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Understanding GenZ consumer perceptions of food delivery packaging in a post-COVID-19 lens and its implications on sustainability.

Esther van Dijken
500 814 899

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Professor: Ian Baitz, Ryerson University

Supervisor: Jay Park, Ryerson University

Industry Research: Pamela Antonio, Supervisor of Waste Management in Oxford County

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ABSTRACT

Over the past five years, concerns about single-use plastic waste have been driving forces for change in the packaging industry. Until recently, the packaging industry had seen significant progress in developing more sustainable alternatives for consumer goods packaging. However, due to the COVID-19 pandemic, the packaging industry is seeing many changes in consumer preferences and perceptions. To manage the impacts of the pandemic, many food-related businesses have turned to E-commerce and delivery to stay afloat. However, this poses issues regarding sustainable food delivery. As the pandemic progressed, research showed that hygiene and health had become the #1 priority for consumers in food packaging, and sustainability is taking a back seat. This study looks further into which areas in food delivery packaging consumer's perceptions are changing the most and how consumer perceptions drive the survival of the plastic industry. With pervasive global pressure to develop more sustainable packaging solutions, COVID-19 has been a challenge in continuing on the trajectory of sustainable developments within the food takeout packaging industry.

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INTRODUCTION

As seen over the past year, a single health crisis can put the whole world to a halt. Brick and mortar businesses have had to adjust to an e-commerce dominated world quickly. Tourism and hospitality have been struggling like never seen before, and sustainable initiatives have been pushed to the sideline. Since the beginning of COVID, it is estimated that 2020 is on pace to see 30% more single plastic waste than 2019 (Ford, D., 2020). That is an astonishing statistic, especially considering the recent sustainable progress and efforts taken by governments and individuals. Out of all businesses, restaurants have taken the most significant hit, as the first wave of COVID in Canada reduced overall restaurant sales by 96% (Restaurants Canada, 2020), forcing them to resort to e-commerce and delivery just to stay afloat. Although takeout has been the saving grace for many restaurants, it contributes to the growing heap of plastic waste globally. It is apparent already from these initial statistics that COVID has changed significant trends in the global packaging industry and is reshaping the packaging industry to a new normal. This new normal is currently posing many threats to our environment. However, if handled properly, it can be a breakthrough opportunity for foodservice delivery packaging. The research pertaining to this paper is relevant to current trends in food delivery and takeout packaging, as there is not extensive data on virucidal outbreaks and its relationship to food delivery packaging.

LITERATURE REVIEW

This research paper aims to understand consumer perceptions and preferences within food delivery packaging concerning the COVID-19 pandemic and examine its implications on packaging sustainability. The journals presented in the literature are all very recent articles and present insightful research into the impacts of COVID19 on the packaging industry as a whole. Common themes prevalent in the journals were increased single-use plastic waste, consumer behaviour changes, and hygiene issues surrounding food protection.

The COVID-19 pandemic has had a critical impact on consumer buying behaviour and is continuing to change consumer buying habits. Three fundamental shifts that have occurred in the market since the beginning of COVID are an emphasis on hygiene, the increase of e-commerce, and rapidly changing consumer preferences (Feber, D. et al., 2020). As a result of this virus, a key trend that has redefined packaging standards is hygiene. Concerns about hygiene and

performance are now at the forefront of food delivery packaging design and have a higher priority than sustainability and recyclability. Another critical element that is changing the packaging industry is e-commerce. Consumers have dramatically increased their digital engagement and continue to buy more online, especially food. Additional factors like transportation, leakage, weather conditions, and air quality will be primary factors in food delivery packaging design.

Additionally, another strong impact on the packaging industry is rapidly changing consumer preferences. As many people and businesses found themselves unemployed during the pandemic's shutdowns, consumers became more price sensitive. In conclusion, this literature is an in-depth evaluation of emerging consumer trends in food packaging and illustrates the impacts of COVID-19 on consumer preferences. The assessment of trade-offs between hygiene, safety, and sustainability mark a significant disruption in the food packaging industry (Feber, D. et al., 2020).

According to *Scientific American*, "single-use plastic use is going through the roof due to increased takeout." From 2002 to 2016, the total amount of solid waste collected in Canada increased by 3.5 million tonnes, or 11% (Canada, E. A., 2018). In addition to the increased single-use plastic usage because of COVID, the world is now dealing with an overflow of personal protection items, plastic shopping bags, and other plastic materials (Berg, P. et al., 2020). This increase creates many issues for the end-of-life lifecycle for packaging, as recycling systems are becoming overwhelmed with the volume of trash. Currently, the global recycling rate of food packaging is roughly only 28% due to recyclability complications. The global demand for plastic is continuing to rise due to this pandemic, and waste collection and recycling systems cannot handle this overall increase in waste (Berg, P. et al., 2020). There are two critical components of the mismanagement of packaging that cause troubles in recyclability. Firstly is the recyclability of the packaging itself. Many packages cannot be recycled in today's systems due to the many materials used in the package. The second factor is recycling leakage. Currently, recycling rates are meagre worldwide, and in Canada, roughly only 9% of all plastic is recycled annually (Canada, E. A., 2018).

The research used in this thesis also examines the implications of COVID-19 on consumer buying behaviour and how these broad trends are influencing the retail world. Roughly 79% of business executives believe that the COVID crisis will have a lasting impact on their

customers for the next five years (Haas, S. et al., 2020). However, shockingly this research revealed that only 30% of all executives felt equipped to address these dramatic changes. This article also predicts that consumer behaviour and engagement with products will drastically throughout the rest of the COVID-19 pandemic. These areas need to remain top of mind for company leaders. Three behaviours that are particularly having a significant impact are: trying new products, the resurgence of large brands, and staying indoors or at home longer. The data presented in this study suggests that consumers are looking for comfort brands familiar to them. This key trend is characterized by Amazon's rapid growth this year, as the demand for online shopping went through the roof (Haas, S. et al., 2020).

There are many future opportunities for improvement in sustainable food consumption. Although food packaging does an excellent job of reducing organic food waste, preventing food-borne diseases and contamination, the pressing issue of plastic waste and pollution on the planet resulting from the packaging industry still leaves room for improvements in the packaging industry. This journal states that at our current rate, Earth could see up to 200 million tons of food waste alone in 2050. This is also to support the 50% increase in food supplies needed globally (Guillard, V. et al., 2018). Future goals to tackle plastic pollution include plastic waste reduction at the end-of-life stage of the packaging and the production of microbial biodegradable polymers from agro-food waste. The packaging is a central element to address sustainable food consumption (Guillard, V. et al., 2018).

During 2015-2016 alone, world plastic production increased dramatically; however, this statistic includes all industries, so this stat cannot be solely attributed to packaging alone. The research done in this journal discovered that 40% of single-use food packaging ends up in a landfill, which is roughly 9 million tons of plastic packaging waste each year. Out of this statistic, 32% is lost due to leakage. Coincidingly, the misconception of biodegradable packaging is only contributing more to this issue. Bio-plastics are not biodegradable, nor are they home-compostable, but instead catered towards industrial composting units. This is also another contributor to complications in waste management and the issues surrounding plastic pollution and packaging. In conclusion, this paper discusses how packaging can be an instrumental element of sustainable food production while simultaneously decreasing food waste. Through the understanding of the fundamental functions of food packaging while looking through the critical lens of sustainable development and environmental stewardship. (Guillard, V., et al, 2018).

Although single-use plastic offers a reliable way for restaurants to continue their operations during the pandemic, it contributes to a stark increase in single-use plastic across the globe. 2020 is set to see a rise of 30% in single-use plastic usage from 2019, and recycling systems are starting to break down all over the world because of the pandemic (Ford, D., 2020). In the Western World, a large portion of plastic is mismanaged and ends up in landfills. On average, roughly only 10% of average household waste is recycled. Statistics determine that 8% of the total amount of plastic is recycled annually. In terms of the rest of the globe, 63% of waste in the US ends up in landfills, 41% of waste in Europe is incinerated, and 74% of waste in Asia is mismanaged. These are astonishing statistics and pose an imminent threat to our current environmental climate. In order to begin to manage the plastic crisis, this article suggests four main recommendations to the waste management industry. These include eliminating unnecessary products, prioritizing investments into sustainable production, double the world recycling rates, and demand more transparency from large corporations (Ford, D., 2020).

In conclusion, significant changes need to be made in the packaging industry. If the world continues on this trajectory, it can expect to see more plastic in the oceans than fish by 2050 (Ford, D. (2020). As concluded from primary and secondary research, consumers are ready and searching for sustainable options, and it is a critical component in their consumer buying behaviour. COVID-19 is playing a large role in shifting consumer behaviours and perceptions and will have implications in years to come. Fundamental changes indicate a heightened priority on hygiene over sustainability, e-commerce, and changing consumer preferences. Although sustainability is temporarily taking a passenger seat in its level of importance, it remains a critical factor in consumer buying behaviour. It will ultimately determine the success of future packaging solutions. I conclude that food delivery packaging, where applicable, should transition towards entirely biodegradable materials to reduce the magnitude of waste approaching landfills. This ties nicely into this thesis's research, as it is studying the consumer preferences after COVID-19 and illuminating shifts in Southern Ontario.

RESEARCH METHODOLOGY

Research Question:

What is Gen-Z's consumer perception of food delivery packaging, specifically sustainability, after COVID-19?

Methodological Approach

This research aimed to explore the new topic of COVID and its impacts on consumer perceptions in the food delivery packaging industry, with a large focus on its overall impact on sustainability. At the forefront of this entire research paper, the issue was: is COVID changing the way people care about and perceive food delivery packaging? The purpose of this research is to understand the cause-and-effect relationship between a virucidal outbreak and its impact on consumer perceptions and its impact on sustainable progress. In order to achieve the desired results, the type of data that was most impactful was quantitative data derived from surveys and analyzed through thematic analysis. The research for this topic began with exploring secondary sources from industry professionals and literary papers. Understandably, COVID-19 is a very new phenomenon in the current world, so there were limited scholarly papers on this topic in relation to consumer packaging. In order to compensate for the gaps in available research in this field, a primary data study was also conducted using surveys. The variables used in the surveys were controlled and pre-determined; however, the results were variant to each participant. In order to gain insight into the waste management industry, a brief interview was also conducted to examine the changes in waste production since the start of the COVID-19 pandemic.

Aim of the research

This paper's problem statement is: is COVID changing the way people care about and perceive food delivery packaging? Before COVID-19, sustainability was a central issue surrounding future outlooks of the packaging industry, but due to the pandemic's health and safety concerns, these trends are taking a back seat. The practicality of this research will reveal whether consumers care more about hygiene and less about sustainability. If people are more likely to trade off sustainability entirely for the sake of hygienics, even if they know it is bad for the environment. If this research proves to be correct, it could hinder sustainable progress in the area of food delivery packaging for the future months/year.

Data Collection Method

The method of data collection was collecting quantitative data through a survey posted on a social media platform. This format was used because it was the best way to reach the greatest number of Gen-Z participants and gather viewpoints from many different demographic characteristics within Gen-Z. The decision to pursue quantitative data is because it is easy to compare against itself and can prove trends or more in-depth analysis in the data.

A survey was chosen in order to understand the general characteristics or opinions of a group of people, in this case, GenZ. The data was collected by distributing a list of questions online and gathered the metrics through Instagram analytics. The survey consisted of 10 questions, and then with interactive buttons/quiz formats to select their preferences. The second form of the primary research was conducted through a brief interview- to better understand plastic waste issues from a waste-management perspective. In addition to the primary research, secondary research of scholarly papers was done to gain a more robust understanding of consumer perceptions before COVID, in order to make a comparison to before and after COVID-19.

Data collection procedure

I decided to use surveys to collect quantitative data, which could, later on, be organized into qualitative data. The procedure in collecting this data asked followers and friends to answer survey questions regarding the same topics anonymously.

Collecting the data

In order to reach the greatest number of Gen-Z participants, the survey was conducted over the social media platform, Instagram. The survey was ten questions long and was formatted in the following two different ways. The questions were formatted as either:

1. Multiple choice question with three variables.
2. Yes or no questions.

The variables were controlled, as there were limited options for social media surveys. There was a maximum of 3 options to answer questions, so in a way, these variables were slightly controlled.

Method of Analysis

To analyze the data in the most optimal format, a survey was conducted, and thematic analysis was concluded from the results of the survey. By using thematic analysis, this study was able to draw on broad themes and trends concluded in the research. Additionally to gather whether there was a correlation between male and female survey respondents, a Chi-Square test was also conducted.

Evaluation and Justification of Methodological choices

Social media surveys are not the most academically advanced formats to gather data; however, it was the most practical and farthest-reaching method to reach Gen-Z audiences. Because of the COVID-19 pandemic, all in-person formats were eliminated before starting the research due to local guidelines, health, and respect.

Some weaknesses or flaws that occurred because of this data collection method were that not every participant answered every question. Overall, there was a fluctuation in the data between the answer-rate of each question. The average answer-rate for the entire survey was 304.13 participants per question, with the highest turnout being 310 participants and the lowest being 298. That is a 12 person difference. Understandably, this flaw in the data collection creates a small discredit to the overall results. However, the large general response rate outweighs the errors of the few minorities.

Overall, this unconventional method was suitable for my objectives. I was able to get a broad and generalized result in the data, which would eventually enable me to analyze trends. The reason behind getting a large array of data and then further analyzing through trend analysis is that I wanted to see if consumers' *thinking* trends are changing, and gathering information from a smaller group of participants would not have had the same impact.

RESEARCH AND KEY FINDINGS

Over the past five years, the world has seen a dramatic increase in single-use plastic waste, largely due to the packaging industry. Although plastic materials offer economical and short-term environmental benefits, plastic poses many environmental issues in terms of its end-of-life stage. This study looks at understanding consumer preferences and perceptions in relation to food delivery packaging in a post-COVID eye. Before the pandemic, one of the most important factors in food delivery packaging was sustainability (Berg, P, et al., 2020). However, new concerns surrounding hygiene and food safety are in the spotlight during this pandemic and is causing many transformative changes within the food delivery packaging industry. This study examines how consumer preferences are changing after COVID-19 and the impact these factors have on the future outlook of food packaging. What changes will need to be made? Is sustainability really becoming less important?

To get a better understanding of the targeted demographic, the study participants answered three preliminary questions. The first was the frequency of delivery food consumption, the form of food, and whether the participants increased their food intake since the start of the COVID-19 pandemic. In the first question, participants could answer their food intake as 1-2 times per week, 3-5, or almost every day. 83% of the respondents stated 1-2 times per week, 12% stated 3-5 times per week, and the remaining 3% indicated 3+ times per week.

Subsequently, the following question in the survey was allocated to determine the form of food consumption that was most popular among this demographic. Similarly to the previous question, participants could choose between take-out, delivery, or fast food as being their most common food choice. 39% of participants indicated takeout as their most preferred form of food delivery consumption, 38.4% indicated fast food, and the remaining 22.6% of respondents expressed delivery as their most preferred choice. Out of these same respondents, 50.3% answered that they had increased their delivery food intake since the beginning of COVID19, while the other remaining 50.7% of respondents shared that they had not increased their intake. These preliminary questions can be concluded because most respondents in this group eat out 1-2 times a week, prefer fast food and takeout and that COVID-19 has not directly impacted their food consumption frequency. In the following questions, the consumers will have these statistics in mind when answering the questions related to packaging.

What is the most important factor for you in takeout/fast food/ delivery packaging?

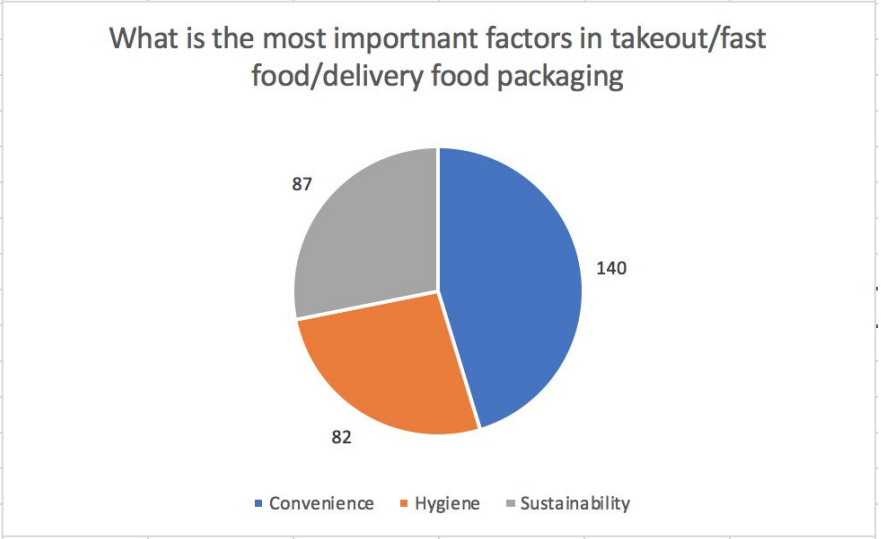

Fig 1.

After the preliminary research was established, the next portion of the research focused on consumer perceptions in regards to food delivery packaging. The first question asked in this series was in regards to perceptions of the most important factors in takeout/fast food/delivery food packaging. The respondents could choose between three variables. These variables were convenience, hygiene, and sustainability. As seen above in Fig. 1, out of the 297 respondents to this survey, 134 respondents indicated that convenience was the most important factor for them in food delivery packaging, 45% of the respondents. The remaining participants indicated equal preferences between hygiene and sustainability, as 27% of respondents selected hygiene as most important, while 28% indicated sustainability.

Does packaging play an influential role in where you get your food from?

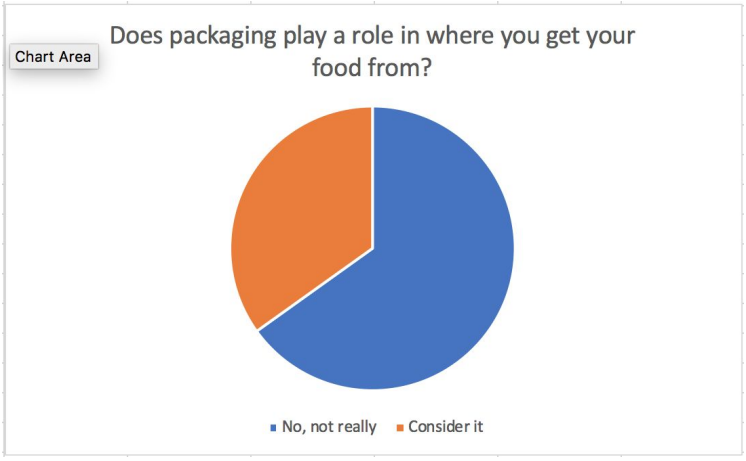

Fig. 2

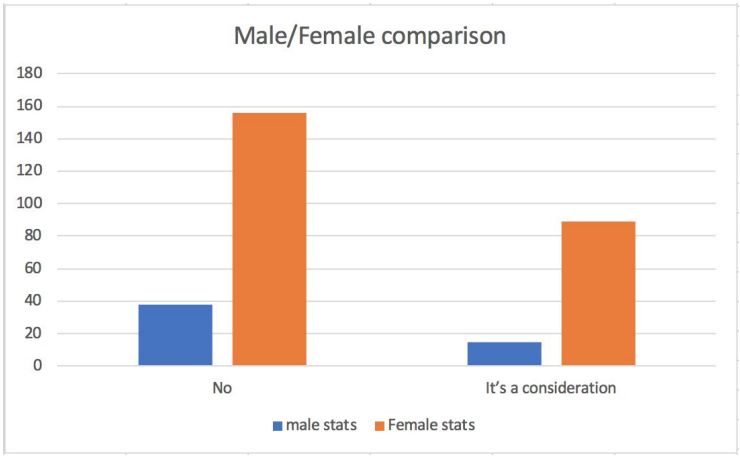

Fig. 2.1

The following question is intended to discover packaging influences buying behaviour in this demographic. The question: *Does packaging play a role in where you get your food from?* Gathered responses from 297 participants. 193 participants indicated that packaging did not influence where they got food from. However, 193 respondents stated that packaging was considered when purchasing delivery/takeout/fast food options (see Fig. 2). When examined between gender demographics, females showed a stronger influence to packaging in relation to the male respondents (see Fig. 2.1). The research done in the male demographic showed that 72% of them indicated that packaging was not influential in their decision making. In comparison, this same factor was not an influence for 64% of female respondents. Overall, this indicates a stronger interest from the female audiences to consider packaging and think about the impact of their decision on the environment.

In your perception, do you feel as though biodegradable packaging is less sanitary?

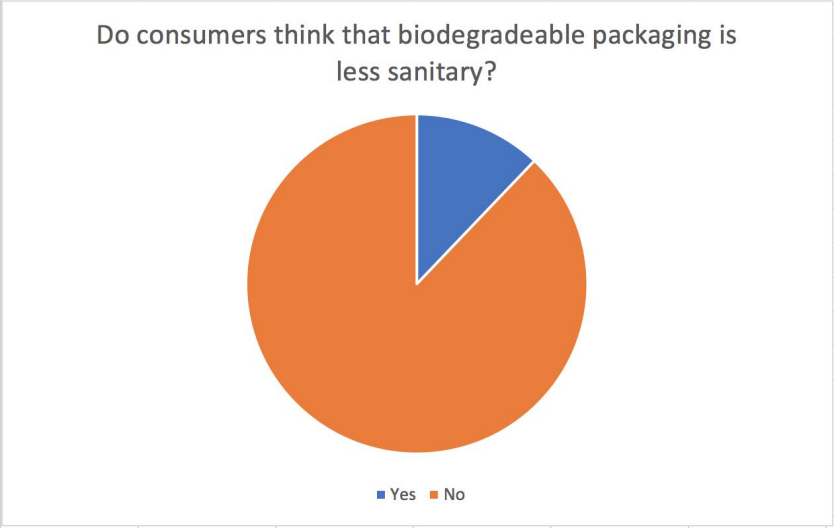

Fig. 3

The following question in the survey intended to discover consumer perceptions surrounding biodegradable food packaging options. Consumers were asked to identify their perceptions surrounding biodegradable packaging and whether they found it less sanitary than other packaging options. 87% of the respondents stated that they did not find biodegradable packaging less sanitary, while the remaining 23% did find it less sanitary (see Fig. 3). This is important to examine because biodegradable food packaging presents a great opportunity to enhance sustainability within this industry. Food delivery packaging has a shorter shelf life than store bought goods, so there are fewer permeability and food protection requirements.

Would you be more inclined to eat somewhere that had sustainable packaging?

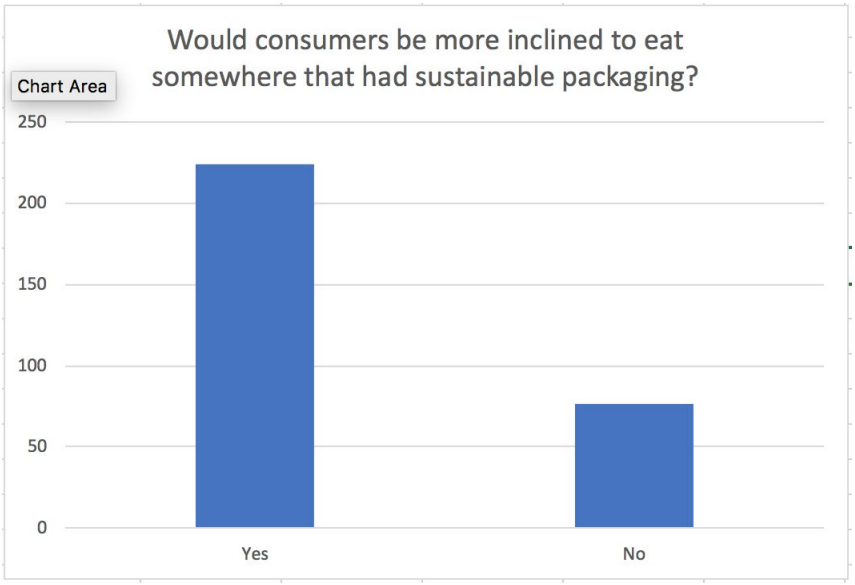

Fig. 4

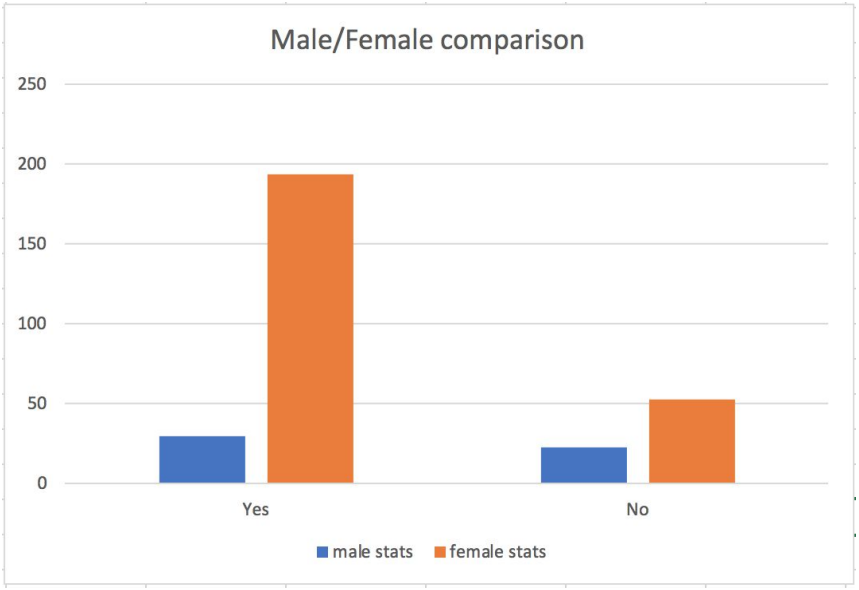

Fig. 4.1

The next question in the survey continued along the same thought process in understanding the influential factors of food delivery packaging on consumption and asked consumers to be more inclined to eat somewhere with sustainable packaging options. As seen in Fig. 4, 74.6% of respondents indicated that they would be more inclined to eat somewhere else if they knew the packaging was sustainable. This is an excellent indication of consumer preferences and suggests that sustainability is still at the forefront of importance for many consumers.

Do you usually take the time to rinse and sort out foodservice packaging materials?

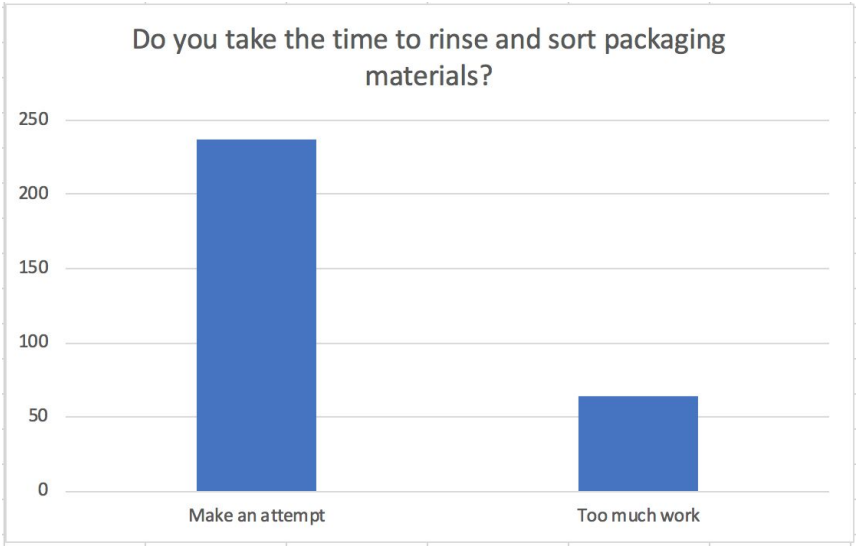

Fig. 5

Lastly, participants were also asked whether they took the time to sort out and clean their takeout food containers. 78% of respondents shared that they did put in the effort to sort and clean out their food containers (see Fig. 5 and 5.1). This is a good indication of consumer participation in environmental responsibility, as ¾ of GenZ stated their participation in recycling programs.

Interview with Waste Management

A brief interview with waste management was also conducted to understand increases in waste generation within Oxford county in addition to a primary survey study. The interview was conducted with the director of waste management of Oxford County, Pamela Antonio.

This short interview (over the phone), examined the impacts of COVID-19 on the waste management systems within Oxford County. Although this is a small sample representation of waste collection systems as a whole, for the purpose and timeline of this paper it illuminates the challenges presented because of the pandemic. During the interview, she stated that waste has increased in Oxford County by 18% since the start of COVID-19. Out of the collected waste she sees daily, she stated that the most common food packaging items collected in her facilities are

takeout, produce, frozen food, and drink and yogurt packaging. Out of all of the waste collected, roughly 50-55% of collected residential waste is recyclable. As one of the concluding questions of the interview, I asked how can recyclability be improved? In her professional opinion, she made a few good suggestions:

1. Better packaging on the products
    a. Create packaging that can actually be recycled
2. Consistency in blue box materials across municipal programs
3. Improved residential behaviour
4. Improved performance by the IC&I sectors

The final question asked was, are there effective systems in place to recycle multi-material packages? She answered that multi-material packaging is one of the most common products that end up in the landfill. Automated material recovery facilities cannot separate the different packaging materials, and to do it by hand is too labour intensive and cost-ineffective.

DISCUSSION

Preface

For restaurants trying to manage the COVID-19 crisis and keep their businesses alive, takeout and delivery have been their saving grace. However, due to price sensitivity, hygiene, and safety, many restaurants and businesses are turning to plastic and styrofoam takeout packaging. As a result of the pandemic, counties such as Oxford County in Southern Ontario have seen increases in waste production by 18% (Waste Management Oxford County, 2020). On a global scale, 2020 is set to see a rise of 30% in single-use plastic usage from 2019 (Ford, D., 2020). Regardless of its enhancements to food restaurant businesses and food safety, the world simply cannot handle any more increases in single-use plastic.

Let us begin with the basic functions and purpose of food delivery and takeout packaging. Food delivery and takeout packaging's primary function is to keep the food safe and protected from physical, chemical, or biological damage (Popa, 2011). On the lesser critical side, it also needs to keep the food warm, intact, and ready to eat as soon as the food arrives at their

home. In light of the pandemic, food packaging also needs to eliminate any exposure to contaminated air or surfaces (Feber, D., Oskar Lingqvist, 2020). So, combining these two main arguments will be critical in designing future packaging for food takeout and delivery. The packaging must be both recyclable or biodegradable and maintain high levels of safety and food protection. As seen in the study results above and conducted from secondary scholarly papers, these two factors are the most important ones to keep in mind when designing food delivery and takeout packaging in the future.

Pre-COVID Consumer perception and preferences

Before the COVID-19 pandemic, growing awareness of environmental issues had a critical influence on customers and began to shift consumers' buying habits. A prime example of this is from 2019 when a viral video surfaced on the internet. This video was about a turtle that got a plastic straw stuck in its nostril. The emotional impact of this video brought incredible media attention to the subject and heightened environmental impacts of plastic straws on wildlife. Since this video was posted, companies such as Starbucks, Disney, and American Airlines all banned plastic straws from their companies (Hirschfeld, A., 2019), due to the immense consumer pressure to make environmental changes. Because straws are easily replaceable, they have found their way onto the list of proposed material bans in Canada, and 35 other countries, starting in 2021 (Environment and Climate Change Canada, 2020). In addition to plastic straws, other materials such including bags, straws, stir sticks, six-pack rings, cutlery, and food ware made from hard-to-recycle plastics will also fall under this category of bans (Environment and Climate Change Canada, 2020). Eventually, more and more materials will face bans in the near future, as consumers demand more and more sustainable packaging options, see Fig. 6. “We’re seeing a tremendous acceleration in the demand for packaging alternatives as the unintended consequences of plastics become more visible, both locally and globally,” says Kate Daly, of Closed Loop Partners (National Geographic, 2018).

Fig. 6

However, many of these trends are changing as a result of the COVID-19 response. In April of 2020, researchers identified three key consumer behaviours that were shifting due to the pandemic. These included trying new products, the resurgence of large brands, and nesting at home (Haas, S,. et al., 2020). Another key disruption this year is the immense role that e-commerce has played throughout the pandemic and increased digital engagement amongst consumers. Additionally, while still reemphasized, sustainability was also redefined as hygiene became the most important packaging element during the pandemic (Feber, D., Kobeli, et al., 2020). These megatrends, changed consumer behaviours, an emphasis on hygiene and safety, and an e-commerce dominated market will all likely become the new normal in food delivery and takeout packaging (Feber, D., Kobeli, et al., 2020).

As a result of the pandemic, online ordering of food increased more than 25%, with 78% of consumers ordering online as frequently or more often than before. Among these respondents, 84% stated that packaging is an important consideration when placing an order (Krook, D., 2020). Although the pandemic has put some environmental concerns on a side note, knowing a packaging's environmental impacts is still a central concern for many consumers. With increased pressure on corporate social responsibility, customers are less forgiving of companies who do not share their values. (Krook, D., 2020). As seen in the primary survey conducted on GenZ

consumers in Southern Ontario, they expressed consistent sustainability preferences amidst the pandemic. 87% of respondents stated that they found biodegradable food delivery packaging to not be less sanitary than other options. This is a strong indication that consumers are interested in eco-conscious packaging and that the health and safety of biodegradable packaging does not deter them from purchasing food. This question was asked amidst the COVID-19 pandemic, and still, consumers stated that they did not find biodegradable packaging less sanitary than plastic or styrofoam. This suggests that although food safety is an integral feature in packaging, the specific material does not matter so long as it keeps the food safe. These consumer preferences put a lot of pressure on packaging companies to align with their [the consumer's] values.

Why is this important to the food takeout and delivery industry?

Packaging is a central element of food quality preservation and is essential for the future of sustainable food consumption (Guillard et al., 2018). Packaging controls gas and vapour exchanges with the external atmosphere, contributes to preserving food quality, and preventing food-borne diseases and chemical contamination (Guillard et al., 2018). The most commonly used materials in the food delivery and takeout packaging industry that meet this criterion are polyethylene or co-polymer-based materials (Popa et al., 2011). These materials create a strong vapour barrier and protect food from physical, chemical, and biological damage (Popa et al., 2011). The food industry has been relying on these materials for over half a century now, and only up until recently have seen a shift to cardboard and fiber-based packaging.

While polyethylene and co-polymer based materials provide the best food packaging safety, it also contributes to an increased level of waste production this year. It is estimated that in countries like America, 30% of all municipal solid waste is attributed to packaging, creating roughly 80.1 million tons per year (Chua, 2019). As consumers are starting to notice the devastating impacts of plastic waste and plastic mismanagement, they are also starting to hold large corporations accountable. The environmental end-of-life impacts of packaging are starting to outweigh the benefits initially provided by plastic and styrofoam. Plastic pollution kills wildlife, damages natural ecosystems, and contributes to climate change. In addition to this, carbon emissions are growing year over year from increased plastic production- to meet the global demand for plastic (WWF). There simply is not enough infrastructure to manage this, especially in light of a pandemic that survives on single-use materials.

Interpretations of Data

The interpretation that can be gathered from this data is that consumers are ready and are interested in sustainable packaging. As gathered from one of the survey questions, many respondents indicated that sustainability was the most important factor (out of the three options) in their food packaging, which was equally important to the other quarter of respondents who answered for hygiene. This shows that regardless of a pandemic, sustainability is equally important for the general population as hygiene. In terms of recycling rates, 78% of consumers stated that they took time to rinse and sort out their containers after use, indicating affluent consumer engagement with recyclability programs. This suggests that consumers want to take on personal responsibility to take part in helping the environment.

Additionally, there is strong evidence from the research that female respondents are more influenced by packaging sustainability and packaging implications on the environment. To understand the associations of packaging preferences between male and female respondents, a Pearson Chi-Square analysis can discover these attributes. This analysis allowed the discovery as to whether or not there were correlations between question answers and genders. One of the last questions, whether or not consumers would be more inclined to eat somewhere else if the packaging was sustainable- there was a variation between answers provided by either sex of the respondent. To discover this, since P-value (0.000) is less than 0.05, the null hypothesis can be rejected, which means that the two distributions are statistically different depending on the sex of the respondent. Thus, can conclude that preferences differ by gender. Female respondents were strongly inclined to eat somewhere else if they knew their packaging was sustainable, while only approximately half male respondents were inclined to eat somewhere else if they knew that the packaging was sustainable. This data proves that there is a difference in consumer behaviour amongst the sexes.

Implications

This research is important to understand for the future outlook of plastic packaging in the foodservice industry. Although food delivery packaging has contributed significantly to the foodservice industry during the pandemic, there is not enough infrastructure in place to manage the amount of waste created from this crisis. The obsession with instant gratification and convenience in our modern-day society has hampered the ability to see the other side of the use-

spectrum of packaging- where it ends up destroying ecosystems. The rise of app-based food delivery services like DoorDash, Uber Eats, and Skip the Dishes does not make it easier to reduce waste. According to a recent study, the food delivery service industry is expected to grow 6.5% each year, year over year (Chua, 2019). This trend will only continue to worsen along with the growth of the foodservice industry.

Because of society's love of convenience, increased plastic use is used to accommodate the demand for convenience (Berg, P. et al.). Convenience in food takeout and delivery packaging is a very influential factor in terms of packaging design. Consumers buy the convenience of not cooking from the comfort of their own homes, or more specifically during COVID, the safety of their own homes. However, at our current recycling and disposing of rates, Americans on average generate 234 pounds of plastic waste each year, and only 9% of that is actually recycled (Chua, 2019). The problem is expected to worsen as poorer nations grow richer and start consuming for packaged foods. Our convenience obsessed world continues to fuel meal-kits, grocery services, and food takeout- all of which create a considerable amount of packaging (National Geographic, 2020).This study's primary research found that consumers value convenience most regarding food delivery and takeout packaging. So, foodservice packaging must be designed with convenience in mind. Factors that ensure convenience include it being lightweight, easy to carry and resealable (Krook, D., 2020). For the food delivery and packaging industry to have the best response from consumers, they need to consider all of these factors: sustainability, safety, and convenience.

This research is vital to understand to navigate future pandemics and food packaging. Will this be the new normal for when another crisis or virus breaks out? How can packaging companies avoid negative environmental impacts while still maintaining proper food protection and hygiene in the future? This is an exciting future for packaging companies because of the possibility to make innovative new designs. Through the research of this study, the understanding that sustainability and convenience drives consumer buying habits is solidified. This is proven through the 74.6% of survey respondents who stated that sustainable packaging would influence them to eat somewhere that had sustainable packaging. Additionally, nearly two-thirds of Americans demand sustainable packaging and clear labelling (Krook, D., 2020). This is clear evidence that consumers want change in the industry.

However, there are still many questions to ask in regards to the future foodservice packaging design. Is it economically viable to make virus-proof sustainable packaging? As the consumers mentioned, they do not find biodegradable food packaging less sanitary. That means there is a low barrier to entry for biodegradable packaging. Is there a way to make biodegradable food packaging that is vapour barrier proof, convenient, sustainable and temperature tolerant? This area will be an exciting course of study in the packaging world in the coming years and will combine two of the most important and popular topics in the packaging industry.

Recommendations

Although the effects of COVID on the world seem dismal, there are also many opportunities for packaging companies to pivot and create lasting change from this pandemic. Many companies worldwide are working to make food takeout and delivery packaging as sustainable as possible. Food packaging's primary role is to preserve food quality and safety and reduce food waste and food-borne diseases (Guillard, V, 2018). Regardless of materials, it needs to serve these essential four functions. This is where food delivery packaging has an advantage over long-term shelf-life products. Food products in grocery stores need to be preserved for long periods, while food delivery and takeout see an average window of 1-2 hours of external exposure. This enables the material to have more flexibility in its material permeability, vapour exchange, and other factors. There are many critical efforts that can reduce overall waste contribution of the food service packaging and enhance sustainability for the future. For takeout and food delivery packaging to appeal best to consumers, they must comply with these factors:

- Keep food safety a priority.
- Design for convenience and easy for the consumer to use.
- Design with sustainability in mind- either reduce plastic use throughout or create packaging with better recyclability.
- Emphasis on better recyclability.

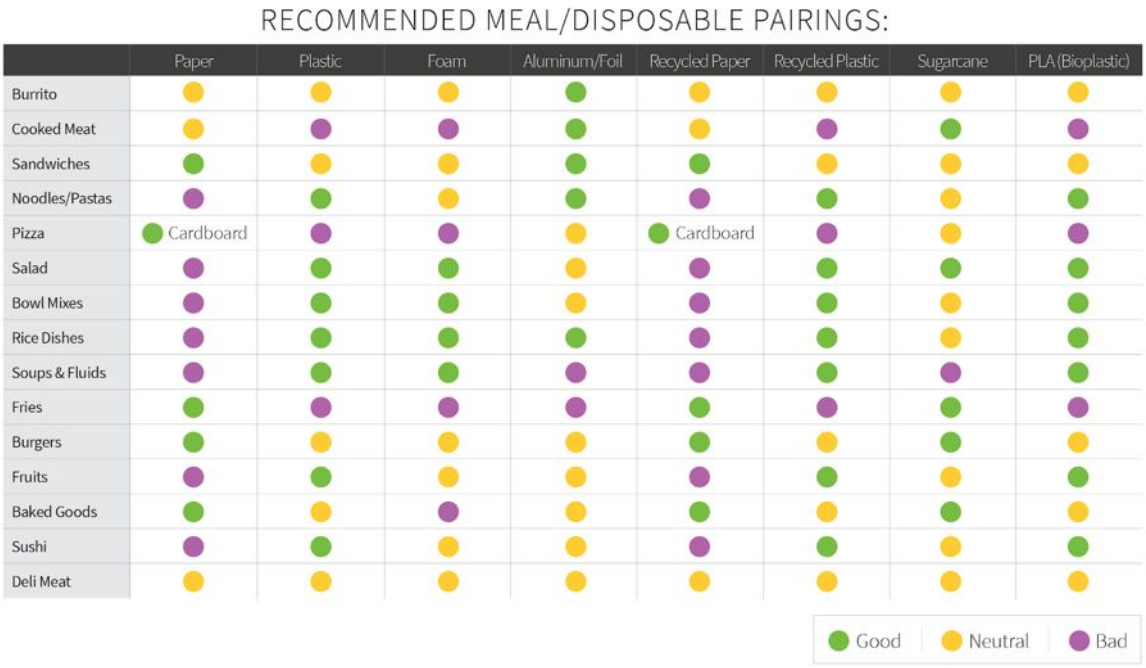

Fig. 7

As seen above in Fig. 7, this is a proposed pairing chart of suitable meal/packaging pairings for food takeout and delivery. However, this only includes popular materials of today. Exciting new revelations in new materials will arise, and continue to expand the versatility of foodservice packaging. There is an exciting future ahead for the foodservice packaging industry that will benefit the economy, the environment, and consumer's health and safety, while adhering to the most dominant consumer preferences.

Conclusion

All of this is important because if the food service packaging industry wants to keep up with global trends, it needs to comply with consumer preferences. Over and over again, consumers are demanding less plastic use. In some cases, companies are scratching packaging entirely and transitioning to zero-waste product offerings. If this trend continues, the packaging industry could decline in the upcoming years, leading to the packaging industry's demise. Companies that use prevalent single-use materials in their business will have a lower social reputation amongst the public. Sustainable packaging can strengthen brand loyalty and win over customers who support environmentally conscious brands. As gathered from research in this paper, consumer preferences are very impactful to the future outlook of an industry. As a result of the pandemic, heightened awareness has been brought to hygiene and packaging safety, but still not trampling the importance of sustainability in consumers' minds. Consumers indicated that sustainability was a factor that altered their buying behaviour.

In conclusion, consumers will drive the industry's future, and hold buying power above companies that produce raw materials. The rise of global awareness for safety, illuminated in the COVID-19 pandemic, and the environment is shifting consumer perceptions across the world. Governments are taking action on these trends and beginning to ban materials. As seen already, bans are slowly creeping into the field of foodservice packaging. Packaging must continue to be innovative to ensure the survival of both the environment and the packaging industry in the future. The collision of consumer behaviour and technology during the COVID-19 pandemic will set the stage for advancements in the packaging industry and poses a bright and exciting future in the world of food takeout and delivery packaging.

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