

Is Metro Vancouver ready to reduce their waste? An evaluation of Returnable/Reusable Container Programs.

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Abstract

Background: As the interest in delivery and take-out meals increases, so too does the amount of food packaging that ends up in the landfill. Programs and incentives are already in place and continue to be adjusted to encourage the reduced reliance on these materials. This study focuses on returnable and recyclable container programs (RRCP) and British Columbian's interest in these programs for Metro Vancouver.

Methods: A survey was created using Google Forms as an online self-administered survey and distributed to participants as a QR code or through email. The survey contained 14 questions that varied from recycling habits to take-out habits to demographics and took less than five minutes to complete. A chi-square test was used to analyse the data from five hypotheses based on question #12 regarding their interest in RRCPs for Metro Vancouver.

Results: The total number of completed responses received was n=118, of those 55% (n=63) were 40 or younger and 45% (n=51) were over the age of 40. For the question about gender, 56% (n=67) identified as female, 41% (n=49) identified as male, ~2% (n=2) chose not to identify or identified as two-spirit. There was overwhelming support for initiating an RRCP program in Metro Vancouver with 83.1% of all respondents being in favour. Results also suggested that this support was broad based with no demographic group(s) showing more interest than others. There was no statistically significant association between gender and interest in RRCPs (p=0.13) or between age and interest in RRCPs (p=0.81). Additionally, it was concluded that there was no association between living inside or outside of Metro Vancouver (p=0.15), recycling habits (p=0.77), or take-out habits (p=0.82) and the participants interest in RRCPs for metro Vancouver.

Conclusions: The small survey of British Columbians showed support for an RRCP regardless of other variables (age, gender identification, location, or take-out and recycling habits). The total number of responses were limited compared to the population of British Columbia, but the results suggest that the public is very interested in reusing food containers for take-out meals and the introduction of RRSPs should be explored further. This research also provides some valuable information into the public interests of recycling and waste in British Columbia.

Keywords: returnable recyclable container program, RRCP, Suppli, DeliverZero, GoBox, Loop, waste, single-use, disposable.

Introduction

Among developed countries, Canada ranks the worst in global waste and recycling, with the United States performing only slightly better

(Byrnes & Frohlich, 2019). There are plenty of initiatives and recommendations to reduce the contribution to landfills. Excess of containers from an increase of takeout and delivery

orders are contributing to the problem. In the city of Vancouver, during 2017-2018, approximately 50% of the garbage collected from public waste bins was single-use food packaging (Chung, 2018). British Columbia continues to see an increased interest in online-based delivery services, such as Skip the Dishes or DoorDash, which can be attributed to the convenience these services provide and the safety concerns the COVID-19 pandemic has placed on the dine-in restaurant industry.

Market research companies expect that the food delivery sector will continue to grow, and that means additional waste destined for the landfill (ResearchAndMarkets.com, 2020). A Returnable and Reusable Container Program (RRCP), called Suppli, has a market base in Toronto and its business model is designed to reduce the need for single-use and disposable containers by reusing returned takeout containers (Mysuppli, n.d.a). There is concern that additional water needed to wash these containers will negatively impact the environment, but with efforts to improve dishwasher efficiency, this factor is likely to have a lower impact than continuous disposal (Gallego-Schmid et al., 2018). Risk of transmission for communicable diseases is a concern for public health officials and the patrons of restaurants, and with new initiatives comes new worries; the fear of getting sick from a restaurant is not specific to RRCPs. Future RRCPs will have to take into consideration the food premises' obligation to ensure equipment, utensils and food contact surfaces are handled and cleaned in a manner to prevent health hazards (Food Premises Regulation, 1999).

Current literature leaves gaps in knowledge regarding whether the public in British Columbia would like RRCPs in their communities, the willingness to reduce their need or dependency on single-use items, and how much of an impact restaurants or

producers play in that role. This research project surveyed British Columbians to determine whether there was interest for RRCPs in Metro Vancouver and to potentially have the results of this study used for future implementation of RRCPs and promotion of waste reduction strategies.

Current Reusable Programs

The idea for the RRCPs, stem from motivation to reduce the carbon footprint. As seen in the goals of several current operations, there is motivation to reduce the need for single use or disposable packaging (cups, boxes, etc.) to reduce the amount of garbage produced. Before the pandemic put a spotlight on basic hygiene, coffee shops were offering discounts for customers who brought in their own coffee mugs. Two big names in coffee, Tim Hortons and Starbucks, joined this focus to 'reduce and reuse' offering discounts to customers bringing in their own coffee cups, while some restaurants were urging customers to bring in their own boxes to pack up their leftovers (Chung, 2018). Only 26% of Canadian restaurants considered allowing customers to bring in their own containers or bags for use, while 40% wanted to continue using single-use dishware (Restaurants Canada, 2020b).

The returnable container model has not been perfected in any region, but it has found success in several places, such as: Portland,



Figure 1: Clean Fairfax. (2017). Plastic Clamshells in Fairfax County, VA: Try not to buy, DON'T RECYCLE, and reuse whenever possible.

New York, Toronto, India and Belgium. The programs model themselves on customers being able to order food in a returnable container that they can drop off or have picked up, that would then get washed and sanitized before being reused. The companies that work out of Oregon, New York and Toronto are Go Box, DeliverZero and Suppli, (DeliverZero, n.d.; Go Box, n.d.; Mysuppli, n.d.a) respectively, and all three have different executions of their programs. Recently another program called Loop launched in Canada and works with Loblaw's in the grocery store sector.

Go Box is the only paid subscription service and limits the number of containers a customer may have at one time. The containers are made of #5 BPA-free plastic that is light, durable and heat resistant (figure 1). Go Box worked with the Multnomah County Health Department (though the service falls out of regulatory purview) to review the operating procedures of sanitary dishwashing (Go Box, n.d.). The service is provided by bicycle delivery, also reducing CO₂ emissions.

To use the free Deliver Zero program, the customer orders from a restaurant through www.deliverzero.com so the restaurants know to use to proper (returnable) containers. Afterwards, the customer is supposed to rinse and return to the restaurant or to the delivery person the next time they use the service. They have six weeks to return the container before they are charged \$3.25 USD (plus tax). As



Figure 2: Hirsch, S. (2020). How This New Company Is Taking the Waste Out of Restaurant Delivery

seen in figure 2, the containers are high density plastic and light, as well as dishwasher & microwave safe and NSF approved (DeliverZero,

n.d.). This service relies on the restaurants to wash and sanitize the containers before reuse.

Suppli is similar to DeliverZero in that it works by having the customer tell the restaurant they are a member of the RRCP service (with proof). This program



Figure 3: MySuppli (n.d.b). Sustainability

offers to pickup the containers with an available online schedule of which days will cover which routes (at the time of writing only two area codes in Ontario were covered). There is a fee of \$0.99 CAD per order of \$20 CAD for not returning the containers within a week. The containers used in this program are made of stainless steel, that are oven and dishwasher safe, with silicone lids (figure 3); Suppli claims that the steel has indefinite recycling potential and there is limited breakdown of the lids in the environment. This company uses Event Rental Group as a third party to wash and sanitize the containers (before returning them to the restaurant) in a manner that meets or exceeds the Ontario Food Premises Regulations (Mysuppli, n.d.a).

During the time of writing, another program launched with the same aspirations, the difference is the program works with grocery store products and not restaurants. Loop



Figure 4: Chung et al., (2021). A big test of reusable packaging for groceries comes to Canada.

launched in February 2021 in Ontario but has been developing partnerships around the world since early 2019 (Makower, 2019). The concept is that groceries are delivered in a reusable tote (reducing packaging materials), in washed and reused containers (ketchup bottles, milk containers, etc.) and any empty containers are picked up, in what they are calling the “milkman model” (Loblaws, n.d.). There is no subscription fee but there is a different deposit on each product that is refunded when the container is returned. Due to different companies being responsible for container development as well as the variety of products available (figure 4), there is very limited information about the amount of reuses each container may get.

As mentioned previously, these companies claim that their containers have significant reuse potential with Suppli and DeliverZero lasting for around a thousand uses and GoBox for around 400 uses (DeliverZero, n.d.; Go Box, n.d.; Mysuppli, n.d.a). Overall, they are reducing money spent by restaurants on single-use items, shipping costs for those single-use items, manufacturing emissions, and landfill contributions. These programs are also relatively new on the market (2018 onward) and have hundreds of users each, meaning these companies have already started to reduce restaurant contributions to the landfills (Delikat, 2020; Lightfoot, 2020).

Waste and Recycling

British Columbia has multiple, efficient, recycling systems that have led to the province being a national leader across Canada for nearly a decade (Johnston, 2019; The Conference Board of Canada, 2016). This is a result of several initiatives, that include education campaigns, community events, and most effectively a program where producers pay for recycling services called the ‘Extended Producer Responsibility’ that is not found anywhere else in North America (Recycle BC, 2018). Though even if British Columbia is a

national leader, Canada ranked in the bottom half of 17 developed countries in terms of waste production per capita through 2013-2017, while ranking last in 2017. Although a large portion is industrial or construction waste, there is a lot of household garbage that is also part of the problem (Byrnes & Frohlich, 2019; CBC News, 2013). Adding to troubles of decreasing landfill space for Canada is the ban on imported waste recently implemented by China, the once “dumping ground for Western material” (Hounsell, 2018).

Canada has been trying to find ways to reduce to amount of materials entering the landfills, which either could have been recycled or a different product could have been used. The Federal Government issued a plastics challenge for food containers in 2018 to “[I]mprove the design of film food packaging to reduce the generation and disposal of plastic waste”, and awarded a one-million dollar grant to AxiPolymer Inc., based in Montreal, Quebec (Government of Canada, 2018). The Government of Canada has, since then, issued six more plastics challenges and three clean technology challenges in 2020, all in the effort to go to a zero plastic waste future (Cameron, 2020).

Two of the biggest contributors to the landfill from the restaurant industry are black plastic containers and plastic (or wax) lined takeout cups. Black plastics are mostly not recyclable because of the carbon black pigments used in the colouring. The reason is that carbon has low reflectivity for the infrared sensors commonly used for sorting in recycling depots (Turner, 2018). It should be noted that new technology is being developed for the infrared sensors to better detect the carbon pigment (Becker, Sachsenheimer & Klemenz, 2017). The typical takeout coffee cup is plastic or wax lined to prevent leakage and there are two common reasons they end up in the landfill instead. The first is that the recycling depots cannot separate the plastic from the paper

efficiently, so it goes to the landfill rather than contaminating the recycling stream (Wiener-Bronner, 2019). The second reason is that it does not typically get rinsed out properly and has leftover contamination (e.g. leftover coffee) that will contaminate the rest of the recycling stream (Quinte Waste Solutions, 2021). Additionally, regular recyclable containers that have food products still in or on it, such as peanut butter jars, are also contamination problems (Lewis & Hayes, 2019). Gallego-Schmid et al. (2019) claim that the “Styrofoam” (expandable polystyrene) containers require less raw materials to produce and would have less impact on the environment than aluminum, plastic and “Tupperware” (polypropylene food saver) containers. Their study also determined that typical plastic containers, compared to Styrofoam, must be reused at least 3 times (3-39) to make up the difference in their environmental impacts. These Styrofoam containers are not able to hold hot liquids or hot greasy foods and they are difficult to clean, hence why they are not commonly used, but they have less impact than the Tupperware that was used in the study. Gallego-Schmid et al. (2019) also claimed it would take 16-208 times of reuse for Tupperware to make up the environmental impact over Styrofoam because of the large amount of raw materials required for production.

The other consideration is the environmental impact of using more water to wash (up to a thousand times) these returnable containers rather than disposing of single-use items. Though this is not the subject of this research, it is worth noting considering Canada’s goal of a zero-waste future. Commercial dishwashers from Meiko, USA Inc. are claimed to use about 100 gallons (378L) an hour or less (Total Food Service, 2016). The impact of additional containers that would require washing would be negligible when considering the amount of water that would already be used to wash plate ware if they were

dine-in customers instead of takeout customers. This would suggest the environmental impact of washing dishes for these programs would be lower than the continued contributions to landfills.

Increased Takeout Orders

The restaurant industry in British Columbia took an unprecedented loss in 2020, when on March 20th 2020, “places at which food and/or drink are prepared and served” had to close their dining rooms and eventually, could only offer takeout, as per the Order of the Provincial Health Officer (Government of B.C., 2020). This order, combined with other pandemic restrictions, urged potential customers to remain at home and avoid other people. The restaurant industry saw a 96% drop in sales, year on year, for the two weeks after March 20th (Restaurants Canada, 2020a). Over the following months, there was a slow recovery period with around 40% of restaurants operating with takeout only (Restaurants Canada, 2020b). Some restaurants re-opened with reduced seating capacity, but safety concerns continued the public’s drive to the delivery and takeout sector.

About 6-10% of a person’s total daily energy intake in Canada is attributed to fast food, without discriminating towards gender, socioeconomic status or province (Black & Billette, 2015). Fast food restaurants are typically more likely to use disposable or single-use containers (over reusable) because of the volume of food they produce, the quantity of people they serve, and the cost difference between containers. The average Canadian ate around 83 meals from quick service restaurants (QSR) in 2018 (Chung, 2018); when comparing that number with the estimated population of Canada (~37million), that turns out to be over 3 billion meals worth of takeout packaging.

Third party delivery services continue to increase in use and popularity, due in part to the ease of use and reduced face-to-face contact required. By the end of 2020, Canada was expecting a 24.7% revenue growth (\$600 million ↑) year on year and 7.70% over the next 3 years (2021-2024) in the food delivery sector, which includes both restaurant-to-consumer and third party delivery (Statista, n.d.). Worldwide, there was an expected growth of 3.61% in revenue for 2020 (\$3.88 billion ↑) and 6.36% expected revenue growth between 2021-2024 for online food delivery (ResearchAndMarkets.com, 2020; Statista, n.d.). The expected growth in the takeout sector suggests that more containers are going to end up as waste.

Risk of Transmission

Research done by Bryan (1988) explored the top factors for approximately 2000 outbreaks of food-borne illness (food poisoning) that occurred between 1961-1982 in the United States. This research has been cited multiple times as “The Top Ten Causes of Food-Borne Illness”. Improper cooling is at the top of the list, followed by several other common causes such as improper reheating, contaminated food-worker and raw or undercooked food in the final product. At the bottom of this top-ten list is improper cleaning of equipment or utensils, with improper dishwashing methods far below that. These two practices combined for less than 5.5% (104) cases over the 20 years of the study. This information is relevant because a major public concern about an RRCP is whether someone will get sick because of inadequate sanitization (trust in the ability to wash the containers safely and properly).

The websites of Vancouver Coastal Health (VCH) (<https://inspections.vcha.ca>) and Fraser Health (FHA) (https://www.healthspace.ca/Clients/FHA/FHA_Website.nsf/Food?OpenPage&A) offer restaurant inspection reports viewable to the public, revealing that dishwashing practices

are part of the regular inspection process for Environmental Health Officers (EHOs – formerly known as Health Inspectors). Beyond the inspection, it is also part of an operator’s responsibility to ensure adequate cleaning and sanitization. The *Food Premises Regulation* Section 17(2) (Food Premises Regulation, 1999) states:

“... every operator of food premises must ensure that the equipment, utensils and food contact surfaces used on the premises are washed and sanitized in a manner that removes contamination”.

Transmission through fomites (non-living objects) has been a focus of concern during the COVID-19 pandemic, since the extent of the role they play is unknown but likely (Public Health Ontario, 2020). The operators of restaurants have adapted to the pandemic restrictions that were put in place from their respective Health Authorities to reduce potential transmission and will continue to follow through on measures that protect their customers: plexiglass barriers, reduced mingling between patrons, and improved sanitization practices. Operators are also currently washing and sanitizing dishes for dine-in customers, as well as the different equipment used to cook meals, in the same dishwashers they would use for RRCPs. This suggests that the risk of transmission from the containers in the RRCPs is similar to that of the regular dine-in business.

Purpose

The purpose of this research project was to survey British Columbians to determine their interest towards an RRCP for Metro Vancouver. This survey asked about the habits of the participant for restaurants, takeout containers and recycling, and opinions about recycling and waste. This information may be used for future studies or promotions for waste reduction strategies in communities throughout British Columbia.

Materials and Methods

The materials used for this study were Microsoft Office Excel 2016, a personal password-protected laptop, and NCSS (2021) data analysis software. A QR-code generator (<https://www.qrcode-monkey.com>) was used to create an image (figure 5) for participants to use their mobile devices that connected them to the survey hosted by Google Forms.



Figure 5: QR Code for Survey

Standard Methods

The standard method used was an online self-administered survey that was open from January 6th, 2021 to February 15th, 2021. The survey was created using Google Forms, a free online service with a cloud server based in the United States (Google LLC, 2020). The survey link was accessible through a QR-code for users to use their phone to participate; this was designed on <https://www.qrcode-monkey.com> (QRCodeMonkey, 2021). The QR-code was distributed via different methods: bulletin boards in public lobbies of apartment buildings and community centers, attached to delivery orders, and posted at pay-stations in restaurants. The survey was also distributed through email and posted on Reddit, a social media website where users were not required to have an account to participate. These methods were used to reach a wider participatory audience across British Columbia.

The survey consisted of primarily closed-ended questions, with a few open-ended questions to allow participants to leave comments or explain previous answers. The survey was separated into three sections: Demographics (about the participant), Food-Based (eating habits), and Waste Production (recycling habits and opinions). The closed-ended questions purpose was to enable

statistical analysis of particular habits, while the open-ended questions were to determine the opinions of the participant about RRCs and potential barriers. There was an additional space for comments.

Inclusion/Exclusion Criteria

People living in British Columbia were invited to take part in the survey but participants were excluded from the survey if they declined participation, did not authorize consent, or they lived outside of British Columbia at the time of taking the survey. If the participant met one of those conditions, they were redirected to the “Participation Declined” page.

Ethical Considerations

The survey included human participants and thus required approval from the BCIT Research Ethics Board (REB). A copy of the invitation letter, consent form and the survey questions were sent to REB, along with the application, and ethics approval was granted January 2021. These forms are attached as Appendices A, B and C, respectively.

The survey first greeted the participant with the consent and details page where they were informed that participation was voluntary, and they could withdraw from the survey at any time without consequence. Had they chosen to not give consent; they were redirected to the last page: “Participation Declined”. This page had three options: to go back if there was a mistake, to submit the survey noting that participation was declined and data would not be collected, or to close the browser window and withdraw from the survey without informing the researcher. The only questions that required an answer were whether the participant has read the information in detailed out in the first page and whether consent was given. Every other question was optional and could be skipped at any time without consequence.

Those who had opened the survey were informed of confidentiality, anonymity and security of the information collected. Risks and Benefits were also part of the informed consent form (Appendix B), with participants being made aware that there was very little risk to participate. In regard to information being used by the United States Government, the researcher prepared the following statement: “Due to the location of the survey platform server being in the United States, any information collected is subject to the United States Patriot Act Sections 215 and 505; though there are no questions that would require a participant to incriminate oneself.”

Results

The survey included different styles of questions: multichotomous nominal (unranked words), multichotomous ordinal (ranked words), numerical, and short answer. The responses were exported to Microsoft Excel where data was organized and sorted. For this survey, the data was organized by the response to question 12: “Would you like to see something like this in Metro Vancouver?” regarding wanting RRCs.

The data collected is presented in bar graphs and pie charts for visual representation of the respondent’s answers. A survey with at least 30 responses per answer would represent normal distribution, indicating that if this survey was repeated with different participants from the same general population, then the results should be relatively the same, if not very similar (Mordkoff, 2016). The survey for this project reached at least 30 responses in the 12 answers used for hypothesis testing with two exceptions: the total number of responses for question 3, indicating if the participant lived OUTSIDE of Metro Vancouver was n=26, and the total number of responses of “NO” and “DO NOT CARE” (together) for question 12 was n=20, while the total number of completed responses for this survey was n=118.

Just under 70% of the respondents (n=80) felt they recycled materials more than 50% of the time while 32% (n=38) felt they were recycling less than 50% of the time (figure 6). The answers to question 5 about takeout had a pretty similar split to recycling, with 37% (n=44) feeling in a month they eat out about 2 times or less and 63% (n=74) eating out 3 times or more (figure 7). Over 75% of respondents (n=92) lived in Metro Vancouver while 22% (n=26) resided outside of Metro Vancouver. The difference in the numbers are not surprising because the survey mentioned RRCs for Metro Vancouver (figure 8).

With respect to gender identity, 56% of respondents identified as female (n=67) and 41% identified as male (n=49). There were 2 responses that chose either “Prefer not to say” or “Other” that, together, represented ~2% of the data collected for this question. Because the number of responses for these categories was so low, they were excluded from data analysis but not from qualitative review (figure 9).

Only 115 respondents chose a selection to question 1 (about which age category they fell in), one respondent chose an age group but did not follow up with a response to question 12, that response was taken out of analysis for this set (figure 10). The data was split with 55% (n=63) being 40 or younger and 45% (n=51) being over the age of 40 (figure 11). The separation of age categories was made at 40 because the average age in British Columbia in 2016 was 42.3 (Statistics Canada, 2019). A look at question 12 (figure 12) on its own, shows the majority in favour of wanting RRCs. Data is from n=118 responses.

To test the existence of an association between two sets of nominal or qualitative data, performing a chi-square test of independence is necessary, using a contingency table to answer whether two variables are independent or dependent of each other (PennState Eberly

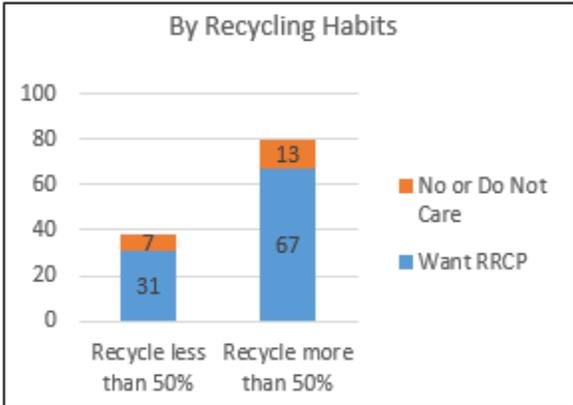


Figure 6: Wanting an RRCP by Recycling Habits

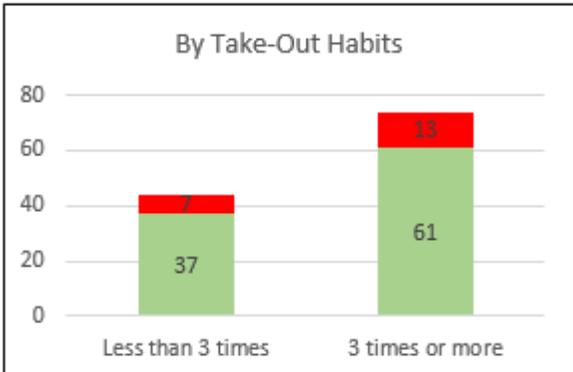


Figure 7: Wanting an RRCP by Takeout Habits

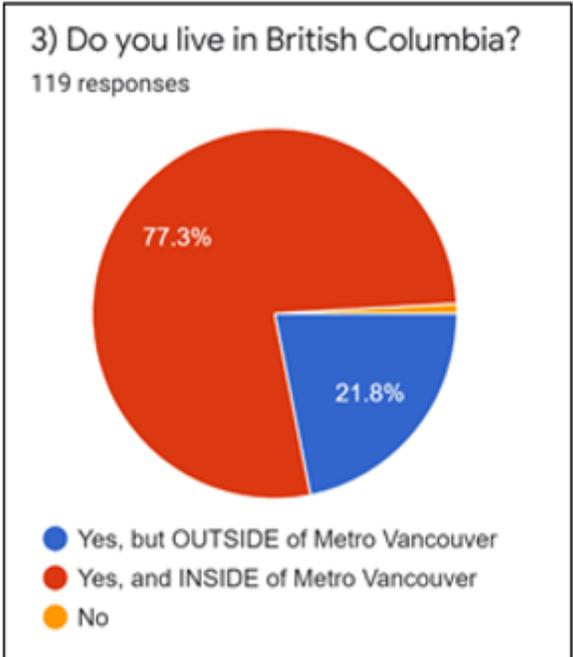


Figure 8: Data Collected About Residence in British Columbia

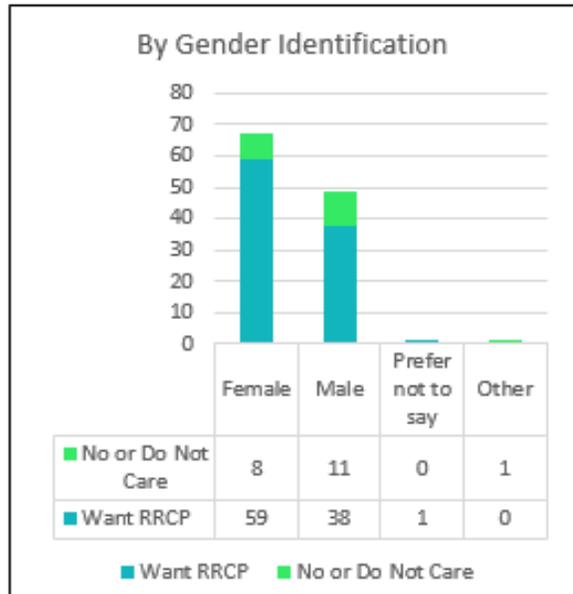


Figure 9: Want an RRCP by Gender Identification

Figure 10 (above): Survey Data Collected about Age

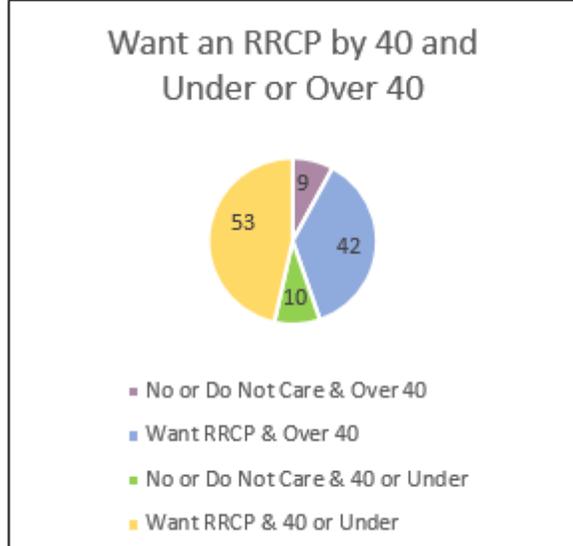
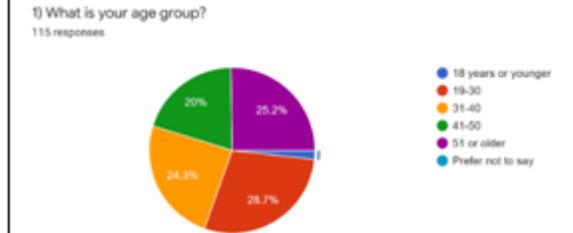
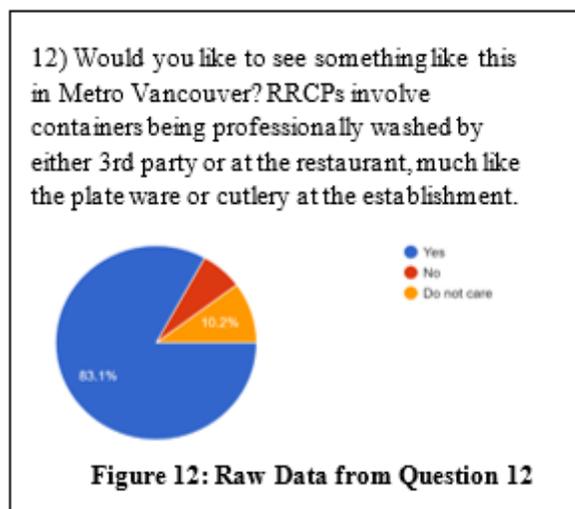


Figure 11 (right): Wanting an RRCP by 40 and Under or Over 40



College of Science, n.d.). NCSS 2021 was the statistical software used to perform the chi-square test and analysis of the collected data (NCSS, 2021).

Table 1: Hypothesis Testing Results and Conclusions

H ₀ and H _A	Result	Conclusion
<p>H₀: There is no association between wanting an RRCP and age.</p> <p>H_A: There is an association between wanting an RRCP and age.</p>	p = 0.81	Do not reject H ₀ . There is no association between wanting an RRCP in Metro Vancouver and age.
<p>H₀: There is no association between wanting an RRCP and gender.</p> <p>H_A: There is an association between wanting an RRCP and gender identification.</p>	p = 0.13	Do not reject H ₀ . There is no association between wanting an RRCP in Metro Vancouver and gender identification.
<p>H₀: There is no association between wanting an RRCP and living in Metro Vancouver.</p> <p>H_A: There is an association between wanting an RRCP and living in Metro Vancouver.</p>	p = 0.15	Do not reject H ₀ . There is no association between wanting an RRCP in Metro Vancouver and living in Metro Vancouver.

<p>H₀: There is no association between wanting an RRCP and recycling habits.</p> <p>H_A: There is an association between wanting an RRCP and recycling habits.</p>	p = 0.77	Do not reject H ₀ . There is no association between wanting an RRCP in Metro Vancouver and recycling habits.
<p>H₀: There is no association between wanting an RRCP and ordering takeout.</p> <p>H_A: There is an association between wanting an RRCP and ordering takeout.</p>	p = 0.82	Do not reject H ₀ . There is no association between wanting an RRCP in Metro Vancouver and ordering takeout.

In all 5 hypothesis tests, the null hypothesis was rejected, and it was determined there was no association between the chosen variable and wanting an RRCP for Metro Vancouver. It can therefore be safely stated that the variables with p-value=0.81 for age, p-value=0.13 for gender, p-value=0.15 for living in Metro Vancouver, p-value=0.77 for recycling habits, and p-value=0.82 for takeout habits, the H₀ cannot be rejected and concluded that the public wanting an RRCP for Metro Vancouver is independent of other variables.

Discussion

The researcher reached out to a wide array of potential respondents from different locations all over British Columbia, from Vancouver Island to the Okanagan and up to Fort Nelson that included different job sectors, age groups, habits, and demographics. Even though responses were overwhelming in favour of introducing a returnable and reusable container program, the study focused on Metro Vancouver, but the comments from the survey would lead one to believe that the interest extends into the respondents' own communities and households.

A small number of respondents were not supportive of this type of program for various

reasons; a few barriers mentioned were costs and effort. If this program does find a way into the Vancouver market, it would be reasonable to assume a small minority would avoid using it at the onset, but a large proportion would embrace it. The overall findings of this project do not stop or redirect the need for new innovations, technologies and practices that can create a positive future for the environment, as seen by the Canadian governments involvement in challenging different innovators to create more sustainable materials (Cameron, 2020).

The results from this research support the RRCPs that base their business model on the desire of consumers to reduce their carbon footprint (Go Box, n.d.) and that the fascination for this type of program possibly stems from evidence that reusability offers a decrease in the quantity of packaging and materials that find their way into landfills (Mysuppli, n.d.a). A trend in participant responses said that they wanted to reduce their landfill contribution, which aligns with the British Columbia model of being a leader in the recycling industry (Johnston, 2019). This data can be extrapolated to all ages, gender identities, and regions because the overall responses towards an interest in wanting RRCPs for Metro Vancouver, with no association to any study category, was highly in favour (figure 12).

Limitations

The study was affected primarily by the COVID-19 pandemic, resulting in the researcher relying on self-administered online surveys. This method of delivery has limitations in that the potential respondents would only participate if they felt like it, had the time to participate and if it interested them. There is also a limitation in whether the respondents are giving truthful answers because there is no pressure to be honest. The chance that false answers were inputted were low since the questions were asking about

habits and opinions while remaining anonymous, but it cannot be determined that every answer was 100% honest.

If the questions were unclear, the participant would have had to reach out to the researcher via email or by phone for clarity, whereas confusion for an in-person or telephone survey could be immediately resolved. The time-period for survey distribution potentially limited the number of responses that were received (Jan 6 – February 15, 2021). A six-week period was longer than most student projects, but the pandemic introduced additional barriers: people were busier than normal, had other responsibilities that required more of their attention, or were survey-fatigued. According to Webster et al. (2020), thousands of papers focusing on COVID-19 were produced in the early months of the pandemic that relied on researchers continuously surveying the public. As papers continue to be published, surveys continue to be distributed and that adds to the fatigue people feel towards any research. Webster et al. also says that following a disaster, participation rates tend to drop over time while research output doubles nearly every 9 years. There is an unknown number of people who were not reached or could not respond due to limited access to internet or cell phones. As previously stated, the results overwhelmingly favoured the introduction of RRCPs, but that statement is extrapolated from a much smaller pool of responses than desired.

Some of these limitations could have been minimized by doing additional in-person or telephone surveys, performing the study during non-pandemic times, or offering prize draws. All these methods have the potential to increase the response rate and increase the validity of the study.

Knowledge Translation

The results from this study can be translated to two different levels: the individual level and

the external level. On a personal level, just participating in or discussing the survey with others may lead to better recycling habits, reduced reliance on single-use packaging and materials, and conversations about other waste reduction strategies. Individuals may also be inclined to act in their communities to better the environment around them. On an external level, it may lead to introducing new or improved recycling policies, entice more companies to invest in reusable materials, or provide information to these programs debating about the British Columbia market. Ultimately the responses from this study can lead to reducing waste and promote recycling at any level.

Future Research

Future research that can be based on this study may include:

- Testing the quality of these containers (heat retention, contamination).
- Survey restaurant operators to see if they are interested and willing to participate in this kind of program?
- Repeat this study in non-pandemic times to increase response rate and reach different audiences.

Conclusion

This research project investigated the interest that a wide range of British Columbians may have in a returnable and reusable container program. The results, though limited in responses compared to the population of Metro Vancouver, seems to lean very heavily towards introducing a program that can reduce the impact on the landfills. The takeout food sector was trending upwards prior to the pandemic, and will continue to do so afterwards, but something has to be done about the increased waste that is produced. Though the federal government does regulate the type of materials allowed in food packaging to protect consumer's health, it does not regulate the recyclability of the

packaging, therefore there is a need to create interest and demand for these products and programs. This project only focused on factors that can change the restaurant industry but there are lots of ways that individuals and businesses can participate in waste reduction. This bodes well for the future of waste reduction in British Columbia, with potential for Canada and abroad.

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Competing Interest

The authors declare that they have no competing interests.

References

- Becker, W., Sachsenheimer, K., & Klemenz, M. (2017). Detection of black plastics in the middle infrared spectrum (MIR) using photon Up-conversion technique for polymer recycling purposes. *Polymers*, 9(9). <https://doi.org/10.3390/polym9090435>
- Black, J. L., & Billette, J. M. (2015). Fast food intake in Canada: Differences among Canadians with diverse demographic, socio-economic and lifestyle characteristics. *Canadian Journal of Public Health*, 106(2), e52–e58. <https://doi.org/10.17269/CJPH.106.4658>
- Bryan, F. L. (1988). Risks of Practices, Procedures and Processes that Lead to Outbreaks of Foodborne Diseases. *Journal of Food Protection*, 51(8), 663–673. <https://doi.org/10.4315/0362-028x-51.8.663>

- Byrnes, H., & Frohlich, T. C. (2019). Canada produces the most waste in the world. The US ranks third. *USA TODAY*. <https://www.usatoday.com/story/money/2019/07/12/canada-united-states-worlds-biggest-producers-of-waste/39534923/>
- Cameron, G. (2020). Axipolymer receives funds to develop recyclable packaging film. *Food in Canada*. <https://www.foodincanada.com/packaging/axipolymer-receives-funds-to-develop-recyclable-packaging-film-143719/>
- CBC News. (2013). *Canadians produce more garbage than anyone else*. <https://www.cbc.ca/news/business/canadians-produce-more-garbage-than-anyone-else-1.1394020>
- Chung, E. (2018). 6 ways to do takeout — without the waste. *CBC*. <https://www.cbc.ca/news/technology/zero-waste-takeout-1.4867042>
- Chung, E., Hopton A., & Reid, T. (2021). *A big test of reusable packaging for groceries comes to Canada*. Retrieved February 28, 2021, from <https://www.cbc.ca/news/technology/loop-reusable-packaging-1.5910620>
- Clean Fairfax. (2017). *Plastic Clamshells in Fairfax County, VA: Try not to buy, DON'T RECYCLE, and reuse whenever possible*. Retrieved February 28, 2021, from <http://www.cleanfairfax.org/2017/02/16/plastic-clamshells-in-fairfax-county-va-try-not-to-buy-dont-recycle-and-reuse-when-ever-possible/>
- Davis, S. & Heacock, H. (2021) Is Metro Vancouver Ready To Reduce Their Waste? An Evaluation of Returnable/Reusable Container Programs. *BCIT Environmental Health Journal*.
- Delikat, S. (2020). *Restaurants reduce waste by delivering food in reusable containers*. Fox 5 New York. <https://www.fox5ny.com/news/restaurants-reduce-waste-by-delivering-food-in-reusable-containers>
- DeliverZero. (n.d.). *DeliverZero*. Retrieved November 8, 2020, from <https://www.deliverzero.com/>
- Food Premises Regulation. (1999). https://www.bclaws.ca/civix/document/id/complete/statreg/11_210_99
- Gallego-Schmid, A., Mendoza, J. M. F., & Azapagic, A. (2018). Improving the environmental sustainability of reusable food containers in Europe. *Science of the Total Environment*, 628–629(2018), 979–989. <https://doi.org/10.1016/j.scitotenv.2018.02.128>
- Gallego-Schmid, A., Mendoza, J. M. F., & Azapagic, A. (2019). Environmental impacts of takeaway food containers. *Journal of Cleaner Production*, 211(2019), 417–427. <https://doi.org/10.1016/j.jclepro.2018.11.220>
- Go Box. (n.d.). *Go Box*. Retrieved November 10, 2020, from <https://goboxpdx.com/>
- Google LLC. (2020). Google Forms. <https://docs.google.com/forms/u/0/>
- Government of B.C. (2020). *ORDER OF THE PROVINCIAL HEALTH OFFICER*. https://www2.gov.bc.ca/assets/gov/health/about-bc-s-health-care-system/office-of-the-provincial-health-officer/reports-publications/covid-19-pho-order-nightclubs-food-drink-services.pdf?bcgovtm=20200319_GCPE_AM_COVID_4_NOTIFICATION_BC_GOV_BCGOV_EN_BC_NOTI

- Government of Canada. (2018). *Plastics Challenge: Food Packaging*. Innovation Science and Economic Development Canada.
<https://www.ic.gc.ca/eic/site/101.nsf/eng/00036.html>
- Hirsch, S. (2020). *How This New Company Is Taking the Waste Out of Restaurant Delivery*. Green Matters. Retrieved February 28, 2021, from
<https://www.greenmatters.com/p/deliver-zero-low-waste-packaging-seamless>
- Hounsell, K. (2018, April 12). Canadian municipalities struggling to find place for recyclables after China restricts foreign waste. *CBC*.
<https://www.cbc.ca/news/technology/garbage-recycling-china-plastics-canada-1.4586602>
- Johnston, J. (2019). Why B.C. is better at recycling than most other places. *CBC*.
<https://www.cbc.ca/news/canada/british-columbia/b-c-recycling-explainer-1.5089661>
- Lewis, J., & Hayes, M. (2019, May 15). Reduce, reuse, recycle, rejected: Why Canada's recycling industry is in crisis mode. *The Globe and Mail*.
<https://www.theglobeandmail.com/canada/article-wish-cycling-canadas-recycling-industry-in-crisis-mode/>
- Lightfoot, S. (2020). Eat, rinse, return, repeat: Reusable takeout container service launching in Toronto. *CTV News*.
<https://toronto.ctvnews.ca/eat-rinse-return-repeat-reusable-takeout-container-service-launching-in-toronto-1.5166878>
- Loblaws. (n.d.). *SAY HELLO TO LOOP AND GOODBYE TO PLASTIC WASTE*. Retrieved February 28, 2021, from
<https://www.loblaws.ca/loop>
- Makower, J. (2019). *Loop's launch brings reusable packaging to the world's biggest brands*. GreenBiz.
<https://www.greenbiz.com/article/loops-launch-brings-reusable-packaging-worlds-biggest-brands>
- Mordkoff, J. T. (2016). *The Assumption(s) of Normality*. Quantitative Methods in Psychology.
<https://doi.org/10.4324/9781315572116>
- Mysuppli. (n.d.a). *Suppli homepage*. Retrieved November 8, 2020, from
<https://www.mysuppli.ca/>
- Mysuppli. (n.d.b) *Sustainability*. Retrieved February 28, 2021, from
<https://www.mysuppli.ca/sustainability>
- NCSS 2021 Statistical Software (2021). NCSS, LLC. Kaysville, Utah, USA, [ncss.com/software/ncs](https://www.ncss.com/software/ncs)
- Patel, S.S., Webster, R.K., Greenberg, N., Weston, D. and Brooks, S.K. (2020), "Research fatigue in COVID-19 pandemic and post-disaster research: causes, consequences and recommendations", *Disaster Prevention and Management*. doi: 10.1108/DPM-05-2020-0164
- PennState Eberly College of Science. (n.d.). *Chi-Square Test of Independence*. Statistics Online. Retrieved November 18, 2020, from
<https://online.stat.psu.edu/statprogram/reviews/statistical-concepts/chi-square-tests>
- Public Health Ontario. (2020). *COVID-19 Routes of Transmission – What We Know So Far*. 1–27.
<https://www.publichealthontario.ca/-/media/documents/ncov/wwksf-routes-transmission-mar-06-2020.pdf?la=en>
- QRCodeMonkey. (2021). No Title.
<https://www.qrcode-monkey.com/>

- Quinte Waste Solutions. (2021). *The Problem with Paper Cups*.
<https://quinterecycling.org/problem-paper-cups/>
- Recycle BC. (2018). *Recycle BC 2018*.
<https://recyclebc.ca/wp-content/uploads/2019/06/Recycle-BC-2018-Annual-Report-1.pdf> Annual Report.
- ResearchAndMarkets.com. (2020). *Global Online Food Delivery Services Market (2020 to 2030) - COVID-19 Growth and Change*. Business Wire.
<https://www.businesswire.com/news/home/20200511005687/en/Global-Online-Food-Delivery-Services-Market-2020-to-2030---COVID-19-Growth-and-Change---ResearchAndMarkets.com>
- Restaurants Canada. (2020a). Restaurant Outlook Survey Q1 2020. In *RC INTEL*.
<https://members.restaurantscanada.org/wp-content/uploads/2015/09/ROS-Q1-2020.pdf>
- Restaurants Canada. (2020b). Restaurant Outlook Survey Q2 2020. In *RC INTEL*.
<https://members.restaurantscanada.org/wp-content/uploads/2015/09/Q2-ROS-Final.pdf>
- Statista. (n.d.). *Online Food Delivery*. Retrieved November 8, 2020, from
<https://www.statista.com/outlook/374/108/online-food-delivery/canada#market-age>
- Statistics Canada. (2019). *Census Profile*. 2016 Census.
<https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/details/page.cfm?%0ALang=E&Geo1=PR&Code1=59&Geo2=PR&Code2=01&SearchText=Canada&SearchType%0Ae=Begins&SearchPR=01&B1=All&type=0>
- The Conference Board of Canada. (2016). *Waste Generation*. How Canada Performs.
<https://www.conferenceboard.ca/hcp/provincial/environment/waste.aspx?AspxAutoDetectCookieSupport=1>
- Total Food Service. (2016). *Top 10 Things To Know About Warewashing*.
https://www.meiko.ca/en_us/products/knowledge-base/knowledge-database/top-10-things-to-know-about-warewashing/
- Turner, A. (2018). Black plastics: Linear and circular economies, hazardous additives and marine pollution. *Environment International*, 117(April), 308–318.
<https://doi.org/10.1016/j.envint.2018.04.036>
- Wiener-Bronner, D. (2019). *Forget plastic straws. Starbucks has a cup problem*. CNN Business.
<https://www.cnn.com/interactive/2019/02/business/starbucks-cup-problem/index.html>