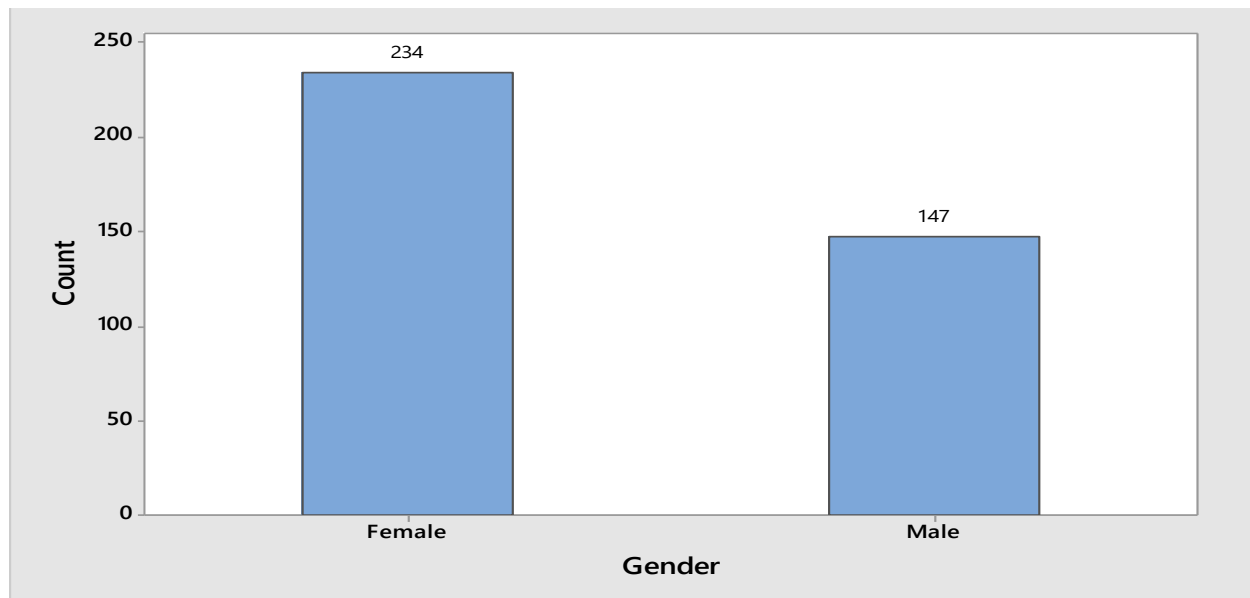


Figure 4.1: Gender of respondents  
Source: Prepared by the researcher, 2020

According to figure 4.1, a total of 381 respondents took part in the survey. The majority of respondents (234) were females and 147 were males.

#### 4.1.1.2: Age of Respondents

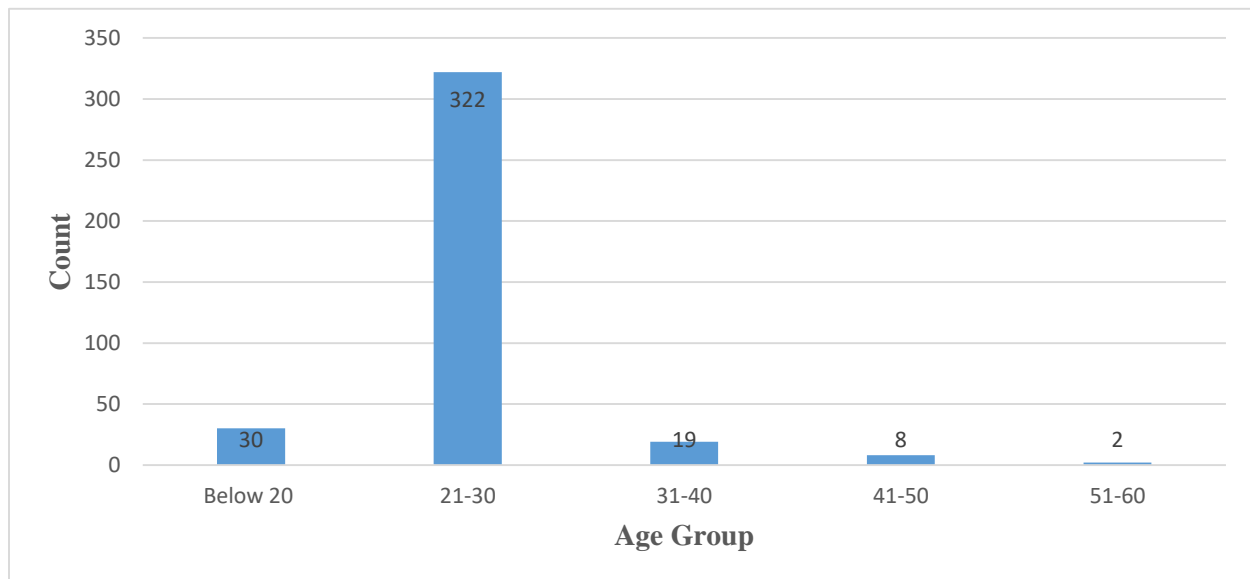


Figure 4.2: Age of respondents  
Source: Prepared by the researcher, 2020

Figure 4.2 indicates that the majority of respondents were in the 21-30 age group. Among them, 23-year-old respondents were the majority. Respondents below 20 and above 30 years of age were poor. It is also clear that the young generation has actively participated in this study.

#### 4.1.1.3: Occupation of Respondents

Figure 4.3 displays the occupations of the respondents. It is evident that males and females have significant variation in their profession in terms of their educational qualifications. The largest proportion of respondents, 280 of whom were students and 96 were working.



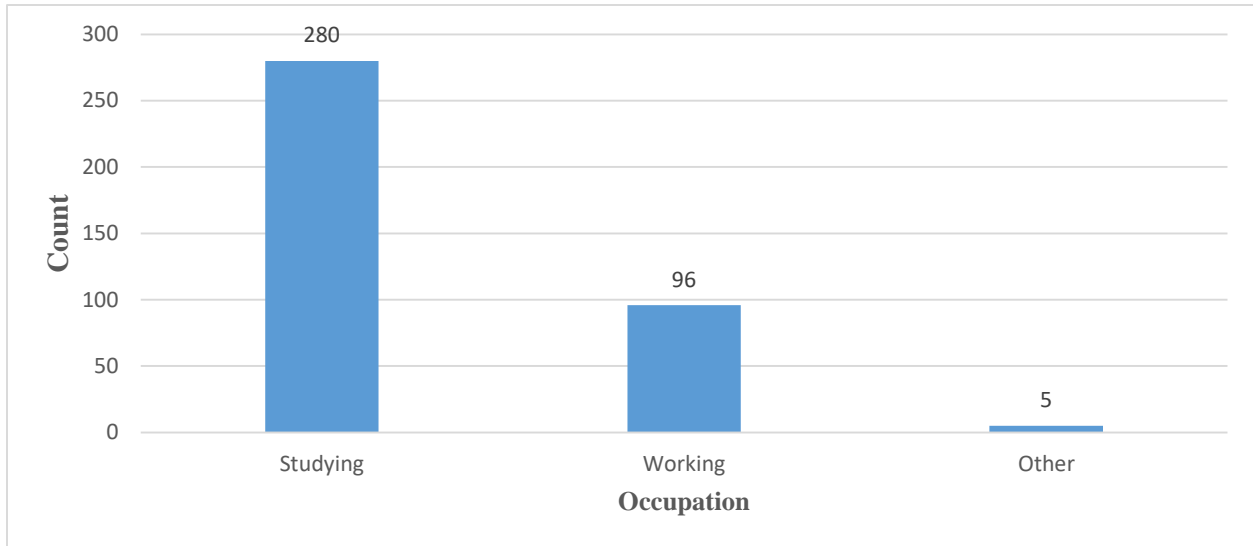


Figure 4.3: Occupation of respondents  
Source: Prepared by the researcher, 2020

#### 4.1.1.4: Educational Qualification of Respondents

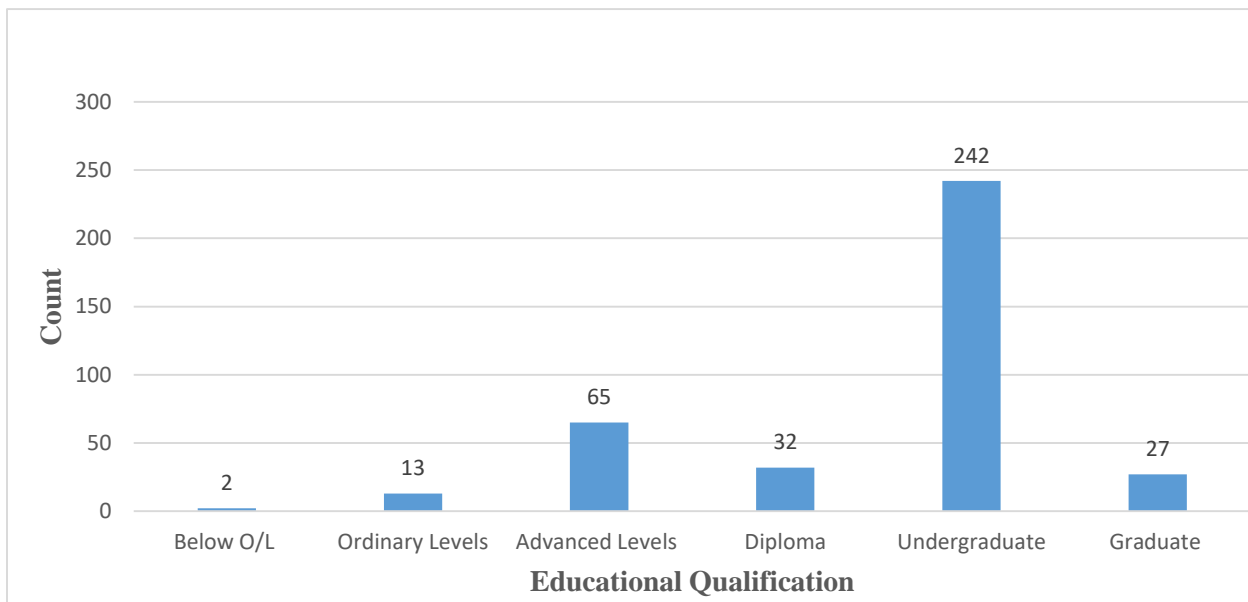


Figure 4.4: Educational qualifications of respondents  
Source: Prepared by the researcher, 2020

According to 4.4, the majority of respondents (242) were undergraduates. This was followed by advanced level (65), Diploma (32), Graduate (27), and Graduate (13). Respondents below the ordinary level were low (2).

## 4.1.2: Identifying Public Interest in Shops/ Supermarkets

The second part of the survey was focused on public involvement in shops or supermarkets. According to Figure 4.5, the respondents indicated their preferred location for grocery, poultry, and other shopping. The majority of respondents identified their location as Keells and reported 144 of a total of 381 respondents. Local grocery stores, Cargills also played an important role. This will clearly demonstrate that respondents prefer supermarkets and other shopping centers to local stores.



Figure 4.5: Shop location of respondents

Source: Prepared by the researcher, 2020

Many people prefer shopping in big malls to traditional shops in today's world of consumerism. This can be a positive development with some drawbacks as well. There are many reasons why people prefer supermarkets and big malls for shopping. At the very outset, it's easy, almost anything can be purchased by people under one roof. Several markets said they had anything from a sewing needle to a truck. Another relevant argument is that for certain goods there are labeled pieces. Quality is guaranteed, thus. Thirdly, there are also promotions and discounts offered on several items. So by buying items in bulk, individuals will save a lot of money. Finally, as bank cards and credit cards are acceptable in these stores, payment methods are much simpler. It is also understandable that people enjoy shopping in supermarkets because of all such facilities.

Shopping in major supermarkets, on the other hand, has some disadvantages as well. One issue is that with many unwanted items, individuals often end up shopping. These items are usually either

piled at their home or past their expiry dates. In addition, in search of products in various sections put on different shelves, longer shopping hours are typically needed. Another downside is that people incur a lot of extra money from their hard-earned cash on massive bill payments. Therefore it is understandable why the majority of respondents prefer supermarkets as their shop location.

### 4.1.3: Identifying the Nature of Use of Grocery Bags

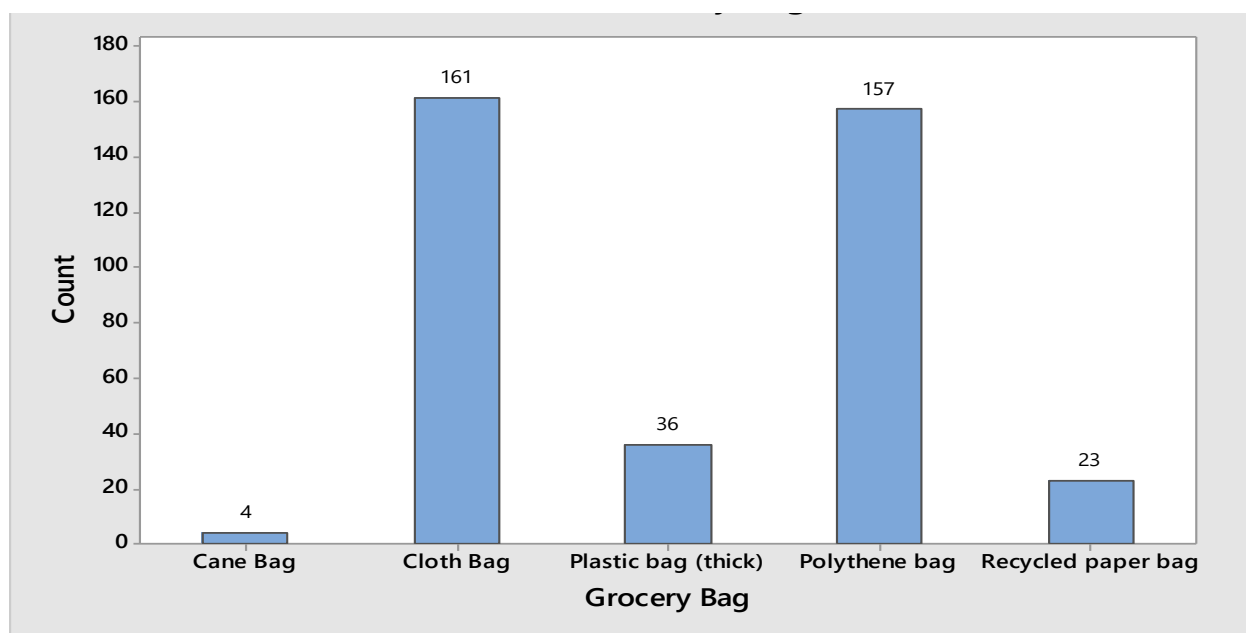


Figure 4.6: Type of grocery bag that used to carry goods home

Source: Prepared by the researcher, 2020

The third part of the survey is based on the nature of the use of grocery bags. Out of a total of 381 respondents using grocery bags, the highest proportion (161) used cloth bags compared to other grocery bags. This was followed by the usage of polythene bags (157), thick plastic bags (36), recycled paper bags (23), and cane bags (4). These findings have shown that the majority of respondents in each category use cloth bags in their daily lives. The findings also showed that the use of polythene bags was high among respondents and also noted the growing trend in the use of thick plastic bags from time to time.

The results of the survey showed that, regardless of gender, educational qualifications, and age, the majority of respondents used cloth bags extensively in their day-to-day activities other than grocery bags. When contemplating grocery bags, it should be explained why people have selected them. According to the findings, some of the key reasons for this are lack of alternative materials, and educated people have an understanding of the consequences of using plastic bags.

#### 4.1.4: Identification of the Current Use of Plastic Bags

The fourth part of the survey was focused on the current use of plastic bags. 294 of the respondents indicated that they would store plastic bags for reuse, while 87 indicated that it would have no impact on the disposal of these bags (Figure 4.7). It is evident from these findings that, regardless of age, educational qualifications, and occupation, the majority of respondents prefer to store these bags rather than disposing of them.

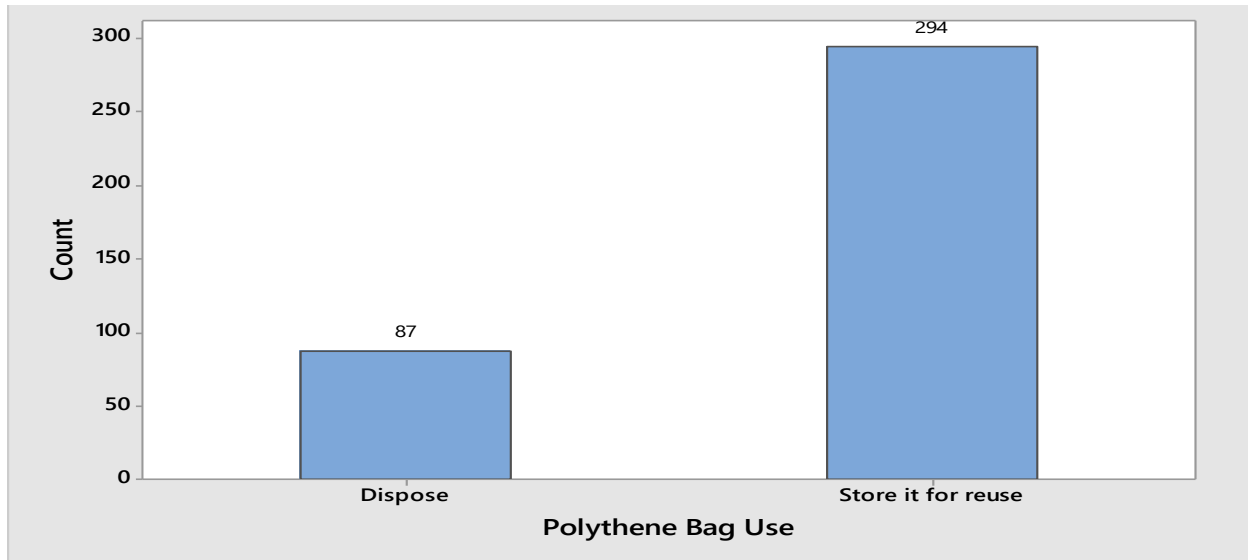


Figure 4.7: Method of use of plastic bags

Source: Prepared by the researcher, 2020

People often wonder about the toxicity that plastics can bring about. In organizing kitchens, the storage bags are excellent; having said this, any proof of toxicity would overshadow any household organizational merits that the plastic and polythene bags have. Indeed some holistic health practitioners are persuaded that plastic bags are a health threat for food storage purposes. The emission of different chemicals from plastic bags by chemical leaching is cited by these experts. This transfer of food will in their opinion, cause harm to our health. This refers to all plastic items, including bags, boxes, and wraps, for storage. Is there evidence that plastic toxicity transferred to food has been demonstrated? Acting on proof rather than just speculation is always good.

There is some evidence that plastic storage materials can potentially cause health issues, such as fertility problems, problems with fetal growth, as well as cancer. More health concerns caused by plastic-related chemicals have been shown by some evidence. There are many chemicals released by plastics, but due to their ill effects, there is particularly noteworthy one. This is BPA or Bisphenol A. Plastic companies still use this chemical extensively. Old plastics, however, will degrade and begin releasing the chemical more freely. This suggests that the more BPA-containing plastic bags that we reuse, the more we pose a health risk to us and our neighbors.

When people spontaneously use and dispose of plastic bags, and without an appropriate recycling system, the environmental implications have exacerbated the situation. Because of the problems created by indiscriminate dispersal of the non-degradable nature of plastic bags, which harm the climate. The treatment of domestic polythene waste has been such a concern with inadequate organizations and methods for solid waste management that the sanitation authority finds it so difficult to deal with. Therefore it is clear that both the methods are not effective due to these mentioned reasons.

#### 4.1.5: Identifying Current Practices for the Disposal of Plastic Bags

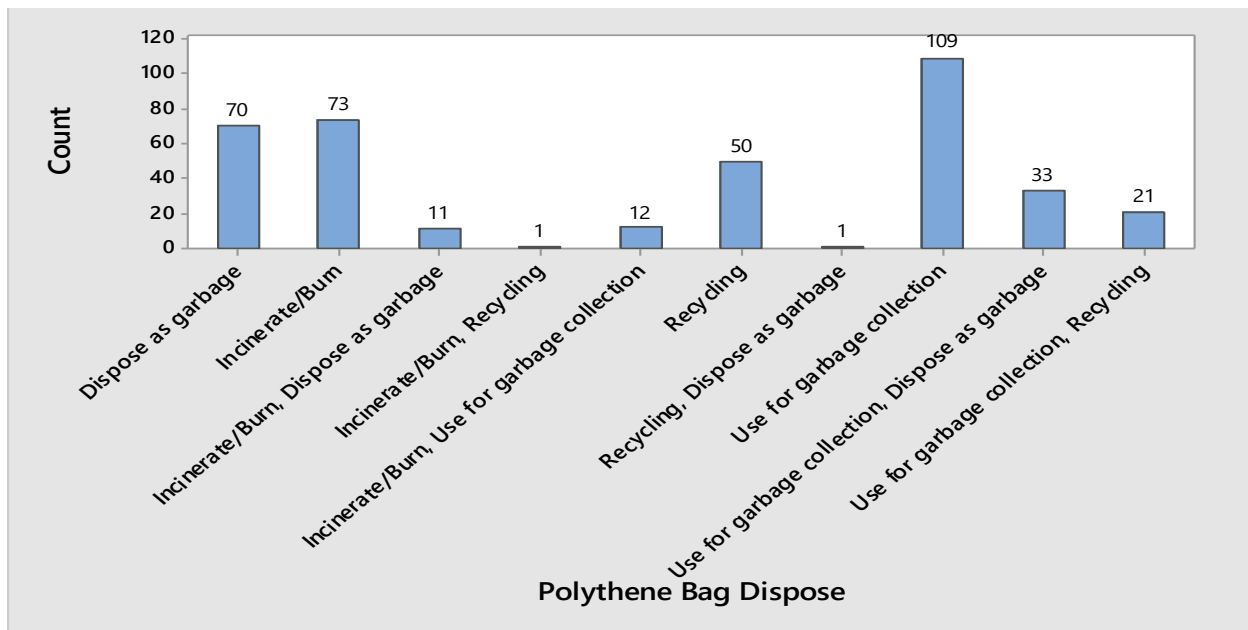


Figure 4.8: Methods of disposal of plastic bags

Source: Prepared by the researcher, 2020

The fifth part of this questionnaire was intended to outline the existing disposal procedures, the explanations for the relevant practices and to obtain an opinion from the respondents on the disposal methods. It is clear that at the end of their short service life, plastic and polythene bags become waste. The respondents were therefore also questioned about the forms in which they disposed of plastic and polythene bags. Disposal as refuse, incineration, recycling, and garbage collection is considered common procedures for the disposal of plastic bags.

Figure 4.8 indicates the behavior of the respondents in the disposal of polythene bags. Accordingly, the majority of respondents (109) used them to collect garbage. 73 of the respondents incinerate or burn as well as 70 of the respondents dispose it as garbage.

According to these results, it can be seen that after the garbage collection method, most the people use the method of plastic bags burning and incineration. The burning of plastic bags is caused negative air pollution and negative health impacts. Many people use these bags to fire their hearts and this is the most possible reason to increase the burning of plastic bags. Most people think that the burning of these bags can help to get rid of plastic and polythene bags or to decrease the amount of these bags in the environment. However, this burning should not be done for several reasons such as the release of toxic gases that can harm both humans and animals, and the greenhouse gas emissions that cause climate change. This study suggests that immediate action needs to be taken to educate the community in Sri Lanka about the human health risk of burning plastic and polythene bags.

#### **4.1.6: Identifying Public Feedback on Polythene and Plastic Bag Management Methods**

The sixth part of this survey was intended to outline the public feedback on polythene and plastic bag management methods. According to figure 4.9, the largest proportion of the 381 respondents who actively participated in the survey (16%) indicated that teaching how polythene bags can affect the environment and banning polythene bags are the best ways to minimize the use of polythene bags. This was followed by paying the price for polythene bags (13%), reducing the cost of non-polythene bags (12%), introducing more non-polythene bags (12%), receiving points for non-polythene bags (11%), making it easier to carry non-polythene bags (8%), punishing plastic bags (6%) and using non-polythene bags in a fashionable manner (6%).

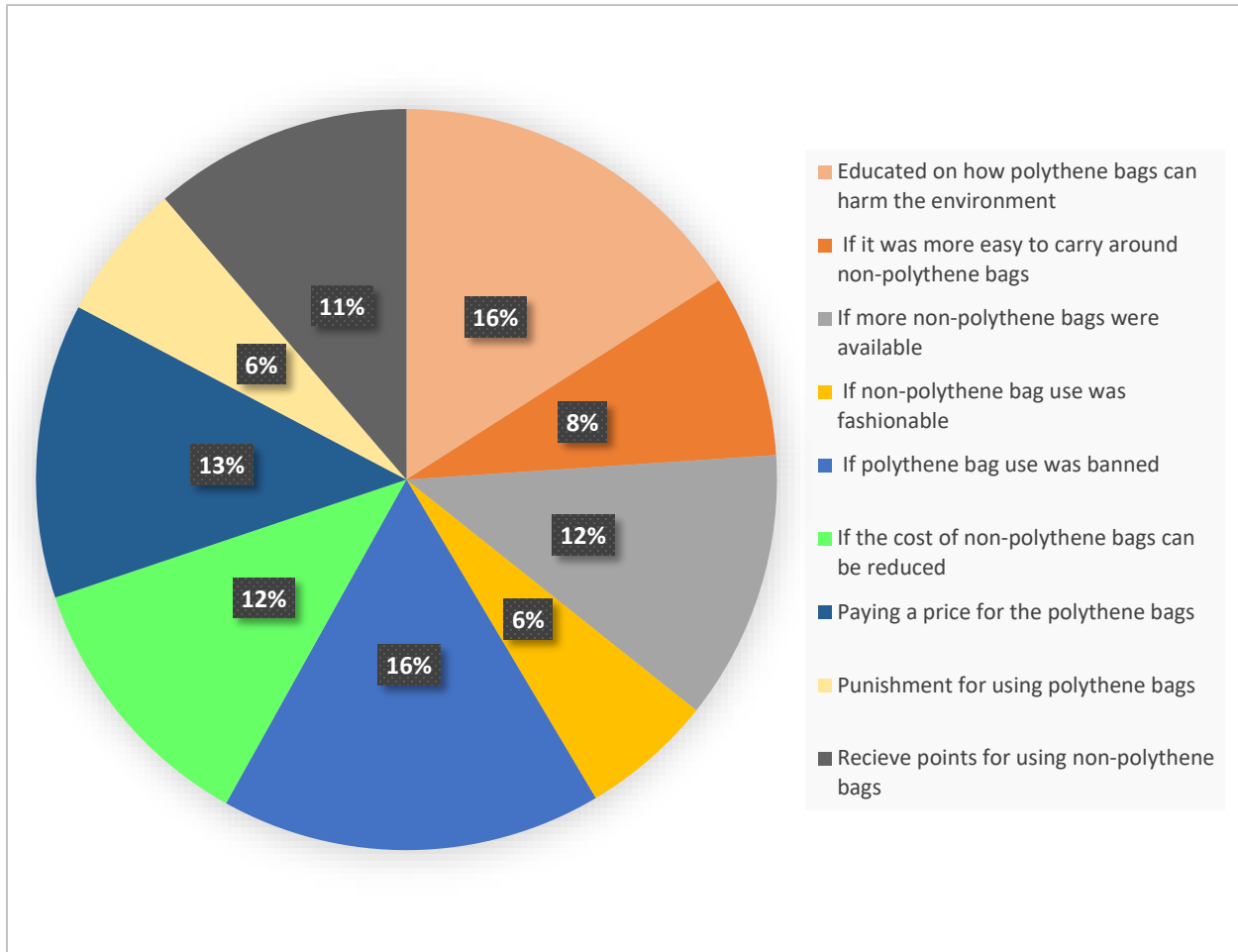


Figure 4.9: Methods for controlling the use of plastic bags

Source: Prepared by the researcher, 2020

The majority of respondents have stated that educating on how polythene bags can harm the environment and banning polythene bags are the better ways to reduce the usage of plastic bags. We can educate the community by speaking to them about polythene bag pollution. The other part of this is talking about plastic waste to legislators or local government officials. Get your colleagues, neighbors, and other members of the group involved, too. The more people who talk about pollution in the city, the more likely your local politicians are to pay attention.

The ban on plastic bags is also very convenient. Banning them has certain benefits. they are; Bans on plastic bags boost the economy: bans on plastic bags give reusable bag manufacturers an uptick in sales and contribute to expanded jobs opportunities, Eliminating plastic bags lowers the cost of goods: retailers have to take into account the cost of disposable bags. Stores will lower costs by removing plastic bags, helping consumers save \$18 to \$30 annually, Plastic bags are not biodegradable: they pollute oceans, rivers, farmlands, cities, and communities as plastic bags become litter. Bans remove sacks, which is similar to less litter and less pollution, Tax money

costs for cleaning up litter: Banning plastic bags would minimize litter and allow tax money to be diverted to more relevant areas, Sealife can improve: plastic bags are often misunderstood by marine creatures as jellyfish or plankton, causing them to eat the litter and become sick or die. There are some disadvantages too. They are; Scale back manufacturers of plastic bans: bans often lead manufacturers of plastic bags to scale back business and can lead to layoffs and Upfront expense to shoppers: Bans on plastic bags require shoppers to buy reusable bags that can range from 1 and up.

According to the responses of the survey, 13% of respondents indicated that paying for plastics bags was effective. If customers have to pay for bags of plastic, they know exactly how many of them they use. Even if a few bags were recycled to make garbage can liners and dog poop bags, most of them will never be seen again.

6% of respondents claim that it is effective to prosecute them for using plastic bags. This approach has already been used in many countries. Making, selling, or even using a plastic bag is now a crime in Kenya, punishable by imprisonment of up to four years or fines of \$40,000. It is the latest country to impose some sort of legislation, ban, partial restrictions, or taxes on the use of plastic bags, joining some more than 40 other nations, Reuter's reports, such as China, France, and Rwanda. The new legislation of the East African country, effective from Monday, is the hardest the world has seen so far, also authorizing police officers to target even those carrying plastic bags around. Major Chain stores have recently started selling customers cloth bags as an alternative.

In the seventh part of the survey, respondents were asked to state their reasons for using alternative bags when shopping.

According to Figure 4.10, the largest proportion of respondents (30%) indicated that they're using alternative bags because they were environmentally conscious. This was followed by the following reasons: reducing plastics (23%), ease of use (20%), more storage space (16%), traditional behaviors (8%), and receiving incentive points from supermarkets when used. The other reasons were also provided by 1% of the respondents.

Plastics don't litter. Humans do. The human nature of littering is not going to improve by opting for biodegradable packaging. Consumers need to be committed to protecting our environment and educating themselves about alternatives to packaging, as well as the advantages of efficient plastic recycling and the proper disposal of products they no longer need. For the reasons stated, the use of eco-friendly alternative bags is therefore successful.



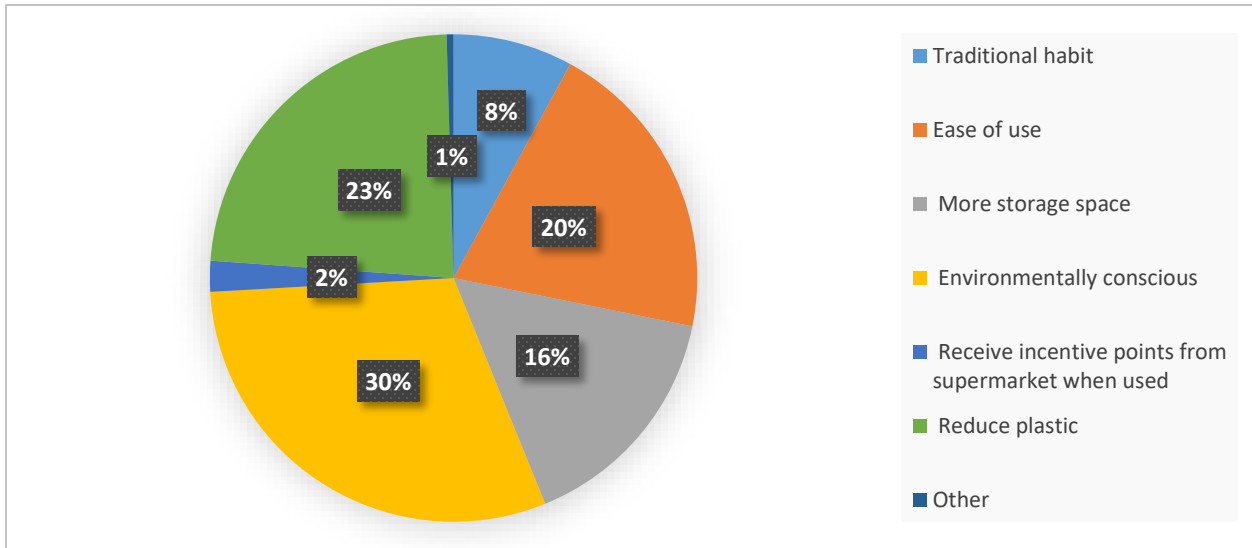


Figure 4.10: Reasons for using alternative bags when shopping  
Source: Prepared by the researcher, 2020

#### 4.1.7: Identifying the Challenges of Using Non-Polythene Bags

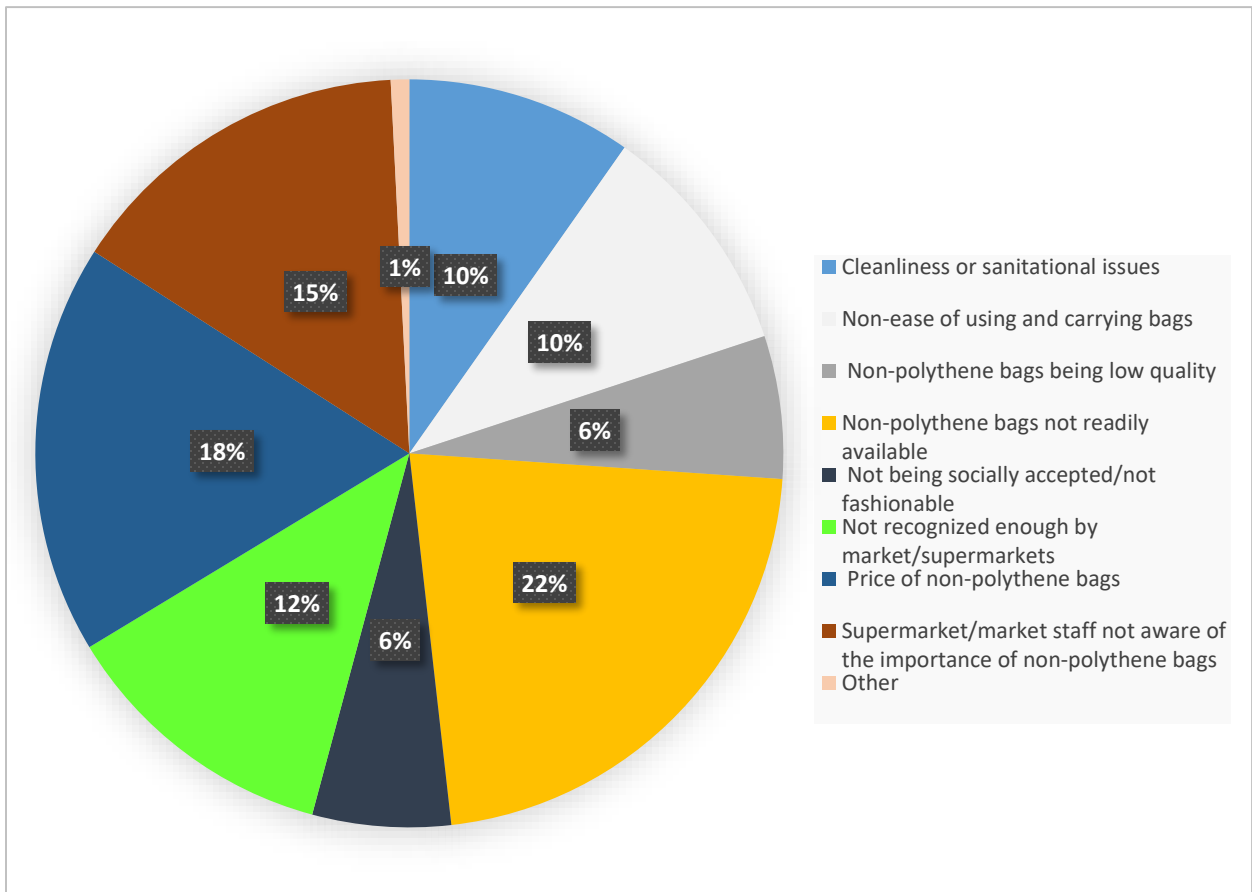


Figure 4.11: Challenges of using non-polythene bags  
Source: Prepared by the researcher, 2020

In the eighth part of the survey, respondents were asked to suggest the difficulties of using non-polythene bags. According to Figure 4.11, the largest proportion of the 381 respondents who participated actively in the survey (22%) suggested that non-polythene bags were not readily available. This was followed by the following challenges: costs of non-polythene bags (18%), supermarket/market staff not aware of the importance of non-polythene bags (15%), not adequately recognized by markets/supermarkets (12%), not easy to use and carry bags (10%), cleanliness or hygiene problems (10%), not socially accepted/not trendy (6%) and non-polythene bags being low quality (6%).

Non-polythene bags have negatives, as with any product. Durability, as stated, is a must. So, make sure the bag is made from a high-quality material when buying a reusable bag. Some manufacturers use thin materials, which means that heavy products cannot be packed inside the bags. Forgetting them at home is another con that applies to reusable bags. If customers are going to use these bags, it is suggested to leave them in their vehicles. Consumers have to use plastic bags if they go shopping without them, which defeats the point of having a reusable bag.

Some reusable bags are simple and have no pattern. Others are configured in odd ways, so it can be difficult to store things that consumers want to bring. Buy bags that come in the sizes consumers like and offer visually enticing designs. Online, they can even design their own bags to be exactly what they want to use. It is also clear that the difficulties listed can be addressed and will help encourage society to use these alternative bags.

#### **4.1.8: Identifying the Problems of Plastic Pollution**

The ninth part of this survey was intended to outline the problems of plastic pollution. According to Figure 4.12, the largest proportion of the 381 respondents who participated actively in the survey (22%) indicated that marine plastic pollution is a major concern for plastic pollution. This was followed by animal hazards (21%), landfill emissions (15%), incineration/burning air pollution (15%), less recycling (11%), plastic poisoning (9%), and increased household waste pollution (6%). 1% of the respondents suggested any other issues.

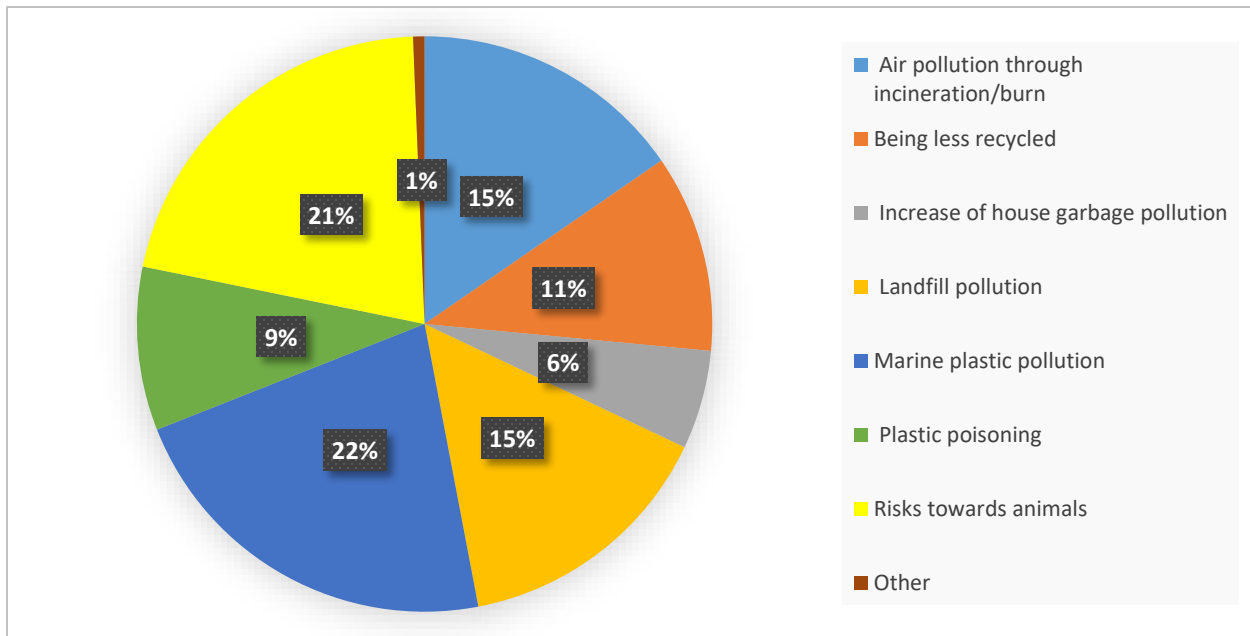


Figure 4.12: Problems of plastic pollution  
 Source: Prepared by the researcher, 2020

The waste in the ocean is mainly plastic and has a terrible effect on marine life. As a consequence, the economy and food supply for communities that depend on fishing can be affected. Plastic bags can damage tiny species, such as plankton, on which larger animals rely for food. If small creatures are poisoned by plastic bag consumption, the animals that eat them will also absorb toxins. Toxins work their way up the food chain, and they may even be found in the fish that people eat.

Not only does plastic cause damage to the ocean, but freshwater supplies may also be affected. Many areas are already facing problems, but water supplies everywhere are at risk because of plastic contamination. Plastic toxins in dumps and litter can be present in the freshwater that people drink every day.

Wind can bring plastic waste or litter all over the environment on land. In trees, fences, traffic lights, or other structures, it may get trapped. They risk swallowing the toxins or being entangled in the plastic and suffocating when animals come into contact with this plastic waste. The plastic will clog its stomach while also poisoning it with toxins when an animal eats a piece of plastic. It is estimated that almost 200 different species of animals eat plastic waste. Another issue for humans and animals is air pollution. It releases significant quantities of toxins when plastic is burned in the open air, which pollutes the air. It can lead to respiratory issues if the toxins are inhaled for a long period of time.

#### 4.1.9: Identification of the Extent of Advocacy of Respondents

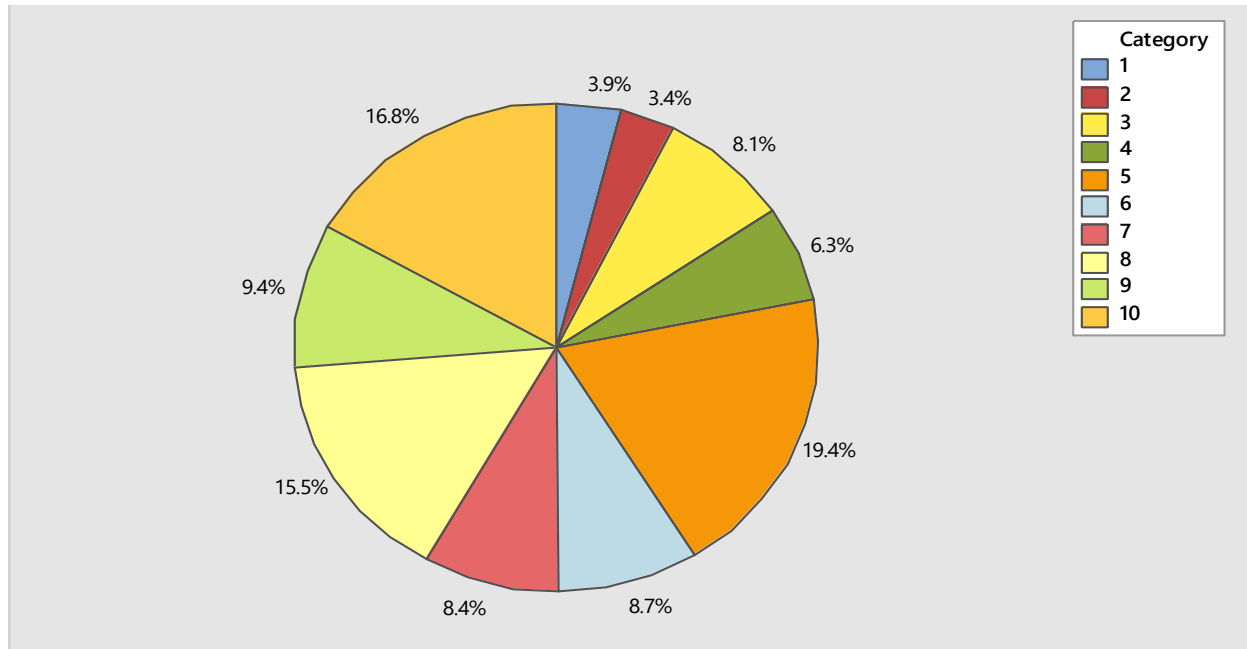


Figure 4.13: Public advocacy of plastic bags

Source: Prepared by the researcher, 2020

The tenth section of the survey was focused on how much respondents inspired/transmitted the practice of making non-polythene bags to other individuals. Respondents had to score this by picking a number between 1 and 10. '10' indicated a high level of advocacy and '1' indicated a low level of advocacy. According to figure 4.13, the largest proportion of the 381 respondents who participated actively in this survey (26.5%) indicated that they had a high level of advocacy while 3.1% of respondents had a low level of advocacy.

The goal of this is to increase understanding of the problem of the plastic bag and polythene pollution to find more sustainable solutions, implement innovations, and empower more individuals and organizations to take action to stop plastic pollution and live free of plastic.

Environmental awareness campaigns are most successful when targeted at specific groups or populations, according to UNEP. Many individuals do not pay much attention to environmental problems because they do not understand how they or their lifestyle will be affected by the problem.

In the developing world, environmental education is just as important as in industrialized nations; however, it can be very difficult to reach out to the people in those countries. They may be prevented from learning about environmental issues by language barriers, illiteracy, and cultural differences, especially in rural or tribal areas. A government organization or non-governmental organization (NGO) can often help to educate people on environmental issues by reaching out to

tribal, religious, and community leaders. Community leaders can help alleviate problems with communication and bridge the cultural divide that often stands in the way of outreach efforts.

The use of print, broadcast, and internet media in developed countries and urban areas can be a great way to increase education and awareness. Government agencies and non-profit organizations can help spread their message by working with the media, either by holding press briefings, issuing printed press releases, or even setting up online databases that can be used as centers of information. Information centers can be helpful tools for educating the public as well as journalists on environmental issues. Many media outlets may want to increase their coverage of environmental problems, but they do not know where accurate information can be found. It can be extremely useful to have a central information clearinghouse that is accessible to journalists and the public.

According to UNEP, thirty percent of the world's population is under the age of eighteen, which is why educating children and young adults on environmental issues are key to long-term success. This will help them foster a sense of duty and "proactive citizenship," so that they will make decisions that help the world rather than destroy it as they become adults. However many schools do not teach their students about environmental issues at the moment. Integrating environmental education into current science classes or teaching environmental science as a separate discipline is one of the best ways to inform children and adolescents about environmental issues, particularly if the classes include some form of 'hands-on' learning, such as starting a garden or caring for an animal.

## 4.2: Survey 02 – Plastic Bag Consumption at Supermarkets

The second survey focused on the amount of polythene/ plastic bags and alternative bags used in supermarkets.

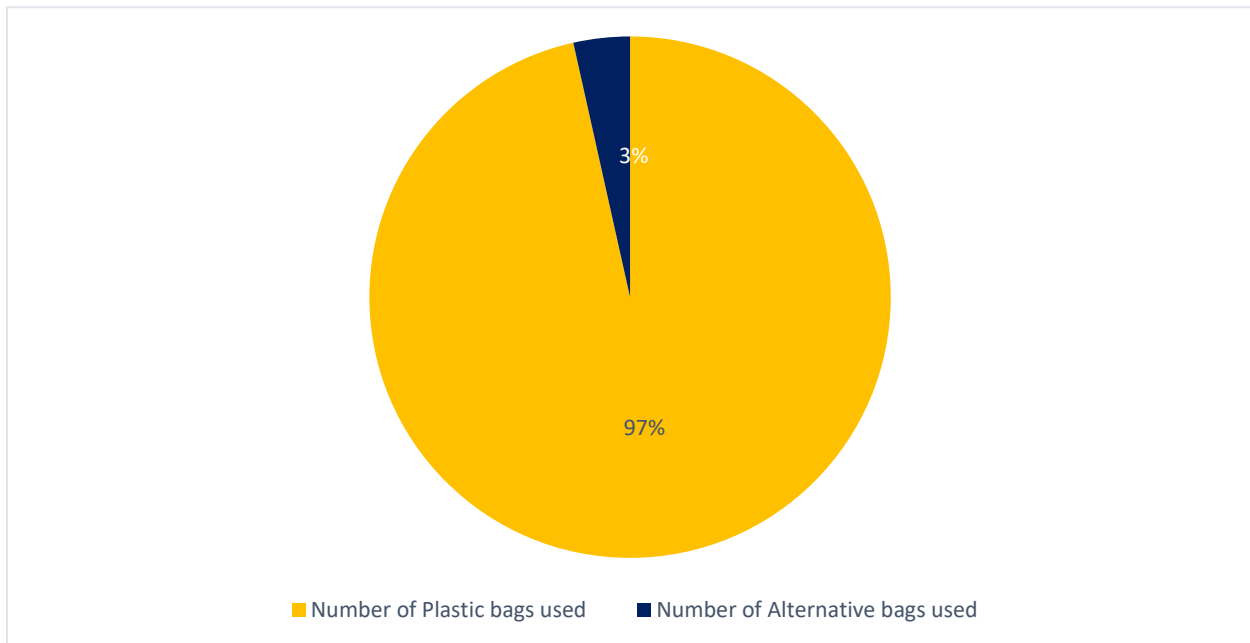


Figure 4.14: Consumption of plastic bags in supermarkets in Negombo city  
Source: Prepared by the researcher, 2020

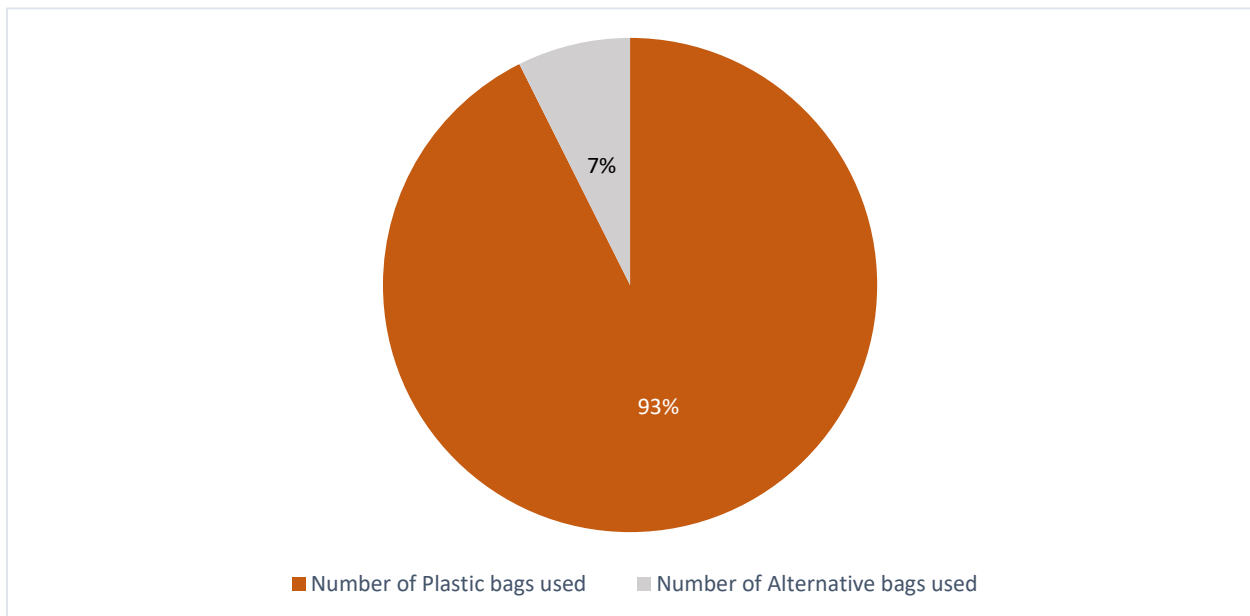


Figure 4.15: Consumption of plastic bags in supermarkets in Anuradhapura city  
Source: Prepared by the researcher, 2020

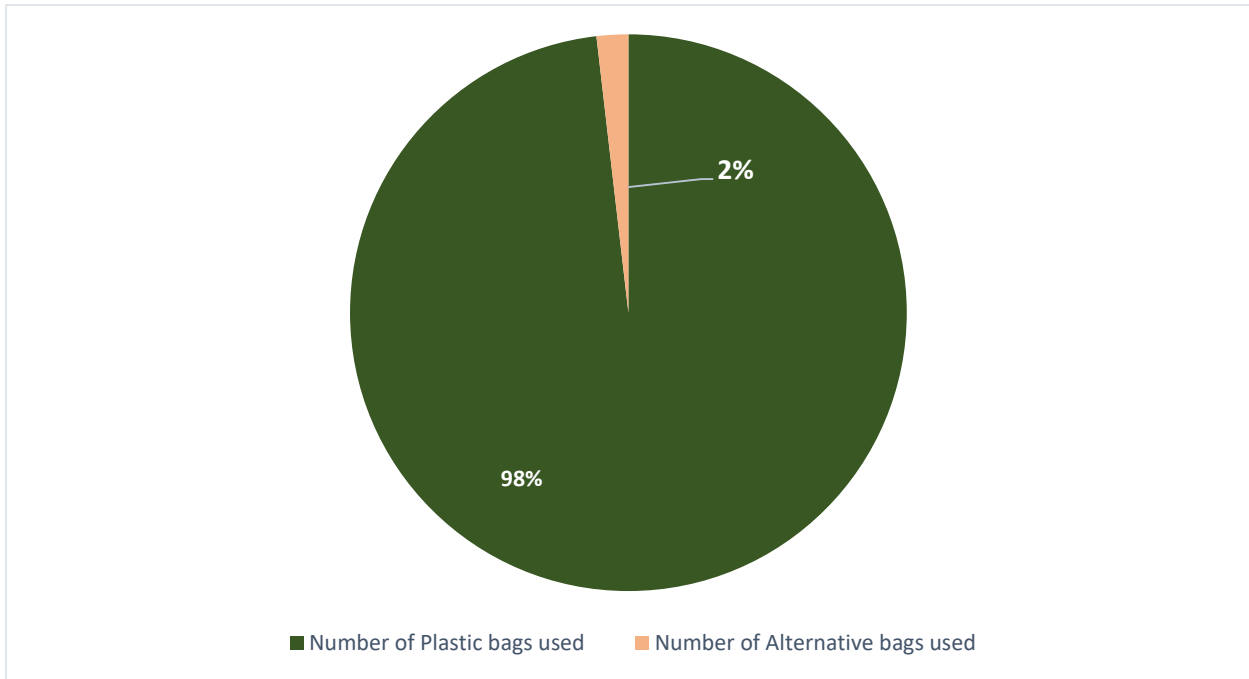


Figure 4.16: Consumption of plastic bags in supermarkets in Avissawella city  
 Source: Prepared by the researcher, 2020

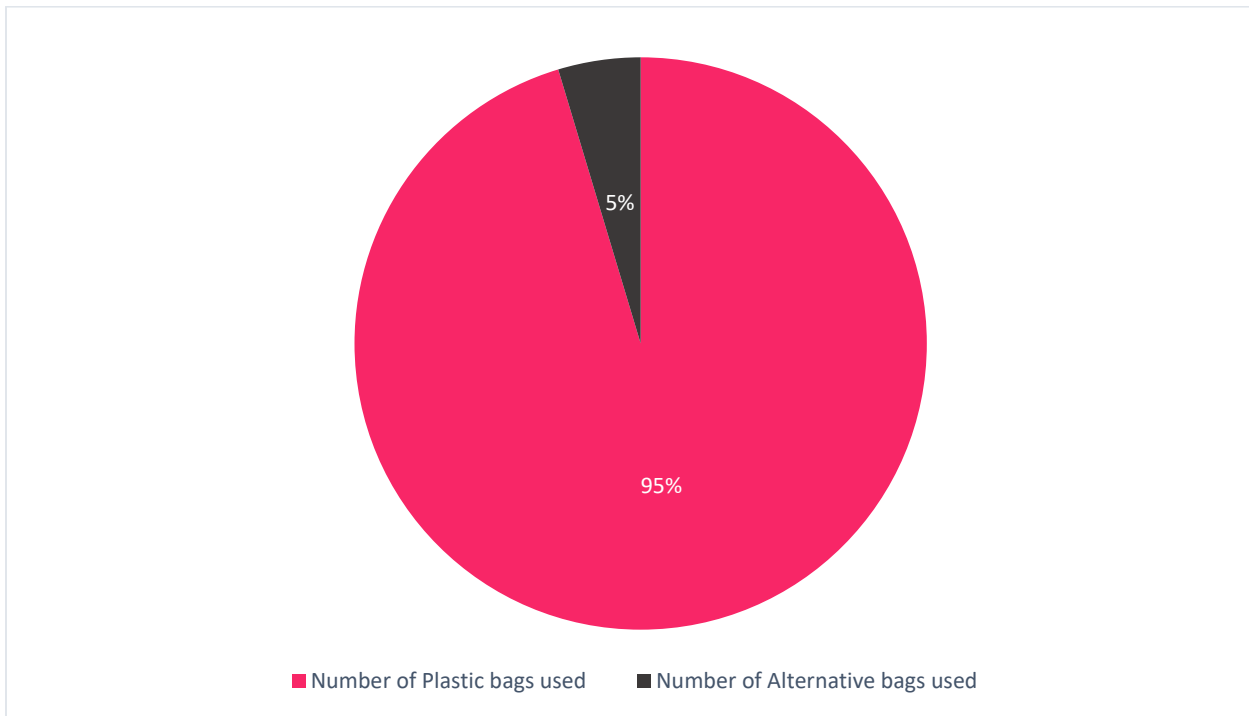


Figure 4.17: Consumption of plastic bags in supermarkets in Tangalle city  
 Source: Prepared by the researcher, 2020

Figure 4.14 indicates that 97% of plastic bags and 3% of alternative bags were used by consumers. This was achieved in two different supermarkets in the city of Negombo and there were 14 counters in all. 197 customers were considered. According to Figure 4.15, customers used 93% of plastic bags, while others used 7% of alternative bags in Anuradhapura. A total of 50 customers and four counters were considered in two separate supermarkets. Figure 4.16 shows that 98% of plastic bags and 2% of alternative bags were used by customers in two different supermarkets in Avisswella Area. This was determined by taking into account 49 consumers in 5 counters. According to Figure 4.17, 95% of customers used plastic bags, while another 5% used alternative bags. This was achieved in the town of Tangalle with a total of 41 customers in 6 counters in different supermarkets.

According to the above graphs (Figure 4.14, Figure 4.15, Figure 4.16, Figure 4.17), it is clear that almost all consumers use plastic bags when shopping in supermarkets. The main explanation is that almost all supermarkets in Sri Lanka use plastic bags as packaging. Therefore when shopping in supermarkets or other shopping centers, customers are ignorant of carrying their bags or other alternative bags.

Plastic bags are one aspect that all supermarkets should easily work on. While the charge of 5p could have pushed down demand for carrier bags, the issue has just changed. Supermarkets can decrease demand by charging more for bags for life, offering discounts to those who reuse them or carry them in their reusable bags. Supermarkets need to do a lot more on throwaway packaging, as well. There mustn't be our seas where they end up.

There is hope, thanks to ordinary people, standing up and taking action. Pumping out useless plastic is becoming less and less viable for supermarkets because of customers and other responsible parties. Everyone wants to see the shop floors struck by a refillable revolt and more efficient plastic reduction measures. Supermarkets know what they need to do, now they need to get on with it, thanks to customers and other responsible parties.

There are positive signs in Sri Lanka that supermarkets are coming on board to provide shoppers with incentives to carry reusable bags, says the environmental regulator. Some leading supermarkets produce millions of kilograms of waste per year and contribute heavily to the challenge of plastics and polythene in Sri Lanka. The Central Environment Authority said that officials had talks with retail chains regarding the ban on high-density polythene and the use of reusable bags. J M U Indraratne, CEA deputy general manager, said supermarkets will also introduce reusable bags. They will market such bags at outlets. Meanwhile, at the Ministry of Mahaweli Development and Environment in Colombo, the CEA established an office to track and



persuade people to avoid using polythene bags, the 'Punarudhaya National Programme for Environment Conservation'. A print ad campaign on the polythene ban started with the initiative. The advertisement said that all high density polythene used for filling, containing, and packaging prepared and cooked meals will be banned from September 1, this year, according to cabinet paper No 17/1405/704/022 of July 11, 2017. The ban includes the common sheets for lunch, grocery bags, and bags used to fill and contain cooked and prepared food. All high-density polythene used for decoration has also been prohibited at events like national, social, religious, cultural, and political events. More specifically, the advertisements state that it is illegal to burn polythene in open areas and on the roadsides. The CEA has said that household and road burning of polythene results in the release of cancer-causing compounds into the atmosphere. But to check enforcement, the regulator has no plans to raid industrial premises.

## Chapter 05

### Conclusions

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#### 5.1: Discussion

Plastic bags are most popularly used by people for shopping purposes but those are one of the significant waste which contribute to environmental deterioration and health impacts. Therefore, it is evident that the practices of plastic bags have caused both convenience and inconvenience in people's and animals' lives. However, as plastic bags are not-biodegradable it should be secure with alternatives. Therefore, it is important to understand the perception and awareness of society on plastic bags to tend alternatives.

As conclusions of the study, young and educated respondents were well aware the adverse impacts of plastic bags at the household level. But people consume non-biodegradable bags at the supermarket level. Therefore, instead of blaming others effective mechanism is needed to tackle this problem at the national level.

A variety of different initiatives have now been placed in place by consumers to limit and prevent the use of plastic shopping bags. This includes the following:

- Supporting reusable bags.
- Cooperative services for reduction - Command and control policies, including taxation of consumption (e.g. fees), restriction of advertisements, and prohibition of single-use products, can be complemented by voluntary actions by industries, known as corporate social responsibility (CSR). These are the actions performed at the corporate level to reduce plastic bags.
- Luggage fees at check out.
- Bag taxes legislated by governments at retail or production and import rate.
- Bans on bags—outright bans, replacement of materials, or minimum gauge requirements.
- Supermarket bag product management programs.

According to the results of both surveys, it can be observed that the impetus varies by jurisdiction for these tactics. Some are sincerely concerned about litter and low rates of recycling; some want to escape the cost of having a recycling/waste management infrastructure in place. Others are trying to reduce the cost of waste disposal, prolong the life of a landfill, or stimulate local manufacturing and jobs. Some want a green ethic to be promoted, where bags are seen as an over-consumption sign. It's just political sometimes.

There are benefits and disadvantages to each reduction strategy.

- Conversion to reusable is highly effective in reducing the use of plastic shopping bags as carrying bags, but it does not reduce the number of bags and the amount of plastic used to treat household waste and it has environmental restrictions because, in Sri Lanka, reusable bags are not recyclable.
- In Sri Lanka, voluntary reduction projects are highly effective, achieving reasonable reductions in the amount of distributed plastic shopping bags.
- Initiatives of retailer stewardship are extremely successful. Retailers are effective partners in improving behavior by raising awareness and offering alternatives.
- Bag taxes are not as effective because they are viewed and unpopular as coercive. They may contribute to non-compliance and conversion to environmental alternatives that are worse.
- In eliminating non-essential bags and enabling customer choice, bag fees are highly successful. This is a voluntary approach that draws on values of product stewardship, facilitates wise use, and is more effective in retaining citizens' support.
- Most frequently, bag bans are not successful. They are a top-down strategy that by removing competition, seeks to force abrupt change in the marketplace. They contradict the ideals of retail and consumer product stewardship and the 3 R's (Reduce, Reuse, and Recycle). Unintended negative effects of prohibitions are linked to impacts on the climate, consumers, economies, and employment. It is also shown that they cause avoidance or non-compliance.

## **5.2: Correlation Analysis**

The first survey revealed that the majority of respondents were carrying cloth bags. Out of a total of 381 respondents who used grocery bags, the largest proportion (161) used cloth bags relative to other grocery bags. This was accompanied by the use of polythene bags (157) and thick plastic bags (36). Figure 4.2 shows that the majority of respondents were in the 21-30 age group. The young generation has been actively interested in this research. The second survey found that most people used plastic bags in supermarkets. Alternative bag use in supermarkets is very limited relative to plastic bags. The majority of people who go shopping are middle-aged.

There may be several explanations to illustrate that this form of recovery causes people's perception of plastic bag waste. The young generation is more mindful of plastic bag waste than the middle-aged ones.

When young people educate about the role of plastic bag pollution and the many ways to reduce environmental pollution, they learn about the future when they will be in a position to make real change. Environmental education for young people should be one of the goals of state education policy in countries.

To increase the number of experts interested in environmental conservation, Sri Lanka is building up the number of students studying environmental and natural resources. School and university curricula emphasis on environmental education. The Government promotes the development of employment in the environmental sector and encourages students to take specialized courses in environmental management. When young people have obtained environmental education, they must be able to internalize the ideals of the environment at local, regional, and national levels.

Young people will engage in debates to raise public awareness of violations; drama and theatrical productions; exhibits, public meetings at different sites, including schools, using digital media technologies. They may be part of environmental regulations being criminally enforced. Once youth know about the environmental problems, depending on the nature of the crime, they can find job opportunities, environmental officers can arrest and pass officers to the police for prosecution.

These are the acute reasons for the use of eco-friendly cloth bags for young people to eliminate plastic bags. Instead of eco-friendly alternative bags, middle-aged people may not be conscious of the implications of using plastic bags or may have other reasons, such as;

- Convenience - Busy lives build a dependency on ready-made food and drinks that are often served in plastic packaging. People don't always feel they have time to prepare, and cooking for themselves decreases the use of plastic dramatically.
- Practicality - Since the 1970s, because it is sturdy, plastic has been the most practical option for carrying goods.
- Financial constraints - Often money will lead people to buy the more plastic product because it is always cheaper.

## Chapter 06

### Recommendations

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#### 6.1: For Policymakers

**Separate Collection** - Enact legislation mandating at least 90% separate collection of plastic waste (while systems for plastic bottles and other beverage containers are already well developed, this should go beyond beverage containers to look at other forms of packaging), and agree that mandatory deposit return systems are the only tested and successful way to achieve high levels of collection and litter reduction.

**Reuse Policy** - Implement reuse goals and other supporting policy frameworks (such as differentiated deposits for refillable), enforce policies from the outset, and understand that without at least 90 percent universal collection and deposit return schemes, plastics and other products cannot be reused on a substantial scale.

**Recycled Content** - Introduce, as a starting point, minimum goals for recycled content in the production of packaging and containers of at least 50% for beverage containers, and at least 30% for other products. This creates a demand for efficient recycling of plastic and preserves plastic without downcycling the material in a closed loop; Fix the problem of dangerous chemicals, and ensure that businesses design goods that can be recycled in a safe closed-loop from the outset.

**Prohibition of Hazardous Materials and Chemicals** - Prohibition of excessive or harmful plastic materials, such as PVC and polystyrene, and of single-use items that often end up in the atmosphere and the ocean as litter; Ban harmful substances, both in recycled materials and in virgin materials, across all products; Prioritize recycled alternatives and avoid unfortunate substitutes, such as replacing single-use plastic with other single-use products, such as bio-based, biodegradable or compostable plastic, that do not address contamination issues and can also contribute to other environmental issues.

**Extended Producer Responsibility** - Develop well-designed Extended Producer Responsibility schemes with modulated payments, the concept of polluter-pays and reduction goals, and provide support for better single-use alternatives.

**Zero Waste Cities** - Promote the strategy of Zero Waste Cities by designing and implementing programs that aim to phase out waste on an ongoing basis, not by incinerating, landfilling, or exporting it but first by not producing waste.

## 6.2: For Companies

**Support Legislation** - Ensure the commitments are more ambitious than current, or planned, plastic emission control legislation. Openly express support for and call for progressive legislation to resolve the plastic crisis, urge peers to do the same, and abandon any industry measures, including their implementation, that resist, obstruct or weaken progressive legislation.

**Transparency** - Be open about the complete plastic footprint of the business (including goods and packaging) and progress towards plastic goals, setting out a holistic approach with tokenistic gestures to prevent 'virtue signaling' (e.g. products from ocean plastic). Ensure the reporting covers successes in all markets and brands and is based on evidence checked independently.

**Reduction** - Commit to meaningful steps leading to a major reduction in the number of single-use plastics and other single-use products. Such initiatives need to be specific observable, time-bound, and independently checked, and should include reuse support, product redesign, and efficient recycling; Maintain accountability of the number of units in reporting progress.

**Clarity on Alternative Materials** - Set out consistent positions on the use of alternative materials, such as bio-based, bio-degradable, and compostable plastic, including justifications on what is and is not a good use of these materials, including clear standards for sustainability that discourage deforestation or food competition; Ensure that these goods are only sold in markets with sufficient waste treatment infrastructure for dealing with them.

**Business Continuity** - Ensure that commitments are uniformly enacted in all the markets in which the company (and its subsidiaries) operates; that is to say, ensure that there is no contradiction in how a company acts in one market on the topic of plastic pollution and how it acts in another.

## 6.3: For Customers

As a customer, it is not easy to solve this issue because corporations retain control of their packaging, making it extremely difficult to opt for plastic-free alternatives or business models. Recognizing that to some degree, we can only behave as sustainably as the framework requires us to be an essential step to understanding where true responsibility lies. We strongly believe that removing plastics should not be the sole responsibility of the consumer, but rather part of a structural shift initiated by politicians and enforced by businesses. For this reason, in calling for reform, keeping companies accountable, and amplifying the voices of those advocating for change, we urge people to be outspoken.

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