Advancements and challenges in removing plastic food packaging from the urban waste stream and the prospect of zero-waste retailing

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Abstract

Over the last several decades, single-use plastic food packaging has contributed to the growing stream of waste generated in urban areas. More often than not, plastic food packaging ends up in landfills, incinerators and the environment. In fact, according to estimates, only 9% of all plastics ever produced, including food packaging made of plastic, have been recycled. More recently, mounting pressure has been placed on governments, producers, retailers, and consumers to reduce the amount of plastic food packaging that they produce, use and discard.

The first part of this SRP seeks to understand the roles various actors play in the pursuit of drastically reducing food packaging waste and the barriers that need to be overcome to achieve this goal. The second part of this SRP examines the operations of zero-waste food retailers in Canada and the attitudes, behaviors and characteristics of their clientele. The outcomes of this research are an overview of the advancements and challenges in reducing plastic food packaging, and an outline of barriers and concerns that will need to be addressed in the future in order to continue transitioning towards a low-waste economy.

Résumé

Au cours des dernières décennies, les emballages alimentaires en plastique à usage unique ont contribué à la production de déchets générés dans les zones urbaines. Souvent, les emballages alimentaires en plastique atterrissent dans les décharges, les incinérateurs et l'environnement. Selon les estimations, 9% de tous les plastiques produits, y compris les emballages alimentaires en plastique, ont été recyclés. Plus récemment, des pressions ont été exercées sur les gouvernements, les producteurs, les détaillants et les consommateurs afin qu'ils réduisent la quantité d'emballages en plastique pour produits alimentaires qu'ils produisent, utilisent et jettent.

La première partie de ce projet cherche à comprendre les rôles que divers acteurs jouent dans la réduction de déchets d'emballages alimentaires et les obstacles à surmonter pour atteindre cet objectif. La deuxième partie de ce projet examine les activités des épiceries zéro déchets au Canada et les attitudes, comportements et caractéristiques de leur clientèle. Les résultats de cette recherche sont un aperçu des progrès et des défis en matière de réduction des emballages alimentaires en plastique, ainsi qu'un aperçu d'obstacles qu'il faudra surmonter afin de poursuivre une transition vers une économie qui génère moins de déchets.

Acknowledgements

I would first like to extend my deepest gratitude to my supervisor, Professor Madhav Badami, and co-supervisor, Stephanie Leclerc, for their insight, guidance and constant encouragement. Their knowledge and experience contributed to a deeper analysis of the subject. I would also like to thank my second reader, Professor David Brown, for his thoughtful comments and recommendations.

I had the pleasure of speaking with various dedicated entrepreneurs who are leading the way in adopting radical solutions for reducing food packaging waste. I was also fortunate to have over 300 customers of zero-waste stores answer an online survey. The participation of business owners and their customers was an integral part of the analysis. I would like to thank them all for providing me with their invaluable insights.

Lastly, thank you to my parents and Brendan for your unwavering love and support over the last two years as I worked towards completing my Master of Urban Planning. I could not have done it without you.

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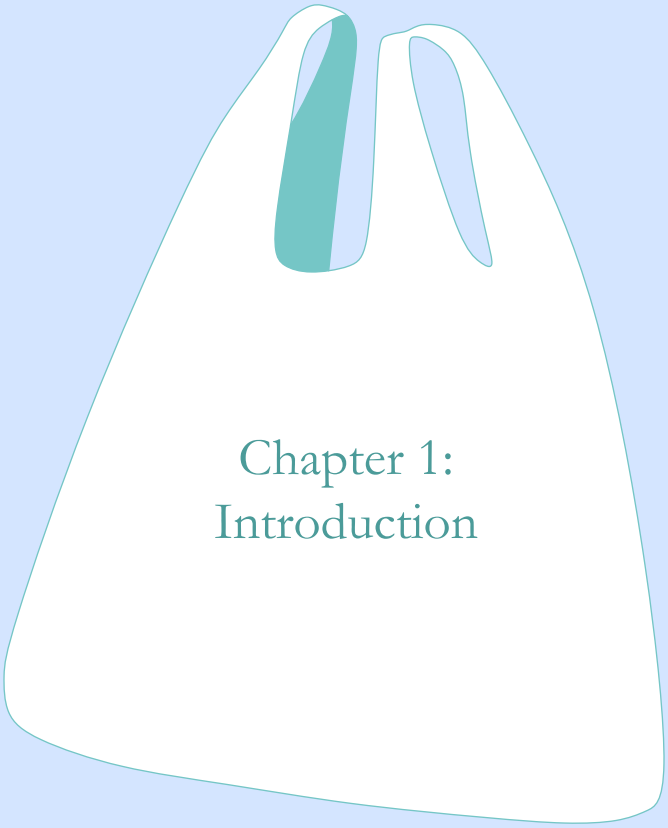

Chapter 1: Introduction

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Over the last several decades, the accumulation of plastic food packaging waste in the natural environment and their resulting impacts have received increasing attention. Most notably, plastic debris originating from items such as drink bottles, single-use grocery bags and snack wrappers have been observed washing up on coastlines (Barnes et al., 2009), collecting in ocean gyres (Ebbesmeyer et al., 2007; Cózar et al., 2014) and disrupting food chains (Rochman et al., 2015). These discoveries, which demonstrate the pervasiveness of plastic in the environment, have inspired the formation of campaigns headed by a number of organizations. These organizations include 5 Gyres, Algalita, Clear Blue Sea, Earth Day Network, Greenpeace, Natural Resources Defence Council, Plastic Change, The Story of Stuff Project, and the World Wild Fund. Their campaigns have called on governments, corporations and the general public to reduce their reliance on plastic. Moreover, in 2017, the United Nations Environment Assembly, with the support of 193 countries, passed a resolution to eliminate plastic waste from the oceans. It is also important to note that the environmental impacts of plastic food packaging are not limited to marine and freshwater environments but also include resource consumption, land degradation, air pollution, and greenhouse gas emissions (Lewis, 2008).

It is clear that over time, public awareness concerning the consequences of consumption habits on the environment has become more prominent (Heberlein, 1972). Despite the public's growing cognizance and the implementation of new policy instruments and corporate social responsibility programs, fundamental change concerning how food is packaged and sold has not been felt (Tencati et al., 2016). To achieve a future in which the flow of plastic through society and the environment is drastically reduced, if not eliminated, will require a very significant societal shift considering our current dependence on these materials.

To achieve this vision of a low-waste future, production, distribution and waste management systems will need to be rethought and redesigned. Coordination will have to take place on a multi-national scale; while the mismanagement of waste in many

developing countries has led to these problems (Jambeck et al., 2015), developed nations which depend on the developing world to import their waste must also assume responsibility. Additionally, actors along the entire supply chain have diverse and significant roles to play in the effort to reduce food packaging waste. Factors shaping the food packaging industry including public and private governance structures, regulatory instruments, corporate social responsibility programs, and consumer behaviour all have influence in improving food packaging consumption rates and their end-of-life treatment.

1.1 Why focus on plastic?

While the goal of this paper is to discuss the roles played by various actors, the factors and systems that influence them, and the barriers that need to be overcome to reduce food packaging waste in general, *plastic* food packaging serves as the focus of this report due to their inability to be recycled without suffering a reduction in quality (unlike glass and metal) or composted (unlike plant- and paper-based products).

Although food packaging has been identified as a broad category of goods that must be reduced and better managed, their absolute elimination is not necessarily feasible or desirable. The key point is that the industry's reliance on virgin materials, the prevalence of over-packaging and ineffective waste management systems have caused negative environmental impacts that need to be avoided in the future. In addition, it is important to question and better understand the social, economic and environmental impacts of food packaging at each step of the life-cycle to correctly improve their design, use and end-of-life treatment without creating additional adverse environmental and social impacts.

Another reason why this report focuses on *plastic* food packaging is because although many types of plastic food packaging materials are deemed recyclable, they are often brought to landfills since recycling them is not economically profitable (Muise et al., 2016). To illustrate the scope of the problem, it is estimated that a shocking 91% of all plastics ever produced globally – totalling approximately 6,300 million metric tonnes – have never been recycled (Geyer et al., 2017). Of that 91%, 12% has been incinerated while 79% has been dumped into landfills or made their way into the environment (Geyer et al., 2017). The improper use and disposal of plastic food packaging has led to harmful chemicals leaching

into the natural environment via terrestrial, marine and freshwater habitats (Thompson et al., 2009). Through these channels, plastics have also made their way into food chains (Cox et al., 2019; Thompson et al., 2009). Not only are the downstream consequences of plastic packaging waste harmful, so are their upstream impacts. Plastics are commonly synthesized from oil, natural gas or coal – compounds whose extraction are becoming increasingly challenging, energy intensive, and polluting (Thompson et al., 2009).

Until the environmental impacts are fully understood and mitigated, plastic food packaging will continue to be improperly produced, used and handled. Considering the public interest in reducing society's dependence on plastics, this report seeks to better understand the role of governments, businesses, and individuals in reducing the use of plastic food packaging and to explore how the challenges and barriers to achieving a low-waste future may be overcome.

1.2 Report Outline

This report is divided into two parts. In part one, I examine the role played by various actors along the lifecycle of food packaging; I discuss the factors that have led to the waste problem; I explain the progress that has been made to reduce the production and improper disposal of food packaging; and I describe the challenges and barriers that need to be overcome to continue reducing plastic food packaging waste.

In part two of this paper, I present an exploratory study on the topic of zero-waste retailers and consumers. The goal of this project is to gain a better understanding of the operations of zero-waste retailers, as well as the perceptions, attitudes and beliefs of business owners and their customers. The rationale for part two is to understand how the zero-waste movement is applied in practice. Retailers play a vital role in the food supply chain in that they have the power to effect positive change in consumer habits and in reducing the overall impact of food consumption on the environment (Fox & Vorley, 2004). As the zero-waste movement grows, governmental and corporate policies and decisions are more likely to be modified and improved accordingly.

Since the zero-waste business model is relatively new, it has not been widely described or discussed in the literature. While consumer behaviour is a relatively prevalent topic of

study, giving the opportunity to customers to explain their motivations, and the challenges they meet when shopping for food at zero-waste retailers presents a novel opportunity to understand their unique set of characteristics, values, attitudes, and preferences.

The outcomes of this research are a discussion of effective strategies for reducing food packaging waste and an outline of barriers and concerns that will need to be addressed in the future. The insights gathered from this study may guide governments, food retailers and the general public concerned with reducing the amount of plastic food packaging that is produced and thrown away. Working towards this goal will alleviate pressure on the waste management system, and more importantly, the environment.

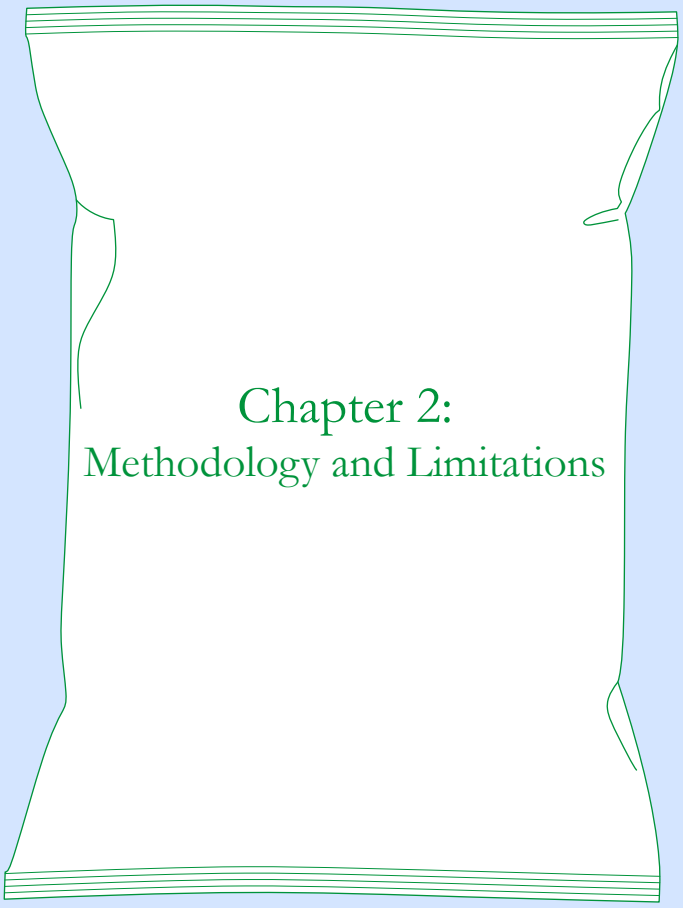
1.3 Research Questions

Part 1: The Actors and Determinants of Packaging Waste Reduction

1. What roles do various actors play in reducing food packaging?
2. What progress has already been made and what are the strengths and weaknesses of these policies and strategies?
3. What barriers need to be overcome to continue reducing food packaging waste?

Part 2: An Exploratory Study of Canadian Zero-Waste Grocery Stores

1. How do zero-waste grocery stores operate, and why?
2. Who shops at zero-waste grocery stores, and why?
3. What can public bodies do to improve and support zero-waste businesses?



Chapter 2:
Methodology and Limitations

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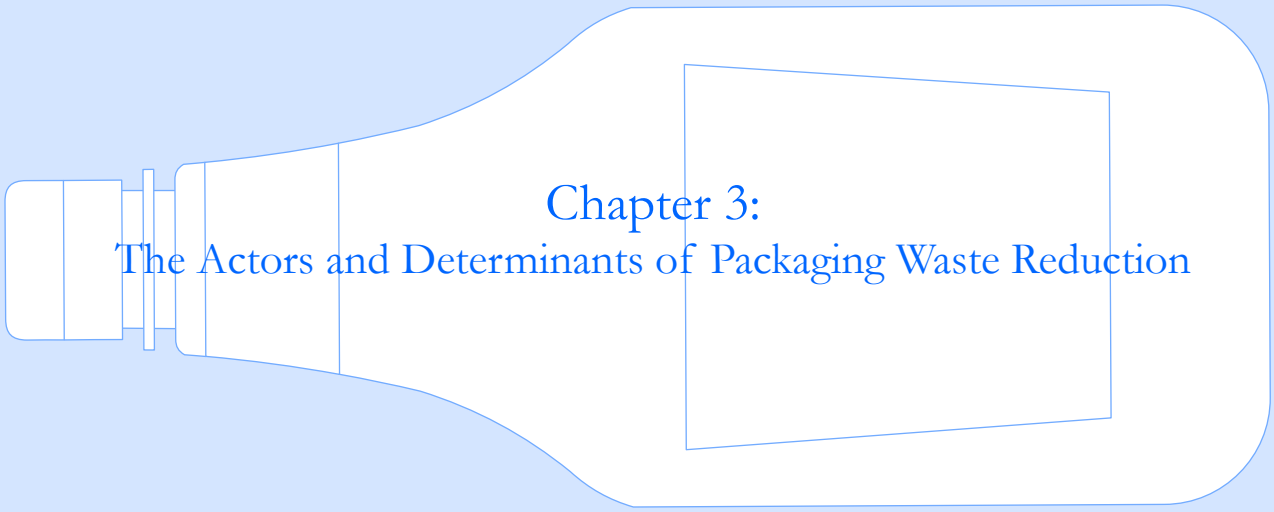
2.1 Methodology

The methodology employed in the first part of this paper involved completing a literature review on the progress that has been made to reduce food packaging waste on the part of governments, producers, retailers, and consumers. I review policies, programs and strategies that have targeted plastic food packaging and discuss their respective outcomes. In the second part of this paper, I present zero-waste grocery stores as an alternative business model that directly aims to reduce food packaging waste. To gain a better understanding of this emerging business model, I distributed a questionnaire to zero-waste retailers across Canada. Retailers were identified via a basic google search. Then, I completed follow-up in-depth interviews with a selection of zero-waste retailers. Lastly, an online survey was posted on the social media pages of a zero-waste retailer in Quebec (NousRire) and a zero-waste lifestyle social media page for residents of Toronto. Survey and interview questions for retailers were designed to gain a deeper understanding on the topics of store operations, to build a customer profile, and to unearth the major challenges associated with the zero-waste business model in the food retail sector, and zero-waste purchasing behaviours and motivations. Survey questions for customers were designed to gain a deeper understanding of their characteristics, values, attitudes, preferences, choices, and motivations.

2.2 Limitations

Due to the limited time frame of this study, the literature review provides a selection of examples and anecdotes concerning the progress that has been made to reduce food packaging waste along the supply chain. In terms of the exploratory study, due to the small number of zero-waste retailers in existence in Canada, the sample size of retailers contacted was small (n=12) and so was the number of respondents (n=5). From the results, it has been made clear that zero-waste stores have a growing and very loyal and passionate customer base. Regardless, due to their novelty, it is difficult to conclude on the economic viability and scalability of the model since the businesses were in their

infancy during the time frame of the study. Therefore, it is difficult to gauge their potential for future growth. In addition, since those participating in the movement were the only group of people evaluated in this study, there is a lack of information on the attitudes of people who do not adopt zero-waste practices in their business or lifestyle.



Chapter 3:
The Actors and Determinants of Packaging Waste Reduction

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Plastics such as Styrofoam, styrene and cellophane started being used in the 1950's, transforming the food packaging industry (Berger, 2002). Their widespread use was further enabled by sophisticated manufacturing technologies. Innovations in food packaging have presented a number of benefits to society including improved food safety, extended shelf-life and easy transportation (Berger, 2002). From a marketing perspective, packaging has been used by companies to make their products more attractive and to communicate important information to consumers such as nutritional facts and ingredients lists (Berger, 2002).

Despite these health and economic benefits, excessive food packaging has caused a host of problems. While advances in manufacturing technologies have facilitated the creation and use of more chemically complex and robust materials for packaging, modern packaging materials are nearly indestructible and rarely recycled, leading to their accumulation in the environment. A basic internet search reveals an abundance of photos showing the extent of plastic pollution in the ocean. In 2018, Lebreton et al. attempted to systematically identify and quantify plastic pollution in the ocean. They found that the majority of plastics floating in the ocean originate from the fishing industry while the second most common types of identifiable plastic debris were containers, bottles, lids, bottle caps and packaging straps, demonstrating the impact of poorly managed end-of-life food packaging. These observations also demonstrate the consequences of modern-day systems of food production, consumption and waste management, more generally.

3.1 The Different Types of Plastic

In this paper, "plastic food packaging" is used as a blanket term to include single-use and recyclable plastics used in the food and drinks industry. For the purpose of this research, "plastic food packaging" includes all materials used to contain food and drinks that is made from plastic in whole or in part and includes other plastic items related to this industry like grocery bags, cups, straws and cutlery.

As suggested earlier, there are several different types of plastic. Generally speaking, there are seven main categories of plastic, each with a unique "resin identification code" (See Figure 1). Resin identification codes were developed in 1988, by what is now known as the Society of the Plastics Industry, to facilitate recycling (American Chemistry Council, n.d.). These seven types of plastic include Polyethylene Terephthalate (PET or PETE), High Density Polyethylene (HDPE), Polyvinyl Chloride or Vinyl (PVC or V), Low Density Polyethylene (LDPE), Polypropylene (PP), Polystyrene (PS), and miscellaneous or other.

Figure 1. Resin identification codes.

PET is commonly used for drink bottles; HDPE is used for juice or milk jugs; PVC is used for cling wrap; LDPE is commonly used for grocery bags, bread bags or squeeze bottles; PP is widely used to contain hot foods; and PS is often used for takeout boxes, disposable cups or egg cartons (Bahraini, 2018). The "other" category includes all other plastics including Bisphenol A (BPA) and Polycarbonate (PC) which are also used by the food and drinks sector (Bahraini, 2018). Whether or not each type of plastic is in fact recycled depends on proper disposal, municipal waste management programs, and the recycler (American Chemistry Council, n.d.).

3.2 The Contribution of Food Packaging to the Urban Waste Stream

Food has received much attention from policy makers and academics as one of the greatest inefficient uses of natural resources (Hall, 2009), and until very recently, food packaging has received less attention. Considering packaging does not decompose as quickly as food does, its presence in landfills and in the natural environment has had devastating effects. Chemicals from packaging materials in landfills leach into the ground and are released into the atmosphere as they decompose (Thompson et al., 2009).

Their short lifecycle and rate of consumption has been identified as one of the main reasons for the dramatic increase of solid waste generated in urban areas (Schwepker & Cornwell, 1991). Packaging production rates are estimated at 207 million tonnes globally each year (Ellen MacArthur Foundation, 2013), of which, somewhere between 50–70% of it is used by the food and drinks industry (Emblem & Emblem, 2012; Belz & Peattie, 2009). Today, it is estimated that packaging waste makes up 30–35% of the municipal solid waste stream in industrialized nations like Canada, the USA and Australia (EPA, 2013; OECD, 2013). In Canada, only 11% of all plastics are recycled, and the global average is even lower at 9% (Denne et al., 2018). As nations around the globe continue to become wealthier and more urbanized, unsustainable consumption patterns and a growing global population will continue to contribute to the production of food packaging waste (EUROPEN, 2013; WPO, 2008). The rate of production and consumption of food packaging makes it an ideal candidate for receiving stricter regulatory intervention, especially considering their low recovery rate.

3.2 Who is responsible?

The environmental impacts of the food packaging industry have been considered at various stages of the supply chain and from the perspective of various actors. A general conclusion drawn in the literature is that in order to achieve the goal of dramatically reducing food packaging and eliminating as many environmental impacts as possible from this industry, all actors need to make changes at their respective stage in the life cycle of food packaging (Polman & MacArthur, 2018). Still, few regulations have been placed on the design and manufacturing of food packaging products. Instead, policies tend to target the end of a packaging product's life cycle (Zaman, 2015).

When considering the actors who are responsible, it is important to acknowledge that certain strategies aimed at effecting change at different stages of the supply chain and implemented by specific actors may be more effective than others. For example, if consumers could only purchase sustainably-packaged or non-packaged products, then a subset of society (i.e. the consumer) would no longer be key stakeholders involved in the pursuit of a plastic-free environment. Their preferences, decision-making and behavior

would not be identified as being crucial to changing packaging waste flows. In reality, however, achieving a future in which this is true will be dependent on consumer demand necessitating their presence and voice in earlier stages of transitioning into a low-waste economy.

3.3 The Circular Economy Concept

Thus far, I have explained *why* there is a need to transition into a low-waste society and how this can be achieved, in part, by reducing the production of food packaging waste. In this subsection, I explore a popular concept which aims to show *how* a low-waste society may be achieved.

The circular economy concept has been increasingly mentioned by decision makers and advocacy groups as a possible alternative economic framework for a more sustainable society (Korhonen et al., 2018a). According to the Waste and Resources Action Program (WRAP) a circular economy is:

> An alternative to a traditional linear economy (make, use, dispose) in which we keep resources in use for as long as possible, extract the maximum value from them whilst in use, then recover and regenerate products and materials at the end of each service life.

The circular economy concept proposes an economic system with closed material loops rather than a linear economic system. It suggests that products should be designed and used in such a way that they can be used over and over again (McDonough & Braungart, 2010). The circular economy concept is gaining popularity as it promises to solve some of society's environmentally harmful means of production, consumption and waste management since its aims are to reduce waste and improve resource efficiency (WRAP, n.d.). Proponents predict that a circular economy would lead to a more sustainable future, the consumption of fewer resources and energy, and a positive industrial transformation (Korhonen et al., 2018a).

Researchers, such as Korhonen et al. (2018b), warn of the limitations of the circular economy model and explain that: "These [limitations] include the limits posed by

thermodynamics, spatial and temporal system boundaries as well as the governance and management challenges concerning inter-sectoral and inter-organizational material and energy flows" (Korhonen et al., 2018a). Here, the authors explain that cradle-to-cradle systems of production will never be "closed loop" as additional sources of energy are required to maintain circulation. While this may be true, one can argue that renewable sources of energy can be used to minimize these impacts and quell some of these restrictions.

Currently, eatable and refillable containers are two kinds of food packaging that meet the requirements of the circular economy concept (Geueke et al., 2018); however, this does not mean that both alternatives are immune to having an environmental impact. Eatable containers are not reusable and require land, water and energy for their production. Cleanable and refillable containers need soap, water and energy. If the source of these resources is not renewable, then eatable or refillable containers may be no better than the alternative single-use option.

In the following subsections, I provide an overview of the actions taken by governments, producers, retailers, and consumers to drastically reduce food packaging. This discussion centers on three mechanisms – governmental policy, the 'green market' and voluntary action (Ritch et al., 2009).

3.4 Governments

In 2009, the Canadian Council of Ministers of Environment (CCME) published a report entitled *A Canada-wide Strategy for Sustainable Packaging* and in it proposed the voluntary adoption of nine strategies for each province to reduce and better manage packaging waste. These nine strategies included: (1) creating a working group consisting of stakeholders across government and industry; (2) pursuing and monitoring industry agreements such as targets and commitments; (3) enacting standards and certification programs for sustainable packaging; (4) developing a nationally applicable labelling system for recyclables; (5) expanding reuse programs; (6) developing indicators and metrics to track the impacts of packaging over their life-cycle; (7) promoting educational initiatives within the industry and recognizing producer achievements; (8) establishing an

ombudsman for packaging issues; and (9) tracking progress through a 'shopping basket' index, that is used to assess packaging of a specific set of common household goods over time. The CCME's role in these efforts would be to provide regulatory and financial support. The abovementioned actions were designed to support the CCME's foremost aim of having provinces adopt and enforce Extended Producer Responsibility (EPR) programs, which is communicated more extensively in the CCME's *Canada-wide Action Plan for Extended Producer Responsibility,* discussed further in subsection 3.4.1 (2009a).

Since the publishing of the report in 2009, Canadian provinces have adopted variations of EPR. For example, New Brunswick, Newfoundland and Labrador, Ontario and Quebec each created non-governmental organizations whose purpose is to oversee the development and implementation of EPR (Hickle, 2013). However, results and progress reports showing reduction data are virtually non-existent owing to complexities associated with accounting for baseline and progress data (CCME, 2014). These complexities include producing a tracking system that can be consistently applied to all product makers and waste collectors.

In a second attempt at targeting plastic packaging waste, nine years later, in November of 2018, the CCME released their *Strategy on Zero Plastic Waste* with the intent of transitioning to an economy that, as suggested by the title, does not produce any plastic waste. Ministers introduced targets to reduce landfill-bound plastic by 30% by 2030 and 50% by 2040. Aspirations to reach a circular economy were also communicated as a means of keeping plastics out of landfills and the environment. The motivation stemmed from the fact that despite the progress made to improve waste management systems, the majority of plastics are still not recycled. "While there are well established waste management programs, the systems need to be improved in order to move away from the existing situation whereby more than 89% of our plastics are landfilled and incinerated" (CCME, 2018).

In the following subsections, I provide an overview of the EPR programs in Canada with the support of examples from international contexts to highlight the strengths and weaknesses of this policy instrument and explore other policies that target plastic food packaging.

3.4.1 How does EPR work?

According to the CCME, extended producer responsibility (EPR) is defined as "an environmental policy approach in which a producer's responsibility for a product is extended to the post-consumer stage of its life cycle" (2009a). That is, EPR programs require producers to assume the end-of-life treatment costs for their products (CCME, 2009b; Kunz et al., 2018). Thus, EPR programs work to shift the costs of waste management from municipalities onto producers and consumers (CCME, 2009b). This differs from the traditional system which relies on the municipal tax base to pay for waste management services (CCME, 2009b). In theory, this mechanism discourages producers and consumers from manufacturing and purchasing items that depend on waste management and works to encourage them to design or buy more sustainable alternatives.

From a regulatory perspective, EPR programs for post-consumer packaging waste seem to be a viable strategy to reduce food packaging waste (OECD, 2014; Habitat U.N., 2016). Germany has often been cited as a successful model for EPR regulations seeing as the country's packaging waste stream shrunk by 13% in a six-year period following the implementation of EPR (otherwise referred to as the Ordinance on the Avoidance of Packaging Waste) in 1991 (Lewis, 2008; Quinn & Sinclair, 2006). Further, researchers have argued that since industry is unlikely to develop and use ecofriendly packaging without customer demand (which is currently lacking), governmental policies play an important role in implementing a system that applies to all food packaging (Quinn & Sinclair, 2006).

3.4.2 Strengths and Weaknesses of EPR

The CCME (2009b) frames EPR as a tool with many benefits including encouraging innovation in packaging design, catalysing change along the supply chain, and promoting packaging reduction and recovery. CCME members also foresee opportunities for agreements to be made within industry such as better data collection in order to estimate baseline levels, the creation of reduction and diversion targets, pilot programs, consumer education initiatives, sustainable design initiatives, and a chance for increasing transparency on performance indicators (CCME, 2009b). The CCME (2009b) maintains that "EPR encourages producers to consider end-of-life management and incorporate

environmental considerations during the design phase", and that "EPR can provide incentives for producers to use materials with greater potential for reuse and cost-effective recycling, and to reduce packaging waste before it is created".

Despite these strengths and opportunities, some question the effectiveness of EPR to promote design for the environment, since EPR programs focus on post-consumer waste. EPR is criticized for not accounting for the most important tenet of the waste hierarchy, which is to **prevent** the production of waste (Hanssen et al., 2003).

> EPR is designed to organize the end-of-life of products. It creates incentives to recover material from waste products, but usually does little in the way of encouraging the re-use and reduction of waste (the two other "R" in the "3Rs" principle), which are given higher priority in the waste hierarchy. (OECD, 2014)

If companies are comfortable paying the EPR tax, which is ultimately passed along to consumers, then little can change and so the effectiveness of the policy mechanism is weakened by the ease with which companies and consumers can absorb the added cost.

3.4.3 Municipal Solid Waste Management and the Global Recycling System

On a global scale, waste management is largely inefficient and waste flow system boundaries cross national borders. For example, only 13% of municipal solid waste is recycled globally, and the US recycles merely 10% of its collected plastics domestically while the rest is exported to China (The Economist, 2018). When waste is exported to other countries it becomes more difficult to ensure that it is properly disposed or reused, which further complicates the measurement of its impacts (Bartl, 2014). Wealthy countries, though they generally have the political and economic capacity to invest in facilities and technologies, have relied on emerging economies such as China to import their recyclables (The Economist, 2018). As such, in the last 25 years, China imported an estimated 106 million tonnes of recyclable plastics from abroad (The Economist, 2018).

An important event that took place recently that demonstrates the complexities and problems presented by the global waste management system is China's ban on importing

waste. The ban (officially called the National Sword policy), which took effect in January 2018, was a decision that affected many Canadian municipalities (Denne et al., 2018). Once a source of profit, waste exporters in some Canadian municipalities had the tables turned on them and were forced to pay waste importers to take their waste away as an alternative to shipping it to China (Denne et al., 2018). China's ban is also affecting other Asian countries who are now carrying the burden of importing the world's waste. For example, recently the Malaysian government has been importing an unprecedented amount of plastic waste (Greenpeace International, 2018). Between January and June of 2018, Malaysia imported over 16,000 tonnes of Canada's plastic waste, overwhelming the country's waste management sector (Denne et al., 2018). "Reuben Muni, Greenpeace's Malaysia program manager, […] says the global recycling system is broken and that fixing it will require the co-operation of the wealthy countries that produce so much of the waste and the countries that import it" (Denne et al., 2018).

It is evident that the rate at which plastic waste is produced is beyond the world's capacity to manage it properly. This event raises a number of questions, including: does the global capacity for waste management need to grow, or does waste production need to shrink? Should waste be managed locally? and, what are the ethics involved with shipping waste to other countries and polluting their air, water and soils?

Over time, governments, corporations and the general population have been prompted to take action to curb waste production, yet this example shows that the accumulation of waste is still a growing problem. Situations such as this one proves that waste management systems, even in developed countries, are vulnerable to disruptions. This story also uncovers a more disturbing truth: that cities may be too reliant on foreign sinks, to absorb their surplus waste; a problem created by deeply entrenched producer and consumer behaviours in the developed world.

Thus far, I have outlined the extended producer responsibility programs in Canada as well as provided description (albeit simplified) of the global waste management system to situate the state of policy in Canada that addresses food packaging waste. In the following subsection, I describe a selection of initiatives adopted by other countries.

3.4.4 International Precedents

To environmental planners, waste has long been considered an environmental and economic burden (Lehmann, 2010; Zaman & Lehman, 2013). Cities around the world are beginning to shift their views on waste and are now looking at it as a resource to be recovered and reused (Lehmann, 2010). A small but growing number of cities have introduced zero-waste policies and practices to minimize the amount of waste that ends up in landfills or is incinerated. Ideally, a zero-waste city diverts 100% of waste from landfills and incinerators and opts for policies that support the three R's: reduce, reuse and recycle (Lehman, 2011). Strictly speaking, a zero-waste policy is not possible because land, energy and material consumption are necessary to meet the needs to a growing human population, however, the term is simply used to express the desire to drastically minimize waste production.

If cities want to become more sustainable or become zero-waste producers, they need to reduce pollution at the source. Much of the decision making in this regard is outside of the realm of municipal control (i.e. waste is mainly the result of decisions made by households and firms). Another problematic issue with zero-waste cities is that the title of "zero-waste" misleads people into believing that a consumerist lifestyle can coexist with the goal of a sustainable future, when in reality zero-waste management policies should be accompanied by a drastic reduction in earlier stages of an item's lifecycle including at the production and consumption stages (Premalatha et al., 2013). Municipalities may however, play a key role in raising awareness through campaigns and by providing better solid waste management systems. Below, I have outlined a few examples of initiatives cities and countries have adopted, or plan to adopt to reduce plastic packaging waste.

Education and Awareness

In terms of educational campaigns, Italy, Sweden and Spain have all developed tools to prevent waste by implementing labeling systems to improve the proper sorting of packaging waste (Tencati et al., 2016). The Government of Chile plans to develop an eco-label for plastic packaging detailing information on packaging efficiency and ability to be recycled locally (Ellen MacArthur Foundation, 2019). Similarly, France's "Loi Grenelle I"

is a law that "outlines the adoption of a communication system based on the carbon/ environmental footprint of a product and its packaging that must inform consumers" (Tencati et al., 2016).

The Republic of Seychelles has implemented education and awareness campaigns for businesses and consumers on the 3R's (Ellen MacArthur Foundation, 2019). Awareness campaigns are also areas of focus for the City of Austin, Texas and the Ministry of Environment and Energy Transition of Portugal.

Distribution Bans

The Republic of Seychelles has a ban on single-use plastic bags, Styrofoam take-out boxes and plastic straws; the Government of Rwanda plans on investing in reusable, recyclable and compostable plastic packaging and implementing laws prohibiting the manufacture, import, use, and sale of single-use plastics; the Government of Grenada has an import ban on polystyrenes and a ban on single-use plastics like shopping bags, cutlery, plates, straws and cups; the Government of the United Kingdom has already implemented and/or plans to implement EPR regulations, a ban on the procurement of single-use plastics in government, and a ban on plastic products where alternatives exist; and the UK is introducing a tax on plastic packaging that contains less than 30% recycled content beginning in April 2022 (Ellen MacArthur Foundation, 2019). More recently, the EU and Canada have both announced their plan to ban single-use plastic such as plastic bags, plastic cutlery, straws and stir sticks and to reduce plastic packaging (BBC, 2019).

Support for Zero-Waste Retailers

In terms of providing support to zero-waste retailers, the City of Ljubljana in Slovenia plans to promote zero-waste businesses on their websites and social media; the City of Austin, Texas offers a rebate to businesses that implement zero-waste practices such as replacing disposable items with recyclable or reusable alternatives; and the Government of Catalonia provides subsidies for circular economy businesses (Ellen MacArthur Foundation, 2019).

Support for Innovations in Industry

The Republic of Seychelles plans to explore financial incentives to support businesses that introduce alternatives for single-use plastics; and the Generalitat de Catalunya gives out an eco-design award every two years to reward innovation in sustainable product design (Ellen MacArthur Foundation, 2019).

3.5 Producers

In the following subsections, a selection of novel and interesting approaches producers have adopted to reduce plastic packaging waste is described. For the sake of simplicity, producers are defined as entities that play a role in the production of food packaging and who profit from the food and drinks industry (other than retailers).

3.5.1 Corporate Social Responsibility

For years, some have argued that the sole purpose of a business is to maximize profit (Carroll, 1991). With the social movement wave that marked the 1960s came a demand for greater corporate social responsibility (CSR). Now, to a large extent, public bodies oversee corporate activity to ensure legal and ethical conduct. Corporations will also sometimes exercise a distinct set of actions independent of governmental standards that meet a unique and more ambitious set of expectations than those outlined by governmental policies and laws. It is important to note that CSR activities are almost always implemented only if they do not come at the expense of profit (Pivato et al., 2008; Parsa et al., 2015). This is especially true in terms of reducing food packaging:

> Research findings in academic literature suggest that waste reduction in the food and drinks industry can make significant contributions to company profitability by improving yields per unit output and by reducing costs associated with waste disposal (Hyde et al., 2001). (Gustavo et al., 2018)

Although, those who are less skeptical argue that CSR is inspired by a "desire to do good" and an "enlightened self-interest" (Smith, 2003) meaning certain companies seek long-term economic viability while simultaneously minimizing negative social and environmental impacts (Porter & Kramer, 2006). A well-known example of CSR in

practice is McDonald's decision to use fewer materials to wrap their food which led to a 30% reduction in solid waste (Porter & Kramer, 2006). As another example, in 2019, IKEA Canada announced that they successfully phased out all plastic straws from their restaurants (IKEA, 2019). Although straws are not in a strict sense packaging, these examples demonstrate the simple changes companies can make to significantly reduce plastic waste.

3.5.2 Industry Targets

Environmentalists are often strong proponents of recycling; however, it is important to note that in some instances, recycling (as opposed to landfilling) plastic may not be the most environmentally friendly option as it sometimes requires high levels of energy and water (Bartl, 2014). As technology advances and new materials and means of recovery are adopted, this reality may change. In 2018, the Canadian Plastics Industry Association and the Chemistry Industry Association of Canada announced their goal to ensure that all plastic packaging in circulation is recyclable or recoverable by 2030 and that 100% of plastics are diverted from landfills by 2040 (Chung, 2018).

As industry attempts to transition to a circular economy, they will need to confront the limitations presented by plastics recycling. While glass and metals can be refilled or recycled over and over again without a loss in integrity, materials such as paper and plastics often suffer a reduction in quality after each repeated recycle. This occurs because the recycling process opens plastics up to impurities as various elements are mixed together due to improper sorting, which in turn reduces the quality of the output (Geueke et al., 2018). Recycling plastic is an imperfect process that does not eliminate the need for virgin materials (Geueke et al., 2018). For example, used PET bottles are commonly recycled into new PET bottles; however, during the recycling process, the material becomes contaminated which requires an additional layer of virgin PET to line the interior wall of the bottle (Welle, 2011).

3.5.3 Design Fixes

In order to reduce plastic food packaging waste, product designers and manufacturers have rethought the amount of product needed and/or redesigned packaging with more

environmentally friendly materials. Eco-design is one of the many initiatives adopted by companies. Common drivers of eco-design vary for each company, but in the packaging industry they include (Lewis, 2008):

- governmental regulations like product stewardship;
- pressure from non-government environment organisations;
- growing consumer awareness concerning over-packaging and waste; and
- demands made along the supply chain, including food retailers and brand owners.

As such, some producers and manufacturers have begun the process of developing materials that are plastic-like, yet have the ability to biodegrade. Developing packaging that is biodegradable would prevent their accumulation in the natural environment (Jabeen et al., 2015). Despite the promise of bio-plastics, they are not free of environmental costs. Thus far, the raw materials used to create biodegradable packaging come from plants such as corn and sugarcane. These raw materials and the energy intensive technologies needed to produce bioplastics are costly and have their own environmental trade-offs making the search for alternative materials an ongoing and complex process (Posen et al., 2017).

Other design strategies include reducing packaging to maximize material efficiency, designing for recovery to divert materials from landfill or incineration, designing for composting, avoiding toxic substances (to prevent health problems and environmental contamination), and promoting labelling standards that communicate the environmental benefits of packaging and responsible disposal (Lewis, 2008).

Eco-design can also be as simple as changing the size of the package and portion inside the package. When it comes to designing the appropriate and optimal size of food packaging, many factors come into play – not just cost savings. Redesign considers production processes, transportation, storage, and purchasing behaviours (Gustavo, 2018).

While these ideas and innovations are certainly interesting options to solve some of the consequences presented by plastic packaging, it may also not be radical enough of an alternative. As explained by Beitzen-Heineke et al. (2017):

> Fundamental change is necessary, but there is limited research on what such radical solutions might look like and how they can be realised. Most efforts have focused on individual environmental or social impacts and on optimising rather than rethinking the current system.

It is important to note that solutions such as eliminating, reducing, reusing, or redesigning food packaging presents their own set of environmental, economic and social trade-offs (CCME, 2009b). These solutions may negatively impact the environment if they have adverse effects on the shelf-life of food, damage food in transport or expose food to environmental contaminants which could lead to greater food wastage and thus introduce other sets of environmental issues (van Sluisveld & Worrell, 2013).

Design solutions should only be implemented if the product must absolutely be protected by packaging. Otherwise, alternative packaging can be co-opted and used to promote a perception of environmental friendliness. For example, it is easy to be deceived by alternative materials such as bio-plastics – even though bio-plastics are biodegradable, they also generate a host of other environmental impacts such as increased land use, water use and energy consumption. Alternative biodegradable packaging also presents other challenges. It contaminates the material flow of plastics intended for recycling. It is sometimes landfilled (in spite of being compostable), which contributes to the production of GHG emissions, mainly methane, in landfills. Finally, the production of biodegradable plastics rests on the use of arable land for its production (corn for example).

3.5.4 Third Party Certification Programs

Third party certification programs bring legitimacy to more environmentally friendly packaging. Certification programs can also serve as a point of reference for businesses looking to improve packaging design. One example is the cradle-to-cradle product standard, otherwise known as the "C2C certification program" (Cradle to Cradle Products Innovation Institute, 2016). Typical of many certification programs, C2C comprises a

number of criteria that businesses need to meet in order to receive certification including categories such as material health, material reutilization, renewable energy and carbon management, water stewardship, and social fairness. Based on how many points they earn, companies may achieve one of five levels of achievement including basic, bronze, silver, gold, or platinum (Cradle to Cradle Products Innovation Institute, 2016).

Certification programs are useful in that they help raise awareness about the problems associated with unsustainable packaging, but should be viewed with caution as they may be used to greenwash packaging that is essentially unsustainable. For example, companies may try to achieve the lowest possible certification level and stop there because they will achieve certification with the least amount of effort.

3.6 Retailers

Retailers have the power to influence consumption habits, nonetheless are simultaneously moderated by consumer reception (Lehner, 2015). When it comes to promoting eco-consciousness among consumers, retailer representatives have described consumers as having "short attention spans in the public sustainability debate" and are considered to be "uncommitted to sustainability" (Lehner, 2015). The challenges associated with having consumers adopt more sustainable behaviours are that eco-conscious consumerism often requires more time, effort and money, which means that sustainable consumption is a path of much resistance. For food retailers to address and minimize all of these challenges and barriers that sustainability-oriented or -curious consumers face is also a challenge. Above all, retailers are price-sensitive and need to keep costs low in order to retain their customer base (Gustavo et al., 2018).

A common argument put forth to incorporate environmental impacts in economic costs is to resort to governmental regulation (Ghisellini et al., 2015). As a counter argument, representatives of retailers have expressed weariness towards more regulations, fearing business losses and distorted competition (Lehner, 2015):

> Even though some interviewees acknowledged that regulation was sometimes necessary to achieve important societal goals, fear that policy-makers could overshoot in regulation for sustainable consumption lead to a widely shared view

> among interviewees that innovation and market orientation would be necessary in the future to achieve sustainable consumption without harmful regulatory interventions. (Lehner, 2015)

These diverging opinions and interests, among other factors, prevent rigorous regulations from being implemented.

To date, studies that evaluate sustainability initiatives and programs adopted by retailers have focused on large supermarket chains (Chkanikova & Lehner, 2015; Morgan et al., 2017), that carry eco-branded products such as organic or Fairtrade, or adopt other initiatives that deal with matters such as food waste or stocking locally produced items (Lehner, 2015). A review of the literature reveals a very limited number of studies on retailers that specifically target food packaging waste. In the following subsections, the results of this limited number of studies are summarized.

In a 2018 study, Gustavo et al. evaluated the challenges retailers face in the pursuit of adopting initiatives concerning sustainable packaging and explored possible solutions to overcome these challenges. Their findings showed that retailers in partnership with their suppliers, often search for opportunities that combine sustainable packaging with cost savings. One of the most important challenges associated with demanding packaging redesign from suppliers was the risk of turning away their customers with a less desirable design. Also, despite retailers' requests, food suppliers have the final say with how food is packaged which serves as another barrier on the retailer's end. However, retailers do have the ability to use their purchasing power as leverage to get suppliers on board with redesigning packaging. In addition to profitability being an important motivator and barrier to change, the packaging industry and retailers also faces barriers like a lack of transparency of demand (to reduce waste), a lack of effective marketing to improve consumer awareness, and deficiencies in external pressure for developing more sustainable supply chains (Wang et al., 2014).

Despite these barriers and challenges, a growing number of retailers and brand owners require producers to adhere to a stricter set of environmental standards for packaging (Coleman-Lochner, 2006; Lewis, 2008). As noted by Megicks et al. (2008) the ethical food

market in the UK has experienced a recent emergence and has largely been supported by a growing consumer base increasingly concerned with ethical and social responsibility. Today's store options are more diverse than ever, featuring a range of conventional supermarkets and smaller independent grocery stores that offer unique assortments of goods and services at various prices. This evolving retailing landscape is continually driven by regulatory, market, cultural, and technological changes (Megicks et al., 2008).

3.6.1 Zero-Packaging Grocery Stores

More recently, a wider variety of food retailing alternatives have been introduced into the marketplace. While conventional supermarkets have dominated the food retailing landscape for several decades, smaller stores with a more focused ethos are beginning to gain popularity. In particular, the ethical food market has grown significantly, notably in the European and North American contexts (Memery et al., 2012; Megicks et al., 2008; Hodgins & Fraser, 2018). The ethical food market demonstrates a rise in action in the face of increasing public awareness on the effects of consumption habits. Such business models include organic food stores, fair-trade and ethically sourced grocers, and locally and regionally sourced retailers (Beitzen-Heineke et al., 2017).

Alternative food retailers are defined as businesses seeking to internalize the environmental and social shortcomings of the industrialized, conventional food system that dominates the food retailing landscape. The conventional food system is typified as:

> Highly industrialized, increasingly corporatized, global in expanse, and operating as an advanced capitalist sector. In this system, the natural and social processes of agricultural production and consumption are subjected to the industrial logics of economic efficiency and capital accumulation, with negative implications for society and the environment. (Ohberg, 2012)

On the other end of the spectrum, zero-waste grocery stores directly tackle at least one of the weaknesses of the conventional food system by reducing food packaging waste. While recycling and innovations in packaging materials to make them more easily degradable will alleviate some of the negative consequences of packaging waste, zero-waste stores prioritize reduction as the most important strategy for eliminating food packaging waste.

The waste hierarchy, which is often used as an educational and promotional tool, values refusing, reducing and reusing above recycling, composting, landfilling, and incinerating. Yet, the proportion of retailers who fully embrace these values are minute.

In the first of its kind, a study by Beitzen-Heineke et al., (2017) evaluated the extent to which social and environmental factors affected sourcing decisions made by owners and managers of zero-waste grocery stores in the UK. The study's purpose was to better understand the operations (including logistics, marketing, procurement etc.) and the environmental and social implications of zero-waste grocery stores. Beitzen-Heineke et al. collected information on the products on offer, shopping experience, special events, food waste, food safety, suppliers, delivery, environmental impacts, and pricing. Experts in the food supply chain were also contacted to gain insight into potential benefits and disadvantages with efficiency, food safety and lifestyle presented by zero-waste grocery stores. The results showed that in terms of the customer experience, the shopping process is relatively time consuming since customers need to bring, tare, fill, and weigh their own reusable containers. However, the experience is described as being more personalized and customer-focused because staff are generally available to answer questions and allow customers to taste products. Marketing strategies focused on transparency and raising awareness with special attention given to educating customers on the mitigated impacts by refusing packaging. The stores also generally dealt with perishing food in creative ways, by either donating it, using it in prepared meals or in smoothies.

In terms of challenges faced by retailers, they found it difficult to find suppliers that deliver goods in reusable or compostable packaging. Additionally, finding local suppliers, and making the shopping experience as convenient and safe as possible, were also costly and time-consuming barriers that were identified in the study. Despite these struggles, trail-blazing zero-waste retailers are changing how people purchase, consume and discard food, and more conventional grocery stores are beginning to look at zero-waste retailers as leaders of change. As new means of food consumption become more prominent, there is hope that solutions to minimize these challenges will be found.

Since alternative food retailers often focus on sourcing socially and environmentally friendly products, the search for high-quality products often comes at the expense of social inclusivity (Sherriff, 2009; Hodgins & Fraser, 2018). Based on the premise that alternative food networks tend to attract largely white and upper-middle-class customers, Hodgins and Fraser (2018) evaluated the barriers experienced by cultural and ethnic minorities and low-income earners with accessing alternative food networks. In terms of serving minorities and low-income earners, the barriers faced by alternative food businesses, as discovered by Hodgins and Fraser, include a lack of concern for low-income customers, operational limitations (e.g. finances, time, management), existing shopping habits, stigmas associated with receiving aid in the form of food stamps for example, and the limited ingredients on offer (Hodgins & Fraser, 2018). Additional constraints mentioned by the authors were accessibility in terms of public transportation and shorter operating hours.

3.7 Consumers

Consumer behaviour studies describe the driving forces that shape human behaviour patterns regarding the purchase, use and disposal of goods. Understanding consumer behaviour can reveal insights into the attitudes, values, preferences and motivations that lead consumers to make decisions. These insights allow industry to design goods to make them more attractive to consumers or allow organizations that identify a need for change to effectively influence consumer habits.

Essentially, in a consumer society, individuals are programmed to buy. Producers of goods influence purchasers to choose their products by employing various marketing techniques. Oftentimes, strategies appeal to values most consumers are not even aware of. More and more, consumers are being asked to be more mindful about what they are buying and to consider the associated impacts of their purchasing decisions. For example, pro-environmental consumer behaviour has been described as an outcome of the societal shift in environmental awareness (Steg & Vlek, 2009). In the following sub-sections, I provide a description of the barriers preventing consumers from choosing food and drink products that are the least environmentally damaging in terms of their packaging, and the barriers preventing individuals from properly discarding food packaging.

3.7.1 Purchasing

When it comes to reducing food packaging waste, the consumer, in a way, represents the last line of defence. If governments are not more restrictive, if corporations do not change the design or use of packaging, and if retailers do not discriminate against poorly packaged food items, then it becomes the consumer's responsibility to be mindful of what they purchase. To illustrate the importance of consumer behaviour, consciously purchasing goods can reduce or even eliminate the downstream environmental impacts of the consumption cycle (Ackerman, 1997; Stern et al., 1997).

Despite a growing environmental awareness among the public, the majority of the population has not altered their behaviours in the face of over-packaged goods which is perceived by companies as a green light to maintain the status quo. Even those who are aware of the impacts of their purchases are prevented from changing their behaviours due to other restricting factors such as lack of choice or price (Devinney et al., 2010). That being said, a small, but growing segment of the population has begun to change their behaviours. These changes, may be attributed to the importance individuals place on their consumption habits as determinants and reflections of their identity (Macias, 2008).

Ethical consumer behaviour, which captures dimensions of pro-social and pro-environmental attitudes, has also been used to describe people who take into account the type and amount of packaging they purchase while shopping for groceries (Elgaaïed-Gambier, 2016). Thus far, only a limited number of studies have evaluated purchasing behaviours and attitudes towards the impacts of food packaging (Elgaaïed-Gambier, 2016; Thøgersen, 1999).

One of the first studies published on this front, evaluated whether the environmental impact of packaging played a role in consumer choice (Thøgersen, 1999). The paper by Thøgersen is based on the premise that consumer choice is not only limited to convenience, aesthetics and price, but also involves other dimensions including environmental friendliness which became more important given the mounting attention on sustainability in the late 80s and early 90s (Thøgersen, 1999). Thøgersen examined a number of factors that may affect the decision-making process of consumer choice,

including awareness of the problem, feelings of obligation to adjust one's behaviour, and the perceived impacts of individual change. The term used to describe these attitudes is referred to as "perceived consumer effectiveness" (PCE), and is classically defined as the extent to which the individual believes their actions to be significant contributors to systemic change. The author concluded that consumers generally fail to change their behaviours despite their concern for the environment and that a possible reason for this may be because consumers do not link their behaviours to having an impact on the environment. Therefore, those who do act on their knowledge more often understand that individual action has the power to effect meaningful change, or they are compelled to "do the right thing" regardless of the outcome.

In another study, Chatzidakis, Hibbert and Smith (2007) examined the attitudinal-behavioural gap exhibited by consumers. More specifically, the authors attempted to better understand why people whose values align with the fair-trade movement do not purchase fairly-traded goods more regularly. They hypothesized that consumers experience different types of cognitive dissonance to justify the observed "attitude-behaviour discrepancies". They introduced Sykes and Matza's (1957) concept of neutralisation as a probable explanation for the cognitive dissonance experienced by consumers. Applying the concept of neutralization to describe the consumer behaviour-attitude gap (which was originally proposed by Strutton et al. 1994), Chatzidakis et al. (2007) describe the concept as follows: "otherwise principled consumers tend to rationalise their non-normative behaviour by appealing to the techniques of neutralisation which include the denial of responsibility, denial of injury, denial of victim, condemning the condemner, and appeals to higher loyalties." The following table provides a brief explanation of each neutralisation technique:

Table 1. Neutralisation techniques originally proposed by Strutton et al. 1994 (Chatzidakis et al., 2007).

Neutralisation Technique	**Definition**
Denial of responsibility	Argues that one is a victim of circumstance.
Denial of injury	Argues that their action did not cause harm.
Denial of victim	Argues that the victim deserves the outcome of the offender's action.

Condemning the condemner	Argues that the condemner is also guilty of the same action.
Appeals to higher loyalties	Argues that the action was carried out for a greater good.

Of the five neutralisation techniques, the most commonly used by participants in the Chatzidakis et al. study were appeals to higher loyalties, denial of responsibility and denial of injury/benefit. Examples of quotes from participants include "I always go for the cheapest things" (categorized under appeals to higher loyalties to the bottom line), "I would really buy more FT products if they were not excessively priced" (categorized as denial of responsibility), and "I think, the problem is too big to be dealt at the level of the consumer... it seems to me that the minority of people that care about FT aren't going to overcome the bigger problem...which is about all those organizations and subsidies, signing agreements" (categorized as denial of injury/benefit) (Chatzidakis et al., 2007).

In 2016, Elgaaïed-Gambier studied consumers' attitudes and beliefs concerning food packaging and the relation to purchasing choice. The goal of the study was to understand why certain consumers decide to avoid overly packaged food items at the purchasing stage. The results of the paper showed that only a small segment of consumers link overpackaging with having a bigger environmental impact and an even smaller segment modify their behaviour accordingly. Since extra packaging makes the product more attractive to consumers, it makes it difficult for the large majority of consumers to resist choosing over-packaged goods (Elgaaïed-Gambier, 2016).

3.7.2 Discarding

The environmental impacts of food packaging are also dependent on how packaging is dealt with at the disposal stage. As mentioned earlier, the amounts of waste generated per capita in developed nations have reached historic, unprecedented numbers. This may be caused by the efficiency with which cities deal with waste. It seems that it has become too easy for people to get rid of goods at the end of their life. Because of this, society seems to have lost consciousness of the downstream impacts of their actions. People rarely see

where their waste ends up and therefore have difficulty with connecting their personal actions with the consequences.

Several other challenges are associated with food packaging waste. The first is that in many cases, food packaging materials are often designed for 'single-use'. Therefore, a lot of food packaging is sent to landfills or incineration facilities. Secondly, of the recyclable food packaging materials, consumers need to be able to identify the container as 'recyclable', and treat it as such by washing and placing it in the correct bin. Consumers play a significant role in sorting food packaging waste and mounting evidence suggests that individuals are often foregoing recycling (Klaiman et al., 2017). In a study in which food and food packaging waste was weighed and catalogued, Lehmann (2015) found that 84% of recyclables incorrectly placed in garbage bins were food packaging materials. Others have attempted to better understand why the proportion of packaging recycled in the US plateaued in recent years (Klaiman et al., 2017). Their results showed that time and cleaning are the most important issues affecting recycling rates (Klaiman et al., 2017). Additionally, when presented with information on the impact of recycling, respondents showed a preference for paper and boxboard over plastic after finding out the energy saving benefits of the former materials, indicating that educational initiatives may be useful in improving recycling rates.

Over the years, decision makers have implemented various policies to improve recycling rates and reduce waste generation. These policies range from waste disposal fees such as weight-based pricing schemes in which residents pay according to how much garbage they throw away (Van Houtven & Morris, 1999). These policies have been implemented in some areas and met with varying degrees of success although are yet to be thoroughly implemented.

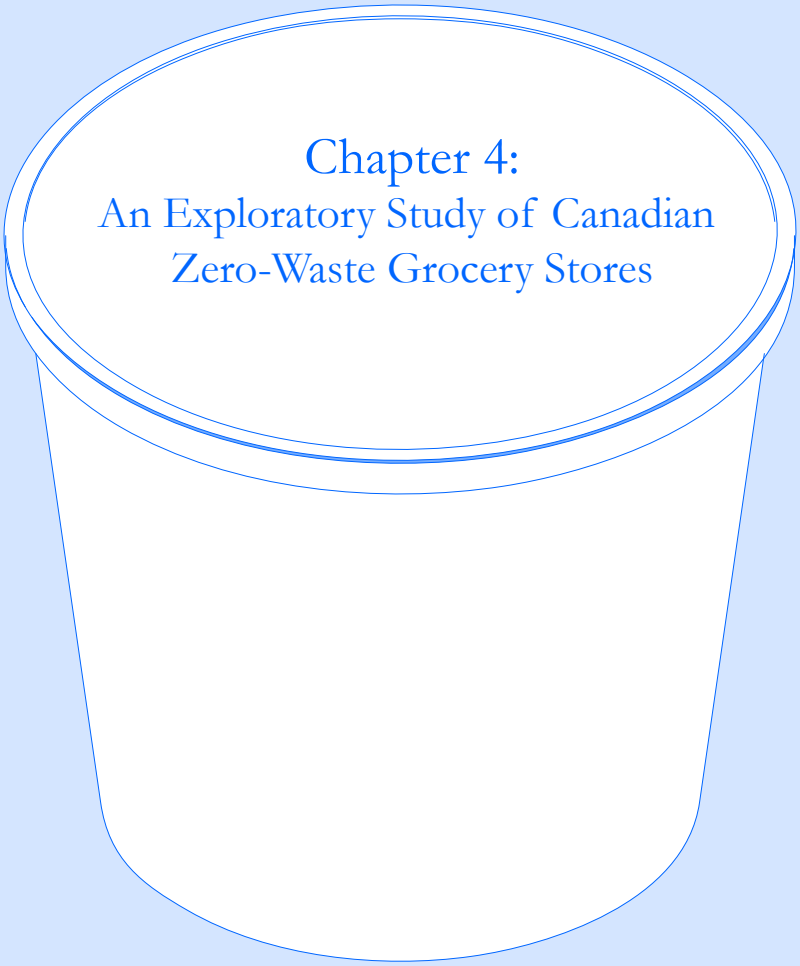
3.8 Conclusion

As discussed, producing and discarding food packaging presents numerous negative environmental consequences including resource consumption, land degradation, air and water pollution, and greenhouse gas emissions (Lewis, 2008). Chapter three demonstrated that in the effort to achieve a low waste future, all actors must play their part. Examples

of governmental regulations, corporate social responsibility programs, alternative retailers, and a growing number of eco-conscious individuals have helped with catalysing movement in the direction of a low-waste future. This chapter provided a discussion on some of the factors and systems that influence these actors and the barriers standing in the way of this transition.

Table 2. Summary of progress and barriers and challenges to reducing food packaging waste.

Actors	**Progress**	**Barriers and Challenges**
Government	-Extended Producer Responsibility schemes -Product regulations -Distribution bans -Education and awareness campaigns -Support and incentives for producers and retailers who are improving the circularity of materials and making significant packaging reductions	-Regulation may impair flexibility and innovation within the packaging industry -Regulations may impact business profitability -Regulation may impact the supply chain -Waste management systems are complex and changes are difficult to implement
Producer	-Corporate social responsibility -Industry targets -Design fixes -Third party certification	-Food and health safety -Price sensitive -Transportation -Food waste
Retailer	-Discriminate against producers who use disposable packaging -Adopt zero-waste practices	-Food and health safety -Price sensitive -Sourcing -Storing -Food waste
Consumer	-Recycling -Zero-waste movement	-Attitude-behaviour gap -Lack of awareness -Lack of choice -Lack of convenience -Cost



Chapter 4:
An Exploratory Study of Canadian Zero-Waste Grocery Stores

Chapter 4: An Exploratory Study of Canadian Zero-Waste Grocery Stores

4.1 Introduction

In 2016, the world's population generated an estimated 2.01 billion tonnes of municipal solid waste (Kaza et al., 2018). Owing to global processes of industrialization, development and urbanization, the means of production and consumption in recent history have undergone rapid transformation and expansion (Kaza et al., 2018). As a result, waste generation is expected to grow at more than twice the rate of population growth and reach an annual 3.40 billion tonnes by 2050 (Kaza et al., 2018), leaving decision makers in urban areas with the important responsibility of managing municipal solid waste.

While some cities have pledged to manage municipal solid waste in such a way that none of it ends up in landfills or incinerators, the transition will take several decades as targets are often set for five to thirty years into the future. Despite this slow pace of change at the municipal level, business owners have begun to engage in the "zero-waste" or "low-waste" movement to alleviate pressure on the waste management system and environment. Their existence is largely in response to a growing number of individuals who are demanding that their products come unpackaged. Zero-waste businesses vary in the assortment of products being offered, ranging from food, to home cleaning supplies, to toiletries. The zero-waste movement is loosely defined; but it is popularly characterized by renouncing the consumption and use of unnecessary single-use items, especially when made from plastic.

Those participating in the movement, as much as possible, live according to the three Rs (reduce, reuse, recycle), while more strictly adhering to the former two Rs. Those participating in the zero-waste movement use their own refillable containers to purchase goods or purchase them 'naked'. For example, a person practicing zero-waste will bring their own containers from home and will fill them with the product they intend to purchase rather than buy the same product enveloped in a single-use container (regardless of whether it is recyclable or compostable). Rather than buy shampoo that comes in a

plastic bottle, a person practicing a zero-waste lifestyle will purchase their product from a supplier or retailer that dispenses product from a larger container. Where most people buy fruits and vegetables in some sort of plastic wrap or container, those participating in the zero-waste movement would only buy produce that is on display free of packaging. For instance, in many supermarkets, vegetables like cucumbers and peppers are wrapped in plastic. While most people overlook this, those practicing a zero-waste lifestyle will refrain from buying vegetables wrapped in plastic.

Although large players in the food provisioning industry can have a meaningful impact on the amount of food packaging that is produced and discarded every year, many Canadian supermarket chains like Loblaws and Sobeys do not have targets (or at least any that are publicly available) in place to reduce disposable plastic food packaging in their supply chains (Denne et al., 2018). On the other hand, as of 2017, Bulk Barn – a Canadian bulk food chain – allows customers to bring refillable containers instead of using the single-use plastic bags provided by the chain. Bulk Barn is one of the first mainstream franchises in Canada to implement such changes. However, Bulk Barn can only supply a small portion of their customers' diets as they only offer dry goods like flour, sugar, nuts, seeds, grains, dried fruit, and legumes. More recently in 2019, Metro Inc. announced that they would begin allowing customers to bring their own reusable containers to purchase products such as meat, fish, pastries, and ready-to-eat meals in all of their stores across Quebec (Metro Inc., 2019).

As discussed, a few large chains have begun to implement incremental steps to reduce food packaging waste, however, the focus of this chapter is zero-waste retailers and their customers. Zero-waste retailers are a relatively new food retailing alternative that has become available to Canadians over the last five or so years. Alternative food retailers, rather than engage with all aspects of the sustainability discourse, choose a subset of possible focus areas and insert them into their business model accordingly (Lehner, 2015). Alternative retailers engaging in sustainability initiatives will often adopt practices defined by ambiguous terms and can set their own limitations on what they define as "sustainable", "ethical", or in this case "zero-waste". In this case, the unsustainable practice that zero-

waste retailers are endeavouring to avoid is the creation of unnecessary food packaging waste and, to an extent, food waste as well.

Zero-waste grocery stores operate by having customers bring their own reusable containers, tare the weight of the container, and fill them with product to be priced according to their weight. Food waste is avoided by allowing customers to decide how much product they want to purchase instead of imposing specific portions. For example, at Nada in Vancouver, British Columbia, customers are allowed to purchase the desired amount of nearly any product; for example, if a customer wants to purchase a sprig of cilantro instead of an entire bunch, they can do so. Moreover, zero-waste retailers apply a holistic approach to their operations as they also try to account for other issues present in the food and drinks sector including sourcing from fairly-traded, organic and/or local producers.

The zero-waste movement's presence in the market is a fairly new phenomenon, and its presence has been sparsely discussed in the literature. One paper, by researchers Beitzen-Heineke et al. (2017) evaluated zero-waste food retailers in Europe, stating their appearance in the year 2014. In Canada, the first zero-waste food retailer to emerge, as the zero-waste movement began to takeoff, was in 2015. Since then, many Canadian entrepreneurs have adopted similar business models and implemented their own versions of the model across the country. Today there are well over a dozen retailers with a few of them even operating second or third locations.

4.1.1 Purpose

The first goal of this research is to investigate the operations of zero-waste retailers to understand the viability and replicability of the business model. Retailers were given the opportunity to explain their motivations, attitudes and the common challenges and barriers presented by their business model. The second goal of this research is to examine zero-waste consumers to determine who is participating in the movement and who might be left out, in an attempt to understand how more people may be included so that benefits of zero-waste practices can be felt on a larger scale. The third goal of this paper is to develop recommendations for municipalities and other public bodies on how they can

provide support to these businesses to further encourage environmentally sustainable businesses and consumer behaviour.

4.1.2 Research Questions

According to the above-mentioned goals, below are the three research questions guiding this study:

1. How do zero-waste grocery stores operate, and why?
2. Who shops at zero-waste grocery stores, and why?
3. What can public bodies do to support and encourage zero-waste businesses?

4.2 Methods

Zero-waste retailers were asked to complete a questionnaire and take part in a follow-up interview. The questionnaire comprised multiple-choice and short answer questions. The interviews were semi-structured and held over-the-phone and in person. The questionnaire and interviews were designed to gain a better understanding of the motivations, operations and challenges of zero-waste business owners (Refer to Appendices C – E for questionnaires and interviews). The information gathered from retailers was analyzed and described in a qualitative fashion. Customers of zero-waste retail stores were asked to complete an online survey. The online survey was designed to gain a better understanding of the factors that lead people to break the attitudinal-behavioural barrier, to build a customer profile, to uncover segments of the population that are not participating in the movement, and to consider why that might be the case. Quantitative analysis of the customer survey was made possible due to the relatively large sample size (n=311). The first seven questions were multiple choice (See Appendix A) and the last three questions were open ended (See Appendix B). The results of the open-ended questions were analysed by using a key-word search, and themes were graphed on bar charts and are discussed in the results section of this chapter.

In terms of finding retailers to participate, a non-probability sampling technique was carried out – a suitable method for studying new phenomena (Tencati et al., 2016; Eisenhardt & Graebner, 2007). As such, retailers were identified based on an internet

search and selected as potential participants if they met all three of the conditions outlined below:

1. zero-waste retailer;
2. for-profit; and
3. located in Canada.

The retailers had to categorize themselves as zero-waste in order to be selected. Secondly, they had to be for-profit since one of the goals of this research was to understand their economic viability and replicability, and given that it is unlikely for the model to be adopted by other entrepreneurs or conventional retailers if they cannot generate a profit. Lastly, Canadian retailers were selected because they have not been previously discussed in the literature. Canadian retailers were also selected so that the recommendations for public bodies could be made in a similar political context.

In terms of limitations, there is a high likelihood that there are additional zero-waste retailers in Canada that were not identified and were therefore excluded from this study.

4.2.1 Data Collection

Overall, twelve zero-waste retailers were identified. An email was sent to each requesting their participation in the study. Out of the twelve retailers contacted, five responded and agreed to participate. Three completed both the survey and interview while two completed only the survey. I supplemented this primary data with information found on the websites of all twelve retailers regardless of their participation in the study. Therefore, for this study, data on Canadian zero-waste grocery stores were collected via surveys, interviews and websites.

In addition, an online survey was posted on the social media pages of NousRire (a zero-waste retailer in Quebec) and a zero-waste lifestyle social media page for residents of Toronto. A total of 311 customers answered the survey.

4.3 Results

4.3.1 The retailer's perspective – motivations, operations and challenges

In this section, a discussion is provided on the information gathered from zero-waste retailers via questionnaires, interviews and internet searches. The discussion of results covers a range of topics including motivations for running a zero-waste business, location choice, general operations, sourcing, and common challenges they face with daily operational activities.

Motivations

The motivations for opening and running a zero-waste business are very similar among retailers. Foremost, they are driven by their passion for preserving the natural environment and their belief that present-day environmental issues from packaging waste are a result of consumer actions and mismanaged solid waste. By offering products free of packaging, retailers essentially eliminate the negative effects of consumption (by only providing low-impact goods) and mismanaged waste (consuming zero-waste ideally removes solid waste management and recycling from the equation). Moreover, their businesses provide the public with resources to practice a zero-waste lifestyle, and empower them to practice a low-waste lifestyle with the products and tools to do so.

Operations

When comparing zero-waste retailers to conventional retailers, the main difference between the two is the need to empty, clean and sanitize each container in order to prepare them for reuse. Accordingly, zero-waste retailers will often have an agreement with their distributors to reuse containers to transport product to their stores instead of having products delivered in single-use packages.

This process of emptying, cleaning and refilling is also reproduced by customers which is one of the main differences between shopping zero-waste and shopping at conventional grocery stores.

Although all of the zero-waste retailers in this study offer the same benefits to consumers and reflect a very similar ethos, there are variations in the details of their business model. While some believe the path to zero-waste is strictly attainable by implementing a reuse system between distributor-retailer and retailer-customer. Other retailers will make exceptions by carrying a few goods wrapped in recyclable or compostable packaging. Thus, the definition of zero-waste varies from retailer to retailer which is reflected in the small differences in how they vet and sell product.

Sourcing

Retailers generally assess the social and environmental impacts of goods through a life-cycle lens. For example, all of the businesses evaluated in this study employ a holistic approach to reducing some of the negative outcomes of running a business. They are conscious of both social and environmental ethics and as such, will often limit their supply to organically produced, fairly-traded, locally-sourced, packaging-free products.

However, despite their good intentions, through this strict product vetting technique, zero-waste stores will often attract wealthier clients and be considered by the public as a high-end enterprise. To combat pricing-out low-income earners, some retailers promise low prices that are comparable to conventional grocery stores and price products below or according to the market rate of comparable products.

Retailers who participated in the study stressed the importance of and difficulty with reducing packaging along their supply chains.

> When ordering from larger distributors we find that they are not keen on changing their protocols in order to reduce waste. When we receive pallets they still come wrapped in plastic. Certain food items (e.g. spices) that are not produced locally tend to come in smaller packaging that is plastic and not necessarily reusable.

As much as possible, retailers seek out suppliers who can accommodate their low-waste or zero-waste model. However, they often experience difficulty with convincing larger scale suppliers. They attribute this challenge to the little purchasing power they have in comparison to conventional retailers.

> With larger suppliers it is a bit harder. Especially since we were filling such small orders at the beginning, it felt like we didn't have the power to ask for something different. But, as we continue to grow, we feel as though we will be able to ask for less packaging.

Location

While a few retailers partake in "pop-up retail" (e.g. operating out of a temporary stall at a farmers' market, mall or business), most operate out of a brick and mortar store and hold regular operating hours. Almost all of the retailers are strategically located in cities or plan their pop-ups in densely inhabited places. The brick and mortar stores are often accessible by multiple modes of transportation. Although, compared to conventional retailers, most zero-waste retailers do not have access to a large, free parking lots which make them less conducive to car-dependent customers.

After testing the market by delivering products via pop-up shops and by attending farmer's markets, one business owner decided to choose a permanent location based on where there is a high demand for their products: "We knew we needed to be downtown to maximize visibility. After looking at many different places, our current location was the right price, and in an up-and-coming residential neighbourhood close to downtown."

Another retailer also noted that they are located in a gentrifying neighbourhood and understand that their presence is contributing to gentrification:

> We are in a gentrifying area and we are working with building relationships with local community organizations and groups to try to attract the local community, not just our demographics. And working to have hiring practices in place to hire from the employment center. The first job posting I did was through social media, and I won't be doing that again. It was just too many candidates and the people who are following us. We are trying to attract more local people.

As seen here, combating this perception of exclusivity is an ongoing process for retailers who want to be more accessible to a larger demographic.

Challenges

A new business model in an emerging market must overcome starting costs by attracting and retaining a significant number of new customers. Their business hours, accessibility, prices, and products are in direct competition with well established retailers. While conventional supermarkets are advertised as one-stop-shops, zero-waste grocery stores generally carry about a quarter of the products found in conventional supermarkets and do not sell items such as meat, dairy or other refrigerated items. Despite the start-up costs, retailers found little support from governmental agencies: "When I was searching, I was very surprised at the lack of funding and grants. I found that there was a lot for green technology, but not that I could find for a retailer."

Another challenge zero-waste retailers faced is with attracting new consumers. It is easy for them to turn people off who perceive them as pretentious or believe that their target audience is the "hippie-type". As with grocers who sell organic, fair-trade and so on, it may be easy for the general public to group zero-waste retailers into the category of stores that cater to upper class individuals. This notion of being elitist is a major turn off for potential consumers, and a problem that retailers are often aware of but have difficulty overcoming.

> As someone who is purchasing this way, you need physical access and financial access and be culturally appropriate for you and needs to be this social movement that seems too fringe that you don't want to participate in it. It needs to seem non judgemental, or you won't want to participate in it.

4.3.2 The customer's perspective – characteristics, benefits and challenges

To better understand the characteristics and attitudes of those participating in the zero-waste movement, retailers were asked to describe the characteristics of their typical customer. Their descriptions revealed a common profile among people who shop zero-waste. The typical customer was described as female, between the ages of 20 and 40, middle to upper-middle class, and white. As for their attitudes, many customers are eco-conscious and are keen on altering their own behaviours in order to live a low-impact

lifestyle. In addition to having retailers describe their customers, an online survey was posted on the social media pages of one retailer and on a zero-waste Facebook group for residents of Toronto. In the span of one week, over 300 participants responded to the survey. This number alone demonstrates the enthusiasm participants have for the zero-waste movement whether it be by supporting businesses or research.

Characteristics

As for the results of the survey (See Appendix A), the characteristics of customers strongly match the descriptions provided by retailers. The majority of customers who answered the survey were women (96%), between the ages of 25 and 44 (67%), living with a partner (68%) and a significant proportion with children (37%), highly educated (79% of whom hold a bachelor's, master's or doctorate degree), and fully-employed (49%) or students (17%).

Benefits

The most common benefit (See Appendix B) mentioned by respondents was the significant amounts of waste and recyclables that they no longer generate. Other common benefits mentioned were the ability to choose the exact quantities of product that they wanted to buy, and the superior quality of food.

Respondents also found that since beginning to shop zero-waste, they noticed an improvement in their diet as they incorporated more whole and less processed foods. They also mentioned that they saved money because they were buying fewer expensive items such as meat and cheese. "[I] learned more about cooking, food preservation, started eating higher quality, started eating less meat/dairy (hassle to buy without packaging), probably saved money overall."

Customers also experienced a deep sense of satisfaction with being able to control the amount of waste they produced. With mounting evidence on the problems associated with human-caused pollution, zero-waste retailers provide those who feel anxious about the state of the environment with the means to incorporate actionable change in their every day lives. Most importantly, zero-waste retailers allow consumers to feel empowered about reducing their environmental footprint. "Reducing my environmental impact is a priority

for me, I absolutely want to contribute to the fight against climate change. I am less anxious when I see that I produce less waste." (Translated from French)

Customers also appreciated the sense of community they feel while interacting with other people participating in or curious about the zero-waste movement. A few mentioned a sense of belonging and enjoy being among a group of people that hold similar values. "Feeling part of something bigger than oneself, belonging to a community with the same values." (Translated from French)

Challenges

As mentioned earlier, the shopping experience offered by zero-waste retailers differs from that of conventional grocery stores in a few key ways. Many of these differences make the shopping experience at zero-waste stores less efficient which is viewed as a challenge for customers. For one, they are generally not a one-stop-shop because they have a more limited supply of products. For example, most do not carry produce, meat or dairy products which necessitates a stop at another store.

Other challenges expressed by consumers centered on physical access. Zero-waste consumers generally need to travel further distances since zero-waste stores are not very prevalent. Large expansive parking lots, which are generally a given attribute of conventional grocery stores, are seldom available to customers of smaller, boutique-styled, zero-waste stores. This means that consumers have to find street parking or take other means of transportation such as walking, biking or public transit.

The following quote summarizes the general sentiment felt by zero-waste shoppers:

> I have to go out of the way in order to access a zero-waste grocery store. It is complicated with public transit that requires of me to make transfers. In addition, I have to visit another grocery store afterwards because there are no fruits or vegetables at the zero-waste grocery store that I shop at. Also, the cost of items is higher because they are usually organic. My purchases also require planning; I must decide which containers to bring and bring them with me to the grocery store etc. It's stressful. (Translated from French)

Further, since customers need to bring their own containers, this makes the experience more time consuming and cumbersome. Even though some people are willing to accommodate accordingly, these challenges may be enough of a reason for a potential customer to refrain from frequenting zero-waste stores.

> I wish there was less plastic packaging. I wish more stores had bulk bins. Sometimes I have to go out of my way to shop where bulk options are available. I am willing to do that because I have very strong desire about reducing plastic waste, but the average person who is just a bit concerned may be less likely to go out of their way. Also, prices are usually higher for many bulk foods vs the same foods sold in packaging which I don't understand since packaging cost money.

Lastly, while some of the benefits of zero-waste are monetary savings, others feel as though it is more expensive to shop at zero-waste store. "Some things are too expensive compared to a chain grocery store. (Especially when comparing fresh produce like mushrooms or other veggies)."

4.3.3 Barriers: What can be done to influence attitudes and behaviour change?

People who participate in the zero-waste movement are often surrounded by friends, family and co-workers who have never been introduced to the concept. Respondents were asked to explain what they believe are the barriers that prevent others from shopping zero-waste. This question was meant to gain insights into how people can break the attitude-behaviour gap.

In addition to the obvious challenges like cost, time and convenience, a common theme mentioned included the idea that consumers have formed bad habits that are difficult to break. Essentially, the average consumers are used to getting what they want, when they want it and because of this, most people expect convenient access to goods without needing much forethought, planning or time. "Habits formed over a lifetime, the fact that there is a choice to have packaging ... it should simply disappear and everyone would adapt." (Translated from French)

Respondents also explained that there is a lack of awareness and education about the benefits of zero-waste, the relative ease with which it can be achieved (which is arguable), and the comparable prices of some, if not most items.

> There is not enough education/promotion about it. It is not advertised enough which means that people do the easy thing and buy at the grocery store. If people knew about it more, I think they would be more inclined. I also think if there were more stores and more options in those stores for buying zero-waste foods, people might consider them more. Also, it would be nice to have options at our local grocery stores that are zero-waste, such as having lactose-free milk in glass jars so that you can bring them back and they can be reused. This would be great especially for products that are frequently bought, like milk, yogurt, etc. If it was advertised more and it was more convenient for people (like getting zero-waste at their normal grocery store), I think that would encourage people to live this way.

4.4 Discussion

4.4.1 Environmental Impacts

Driven by aspirations of running an environmentally conscious business, business owners of zero-waste grocery stores are seeking to reduce the impacts the conventional food system has on the environment by ensuring that natural resources are used more effectively. By taking away unnecessary packaging and by encouraging customers to take only what they need so as to also reduce food waste, they are in turn maximizing material productivity and ensuring energy efficiency. Through their business model, they are endeavouring to generate less waste, and perhaps, thereby reducing emissions, pollution and land consumption. However, zero-waste grocery stores are not without environmental costs, the value added is that they are more effective with confronting the environmental issues present in the current food system and do their best to internalize these weaknesses to reduce their impact. In doing so, they also set an example for other retailers to do the same.

To highlight the impact of one zero-waste retailer, over the span of approximately four years, NousRire (a Montreal retailer) saved an estimated 1 million packages from being

produced and ending up in the urban waste stream (their metric based on approximately one package saved for every 500 grams of product sold).

4.4.2 Social Impacts

Although zero-waste grocery stores have made remarkable strides in terms of avoiding food packaging and may inspire other food retailers to do the same, some question their effectiveness with regard to reaching the majority of Canadians rather than the niche market they currently serve. Since the quality of the product is highly valued, there is a risk that low-income earners may be 'priced out' of consuming sustainably.

There is a general concern that alternative food systems and alternative food retailers, though they appear to be making steps in the right direction and demonstrate potential for scalability and signal positive change to the current consumption system, have unknown and potentially negative impacts on members of the local community (Macias, 2008). In large part due to high prices set for high quality product, inequities in access are created and exacerbated. As with similar studies, researchers have found that despite attempts to attract a diversity of customers in terms of their education, income and employment backgrounds, alternative food projects fall short of their aspirations (Hinrichs & Kremer, 2002; Macias, 2008). Further, a lack of promotional and educational programs enables individuals with higher levels of education and income to have better access to higher quality food with a lower environmental impact (Macias, 2008).

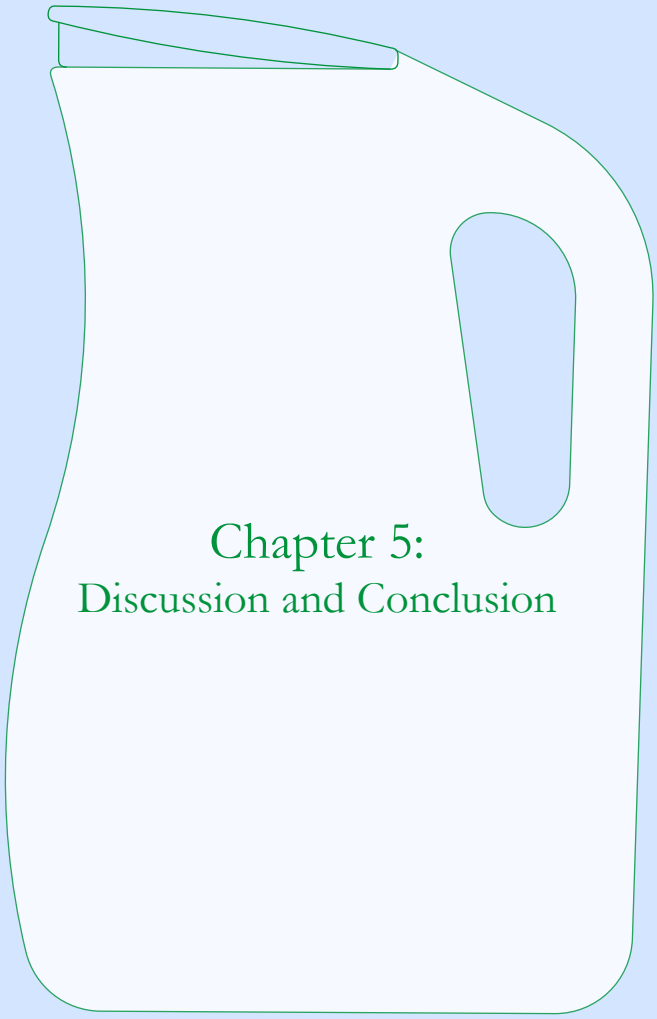
4.5 Conclusion

Once embraced by farmer's markets and community-supported agriculture, "local food" was later marketed to consumers by specialized retailers and then eventually adopted by conventional retailers (Dunne et al., 2011). Similarly, the zero-waste movement is led by a limited number of actors; however, participants in the movement are hopeful that just as locally produced goods made their way into mainstream markets, so could zero-waste goods.

When governments only provide support and incentives to manufacturers and designers of eco-conscious packaging, they send the message that consumption is not the problem

– when it is in fact the most significant factor needed to reduce the effect of our everyday actions on the environment. Cities and other public bodies should be supporting businesses who are radically changing how people buy and dispose of goods. Businesses like the ones covered in this paper are generating conversation, raising awareness and educating thousands of people on how they can meet their needs without creating undue environmental harm. Support could be provided in the form of tax breaks or subsidies or by promoting zero-waste businesses online or through other channels. Since municipalities are responsible for managing solid waste, they should be recognizing and supporting businesses and individuals who are doing their part to alleviate pressure on this overburdened system.

This chapter offers insights into the zero-waste movement, their percolation into traditional consumer society, and highlights the potential for change on a larger scale. The motivations and attitudes of zero-waste retailers and their customers were outlined, and common challenges and barriers were described. More importantly this chapter is meant to inspire retailers and the public to adopt similar strategies and to bring attention to the environmental and social impacts of this business model.



Chapter 5:
Discussion and Conclusion

Chapter 5: Discussion and Conclusion

5.1 Discussion

In many developed countries people are generating unprecedented amounts of waste. Presently, high-income countries make up 16% of the world's population and produce 34% of the world's waste (Kaza et al., 2018). This problem is in large part due to the linear consumption system under which society operates where it has become common practice for producers to design goods that are meant to be used once, then thrown away.

As incomes rise, waste production per capita will continue to rise (Gutberlet, 2003). Therefore, it has become increasingly apparent that the transformation of consumption patterns and waste management systems is imperative. Cities in both developing and developed countries play a critical role in implementing policies and practices that address waste management.

It has long been known that reduction and reuse programs are the most environmentally sustainable policy programs. However, low-impact and circular systems for goods have seldom been implemented. Policy makers, companies, retailers, and consumers should, as much as possible, consider and implement reduction strategies before looking at recycling; as well, they should consider redesigning as solutions to the waste problem.

It must be made clear to a layperson that the primary goal of a low-waste or zero-waste future is not to recycle 100% of packaging materials because the recovery and reuse of recyclable packaging requires additional processing that depends on unsustainable sources of energy and other materials. Rather, the primary goal is to reduce the amount of material goods flowing through society. However, it should be noted that reductions in packaging production should be implemented if they do not come at the cost of other wastage (i.e. energy, water or food). After all, the goal of low-waste/zero-waste is to not only to divert waste from landfills, but to lessen our demand on natural resources (Zaman & Lehmann, 2013).

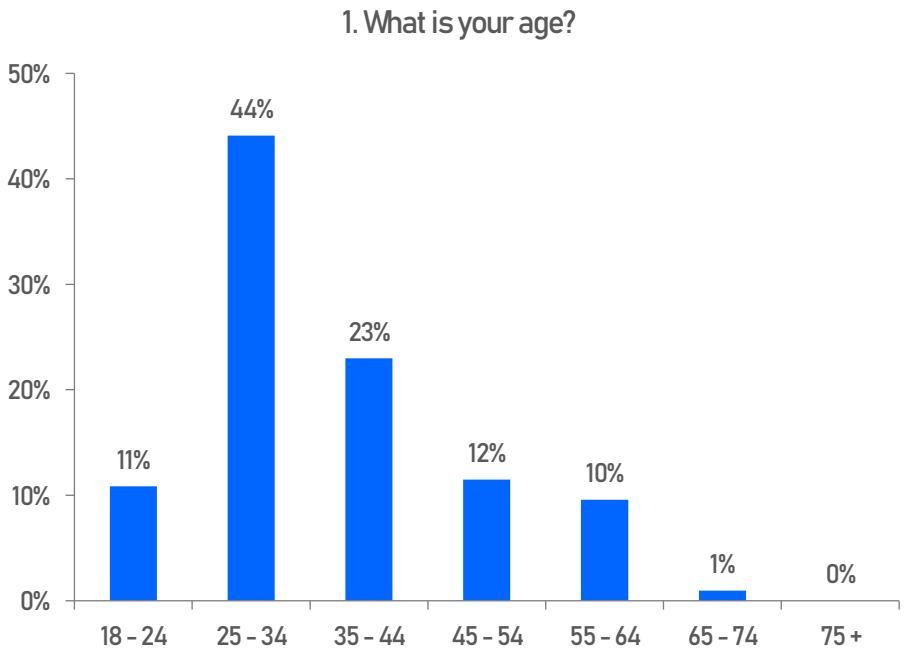
For decision-makers, education and awareness, and regulatory approaches need to be more effective at reducing food packaging waste. In Toronto, for example, the City is running a "Bring your Own Container" (BYOC) campaign for the month of July to encourage residents to think twice about accepting disposable containers at restaurants (Global News, 2019). Also, in July 2019, the city of Calgary had it's first Zero Waste Festival featuring presentations on sustainable living and stalls for waste-free businesses (CBC News, 2019). Regulatory approaches such as bans on plastic have also been effective and should be adopted by more municipalities. Support from governments should be provided in the form of tax breaks or subsidies or by promoting zero-waste businesses online or through other channels. Since municipalities are responsible for managing solid waste, they should be recognizing and supporting businesses and individuals who are doing their part to alleviate pressure on this overburdened system.

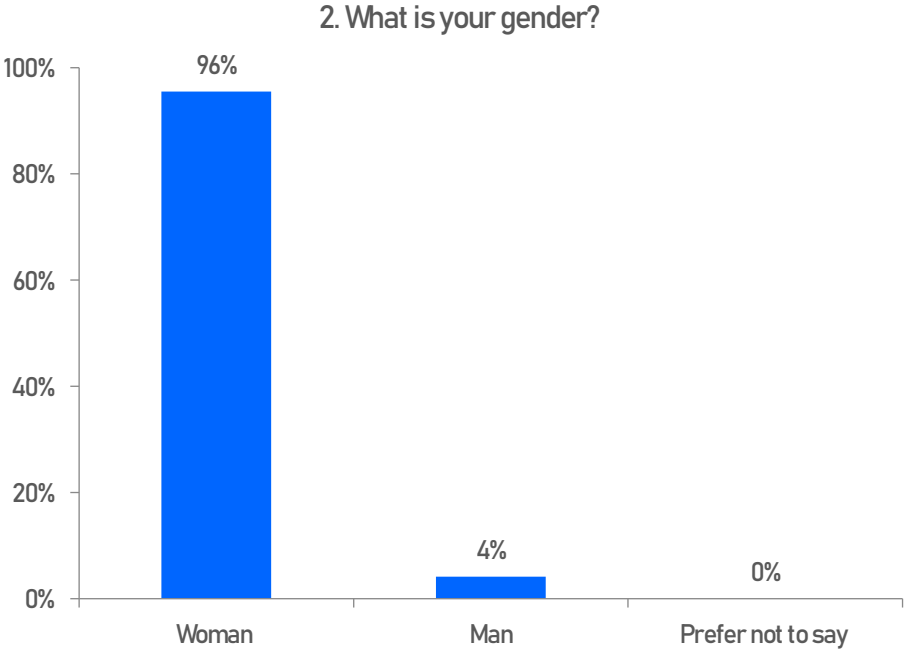
5.2 Conclusion

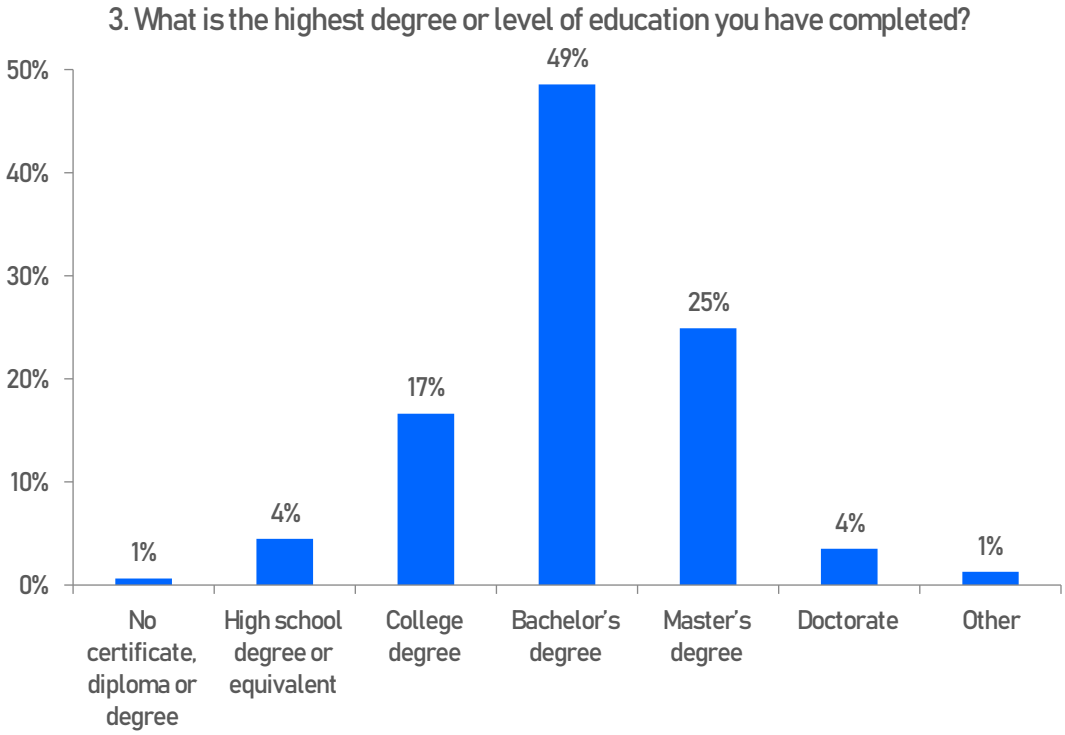
The primary goal of this report was to better understand the roles played by various actors, the factors and systems that influence them, and the barriers that need to be overcome to reduce plastic food packaging waste. In chapter one, I demonstrated that the dominant systems of production, use and disposal of food packaging are defective and have led to the destruction of natural ecosystems and overwhelmed the global capacity to manage waste. In chapter two, I explained the methods and limitations of the following two chapters. In chapter three, I argued that it is the responsibility of all stakeholder groups to reduce the amount of food packaging that is produced, used and discarded; and I explained some of the actions taken by governments, corporations, retailers, and consumers to confront the problems presented by the current system in which we produce, consume and discard food packaging. In chapter four, I presented an exploratory study on the topic of zero-waste retailers and consumers. I described the motivations, operations and barriers faced by retailers and consumers related to quest to provide and purchase food items that are not wrapped in disposable or recyclable food packaging. The purpose of this chapter was to demonstrate that there are alternatives to the dominant system of consumption and that there is a large number of people who are altering their behaviours to reduce their environmental footprint.

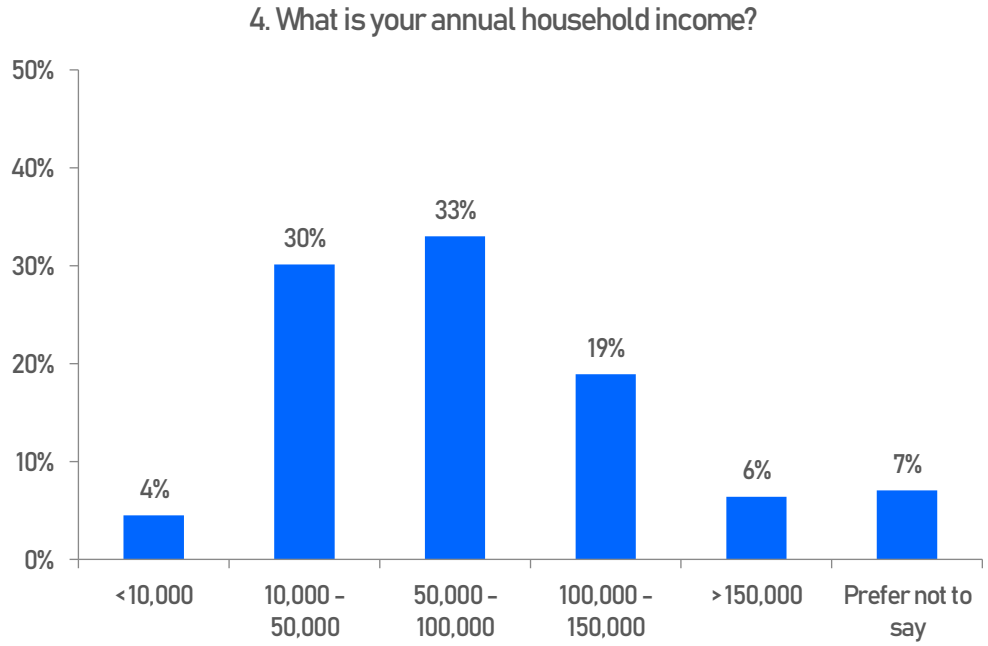
The literature review in part one and the case study in part two catalogue some of the efforts being taken to alleviate the pressure unchecked solid waste production has placed on the environment and on communities across the globe. Although there is still much progress to be made, the case study is meant to demonstrate that there are viable alternatives and there is a growing consumer base that wants to see changes being made concerning how food and other goods are packaged.

Appendix A – Zero-Waste Customer Survey Results (Q1-Q7)

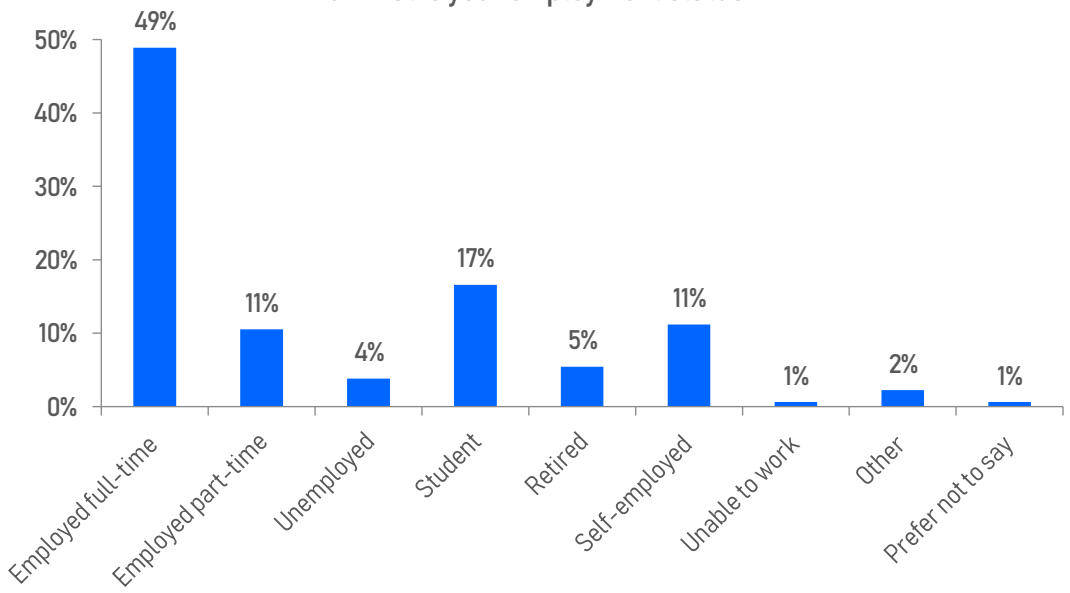




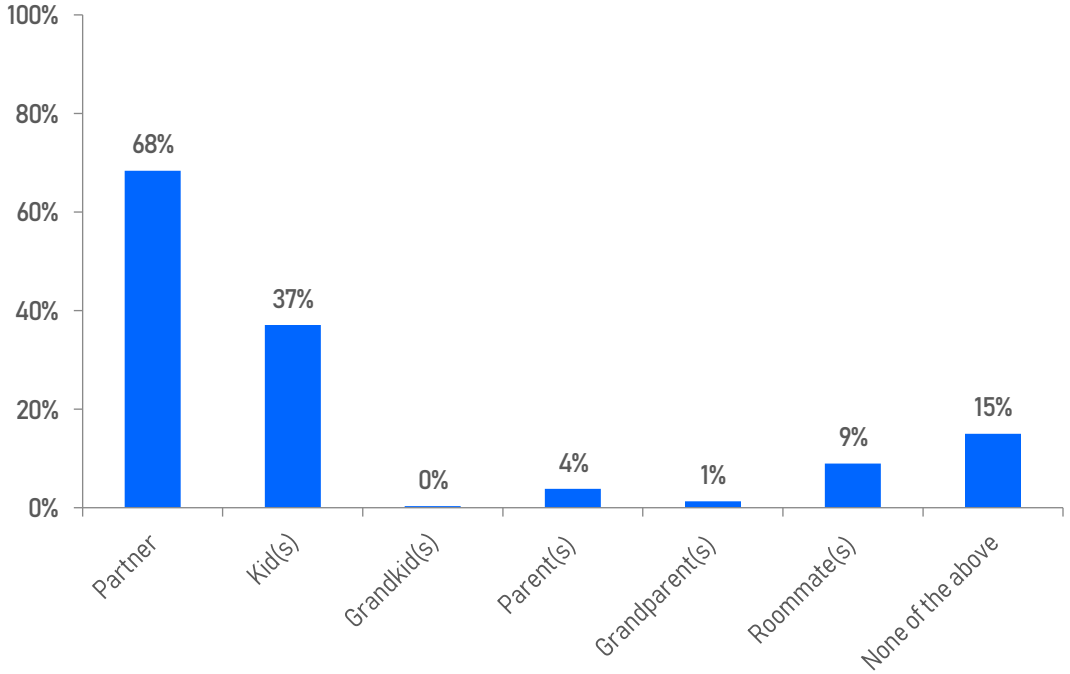

3. What is the highest degree or level of education you have completed?
50%
40%
30%
20%
10%
0%
1%
4%
17%
49%
25%
4%
1%
No certificate, diploma or degree
High school degree or equivalent
College degree
Bachelor's degree
Master's degree
Doctorate
Other

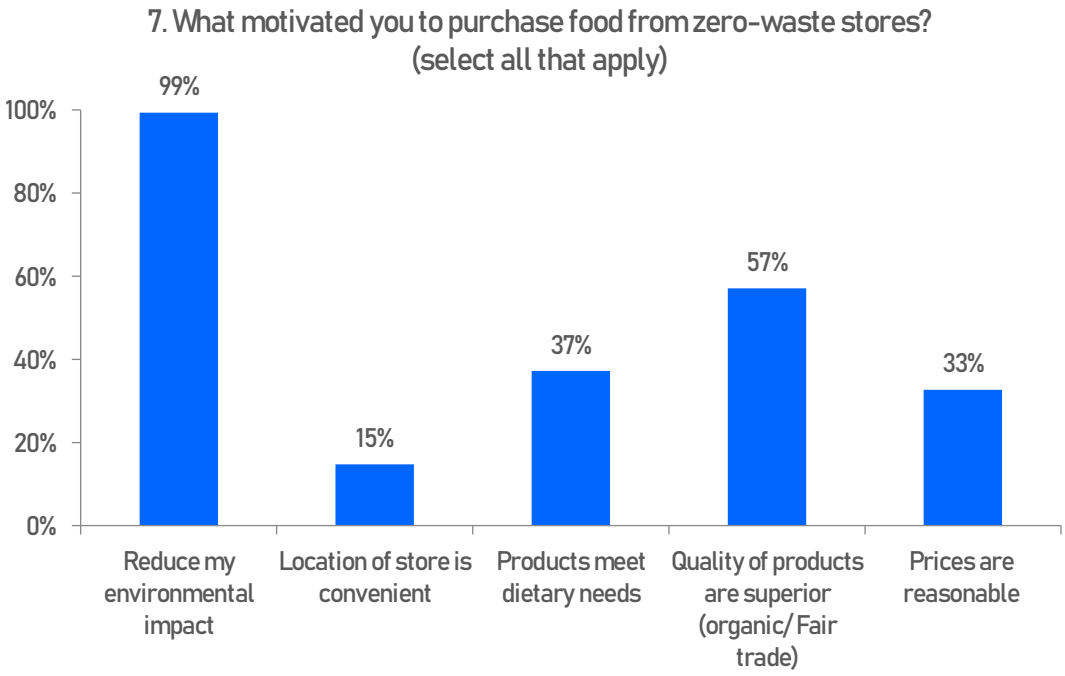

4. What is your annual household income?
50%
40%
30%
20%
10%
0%
4%
30%
33%
19%
6%
7%
<10,000
10,000 - 50,000
50,000 - 100,000
100,000 - 150,000
>150,000
Prefer not to say

5. What is your employment status?

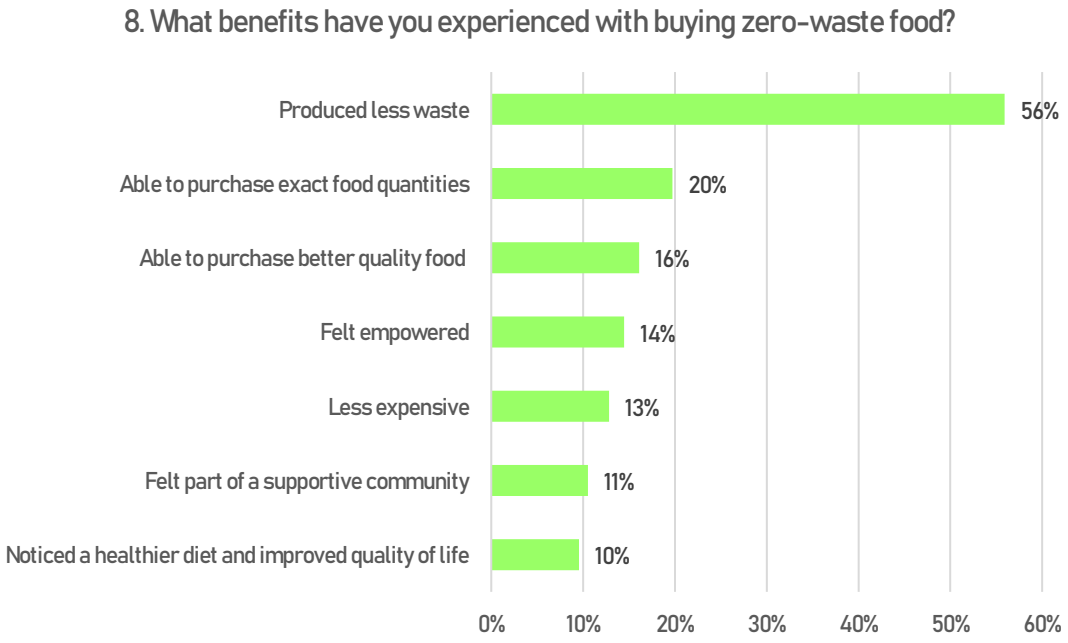


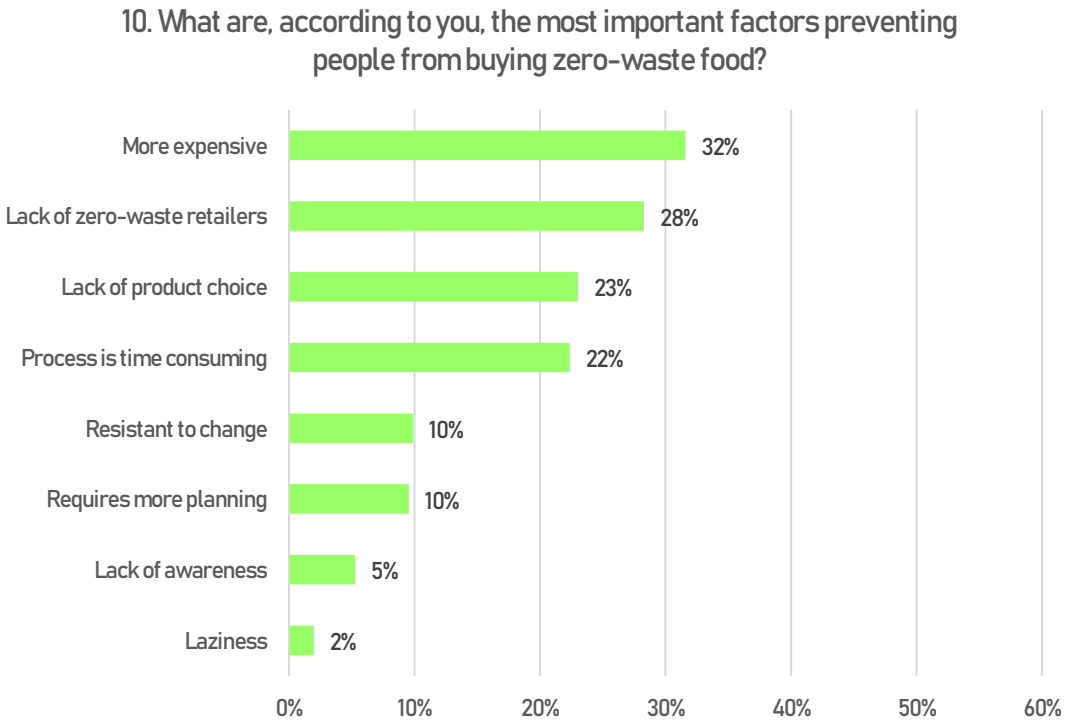
6. Who, if anyone, currently lives with you in your household? (select all that apply)




7. What motivated you to purchase food from zero-waste stores? (select all that apply)
100%
80%
60%
40%
20%
0%
99%
15%
37%
57%
33%
Reduce my environmental impact
Location of store is convenient
Products meet dietary needs
Quality of products are superior (organic/ Fair trade)
Prices are reasonable

Appendix B – Zero-Waste Customer Survey Results: Keyword Search (Q8-Q10)





Appendix C – Interview Guide for Zero-Waste Retailers

1. Why did you decide to open a zero-waste store?
2. How has business grown over the months/years?
3. Can you describe your typical customer?
4. Do your operations correspond to specific municipal/provincial regulations?
5. Do you receive grants or governmental support?
6. Are there hygiene and food safety issues resulting from the zero-waste business model? And how is it dealt with?
7. Do your business activities generate packaging waste? How is it dealt with?
8. What other sustainable practices are incorporated into your business model?
9. Do you see the business lifecycle of zero-packaging grocery stores as a fad or long-term trend?
10. Do you see the market for zero-waste as niche or do you believe it has the potential to grow and reach a larger market?
11. What challenges, issues, concerns arise with sourcing specific to packaging?
12. What challenges are attributed to reducing/eliminating packaging?
13. What are other barriers for businesses and consumers to reduce the use of disposable food packaging?
14. Do you have any final comments?

Appendix D – Survey for Zero-Waste Retailers

1. What month and year did you open?_____
2. What is your ownership structure?

Inventory

3. How many different kinds of products do you carry? (please provide an approximate number)_____
4. Which types of products do you carry? (check all that apply)
   - ☐ Dairy
   - ☐ Produce
   - ☐ Meat
   - ☐ Dry goods
   - ☐ Frozen foods
   - ☐ Bread
   - ☐ Household items
   - ☐ Prepared meals (served warm or cool)
   - ☐ Drinks
   - ☐ Personal care
   - ☐ Other:_____
5. Which products do you **not** carry and why? (check all that apply)
   - ☐ Dairy
   - ☐ Produce
   - ☐ Meat
   - ☐ Dry goods
   - ☐ Frozen foods
   - ☐ Bread
   - ☐ Household items
   - ☐ Prepared meals (served warm or cool)
   - ☐ Drinks
   - ☐ Personal care
   - ☐ Other:_____

Please explain why you do not carry certain products:

6. On a scale of 1 to 10, please rank the most (1) to least (10) popular products in terms of **revenue.**

___Dairy

___Produce

___Meat

___Dry goods

___Frozen foods

___Bread

___Household items

___Prepared meals (served warm or cool)

___Drinks

___Personal care

7. On a scale of 1 to 10, please rank the most (1) to least (10) popular products in terms of **quantity.**

___Dairy

___Produce

___Meat

___Dry goods

___Frozen foods

___Bread

___Household items

___Prepared meals (served warm or cool)

___Drinks

___Personal care

Sourcing

8. How are products sourced? (please provide a percent of each in terms of quantities)
   a) Wholesaler: _____%
   b) Large National Manufacturers: _____%
   c) Direct-Store-Delivery Vendors: _____%

d) Direct from Small Food Producers: _____%

e) Other (please specify)_____: _____%

9. Approximately which proportion of products are sourced from within:
   a) The province _____%
   b) The country _____%
   c) Internationally _____%

Marketing

10. What marketing strategies do you use?
11. Do you host events? If so, please list them and provide a brief explanation.
12. How do you determine the price of products? And how do your prices compare to conventional grocery stores?

Demographic Characteristics of Customers

13. On average, how many customers visit the store each day?_____
14. What percentage of customers would you say frequent the store regularly? (i.e. once a week)_____
15. Can you describe your typical customer? (age, gender, income, ethnicity, values…)
16. Are your customers willing to pay more for the zero-waste shopping experience?
17. Are customers generally residents of the neighbourhood?

Accessibility

18. Do you offer alternative containers if your customers forget to bring their own? (please explain)
19. Why did you choose your current location?
20. Is your store accessible by (check all that apply):

☐ Public Transit

☐ Car

☐ Bicycle

☐ Walking

21. How do most people access your store?

Progress and Challenges

22. Do you keep track of how much packaging waste you have reduced? If so, can you provide any data that you may have?
23. What are some common challenges that you face when it comes to reducing/eliminating packaging waste?

Appendix E – Survey for Zero-Waste Consumers

1. What is your age?
    - ☐ 18-24
    - ☐ 25-34
    - ☐ 35-44
    - ☐ 45-54
    - ☐ 55-64
    - ☐ 65-74
    - ☐ 75+
2. What is your gender?
    - ☐ Woman
    - ☐ Man
    - ☐ Other
    - ☐ Prefer not to say
3. What is the highest degree or level of education you have completed?
    - ☐ No certificate, diploma or degree
    - ☐ Highschool degree or equivalent
    - ☐ College degree
    - ☐ Bachelor's degree
    - ☐ Master's degree
    - ☐ Doctorate
    - ☐ other
4. What is your annual household income?
    - ☐ <10,000
    - ☐ 10,000-50,000
    - ☐ 50,000-100,000
    - ☐ 100,000-150,000
    - ☐ >150,000
    - ☐ Prefer not to say
5. What is your employment status?
    - ☐ Employed full-time

- ☐ Employed part-time
- ☐ Unemployed
- ☐ Student
- ☐ Retired
- ☐ Self-employed
- ☐ Unable to work
- ☐ Other
- ☐ Prefer not to say

6. Who, if anyone, currently lives with you in your household? (select all that apply)
   - ☐ Child/children
   - ☐ Grandchild/grandchildren
   - ☐ Parent(s)
   - ☐ Grandparent(s)
   - ☐ Roommate(s)
   - ☐ Partner
   - ☐ None of the above
7. What motivated you to purchase food from zero-waste stores? (select all that apply)
   - ☐ Reduce my environmental impact
   - ☐ Location of store is convenient
   - ☐ Products meet dietary needs
   - ☐ Quality of products are superior
   - ☐ Prices are reasonable
   - ☐ Other (please specify)
8. What benefits have you experienced with buying zero-waste food?
9. What challenges have you experienced with buying zero-waste food?
10. What do you think are the most important factors preventing people from buying groceries that are zero-waste?

Appendix F – Certificate of Ethical Acceptability of Research Involving Humans

McGill

Research Ethics Board Office
James Administration Bldg.
845 Sherbrooke Street West. Rm 325
Montreal, QC H3A 0G4

Tel: (514) 398-6831
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Research Ethics Board 1
Certificate of Ethical Acceptability of Research Involving Humans

REB File #: 380-0219

Project Title: Zero-packaging grocery stores: Exploring operations, clientele, and other lessons

Principal Investigator: Jamie Rathwell

Department: School of Urban Planning

Status: Master's Student

Supervisor: Prof. Madhav Badami

Co-supervisor: Stephanie Leclerc

Approval Period: **February 22, 2019 February 21, 2020**

The REB-1 reviewed and approved this project by delegated review in accordance with the requirements of the McGill University Policy on the Ethical Conduct of Research Involving Human Participants and the Tri-Council Policy Statement: Ethical Conduct For Research Involving Humans.

Deanna Collin
Senior Ethics Review Administrator

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* Approval is granted only for the research and purposes described.
* Modifications to the approved research must be reviewed and approved by the REB before they can be implemented.
* A Request for Renewal form must be submitted before the above expiry date. Research cannot be conducted without a current ethics approval. Submit 2-3 weeks ahead of the expiry date.
* When a project has been completed or terminated, a Study Closure form must be submitted.
* Unanticipated issues that may increase the risk level to participants or that may have other ethical implications must be promptly reported to the REB. Serious adverse events experienced by a participant in conjunction with the research must be reported to the REB without delay.
* The REB must be promptly notified of any new information that may affect the welfare or consent of participants.
* The REB must be notified of any suspension or cancellation imposed by a funding agency or regulatory body that is related to this study.
* The REB must be notified of any findings that may have ethical implications or may affect the decision of the REB.

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