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Addressing Food Waste at the Retail Level:

Consumer Preferences and Practices in Metro Vancouver Supermarkets

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# Addressing Food Waste at the Retail Level: Consumer Preferences and Practices in Metro Vancouver Supermarkets

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## Introduction

Food waste is a major issue, which has social, environmental, nutritional, and economic impacts (Cicatiello et al., 2017). Although food is wasted at different levels throughout the supply chain, the retail level alone accounts for a \$750 billion loss globally each year (Welch et al., 2018). Retailers can play a big role in reducing food waste through their management practices, directly within grocery outlets. These management practices, in turn, specifically affect consumers' perceptions and behaviours surrounding certain foods (Kulikovskaja & Witzel, 2017).

The main focus of our research is on the wastage of fruits and vegetables in the supermarkets of Metro Vancouver. Through our literature review on studies specifying food waste at the retail level, we used research about fiscal resource loss, causes, existing mitigation strategies, and consumer ideologies around food waste to create a series of questions for a survey and supplemental interview. Using these questions, we explored how the consumers' perceptions, expectations, and desires were influenced by produce display structures and the quality of produce offered at supermarkets in Metro

Vancouver. The purpose of our research was to determine how food waste at the retail level can be reduced by assessing consumer perspectives in order to suggest changes to current retail practices.

## Literature Review

The focus of our research is to explore the wasting of produce within supermarkets. Therefore, we prefaced our work primarily by examining numerous articles studying food waste in the food distribution chain, specifically at the retail level. Many reports show substantial food waste in the grocery retail sector (Gooch, Felfel, & Marenick, 2010; Aschemann-Witzel et al., 2016; Filimonau & Gherbin, 2017; Kulikovskaja & Aschemann-Witzel, 2017; Chalak et al., 2018). Within this scope, we categorized our research into four recurrent and related topics: the value and amount of food wasted; the primary causes of food waste; avenues to address and minimize this wasted food, realized and suggested; and finally, legalities linked to certain methods of reducing food waste.

## Quantifying Wasted Food

We choose to mention the value of wasted food to showcase the profit loss that occurs to retailers who use unsustainable practices within their superstores. This is to incentivize better management of fresh produce. Although the value of wasted food varies depending on the scale of the study and which food products were included, total values of wasted foods were substantial across the board. These amounts range from \$250 thousand from primarily fresh produce and bread in Italy (Cicatiello et al., 2017), to a \$750 billion loss globally (Welch et al., 2018). Cicatiello et al. (2017) found that approximately 4.6 million tons of food are thrown away yearly in retail locations,



comprised primarily of fruits and vegetables. In Canada, \$27 billion is lost every year through food waste, equating to roughly 40% of the food produced (Gooch, Felfel, & Marenick, 2010). Despite the increasing trend of food waste, retailers switching to corporate practices holding greater social responsibility may see financial benefits to their business. These changes can improve reputations among and relationships to employees, clients, and stakeholders, create savings by reducing waste of costly resources, and even gain the company a competitive advantage (Carroll & Shabana, 2010; Gooch, Felfel, & Marenick, 2010; Aschemann-Witzel et al., 2016).

### Causes of Wasted Food

There are many different causes of food waste at the retail level, such as overstocked produce displays, rejections of imperfect produce, fresh produce upkeep, packaging, contamination during the packaging process, unpurchased products, and best-before dates (Stenmarck et al., 2011; Gunders, 2012; Neff et al., 2015; Aschemann-Witzel et al., 2016; Cicatiello et al., 2016; Macrae, et al., 2016; Kulikovskaja & Aschemann-Witzel, 2017; Chalak et al., 2018; FSstrategy, 2018; and Www2.gov.bc.ca, 2019). Filimonau & Gherbin (2017) specifically address the role of managerial positions, as people who oversee the product merchandising, giving them direct power over waste management practices of food. Welch et al. (2018) examine the narratives and responses to food waste in the United Kingdom, criticizing the retailer's placement of responsibility for minimizing food waste directly on individualist consumer behaviours. Instead, Welch et al. (2018) emphasize the responsibility retailers also hold in causing food waste. However, it is important to note the low tolerance many consumers have for produce with slight imperfections (Aschemann-Witzel et al., 2015).



## Avenues to Address Food Waste

While methods to address food waste are specifically targeted to the location of their studies, we find many of the food waste avoidance actions listed by various authors are transferable and applicable to most grocery retailers. The most effective means of addressing and minimizing food waste include offering food at strategic prices, especially for sub-optimal foods, improving marketing and communication around the food, changing the unit size of food items, more holistic in-store management, and creating partnerships with food supply chain actors (Aschemann-Witzel et al., 2016; Cicatiello et al., 2016; Macrae et al., 2016; Filimonau & Gherbin, 2017; Kulikovskaja & Aschemann-Witzel, 2017; Welch et al., 2018; Aschemann-Witzel et al., 2019). Some academics also recommend the promotion of freeze-by dates on suboptimal food or the food near expiry dates. This will help in increasing the sale of sub-optimal foods and will help in reducing the food waste at retail level (Aschemann-Witzel et al., 2015; Macrae et al., 2016).

Because of the unique nature that food waste may take at local supermarkets, the “gate-keeping” role managers play should be highlighted, giving them more independence and autonomy with their store, in order to effectively implement tactics that are appropriate to their customer’s ethics and practices (Gruber et al., 2016). While managers hold key power to control waste of in-store produce, consumer preferences and practices shape how these measures are implemented. As such, Aschemann-Witzel et al. (2015) identify crucial psychographic factors that must be considered for consumers to engage with these means listed. Specifically, this includes their motivation to avoid food waste and their ability to do this within contextualized

benefits and trade-offs. For example, altering actions due to moral ethics (considering world hunger or environmental concerns) or financial behaviours (saving money) in light of “health orientation, safety concerns, feelings of disgust, convenience orientation, or the wish to be spontaneous, hedonism and food enjoyment” (Aschemann-Witzel et al., 2015). In sum, this study finds that surrounding factors must be considered when implementing practices of food waste minimization.

Relatedly to this,  Aschemann-Witzel et al. (2019) found that there is indeed a market and desire for suboptimal products, especially if they are presented with having positive attributes, such as being environmentally friendly, thrifty, or economically wise, that align with a retailer’s customer group characteristics. It was also discovered that consumers are more open to purchasing sub-optimal produce if they were given  information that most of the produce might end up as waste (Www2.gov.bc.ca, 2019). In giving the consumer an opportunity to be part of the solution, retailers noted that consumers were willing to purchase sub-optimal produce, therefore reducing food waste.

From this research, we can conclude that an implementation of all these listed actions to minimize food waste would be ideal, as each method complements its counterparts and creates a more effective synergy. However, in terms of our focus on changing consumer behaviours and interactions with food while they shop, a creation of information campaigns—in-store and publicly—in addition to strategic pricing of low-interest foods would be most effective. This is supported by Macrae et al. (2016)

who supply a thorough discussion on possible informational campaigns, as well as other means to reduce food waste specific to Canada.

Consider the following examples. In the French campaign *Inglorious Fruits and Vegetables*, customers were encouraged to purchase oddly shaped and visually flawed produce through clever advertising and price reduction of these items by 30%. The initiative was widely successful, with aisles of “ugly” produce selling out completely. This led to copy-cat campaigns by other large supermarkets in other countries around the world, including Belgium, Australia, and Spain, among others (Chalak et al., 2018). Another successful awareness campaign is *Eat Soon*, which encourages the purchasing of produce close to its expiration date when buyers intend to cook and eat food on the same day (Stenmarck et al., 2011). *Love Food Hate Waste*, a campaign started by Waste & Resources Action Programme (WRAP) in the United Kingdom, advocates for “completing”. This idea of “complete eating” prompts eaters to use typically wasted food items, such as skins, leaves, stalks, and crusts. These campaigns, relatively simple to organize, are important not only because they effectively minimize food waste, but also because they reshape consumer understandings around  food that is otherwise wasted. **As such, information campaigns should be a top priority.** Topics pertinent to informational campaigns which further engage with consumer perspectives and behaviours on food waste include: the dissociation of best-before and expiration labels with “edible by” dates, the reduction of popular “more choice is better” beliefs, the increase in consumption of less-desirable produce, and knowledge of inferring ripeness of different produce.

## Associated Legalities and Policies

Another option to address food waste at the retail level is to donate unused food to food banks or other food-dispersing organizations. The issue with this solution lies in the legalities surrounding food donations, and the consequences of those regulations. Macrae et al. (2016) and Gooch et al. (2010) conclude that the Canadian government has not done enough to address the issue of food waste at a systemic level. Existing legislations and regulations restrict potential efforts to reduce food waste, as they do not consider the relationships between each link of the food chain and the corresponding food waste. Therefore, the connections between different sectors of food production and consumption need to be addressed when creating future regulations for food systems (Macrae et al., 2016).

Store managers interviewed on this topic identified feelings of moral guilt over the amount of food wasted but felt helpless, due to being bound to the legal and health regulations related to donating food (Gruber et al., 2016). Thus, the regulations around food donations that restrict food donation opportunities create barriers to addressing food waste at retail levels. In response to this, the managers interviewed in this study recommended they be given authority to donate edible, but unsellable food (Gruber et al., 2016) at their discretion.

In B.C., however, there are measures that can be built upon to remove the barrier on food donations a nsulate donors from negative effects, such as the **Food Donor Encouragement Act**. According to this act, if the food was in edible condition at the time of donation, no legal action can be taken against the donor if a person falls ill after consuming the donated food. This act protects the donor from legal action and

should be used to utilizing potential food waste from retail stores in B.C. (Food Donor Encouragement Act, 1997). From past research in the food waste field, academics recommend various development strategies, such as recovery, to limit environmental impacts, build sustainable businesses, and create social benefits, outlined by Cicatiello et al. (2017).

Using this compilation of knowledge surrounding different sources and mitigators of food waste at the retail level, we created a methodology to further assess the relevance that consumer preferences, practices, and perceptions have in tackling this issue within the Metro Vancouver Area.

## Methodology

In the first half of this section we discuss the details of our research methodology with respect to our two main methods: the framing and structure of our questionnaires, and the size of scope of our population parameter. The latter half addresses our sampling methods, the process of recruitment our targeted sample, and some of the limitations of the study as a result of our research design.

### Methods

We have generated two sources of primary data for analysis: (1) an online survey and (2) a personalized interview, with the latter designed to supplement the former. The tools of our investigation include SurveyMonkey as a means to administer our web poll, and Google Docs/Slides to guide our one-on-one inquiries. Our research design enables us to respond to our research inquiry with quantitative data for statistical analysis and quantitative data for substantiation.

## Framing

Our online survey, is comprised of 40 questions and six parts: (i) eligibility, (ii) demographics, (iii) Visual Assessment Test (VAT), (iv) displays, (v) produce state, and (vi) education. The first two parts are intended to retain individuals who qualify under our inclusion criteria and to assess the representativeness of our sample. Second, the VATs are a primary aspect of our inquiry in which we ask respondents to compare and evaluate pictures of different types of produce in varying displays in order to develop a situational and conditional understanding of consumer perceptions, preferences, and practices. Third, we focus on selection preference for two types of produce availability (i.e., individual or packaged). Fourth, we inquire about the practice of squeezing produce and the mechanism which may lead to food waste. Lastly, the survey briefly explores the role of information and education and its effect on produce choice.

As a supplement, we conducted several personalized interviews which contained six open-ended, leading, and follow-up questions to gain a discursive understanding of five key areas: (i) learned methods of determining ripeness, (ii) knowledge of produce dates, (iii) opinions on the status quo of produce layouts, (iv) value-based shopping, and (v) impressions of oddly-shaped or ugly produce. The last aspect also employs a VAT, showing comparisons of supermarket standard produce and substandard oddly-shaped produce. We captured the responses of our interviewees via transcription.

The effect of framing behavior to labels and identifiers have powerful implications for social identity and its influence on affecting responses in both surveys and interviews (Bryan, Walton, Rogers, & Dweck, 2011; Leonie, 2001; Stets & Burke, 2000). As a result, the design of both modes of investigation were carefully crafted to ensure the

framing and introduction of the concept of food waste did not bias the quality of responses and the subsequent results. For the survey, we avoided titling or describing our study with the phrase “food waste” to avert or minimize the possibility of virtue signalling.  We introduced the concept of food waste in Question 38 when it was necessary, using it sparingly thereafter. This precaution has also been taken into account in our interviews.

### Scope

Our population parameter is designated to individuals who shop in supermarkets within the Metro Vancouver Regional District (MVRD). Specifically, we required that respondents have shopped for produce at any supermarket in the MVRD within the past year. In terms of our survey sample size, we aimed to collect a minimum of 100 respondents and managed to obtain a total sample of 220 responses with a completion rate of 64-percent (i.e., 141 complete responses). Additionally, we conducted a total of seven personalized interviews.

### Sampling

We derived our inclusion criteria from our population of interest, and in which three requirements must be satisfied. First, we required that individuals identify their *age range*, *gender*, and *education* so that we could establish a minimal demographic basis to conduct basic descriptive statistics. Second, the prospective individual must have shopped at any supermarket in the MVRD at least once to be able to qualify as a respondent in our study. Third, they must also have shopped for at least one kind of produce to be able to validly answer the questions in either our survey and/or interview. The subjects who did not meet our requirements were excluded from our analysis.

Overall, our inclusion criteria illustrate three necessary attributes of our targeted sample: (1) supermarket shopper, (2) produce shopper, and (3) MVRD situate. These categories are not mutually exclusive, and must be simultaneously satisfied to qualify as a valid unit of analysis.

**Recruitment**

Individuals for our study were recruited according to the following processes listed in the table below:

<b>Survey - Snowball Sampling</b>	<b>Interview - Convenience Sampling</b>
<ol style="list-style-type: none"> <li>1. Generate web link</li> <li>2. Team Members to share hyperlink with individuals in their network</li> <li>3. Request for respondents to refer the poll to individuals in their network</li> <li>4. Repeat Step 2 until minimum sample requirement fulfilled, or as much as time permits</li> </ol>	<ol style="list-style-type: none"> <li>1. Create slideshow questionnaire</li> <li>2. Team Members to enlist interviewees based on the principle of heterogeneity.</li> <li>3. Conduct personalized interviews until minimum requirement fulfilled, or as much as time permits</li> </ol>

*Table 1 - Individuals recruitment processes*

**Limitations**

On the whole, the general nature of our research design is exploratory and prescriptive. The limitations of our framework and analysis (i.e., a small sample size, snowball/convenience sampling, and an absence of control/treatment groups) do not permit us to make strong, generalizable claims from our findings. Instead, our preliminary investigation aims to provide intriguing avenues for further examination and preparatory recommendations.

## Findings

Overall, our statistical summary of results produces five key findings: (1) consumers are willing to buy suboptimal produce if it is offered at discount rates; (2) consumers prefer individual selection over pre-packaged amounts of produce; (3) consumers would prefer to make their selection from fuller, thinner, and varied displays over deep piles or pre-packaged produce; (4) squeezing produce remains as the primary and irresistible mode of determining produce ripeness; and (5) consumers would like to see more informational/educational produce programs at supermarkets.

In brief, our sample of respondents consist largely of individuals who are relatively young and highly educated. Within the MVRD, the top three cities where most of our respondents shop for produce are Vancouver, Coquitlam, and Burnaby. In terms of gender, 57.7% identify as female, and 39.4% as male. The distribution of the age brackets are skewed to the right or in the direction of the older cohort with 26.4% of respondents within the age bracket of 18 to 24, 42.3% within 25 to 34, and 17.3% within 35 to 44. Lastly, 34.2% of our respondents have an associate degree, equivalent, or less while 63.5% have reported possessing a bachelor's degree or higher.

## Perceptions

In section three of our survey VAT, we asked a series of four, three-part questions concerning their (1) rating of a certain quality of produce, (2) whether they would expect a discount, and (3) how much of a discount they would expect. We presented four kinds of suboptimal produce, displaying those with dents, discoloration, gashes, and bruising. The average median rating for these four types of suboptimal

produce is 2.0 out of five. Additionally, approximately 55% respondents expected a discount. For those who expected a discount, 50% is the median discount expectation.

### Preferences

Among our sample, the data suggests that most of our respondents have an aversion to prepackaged produce items and highly prefer the ability to choose from individually available selections. Of our respondents, 63.6% prefer to pick produce individually. In terms of how much they actually bought food as a packaged set, 28.9% purchase a moderate amount, 47.2% buy a little, while 14.1% avoid it completely. In addition, 91% of respondents selected uncovered/unpackaged produce as a preference over packaged ones in a question from the VAT.

Another preference which came to light from our VATs is that respondents prefer fuller and thinner/narrower displays accompanied with variety, as opposed to deep piles and stacks of produce. When showed a comparison of bell peppers, 93.8% of individuals prefer to select their choice of produce from a full, thin, and varied display over a packaged set with variety. When showed a comparison of apples 72.4% of respondents would prefer to make their selection from yet another full, thin, and varied display over a deep pile. When asked to rank several images of the same kind of produce for differing displays, respondents would prefer to make their selection from full and thin displays over those which had packaged or piled produce.

### Practices

With respect to the practice of squeezing produce, our findings reveal an interesting series of responses. First, 75.5% of respondents squeeze produce to determine its ripeness. Second, 76.2% are aware that this practice may contribute to

bruising. Despite this knowledge, 83.2% admit to knowing that bruised produce tends to remain unpurchased and that it contributes to food waste. Knowing that bruising produce leads to food waste, 46.8% are *at least* likely to eliminate the practice of squeezing produce altogether, while 18.9% remain neutral, and 34.3% are *at least* unlikely to change. However, the interviews with our subjects suggest that the aforementioned progression of results may not be entirely surprising. The general two-step consensus to determine ripeness from our seven interviewees is first checking for color and then squeezing for firmness. Although some practices may vary between people for different produce, there is a sense of primacy for tactile interaction.

### Education

In the information and education segment of our survey we had showcased a food tip card regarding the consumption and storage practices for bananas marked with bruising, browning, or spots: the results suggest a high interest in seeing supermarkets adopt the practice of incorporating food waste tips on signs. A third of respondents have responded with a “great deal of interest,” while 22.7% said “a lot,” 20.6% at “a moderate amount,” and 15.6% expressed a little amount of interest.

### Discussion

Addressing food waste at the retail level is the primary focus of this project. One cause for a large proportion of food waste at the retail level is overstocking of produce in supermarket to ensure large elaborate piles with the thought that this was what consumers would like to see in grocery stores (Gunders, 2012). According to the survey, in contrast to what grocery stores have been said to believe about consumers' preference to large elaborate displays, consumers preferred shallow displays to ensure

ease of selection with a wider variety of produce (Aschemann-Witzel et al., 2016; (Kulikovskaya & Witzel, 2017). Overstocking is one of the major contributors to food waste at retail stores, and to a retailers assumptions about consumer needs is in contrast to reality (Gunders, 2012).

We found that consumers are interested in becoming more proficient in food literacy and are interested in educational campaigns within supermarkets. For example: giving the consumer options on better use of suboptimal produce that they would have otherwise considered. Consumers tended to respond positively towards overripe bananas that were paired with an information card on their use in banana bread. Similarly, consumers were open to purchasing bruised fruit given there was an information card. Suggesting that they could use it for jam or to make other condiments.

Furthermore, in depth interviews found that there are gaps in consumer knowledge about time and dating terminology such as “best before” and “expiration date” with the “sell by” date causing the most controversy and often being confused with an expiration date which contributed to a lot of produce being left on shelves. This confusion could also be remedied by educating consumers on these dates on information cards placed around grocery stores. Consumers were also seen to be open to using information cards to check for ripeness of fruits and vegetables to avoid continuous squeezing of produce that would cause bruising and later lead to wastage. Overall, Getting consumers to think about sustainable practices in the form of

educational campaigns when they dealt with food in grocery stores would have a positive impact on how consumers interact with food as well as the choices they make in grocery stores.

The data from our survey suggests that consumers don't want to see any more packaged produce with 91.03% of respondents backing this option. The in-depth interviews provided more insight as consumers stated that often, packaged produce would have large quantities that the consumer did not need or have a single fruit or vegetable that had gone bad that led to the consumer abandoning the whole pack. This is in line with findings that had been stated above where consumers appreciated the agency to pick what they preferred especially when it comes to fresh produce instead of having packaged produce. The amount of usable produce that is wasted when, for example, an entire bag of apples is overlooked and subsequently thrown away because one or a few of the apples are bruised or unripe can be decreased if those items are not grouped together (Aschemann-Witzel et al., 2016).

Another statistically significant finding from our survey finds that 56.6% of consumers would expect a discount for purchasing sub-optimal produce with a positive relationship between the extent of blemish to the discount. Consumers expected higher discounts when the produce was more blemished. If a supermarket were to take advantage of this finding, they could introduce a discount produce display that only stocks old, "ugly", or slightly blemished items. These displays could decrease net losses in profit and wasted produce, while also offering consumers more accessible pricing on some produce items that they either could not or would not think to buy. Increasing

consumer knowledge and accessibility of items can decrease food waste at the retail level based on smarter and more thoughtful consumer shopping habits. Consumers that choose not to squeeze produce to check for ripeness, because it contributes to food waste, leave food in better shape for those coming after them. Consumers and retailers have a shared responsibility to address food waste. On one hand, retailers should address the way produce is stocked and displayed for customers to pick from. On the other hand, consumers should strive away from squeezing produce to check for ripeness. We are aware that there needs to be a better mechanism to check for produce ripeness, besides checking for firmness and colour.

Limitations to our findings are that they only apply to Metro-Vancouver consumers. Due to time constraints, we did not get the chance to get a larger sample for our survey, thus this limited the demographics of our survey respondents. We are confident that our findings are accurate and close to what consumers in general want, based on our literature review. Some respondents to our online-posted survey, commented that they would not expect a discount on blemished produce, the reason was that they would not be buying it.

As consumers, we should rethink our relationship with food, especially with produce. In nature, fruits and vegetables come in all sizes, shapes, and colours, we should not expect produce in supermarkets to be perfectly good-looking without slight bruises and dents. Supermarkets will respond to what consumers demand so there is a need for both consumers and retailers to address food waste.

## Conclusion

As mentioned, the retail level is one of the main sectors for food waste. The causes of wasted food in the supermarkets vary from consumer behaviours and practices in the supermarkets, the influence of these practices on big displays, wastage of imperfect produce, to legal regulations limiting food donations from supermarkets.

To understand how retailer's current practices lead to food waste (such as the maintaining of big displays of produce, the packaging of produce, and the selling of standardized, perfect produce items) might be changed, our team created a study assessing the relation of these wasteful practices to Metro Vancouver consumers' behaviours. The results from our study found that consumers do employ practices and perceptions that contribute to waste in supermarkets, such as squeezing to check for ripeness, preference for "perfect" produce, lack of knowledge on best-before and expiration dates, and favouring full displays. However, consumers also show a preference for practices that can be considered less wasteful, such as preference for shallow displays over heaping piles and the minimization of plastic wrapping. In addition to this, many consumers are open to knowledge about how they can minimize the food waste at retail level, personally. Using the results from our survey and interview, we suggest that current retail practices can be changed in order to minimize food waste according to relevant consumer preferences.

## Recommendations

In conjunction with information found within our literature review about successful practices to minimize food waste, we can use our results to look at several problem practices. One is to avoid squeezing the produce to check for ripeness as it bruises the

produce, then contributing to food waste. The other ways to check ripeness, as suggested in some of the interviews, can be used such as looking at the colour of the produce to check for ripeness or smell for some of the produce items. Second,  'ugly-looking' produce is edible. Some of the participants in interviews suggested that they will not buy imperfect or ugly looking produce because it does not look like the produce they see at the supermarkets. But, others mentioned that they will buy the 'ugly-looking' produce. So, there is a need to expose consumers to 'ugly-looking' produce and create awareness that not all the produce items grow polished, there can be natural imperfections in fruits and vegetables, and are edible.

There are some recommendations for retailers based on our study. Some of the current practices in the retail stores can be changed based on these recommendations, which can help in reducing food waste. First is to structure the produce in thin or shallow displays, because most of the participants in the survey said that they prefer to pick their produce from shallow display rather than a big pile of produce. This also suggests that the assumption of retailers regarding big, beautiful displays as consumer's first choice is incorrect. The second recommendation for retailers is to limit the packaged produce in supermarkets, because the consumers prefer to pick and buy their produce individually rather than packaged produce. The retailers should look for suppliers that sell plastic-free produce or unpackaged produce because consumers prefer to buy unpackaged produce. The consumers also expected discounts on suboptimal foods based on the results from our survey. The third recommendation for retailers is to sell the suboptimal foods on discounted rates, so that the sales for suboptimal foods can be

increased and wastage of produce can be minimized in the supermarkets. The consumers also relate buying suboptimal food with attributes such as being environmentally conscious and thrifty, which encourages consumers to buy suboptimal food.

The retailers can take advantage from both of the perceptions of consumers on suboptimal foods that are positive attributes and discounted prices. The retailers can communicate about the food waste by targeting the groups of consumers in their store. For example, the consumers who are more conscious about food waste than prices, can be encouraged to buy suboptimal food by communicating the information about being environmentally conscious and thrifty by buying suboptimal food. The other group of consumers, who are more conscious about prices and discounts, can be encouraged to buy suboptimal food by communicating the savings and discounts they get on suboptimal produce. This way, the retailers can minimize the wastage of suboptimal food by increasing sales.

The educational campaigns were mentioned heavily in interviews. There is a gap in knowledge around the “best before date”, “sell by date” and “expiration date”. Some of the participants mentioned that these dates are not important for produce items and suggested that one can check if it is still edible by looking at it, instead of checking best before date. Other participants suggested that checking date is important. So, we think that the supermarkets can incorporate information campaigns defining the meanings of different dates labelled on produce or other food products. This will help to clarify the meaning of “best before”, “sell by” and “expiration date”, which will help consumers

make the right choice when buying any food products at the supermarket. The campaign will also help in minimizing food waste because customers will get less confused between sell by and best before dates, campaigns like *Eat Soon* can be incorporated with this campaign to encourage customers to buy food near “best before” dates, if they know they will cook it the same day (Stenmarck et al., 2011).

The results from interviews also suggest that there can be a market for ‘ugly produce’ because some of the participants said that they will buy it while others said they will not buy it. One of the reasons for not buying the ‘ugly-looking’ produce is that the consumers only see perfect produce in the supermarkets, so they do not even know if it is the same as other produce. The retailers can help in changing the perception that ‘ugly-looking’ produce is not edible, by information campaigns such as showing the farms where the displayed produce was grown. One participant also suggested that the information about the location of the farm, farmer and farmer showing ugly fruits and vegetables from their farms, can be shown in the form of video on a TV in supermarkets. This way the customers will pay attention to information shown and will help in promoting the knowledge about natural imperfections in the produce.

There are some limitations of our study, such as small sample size and participants only from the Metro Vancouver area. Future research can explore the consumer’s perceptions by surveying a large sample and interviews of more participants to supplement the results of survey. Studies in the future can also assess the assumptions of retailers regarding consumer perceptions and their own perceptions on food waste at retail level.

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## Appendix

### Item 1a - Survey Summary Results

To view the entire PDF, please view our link: [SurveyMonkey Summary Statistics](#)

### Item 1b - Survey Question Bank

To view the entire PDF, please view our link: [Food Shopping Practices Survey](#)

#### **Eligibility**

1. Have you shopped for produce at any supermarket (e.g., Costco, Safeway, Superstore) in Metro Vancouver within the past year?
2. If yes, please select the place where you often or have last shopped in Metro Vancouver.

#### **Respondent Demographics**

3. Which category below includes your age?
4. What is your gender?
5. What is the highest level of education you have received?

#### **Visual Assessment Test (I)**

6. If you were to buy only one apple, which of the displays (as presented below) would you prefer to make your choice? Please rank these images in order from most preferred to least preferred, beginning with number '1' as the most preferred.
7. If you were looking to purchase apples, which of the displays (as presented below) would you prefer to make your choice? Please rank the images in order from most preferred to least preferred, beginning with number '1' as the most preferred.
8. If you were looking to purchase bananas, which of the displays (as presented below) would you prefer to make your choice? Please rank the images in order from most preferred to least preferred, beginning with number '1' as the most preferred.
9. If you were looking to purchase peppers which of the displays, as presented below, would you prefer to make your choice? Please rank the images in order from most preferred to least preferred, beginning with number '1' as the most preferred

#### **Visual Assessment Test (II)**

10. If you were to purchase vegetables based only on the type of product offering (i.e., packaged versus uncovered), and not the actual type of vegetable, which product offering would you prefer to make your choice?
11. If you were looking to purchase apples, which display would you prefer to make your choice? Please select one.
12. If you were looking to purchase avocados, which display would you prefer to make your choice? Please select one.

13. If you were looking to purchase bananas, which display would you prefer to make your choice? Please select one.
14. If you were looking to purchase peppers, which product offering would you prefer to make your choice? Please select one.
15. If you were to buy only one apple, which display would you prefer to make your choice? Please select one.

**Visual Assessment Test (III:1)**

16. If you were looking to purchase only one apple, how willing are you to select the last one from this display?
17. If you were to purchase the last apple from this display, would you expect a discounted price?
18. If yes, how much of a discount would you expect for the last apple?

**Visual Assessment Test (III:2)**

19. On a scale from 1 to 5, please rate the overall quality of the display of avocados as presented below.
20. If you were to purchase avocados from this display, would you expect a discounted price?
21. If yes, how much of a discount would you expect for the avocados?

**Visual Assessment Test (III:3)**

22. On a scale from 1 to 5, please rate the overall quality of the centre apple as presented below.
23. If you were to purchase the centre apple from this display, would you expect a discounted price?
24. If yes, how much of a discount would you expect for the centre apple?

**Visual Assessment Test (III:4)**

25. On a scale from 1 to 5, please rate the overall quality of the centre apple as presented below.
26. If you were to purchase the centre apple from this display, would you expect a discounted price?
27. If yes, how much of a discount would you expect for the centre apple?

**Displays: Quantity, Merchandising & Variety**

28. About how much do you buy your produce as a packaged set (e.g., mesh bag of oranges/avocados, vegetable bags)?
29. Generally, do you prefer to select your produce individually or to select it as packaged?
30. On a scale from 1 to 10, how much do you think an appealing package of produce influences your decision to purchase it?
31. Do you purchase produce items from the discounted section in the supermarket?
32. If so, how often do you purchase items from the discounted section?

**Produce State: Quality and Shape**

33. Do you squeeze your produce (e.g., avocado, tomato, eggplant) to determine its ripeness?
34. Did you know that squeezing certain produce contributes to its bruising?
35. Did you know that bruised produce tends to remain unpurchased, contributing to food waste?
36. Knowing that bruising produce leads to food waste, how likely are you to eliminate the practice of squeezing produce to determine its ripeness?
37. How interested would you be in the prospect of supermarkets employing a 'produce picker'? In other words, someone who would select your requested produce for you, determining both the individual selection and overall quality.

**Information & Education**

38. Say you were looking to purchase bananas: How likely are you to make a purchase of any one or several, if a display contained only this quality of banana as depicted in the image below?
39. Referring to the image in the previous question, regarding blemished bananas: How much more likely are you to make a purchase of any one or several bananas, now that you have learned browning/spotted bananas are perfectly fine to eat?
40. Referring to the image in the previous question, regarding banana food waste tips: How much would you like to see supermarkets incorporate these kinds of food waste tips on informational cards around the produce?

### Item 2a - Personalized Interview Responses

To view the entire file, please view our link: [Personalized Interview Responses](#)

### Item 2b - Personalized Interview Question Bank

1. What methods do you use to determine the quality or ripeness of produce?
  - a. Does a perfect image of produce mean it is a perfect product?
2. How much of your shopping is influenced by what you were taught by family, friends, other shoppers, and or the media?
  - a. What were you taught?
3. Please define the following terms: (1) best before date, (2) expiration date, and (3) sell before date.
  - a. How do these influence your produce purchases, if at all?
4. For produce, what do you like about the standard supermarket layout?
  - a. Do you have any changes in mind regarding the reduction of food waste and how produce is displayed?
  - b. E.g., In Spain, you are not allowed to touch fruits or vegetables when you are shopping. Someone, equipped with gloves, handles the fruit and you instruct them for what you want.
5. How much of your shopping habits are based your values as opposed to realities (e.g., price, time, convenience)?
6. How do you feel about oddly-shaped produce?
  - a. See [uglyfruitandveg's Instagram](#) for example.
  - b. What do you think about 'ugly' produce, or non-standard looking produce?
  - c. Let's compare produce. Please describe your impression of the following comparisons. Click [here](#).

Hello Team,

Overall you did a very good job with this paper. It is well written, well researched, and very close to what I was expecting from a journal manuscript. There are several issues that I will point out as a suggestion for improvement:

1. The interview part of the research was a significant gap. 7 people were interviewed but it's not clear what the outcome was of that interview as I did not see any quotes. Also the demographics of the interviewee were not outlined (you should treat this like the survey demographics). Some of the most interesting insights from the paper came out of the interview response (for example about people throwing out all the bag when one of the food is spoiled) but without quotes, it's not very meaningful.
2. Another issue has to do with the communication of the findings. It would be helpful to have some figures as the stats tend to be buried in the text. I also had a question w/ the mention of statistical significance, I didn't see any tests or p value?
3. Best before dates came in the recommendations but was not part of the findings from the survey, so it would be important to stay in scope or to ensure that recommendations are informed by the findings.
4. Lastly, do make sure you check updated data, for example, Gooch et al's 27 billion (2010) was updated to \$31 billion in (2014) and now updated to \$49 in 2019. So just be careful with the literature because knowledge and stats can change rapidly and to make relevant recommendations, you need to be abreast of the most current info (to the best of your availability)

Again good job. I grade this paper: 21/25 (84%)

### Item 3 - Survey Informed Consent Form

#### **Food Shopping Practices in Metro Vancouver Supermarkets**

Welcome to our Survey

We are seeking your voluntary participation for our study regarding food shopping practices in Metro Vancouver supermarkets. This research, conducted by Simon Fraser University students of the REM363 course, known as "Building Sustainable Food Systems," will contribute to our final research project. It may be published as a journal article or a report. If you would like to participate, please review this form and feel free to ask the researcher(s) any questions about the project methods and goals.

By voluntary filling out and submitting the online questionnaire, you are confirming your agreement to participate along with your understanding of the research study. If you submit this form online and you decide to no longer participate, we will not be able to retrieve the form as it is anonymous and will not include any identifying information. Before confirming your response, please read the following statements:

1. Your permission is being asked to document your perspective/knowledge regarding food shopping practices in supermarkets.
2. Participation is voluntary and there is no compensation for participating.
3. The online survey will take approximately 15 minutes to complete.
4. You may withdraw your participation in this study at any time by quitting the survey through the application or by closing your web browser.

If you have any concerns about your rights as a research participant and/or your experiences while participating in this study, you may contact Dr. Jeffrey Toward, Director, Office of Research Ethics (jtoward@sfu.ca or 778-782-6593). You may also direct project inquiries and requests for draft or final results to the Faculty Supervisor, Dr. Tammara Soma (tammara\_soma@sfu.ca or 778-782-6820).

By selecting "I agree," you are consenting to the conditions described above. If not, you will be taken to the end of the survey.

- I agree
- I disagree