Implementing Eco-Friendly Cutlery in Hong Kong

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Abstract

Our goal was identifying cutlery and tableware that met the criteria of being "compostable and biodegradable," as well as being feasible for implementation in Hong Kong. Using a public survey, interviews, observations, and data analysis techniques, we concluded that Hong Kong is still in transition and, while there are many biodegradable alternatives on the market, the public lacks knowledge about how to recycle. We developed recommendations for alternatives to plastic cutlery and identified ways to improve waste management. Our project furthers the World Wildlife Fund's research and proposes a way to implement a more eco-friendly alternative to plastic cutlery.

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Finally, we would like to express thanks to our two advisors, Professor Alexander Smith and Professor Gu Wang, as well as our on-site liaisons, June Wong and Patrick Yeung, for their helpful feedback and support throughout the course of our project. In addition, we would like to thank the Hong Kong Project Center Director, Creighton Peet, for his help during the initial steps of research in ID 2050.

Executive Summary

Introduction

Estimates suggest that by the year 2050, the number of pieces of waste produced per year will equal the world's population (Stromberg, 2013). By 2100, the amount of trash produced will equal almost 11 million tonnes. Of the waste produced, almost 75% is from plastics, which litter the oceans, consume space in landfills and dumps, and damage our ecosystem (Parker, 2017). Waste management is a problem in many countries, as governments are trying to do whatever they can to reduce the amount of waste produced by people every day. One such place where waste management has become a priority is in Hong Kong.

Managing a population of over seven million, Hong Kong's government has a problem with controlling plastic waste production. From water bottles to bagged materials, plastics offer convenience for the fast-paced, on-the-go lifestyle that defines Hong Kong. In 2016, almost 136 tonnes of single-use plastic went into the city's overflowing landfills daily (Ng, 2017). With many families in Hong Kong turning towards takeout and delivery for convenient meals, the prevalence of plastic cutlery increased despite the polluting effects it has on the environment (Prof. Roger Lui, Personal Communication, Nov. 30, 2018). As Hong Kong's population grows, residents will use more utensils each year.

As the use of plastic utensils and containers is increasing, organizations like the World Wildlife Fund are looking for more eco-conscious alternatives like biodegradable forks, reusable containers, and compostable straws. Therefore, the goal of our project was determining the best biodegradable cutlery alternatives to plastic and making suggestions to the World Wildlife Fund to help them transition Hong Kong to become more eco-friendly. To accomplish our goal, we had a series of objectives that allowed us to first get an understanding of Hong Kong's culture, before proposing an approach to limit plastic cutlery, that we outline below.

Methodology

Our first and second objectives were identifying the types of cutlery used in Hong Kong in restaurants and businesses, as well as the public's knowledge of recycling. We focused on three types of consumers: restaurant owners, supermarkets, and customers who receive single-use plastic with each takeout meal. For each of these groups, we determined why they use plastic

cutlery and the frequency that they use such items. Following that, we determined important aspects that each consumer looks for when purchasing or using these items (whether it be cost, efficiency, design, or package labeling). Furthermore, we learned the extent to which the people of Hong Kong understand concepts like "biodegradability" and the importance of recycling so that we could better understand how to educate the public.

Our third and fourth objectives were analyzing the data we collected in the public survey, interviews, and observations to help the World Wildlife Fund begin transitioning Hong Kong. We conducted a cost-benefit analysis and weighted decision matrix of the alternatives we researched on the market to determine the best products for different types of restaurants. Our project helped the World Wildlife Fund determine their next steps regarding the implementation of biodegradable cutlery alternatives and how to increase public awareness about biodegradability and recycling.

Results

We found that a majority of plastic use in restaurants comes from forks, knives, and spoons. Using our survey, we determined that almost 90% of Hongkongers who get takeout are getting at least one plastic utensil with each meal, with 1 in 4 Hongkongers using plastic cutlery at least once a day. While talking with restaurants, we noted that many businesses have begun reducing their plastic use, but still provide plastic utensils to customers if asked. During this period of observation, we used the same survey to gauge the public's knowledge of recycling. We found that although the public has a basic understanding of "biodegradability" and "recycling," they do not understand *how* to recycle or what they can do individually to help reduce plastic waste.

After completing our first and second objectives, we were able to determine a set of alternatives that could be effective in replacing plastic cutlery in Hong Kong. We created a weighted decision matrix using information from our observations, survey, and interviews to define criteria and identify successful alternatives. We compared 25 different brands, including the most commonly used plastic utensil, and determined that Yantai E-Stick Bamboo and Wooden Products (E-Stick) and YIEN Wooden Cutlery would be the best alternatives for the World Wildlife Fund to consider. Using E-Stick and YIEN's product information, we conducted a cost-benefit analysis that showed how both products are comparable to the price of plastic,

possibly saving a company money as well as serving as good publicity. We used the information from our cost-benefit analysis and our results when making recommendations to the World Wildlife Fund.

Conclusions and Recommendations

Based on our observations and findings regarding the poorly maintained waste collection bins of Hong Kong, we recommend:

- *Maintaining Waste Collection Bins*: We recommend that the World Wildlife Fund contact the appropriate persons/organizations to better manage the waste collection bins around Hong Kong. By improving the appearance and clarity of the collection bins, the government can better promote proper recycling to the public.

Given our survey data and findings regarding the public's knowledge, we recommend:

- *Social Media*: We recommend that the World Wildlife Fund use their social media accounts to increase their public credibility and influence. Posting and advertising on sites and apps can have a larger outreach to the public given the high use of social media by Hongkongers.
- *Education on how to Recycle*: We recommend that the World Wildlife Fund provide concise information to the public on how to properly recycle with steps on how an individual can improve their practices. This information should be provided to show that anyone can do their part to help the environment.

Based on the brands of biodegradable cutlery we identified from our weighted decision matrix, we recommend:

- *Product Research and Networking*: We recommend that the World Wildlife Fund establish contact with Yantai E-Stick Bamboo and Wooden Products (E-Stick) and YIEN Wooden Cutlery. Our findings suggest that these alternatives can be implemented in restaurants and businesses in an attempt to transition away from conventional single-use plastics.

With our interviews, we determined the feasibility and steps needed to implement a successful alternative. Therefore, we recommend the World Wildlife Fund:

- *Acknowledge Eco-friendly Businesses*: We recommend the World Wildlife Fund acknowledge and advertise eco-friendly businesses that are using biodegradable cutlery. This could increase the exposure of successful alternatives and potentially encourage other businesses to transition as well.
- *Present Cost-Benefit Analysis to Organizations/Businesses*: Cost is arguably the overarching factor for most decisions in business. The World Wildlife Fund should assist these businesses to create a long term cost-benefit analysis to detail their potential cost savings/ losses by switching. This could help reduce uncertainty regarding the financial aspects of implementing an alternative.
- *Promote Transition to Natural Alternatives*: We suggest the World Wildlife Fund explain how switching to more natural alternatives helps to support the culture and future of Hong Kong. Being a territory heavily rooted in family and tradition, promoting how biodegradable cutlery supports Hong Kong on a social and environmental level could influence local and international businesses.

In conclusion, the goal of this project was addressing the issue of plastic cutlery use in Hong Kong and identifying alternatives to plastic that we could recommend. We encourage the World Wildlife Fund adopt these recommendations to improve their success in reducing single-use plastic cutlery. If done properly, these recommendations that we make above will not only benefit businesses, locals, and Hong Kong's future, but could also serve as a positive example to other countries around the world facing similar issues.

Authorship

Abigail equally contributed to drafting and editing each chapter of the paper as well as leading discussion during meetings and interviews. She used her Chinese language skills to help collect many of the public questionnaires and assisted with the analysis. In addition, she organized interviews, maintained external communications with our interviewee's and sponsors, and helped to create the weighted decision matrix.

Andy equally contributed to drafting and editing each chapter of the paper as well as leading discussion during meetings and interviews. He helped with creating meeting agendas, taking minutes for meetings, and assisted in constructing the observation spreadsheets. In addition, he helped in transcribing the interviews that we conducted with contacts given by the World Wildlife Fund to include in the report.

Max equally contributed to drafting and editing each chapter of the paper as well as leading discussion during meetings and interviews. He constructed the initial public survey, established first contact with restaurants, developed the foundations of the cost-benefit analysis, weighted decision matrix, and survey result analysis. In addition, he contacted product distributors and helped primarily in creating the posters that we presented to the World Wildlife Fund.

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1. Introduction

Since the early 1960's and 70's, education on responsible consumption and nature conservation has grown on a worldwide scale (Gordon, 2012). While environmentalism began with a focus on large issues and disasters, it has recently shifted towards a smaller scale analysis of human habits that can have equally devastating effects. Environmental organizations have concluded that reducing the use of plastic can have a positive effect on the cleanliness of our oceans and public areas, as well as helping prolong the life of landfills. However, the convenience and cheap price of plastic make it a preferred choice over environmentally friendly products (British Plastics Federation, 2018). High plastic use in crowded cities like Hong Kong has many negative environmental effects.

According to the *South China Morning Post*, Hong Kong disposed of almost 154 tonnes of single-use plastic tableware into its overflowing landfills in 2016 (Kao, 2018). The Hong Kong government is aware and is taking measures to stop this problem, like encouraging caterers to refrain from providing plastic cutlery to consumers. Furthermore, by 2019, all government canteens will stop providing plastic straws and Styrofoam lunch boxes. Although the government is actively trying to limit the distribution of single-use plastics, customers and businesses are having a hard time transitioning to plastic alternatives on a large scale. The Hong Kong Environmental Department (2016) predicts that, if the issue is not addressed, landfills in Hong Kong will reach capacity by 2020.

While the Hong Kong government and other organizations are aware of the low recycling rate and high plastic use, they have had difficulties implementing alternatives (Chung, 2016). Convenience is something that Hongkongers value in order to keep up with their fast-paced lives, making implementation of new alternatives difficult for many organizations, as plastic offers more convenience. Furthermore, environmental organizations in Hong Kong, such as the World Wildlife Fund (WWF), have attempted to educate the public about the damage caused by plastics; however, they have not yet identified an alternative that is easy to implement (June Wong, WWF, Personal Communication, Nov. 8, 2018). Other places like South Africa, Canada, and Europe have experienced similar struggles with high plastic use, going so far as to put an additional tax on plastic bags (Risky, 2017). As a result of this policy, Europe saw a 90% decrease in plastic bag use and litter. While Hong Kong did see a decrease in plastic bag

prevalence by implementing a similar tax in 2015, the effects were not as drastic, as plastic is still the most convenient option for the residents of Hong Kong (Kao, 2015).

The World Wildlife Fund (2018a) in Hong Kong is an organization dedicated to maintaining a clean environment through education of the public. They are aware of the large amount of plastic waste that Hong Kong produces and are working to identify alternative materials (like wood or plant-based) that could replace single-use plastics. However, integrating these alternatives into the fast-paced lives of Hongkongers has been difficult.

Our goal was identifying cutlery and tableware that met the criteria of being "compostable and biodegradable," as well as being feasible for implementation in Hong Kong. To achieve our goal, we had the following objectives: (1) Determining the public's opinions and knowledge on recycling and waste management strategies, (2) Identifying the extent of plastic cutlery use, (3) Determining the costs and benefits of new cutlery options for Hong Kong businesses, (4) Proposing an approach to limit the amount of plastic cutlery used. To achieve these objectives, we made observations, surveyed the public, and interviewed restaurant owners and recycling agency members to determine their opinions on plastic consumption. We then analyzed our results using a cost-benefit analysis and a weighted decision matrix to identify the best alternatives. After determining the best alternatives for Hong Kong, we made informational guides and educational graphics for the World Wildlife Fund to post on their social media accounts. We expect that our recommendations on biodegradable and compostable cutlery will have many benefits on the environment of Hong Kong and the surrounding oceans.

2. Background

Many countries face the problem of poor recycling (Fieschi, 2018). The complex composition of plastics and the way they degrade is harmful to wildlife, polluting our oceans, land, and air. The World Wildlife Fund recognizes this issue in Hong Kong and is actively researching more environmentally friendly alternatives to single-use plastic items, specifically for tableware and cutlery (WWF Hong Kong, 2018a). In this chapter, we discuss how single-use plastics affect the environment. Furthermore, we discuss how other places have recommended alternative options, and their varying levels of success. We conclude with a description of Hong Kong's environment and why there is a low recycling rate in the city.

2.1 Plastics

The composition and manufacturing process of plastics can help explain why plastics cause environmental damage (American Chemistry Council, 2018). In this section, we discuss the different kinds of plastics, why they are harmful to the environment when they degrade, and the strategies that other places around the world have taken to limit their plastic consumption.

2.1.1 Composition

The term "plastic" refers to materials composed of elements such as carbon, hydrogen, oxygen, nitrogen, chlorine, and sulfur (American Chemistry Council, 2018). Plastics are composed of polymers that typically have a high molecular weight, meaning that each molecule can have thousands of atoms bound together. The higher the molecular weight of the polymers, the less degradable the plastic will be (Tokiwa, 2009). Plastics are manufactured to mimic natural materials that have high molecular weights such as wood, horn, and rosin. However, the composition of plastics poses a problem as they contain chemicals and additives for longevity and strength. Plastic pollution places a burden on the environment as the chemicals leak into groundwater, air, and the surrounding areas, especially when left unattended for extended periods of time (Ecology Center, 2018). These pollutants are not only hazardous to the environment, but can lead to severe health problems such as endocrine disruption, impaired immune systems, and reproductive problems in both humans and animals.

2.1.2 Defining "Biodegradability"

Biodegradability refers to the ability of a material to be decomposed by "biological activity" - the breakdown of organic and synthetic compounds by microorganisms - in a natural environment (Focht, 2014). However, the extent to which something degrades is classified on a spectrum, as something can be fully biodegradable, partially biodegradable, compostable, or cannot be broken down at all. Fully biodegradable materials could help to solve the issues regarding overflowing landfills as these materials disappear in nature after some time. Plastics that are biodegradable may also be compostable, which means that they degrade into carbon dioxide, water, mineral salts, and biomass through a biological process that occurs naturally. However, environmental organizations are not able to classify all biodegradable materials as "compostable" due to the conditions required for them to properly compost. Specific conditions are also required for the proper decomposition of materials classified as being "biodegradable" which we further describe in Section 2.2.1 (Rujnić-Sokele, 2017). Furthermore, recycling agencies have not sufficiently defined their testing methods to determine if something is truly "compostable" due to confusing standards and definitions (Reiven, 2018). As such, the sustainable management of biodegradable plastics depends on the properties of these plastics, the way people dispose of them, and the environments in which they are disposed.

2.1.3 Worldwide Need for Plastic Alternatives

Plastic consumption is high around the world. In 2016, the world population generated around 242 million tonnes of plastic waste, totaling 12 percent of all solid municipal waste (WorldBank, 2018). Many of the main contributors, being East Asia and the Pacific (57 million tonnes), Europe and Central Asia (45 million tonnes), and North America (35 million tonnes), have been striving to reduce their plastic use. As the nature of recycling is different everywhere, governments have implemented a variety of strategies (with varying levels of success) divided primarily into three categories: policies, societal changes, and industrial changes.

Policy is a way to influence plastic use through taxation. Governments and environmental organizations around the world have implemented policies to limit the public's plastic use. Locations like Thailand and San Francisco have even implemented taxes on plastic products in an attempt to reduce their prevalence (Tanakasempipat, 2018). A good policy can provide a simple and quick stop to the issue.

For others, the societal and cultural effects of plastic abundance can be just as shocking as a tax. The tax on plastic bags in Indonesia and the Philippines, for example, has negatively affected their food industry (Tanakasempipat, 2018). For the people in these countries, rather than a government tax, the effect on their local marine life prompted a desire for change. Unlike policy changes, societal changes take time and require the people to notice the problems. However, many organizations, including the ReThink Plastic Alliance (supporting the EU policy of the "Break Free From Plastic" global movement) feel that allowing people to recognize the issue, in addition to their government's taxes, is the most successful way to see changes (Alvares, 2018). Europe's Plastic Alliance focuses on reducing an individual's plastic consumption, through knowledge and campaigning, while also focusing on the devastating effects from industries (para. 2).

Industrial changes are the most difficult, as they require time, money, and legislative initiatives to be successful (Shaxson, 2009). However, industrial changes target the source of the problem and are, therefore, also the most effective if done properly. In the United Kingdom, plastic businesses employ around 220,000 people across 6,000 businesses, producing an estimated revenue of around £12.4 billion. Furthermore, the United Kingdom uses around 5.9 million tonnes of single-use plastic per year as there are no restrictions on them. As a result, the Department of Business, Enterprise and Regulatory Reform (BERR) is supporting businesses that switch to more environmentally-friendly manufacturing or prompting organizations to cut back on overall waste. In addition, the UK's Department for Environment, Food and Rural Affairs is playing a part in developing policies to reduce the impact of plastics on land and sea.

While many of these strategies have been successful, without a product that can replace single-use plastics, changes are hard to enforce (Alvares, 2018). Many alternatives exist, but identifying the correct plastic alternative determines the success of the anti-plastic movement (Gordon, 2012).

2.1.4 Biodegradable Plastics on the Market Today

There exist many eco-friendly alternatives to single-use plastics (US Environmental Protection Agency, 2016). For example, in Seattle, the PPC Community Markets have already transitioned to compostable/paper straws, birch wood cutlery, and compostable coffee cups. For cutlery, the main material used for alternatives is bagasse, a material made from the processing

of sugar cane, that can decompose in the environment (Salem, 2014). However, the main kind of recyclable and compostable material used as a plastic substitute globally is polylactic acid (PLA), which closely resembles plastic and degrades rather than contributing to overflowing landfills (Royte, 2006). However, PLA must be processed in a certain way in order for it to properly compost in nature, which we further describe in Section 2.2.1. Unfortunately, some places like Hong Kong can not process PLA properly (Chung, 2016). For Hong Kong, paper and wood products are the best eco-friendly alternatives as they can be properly managed (Dr. Wong, Fukutomi Recycling, Personal Communication, Jan. 31, 2019). Other plant based biodegradable tableware options on the market include products like Loliware and Leaf Republic. While these products degrade properly without harming the environment and do not require much management, their performance is not comparable to plastic (Rujnić-Sokele, 2017). People believe that transitioning to biodegradable alternatives would significantly reduce the prevalence of plastic pollution (Ritchie, 2018). However, many also doubt the strategy of implementing single-use compostable or bio-plastic items, over reusable utensils, as they require just as much, if not more, materials and energy to produce (Boyd, 2017).

2.2 Factors Associated with Changing to Eco-Friendly Alternatives

As we mentioned in Section 2.1.4, there are many biodegradable alternatives to plastic (McClurg, 2015). However, even with the extensive research on the dangers of plastic pollution, plastic is still very prevalent (Ritchie, 2018). One reason could be economic factors such as cost differences and the availability of eco-friendly options. Another could be that processing eco-friendly alternatives requires certain infrastructure that many places do not have (Harris, 2018). In this section, we analyze the cost of changing to eco-friendly alternatives to show why plastic is so common in society today. Furthermore, we discuss why changing to eco-friendly alternatives is difficult in many places.

2.2.1 Processing and Managing Eco-Friendly Plastics

Many types of eco-friendly cutlery that we described in Section 2.1.4 require certain disposal and processing in order for them to properly decompose (Davey, 2017). The way these materials are processed is vital to being a successful alternative. Unfortunately, many places lack the infrastructure and knowledge to properly manage these biodegradable alternatives, which is

an important factor to consider before selection. As stated by Celine Jennison, founder of Plastic Tides (a nonprofit organization in Ithaca, NY), “Many restaurants today offer ‘compostable’ utensils when people get takeout; however, the odds that their customers are properly disposing of the compostable utensils are really low” (Harris, 2018, para. 7). There are various ways to “properly dispose of ‘compostable’ utensils” as we show in the first column of Table 1 below. Many products promote being “self-compostable” or able to breakdown in the user’s home; however, the table describes that certain composting systems such as rotting boxes or tunnel systems must be implemented. Furthermore, composting can take a long time, as we note in the “Active composting” column in Table 1.

Table 1: Breakdown of Different "Self-Compost" Methods (H.K Government, 2017)

Type of Composting System	**Description of System**	**Active Composting**	**Post-Rotting**
Rotting Boxes	Closed, air-forced, no turning applicable, humidification by process & industrial water	7-10 days	56-70 days
Tunnel System	Conditioned organic waste loaded into a tunnel, final composting in windrow, forced aeration, no turning applicable, humidification by process & industrial water	2-3 weeks	5 weeks
Enclosed windrow	Forced aeration, automatic turning process included, humidification by process & industrial water	9 weeks	3-4 weeks
Trapezoidal windrow (open air)	Pre-fermentation, includes a 3 week anaerobic period, turning performed, additional aeration not applicable, humidification up to 2 ½ weeks (industrial & process water used during turning process)	5 weeks	8-12 weeks
Triangular windrow (covered)	Simplest form of composting, no forced aeration, turning performed weekly, humidification up to 2 weeks, industrial & process water used during turning process	4 weeks, average 4-6 months	n.a.
Triangular windrow (uncovered)	Flexible composting time, and degree of composting, additional aeration not applicable, turning required at least every 4 weeks, humidification by industrial & process water	6 weeks, average 3 months	n.a.

Jennison also describes the effectiveness of "bio-plastics," which use natural materials coupled with plastics but that "act like plastic and [only] break down into smaller and smaller pieces because they need a high temperature to really break down" (Harris, 2018, para. 13). Therefore, determining which plastics are truly biodegradable and feasible for a certain country, given their recycling methods, is very important before recommending them. Otherwise, "biodegradable" products may end up in landfills and do more harm than good. This demonstrates the need for public education about how to handle different biodegradable products (Davey, 2017). Many organizations encourage a standardized education on how to be well-informed when recycling because, if left unguided, many people will not change their habits, and the progress of transitioning to eco-friendly alternatives will stop.

2.2.2 Cost Analysis of Changing to Eco-Friendly Cutlery

For all of the alternatives to plastic, cost is an important factor. Eco-friendly cutlery is known for being costly compared to traditional plastics due to the way it is produced, and the methods needed to process it that we describe in Section 2.2.1 (PlasticFree HK, 2017). For example, a common brand of biodegradable cutlery is Transitions2earth (Greenstaurant, 2018). Transitions2earth makes different kinds of cutlery, all of which degrade naturally in landfills. For approximately $210 HKD, you can buy 500 of their biodegradable plastic spoons wholesale ($0.39 HKD/piece). In comparison, the common SOLO brand plastic spoons are only approximately $93 HKD for a pack of 500 ($0.19 HKD/piece). Other common brands like Loliware and Vegware are even more expensive, making them less appealing to consumers (Vegware, 2018). If an organization commits to an alternative, they must consider aspects like money and time.

2.3 Hong Kong Culture

The territory of Hong Kong has a deep history of consistent development and change. With a population of over 7 million, many of the government's actions focus on ensuring the best lifestyle possible (Worldometer, 2018). However, as the government focuses on trying to meet the public's expectations, sometimes other necessities are not prioritized. In this section, we discuss Hongkongers' daily habits and their current recycling methods.

2.3.1 Lifestyle

Hongkongers live fast-paced lives, balancing the traditional Chinese practices with a modernized lifestyle (Living in Hong Kong, 2018). The densely populated city has one of the best public transportation systems in the world which offers its people an easy and quick way to get around (Odyssey Tours, 2018). One article even describes the lifestyle by stating "they walk fast, eat fast, speak fast, and live fast" (Odyssey Tours, 2018, para. 3).

The fast-paced lifestyle in Hong Kong may help to explain why people choose convenience when purchasing products. Most people in Hong Kong carry around plastic water bottles, as they are light, cheap, and most of all, easy to get. A study by The Green Earth (2017) in Hong Kong found that around 60% of the population buys a plastic bottled drink daily. Furthermore, the study showed that there was not only a high use of plastic bottles, but a lack of knowledge that over 5 million bottles were thrown away each day (Cheah, 2016). As a result, Hong Kong lifestyles have negatively impacted the environment.

2.3.2 Food Culture

Due to the fast-paced lifestyle, eating out is popular in Hong Kong. A recent study of 401 people in Hong Kong showed that approximately 65% of people between the ages of 15 and 59 eat out more than four days a week (Chan, 2016). Many restaurants are fast food restaurants that typically serve single-use plastic cutlery. In fact, the city's most popular fast-food chains, which include Cafe de Coral, McDonald's, Jollibee, and KFC, collectively generate tonnes of plastic waste every day, with about a third being from plastic utensils (Tsang, 2018). This could be because Hongkongers eat about five meals a day, increasing the amount of cutlery they use (Sterling, 2001).

Besides the large amount of plastic cutlery restaurants use, there has been an increased popularity in restaurants that use online food delivery apps (Blundy, 2017). Since food delivery comes with plastic cutlery and packaging, their high use is also producing a lot of plastic waste. The increasing number of people using food delivery apps has become a worldwide phenomenon, and contributes to the volume of plastic Hongkongers throw away daily (Odyssey Tours, 2018).

2.3.3 Recycling Methods

Hong Kong's government (2017b) has established recycling methods that attempt to make recycling convenient for residents. For example, in 2005, the Environmental Protection Department launched the Programme on Source Separation of Domestic Waste with the goal to make separating waste more convenient for residents. This programme encouraged property management companies to provide waste separation facilities on each floor of buildings in Hong Kong so that various kinds of plastics and paper could be recycled domestically. Other items like electronics and batteries can now be disposed of in Hong Kong by bringing them to the brightly colored collection bins scattered around the city that we show in Figure 1 below.

Figure 1: Hong Kong's "Brightly Colored" Recycling Containers (Davey, 2017)

According to the Hong Kong Environmental Protection Department's (2015) recycling figures, 35% of the 5.7 million tonnes of waste produced annually from household, commercial and industrial sources is recycled, 44% of it being paper (Kammerer, 2017). While this statistic seems impressive, much of what was "recycled" was actually shipped to mainland China or elsewhere for disposal, as Hong Kong lacks paper recycling and manufacturing plants for the processing of waste (Tam, 2006). However, as of 2018, China has closed their borders and no longer receives outside waste from Hong Kong (Dr. Wong, Fukutomi Recycling, Personal Communication, Jan. 31, 2019). Therefore, Hong Kong's efforts in waste management are now in critical need of improvement.

2.4 Knowledge of Recycling in Hong Kong

While environmental organizations have advertised the importance of being environmentally conscious, many people are still not making changes in their everyday lives (Government of Hong Kong, 2017c). Because the Hong Kong government has focused mainly on growth and development over the past few decades, it has not prioritized proper waste management. In this section, we analyze the importance of recycling in Hong Kong and the environmental awareness of the public.

2.4.1 Importance of Recycling

For a highly populated place like Hong Kong the abundance of municipal solid waste – things like food scraps, cardboard, human biological waste, and plastic – has grown steadily over the past few decades. While an individual may only use a couple pieces of plastic daily, the combination of people in Hong Kong paired with the increasing need to meet the "fast-paced lifestyle" has seen Hong Kong generating almost 6 million tonnes of municipal waste every year (H.K. Environmental Protection Department, Statistics Unit, 2017). Most of this waste is stored in two landfills named the West New Territories (WENT) and the North East New Territories (NENT) (H.K. Environmental Protection Department, 2016). While Hong Kong's Environmental Protection Department provides a controlled solution for the time being, they expect that these landfills will reach their maximum capacity in almost two years, forcing the government to seize more land to convert to landfill area. The Environmental Protection Department estimates that if waste production is not reduced, almost 400 hectares of land (1.5 square miles) will need to be converted to a landfill to meet the population's waste disposal needs by 2030. Where that land will come from poses a large concern for Hong Kong.

Therefore, the Government of Hong Kong (2017b) and eco-friendly organizations like Green Earth (2017) and GreenPeace have made consistent efforts to encourage the proper control and reduction of waste by the population. Despite these efforts, however, Hong Kong still has a massive waste output, potentially due to the public's lack of understanding on how to recycle (Pradhan, 2018).

2.4.2 Environmental Awareness

While many people in Hong Kong are aware of the importance of recycling, not understanding *how* to properly recycle is a problem (Pradhan, 2018). On Hong Kong's Environmental Protection Department (2017) website titled "Waste Education," the information about when, where and why to recycle is evident. However, the site does not clearly define the proper steps on how to recycle. Although the Hong Kong Government (2017b) has begun to educate the public and increase the prevalence of waste control organizations like Wastewi$e (which help provide businesses and organizations with plans to reduce waste), it falls primarily on the people to properly recycle. According to Plastic Free HK Founder, Lisa O'Dell, "the main issue is that Hongkongers do not have access to recycling collection points or do not know where they are," as she urges users to read through the government's recycling regulations (Plastic-free HK, 2018, para. 3). However, in a fast-paced place like Hong Kong, the importance of recycling does not always take precedence over other daily tasks and can unintentionally cause problems.

Finding methods that produce the least waste, whether they rely on biodegradability and compost-ability or require fewer materials, seems to be what Hong Kong needs to combat its waste problem (Pradhan, 2018). While the public in Hong Kong has begun to address the problem, some important distinctions regarding how to handle waste and ways to help the region overall are needed. By providing people with a clear, defined, and easy path to follow, Hong Kong could see improvement in waste management in the future. As such, we gathered additional background information through research, interviews, and observations (that we describe in Chapter 3) in order to examine plastic cutlery use in Hong Kong and make recommendations.

3. Methodology

Our goal was identifying the best kind of biodegradable, eco-friendly cutlery and tableware for use in Hong Kong based on public perception, feasibility, cost, and environmental concerns. The World Wildlife Fund intended to use this information to further their independent research on biodegradable products and educate the public about alternatives. To achieve our goal, we had the following objectives:

1. Determining the public's opinions and knowledge on recycling and waste management strategies in Hong Kong;
2. Identifying the extent of plastic cutlery use in Hong Kong;
3. Determining the costs and benefits of new cutlery options for Hong Kong businesses;
4. Proposing an approach to limit the amount of plastic cutlery used in Hong Kong.

In this chapter, we explain the methods that we used to achieve our four objectives. Our team hopes that this will help the World Wildlife Fund further their research on biodegradable alternatives and ultimately help lead to a reduction of plastic waste in Hong Kong.

3.1 Plastic Use and Waste Management in Hong Kong

In the first phase of our project, we acquired an understanding of recycling in Hong Kong and experienced first-hand how Hong Kong manages its waste. As we explained in Chapter 2, the primary reason for the high plastic consumption does not stem from a lack of eco-friendlier options, but from a lack of knowledge. We hypothesized that not knowing how to recycle is one of the biggest issues stopping people from changing. Determining the public's knowledge and the way that Hongkongers recycle and use plastic helped us develop ideas about how the World Wildlife Fund can further their research.

3.1.1 Observations of Local Areas and Restaurants

To determine the use of plastic cutlery in Hong Kong, we made observations in and around restaurants in different districts, including Kowloon and Central. We focused on identifying the extent of plastic use as well as how restaurants have (or have not) attempted to limit their distribution. We took photos of plastic cutlery used in restaurants, as well as any educational flyers or posters restaurants have displayed to promote eco-friendliness. Our team organized all of the pictures and observations in a spreadsheet containing columns like "Restaurant Name," "Type" (franchise or independently owned), "Location," "Plastic use," etc. By organizing our observations in a spreadsheet, we were able to easily compare restaurants and their plastic use.

3.1.2 Survey of the Public

To identify biodegradable cutlery that could succeed in Hong Kong, we determined recycling knowledge and opinions among residents using a public survey, thus achieving part of our first objective. By doing so, we learned what "biodegradability" and "compostable" mean to the public, as well as how often residents purchase takeout food and ask for plastic cutlery at restaurants. Furthermore, we determined if residents have access to recycling facilities and if they feel educated on how to properly recycle.

We surveyed a sample of the population during various hours of the day, in the largest districts of Hong Kong including Mong Kok, Central, and Kwai Tsing due to these areas maintaining the largest population densities (and consequently representing diverse communities) (Worldometers, 2018). Given that the population of Hong Kong is 7.4 million

people, we planned to collect approximately 300 - 400 questionnaires to ensure that the population was well represented (Krejcie, 1970). Our survey was brief, contained traditional Chinese characters and English, which we administered to residents on paper and collected on the spot. Our survey also contained a QR code which allowed participants to take it online when it was convenient for them. In addition to convenience sampling using the paper questionnaires, we also used the World Wildlife Fund's contacts to administer the electronic version of the survey to help improve our outreach. Identifying the public's knowledge allowed us to better understand the public's views on recycling and tailor our recommendations. The survey is in Appendix C.

3.1.3 Interviews with Recycling Agency Members

While surveying people was important for us to determine what Hong Kong residents know about recycling, the responsibility of recycling also falls on the people who manage the region's waste. We interviewed representatives from Fukutomi Recycling and Chun Shing Development HK Limited about the process of recycling, overall recycling volumes, what kinds of materials are able to be recycled in Hong Kong, and additional problems that they face with plastic management. In addition, we asked if they have made efforts to educate the public and reduce plastic waste. We communicated with these agencies via the contacts given to us by our sponsor and asked for additional people that we could interview in each organization. Interviewing these agency members allowed us to identify the needs of recycling agencies so that we could research products that were suitable for Hong Kong's waste management facilities. The interview protocol is in Appendix D.

3.2 Cutlery in Hong Kong

To achieve our second objective, we determined the types and the amount of plastic cutlery people use in Hong Kong. To do so, we interviewed chain restaurant owners/managers as well as owners of smaller, independently owned restaurants who provide cutlery to their customers. We also observed local convenience stores and supermarkets to determine the types of products available to consumers. In addition, by determining restaurant needs (through interviews) and what products are available to the public, we were able to identify the right

characteristics to look for when finding alternative cutlery, and why the public prefers some products over others.

3.2.1 Interviews with Restaurant Managers and Staff

We interviewed restaurant owners and employees to get a better understanding of what kinds of cutlery they provide, if any, and why. We conducted these interviews with a variety of popular chain restaurants such as McDonald's, Starbucks, and Jollibee, as well as smaller, independently owned restaurants. Through these interviews, we learned about the quantity of plastic they use and why they choose their cutlery over others. We also asked how willing these restaurants would be to consider changing their cutlery, allowing us to identify the restaurant industry's current knowledge about eco-friendly alternatives and any measures they are taking to be more environmentally friendly. We used this information to identify qualities of cutlery to research and the feasibility of introducing these alternatives. The protocol for these interviews is in Appendix E.

3.2.2 Observations in Convenience Stores and Supermarkets

We also learned about the cutlery options available to the public by observing popular convenience stores and supermarkets like 7-Eleven, Circle K, ParknShop, and Wellcome. We recorded the types of cutlery supermarkets and convenience stores sell and the cost of each type. We then documented and organized our observations in a spreadsheet to summarize our findings. This information helped us determine the extent of plastic cutlery being given to the public through convenience stores and supermarkets. By identifying the extent of plastic cutlery coming from supermarkets and the prices of these plastic products, we were able to gain background information so that we could research cost-effective alternatives and tailor our recommendations.

3.3 Analyzing Biodegradable Cutlery Options

After identifying a variety of biodegradable products, we narrowed down our list of potential alternatives by analyzing the costs and benefits of each option in a weighted decision matrix. In this section, we describe how we compared the different brands of biodegradable cutlery and how they met the criteria defined by the Hong Kong public and the restaurants we interviewed.

3.3.1 Quantifying Data from our Survey

We summarized the information from the survey, interviews, and observations that we described in Sections 3.1-3.2 in tables and diagrams. We expected that a majority of our survey data would be quantitative based on the questions asked; however, given that question 1 was open-ended, it needed further analysis. To quantify responses, we used content analysis with our main research question focusing on if the public understands the concept of biodegradability. We identified key words in the responses to question 1 that would allow us to classify each respondent as having a "good understanding," "moderate understanding," or a "poor understanding." We then tallied up the number of responses in each category and used the data to individually analyze people's knowledge within the three groups defined above. This helped us to determine the most important points to educate the public about on a more personal scale. We also used the data to make a weighted decision matrix, as we explain in Section 3.3.2, as well as creating the materials for our approach to limit the amount of plastic cutlery that we describe in Section 3.4.

3.3.2 Creating a Weighted Decision Matrix

After converting the survey responses to quantitative data, we created a weighted decision matrix to compare the different kinds of biodegradable cutlery we researched. A weighted decision matrix is a tool used to compare alternatives using multiple criteria with different levels of importance (ASQ, 2018). We summarized aspects such as cost, availability, appearance, durability, and other factors that the public as well as restaurant owners reported being important in the survey or in interviews. We noted aspects of cutlery that appeared more frequently throughout our results as being more important to the consumer and recycling industry, and gave them a "higher weight" in the matrix. Next, we compared each biodegradable alternative to the current plastic products in supermarkets to see which products were best. By doing so, we established rankings for each product so that we could recommend the best alternative for Hong Kong.

3.3.3 Cost-Benefit Analysis

After we developed our matrix, we created a cost-benefit analysis to estimate the cost implications biodegradable alternatives would have. We gathered the wholesale prices of our alternatives from their distributor websites and compared these prices to those used by fast-food

chains, like McDonald's, by pulling supplier data from yearly balance sheets, allowing us to estimate what large franchises might spend on cutlery. By comparing the two prices, we determined the percentage savings/losses for a business if our product was implemented. In addition to the weighted decision matrix in Section 3.3.2, this helped us to determine if a product was feasible.

3.4 Limiting Plastic Cutlery Use in Hong Kong

The last phase of our project was to make recommendations about the best alternatives to conventional single-use plastics and how to educate the public in Hong Kong. We did this by using the information from the interviews, survey, observations, and analysis techniques that we described in Sections 3.1-3.3. We hoped that by educating the public, there would be an increased awareness about feasible biodegradable options. In this section, we outline our approach to educating the public about recycling.

3.4.1 Creating Visuals and Educational Graphics

Using software packages like Canva and Adobe Photoshop, we created virtual flyers including information about biodegradability and recycling, alternatives to single-use plastics, and information regarding the sorting process. We created these bright and colorful graphics to highlight the negative effects of plastic and encourage the public to recycle properly. We used these visuals and graphics to capture the public's eye through the World Wildlife Fund's social media accounts. By using social media, the World Wildlife Fund can potentially increase the number of people they are able to reach. The graphics we created are in Appendix F.

4. Results and Analysis

Throughout our project, we worked to achieve our four main objectives and goal of identifying the best biodegradable alternatives to plastic utensils. Here, we begin by explaining our findings about public knowledge and detail the abundance of plastic in the city, that we determined through our observations and survey. We then describe how plastic is managed by recycling agencies and restaurants. Finally, we analyze the biodegradable alternatives that we identified and provide recommendations about these alternatives.

4.1 Understanding Plastic in Hong Kong

By conducting our observations, interviews, and public survey, we determined that the confusion among the local people extends from an abundance of advertisements and waste management strategies with no clear message. While much of the public is aware of topics like "biodegradability" or "compost-ability," the lack of personalized direction is hindering many people's ability to contribute. In this section, we outline the abundance of plastic waste in Hong Kong and the public's knowledge of plastic pollution and recycling.

4.1.1 Abundance of Plastic Around Hong Kong

Despite current waste management strategies, there is a lot of plastic waste, particularly plastic cutlery and packaging, littering Hong Kong. We observed that a large portion of the plastic waste in Hong Kong is coming from the restaurant industry (which we further describe in Section 4.2.2). Although the restaurant industry is producing a lot of plastic waste, we observed that the public produces just as much. We observed a large number of recycling collection bins in the city for the disposal of the public's plastic; however, the condition of these bins is affecting their effectiveness. The overflowing bins are not only unappealing, but also hindering people's ability to properly dispose of their garbage. Figure 2 shows the poor condition of one waste collection bin in Mong Kok that we took in January 2019.

Figure 2: Poorly Managed Waste Collection Bin in Mong Kok

The poor condition of the recycling bins is also affecting the way that recycling agencies manage the waste. Our interview with Mr. Wong - member of the Hong Kong Scrap Plastics Association and founder of Chun Shing Development (HK) Limited - helped us understand the amount of plastic that recycling agencies have to manage and the problems associated with the current methods. Much of the garbage that is "recycled" by the public ends up in a landfill due to it being put in the wrong bin or contaminated (Mr. Wong, Personal Communication, Jan. 22, 2019). We determined that the high volume of plastic improperly sorted in these bins is due to a lack of public knowledge, as well as the desire to make a change which we further describe in Section 4.1.2.

4.1.2 Public Responses to Plastic Use

While understanding plastic use is important, it was also useful to understand the public's knowledge about recycling. By talking with business people and market vendors, we were able to test the claim that "Hong Kong is knowledgeable about recycling," and identify gaps in their knowledge that would be helpful to know when recommending solutions. We worked for 5 days in Mong Kok, Central, and Kwai Tsing to gather over 300 questionnaires which we then compiled into an excel spreadsheet. While we expected to find a lack of knowledge, we actually found that many Hongkongers have a good understanding of recycling overall, but simply do not understand the specific steps that they must take to personally make an impact.

Using the survey in Appendix C, we identified factors and aspects that the public finds important when choosing a "biodegradable alternative." In the first question, we asked the respondents to define "biodegradability." This question allowed our team to classify the survey respondents into three groups based on our own content analysis which can be seen in the first row of Table 2 below. We categorized people that responded with terms like "Decompose" and "Degrade" as someone with a "good" understanding, while we used terms like "Recycle" or "Natural" to identify those with a "moderate" understanding, and "I Don't Know" indicated a "poor" understanding. After we divided the survey respondents into three groups based on their responses from question 1, we then analyzed the data within these groups, which we show in Table 2 below.

Table 2: Example Results of Survey Question 1

Good Understanding	**Moderate Understanding**	**Poor Understanding**
Key Word Examples: "Organisms, Environment, Decompose, Degrade"	**Key Word Examples: "Animals, Non-toxic, Recycle"**	**Key Word Example: "I Don't Know, Durable"**
Ability to break down	Waste Less	Easy to Remove
Break down naturally	Is Earth-made	I don't know
that materials can break down naturally	stuff which easily get converted to fertilizer or mix in nature	completely grow in soil
products that can be broken down in time	can be easily recycled	Go into ground
If you were to bury, would become earth	material disintegrates	I don't know

From our second question, we learned that the three most important aspects for something to be "biodegradable" (according to the public) are the "ability to degrade," the item being "non-toxic," and the item's overall "plastic content." From this information and the results of question 1, we determined that the majority of the public does have a baseline understanding of biodegradability, as these three terms fall in line with the definition of "biodegradable."

When reviewing our third question, we noted that while on average about three out of four Hongkongers have access to recycling facilities near their residence, those that we categorized as having a "good understanding" have 16% greater access to recycling facilities than those with a "poor" understanding. This could indicate that those with a better understanding of recycling are actively seeking out homes or apartments that provide these services and therefore are more conscious about being environmentally friendly. In contrast, this could also indicate that those with a poor understanding are unaware of recycling facilities near their residence and lack the ease of access needed to make a change individually. However, we did not account for this information in our survey and it could be a potential area of interest for the World Wildlife Fund.

We also noted that 75% of the respondents who have a "good understanding" feel that they are properly informed about recycling which we show in the red and yellow sections of the chart in Figure 3. In comparison, those with a "poor understanding" were not as confident in their knowledge causing more equally distributed results between those who agree, disagree, and felt neutral, which we show in the pie chart in Figure 4.

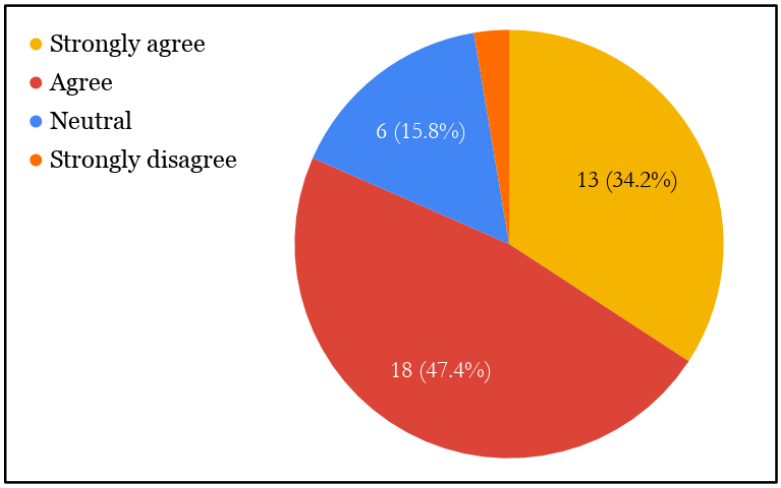

Figure 3: "Good Understanding" Survey Results of Question 4

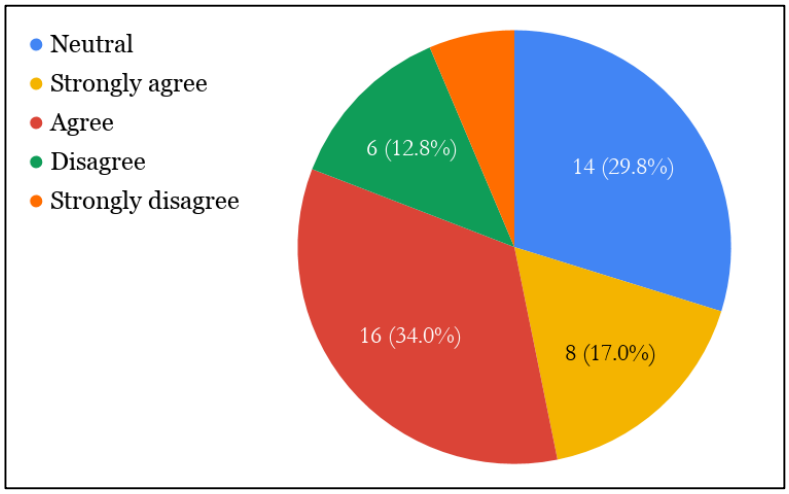

Figure 4: "Poor Understanding" Survey Results of Question 4

Although many people understand the concept of biodegradability and feel they are informed about how to recycle, our fifth survey question indicated that many individuals are not taking steps to be more eco-friendly. When we asked if people request plastic utensils when getting takeout, we noted that 53% of people only ask if their meal required utensils, while 37% ask regardless; the other 10% say they have their own sets which we show in Figure 5 below.

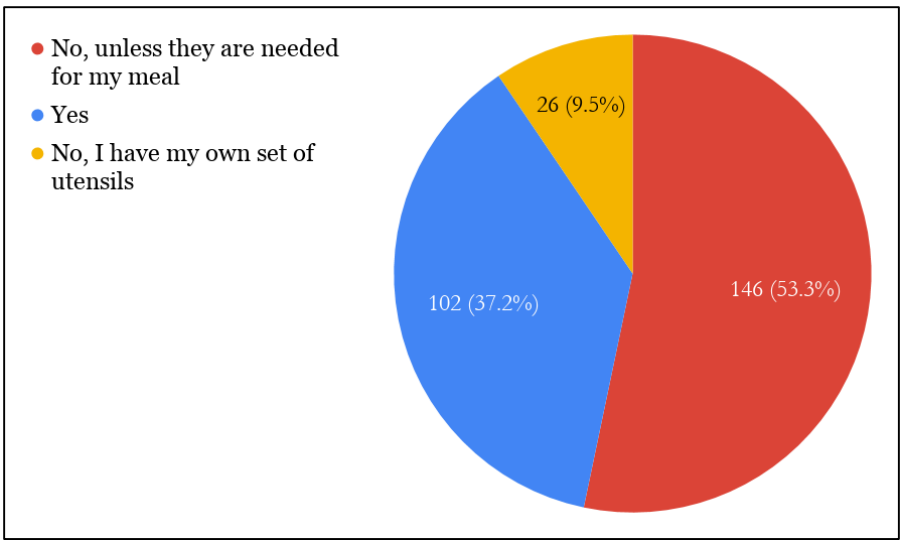

Figure 5: "Asking for Plastic Utensils" - Total Survey Results of Question 5

While businesses like Starbucks or McDonald's are attempting to limit their use of plastic straws and cutlery, our survey data shows that approximately 90% of customers continue to ask or use cutlery with takeout orders, with 1 in 4 people getting plastic at least once a day. As a result of this information, while a majority of Hong Kong can benefit from education on biodegradability, educating the public about steps that they can take personally to limit their individual plastic use would be equally as, if not more, beneficial.

Although our survey was useful in determining the public's knowledge, we were aware of some limitations. For example, we did not keep track of respondent demographics. We focused on being as inclusive as possible, but realized later that having this information might have been beneficial when it came to advertising and education plans. Furthermore, while heading to multiple locations was meant to diversify respondents, we avoided rush hour times (12-2 pm on weekdays) as to not disturb workers during their breaks, instead favoring parks, cafes, and shopping centers during quiet times. Lastly, while we were able to use all 300 survey responses when looking at total gathered data (as seen in Figure 5), we could only use around 200 during our content analysis due to the lack of valid responses from our first question. This is potentially due to a translation error in the first question where the characters in Chinese could be confused with "Do you know" rather than "What does biodegradable mean?", prompting some surveyees to respond with "Yes" or simply skipping the question all together. These survey responses still provide valid answers to questions two through six, but to prevent misconstruing data, we could not use the first question in our content analysis.

Overall, the responses from the survey helped us identify important aspects to advertise something as "biodegradable," as well as determining ways to educate the public. The data also supported our hypothesis regarding the high volume of takeout food and plastic cutlery coming from the restaurant industry. As a result, we used these data sets to add to our background research, determine alternatives, and design an approach to limit plastic use that we describe in Section 4.4.

4.2 Distribution of Plastic Cutlery

We found that the use of plastic cutlery was larger than what we had initially thought. While supermarkets sell plastic cutlery, the main source seems to be the restaurant industry. In this section, we analyze our observations in supermarkets, as well as the interviews that we conducted with restaurant owners and staff.

4.2.1 High Plastic Use in Restaurants

Restaurants provide consumers with a large amount of plastic, as ordering takeout has become increasingly popular and convenient. According to our interviews with recycling agencies, Hong Kong is struggling to regulate and recycle plastics overall. Based on our survey results, ordering takeout food is a daily task for most Hongkongers, whether it be at fast food chains, restaurants, or food stands. The problem is the amount of plastic that comes with each takeout meal. Although restaurants have taken some steps to be more eco-friendly, Hongkongers are still having difficulties reducing their plastic consumption. We show an example of a typical local takeout meal in Figure 6 below, where every item has plastic material.

Figure 6: Takeout Meal Showing High Amount of Plastic

We observed that several restaurants offer takeout options and hand out plastic utensils or straws based on the type of meals people order, primarily because plastic utensils are the cheapest option to give to a customer. To support this claim, we learned that larger restaurants care more about cost-efficiency rather than unique appearance, as the cutlery at these kinds of restaurants look very similar and lack branding/logos. Through interviews with some of the most

common food chains in Hong Kong, we found that each chain has their own methods to reduce plastic use. In Starbucks, employees only give out plastic utensils to customers who specifically request them (Starbucks Employee, Personal Communication, Jan. 28, 2019). In addition, employees typically ask dine-in customers if they would like to use a reusable mug instead of plastic/paper cups. However, while some Starbucks branches (like the one we interviewed in Kowloon Plaza) are enforcing this policy, it seems like other Starbucks branches are not. For example, through our observations at the Starbucks location in Langham Place, a dine-in meal came with a plastic fork, knife, straw, and cup although we did not request it. It could be because this is a relatively new policy and transitioning and employee training takes time. Regardless, it seems Starbucks is beginning the transition to become more eco-friendly.

While Starbucks stores are making an effort to reduce their plastic consumption, other places, like Subway, are not. Subway provides plastic cutlery for customers regardless of whether they choose to eat in or takeout. In addition, takeout options not only come with plastic cutlery, but also a plastic bag to carry the food (Subway Store Manager, Personal Communication, Jan. 28, 2019). Despite certain chains already implementing specific strategies to reduce their plastic use, Hong Kong is still in a transition period.

Our interview with Mr. Wong of the Hong Kong Scrap Plastics Association informed us that paper straws in restaurants are becoming more common. Although restaurant chains and franchises are beginning to reduce plastic straw use, they are still providing other single-use plastics such as spoons, forks, and knives, as they are required for certain meals. In our interview with Dr. Steve Wong, Executive President of Fukutomi Recycling, he noted that the recycling process is largely based on the plastic type rather than the type of utensil. In the discussion, Dr. Wong remarked how near-infrared (NIR) technology must be used to sort between the seven common types of plastic (PET, HDPE, PVC, LDPE, PP, PS, and miscellaneous). For Dr. Wong, sorting is the primary factor that comes with managing recycled waste and since there exists "over 23,000 types of different plastic," controlling waste is difficult. Dr. Wong believes that finding a way to reduce the variety of plastics - while possibly "detrimental to [his] business" - would allow for much more precise control over plastics that are still used throughout Hong Kong.

4.2.2 Cutlery Distribution in Supermarkets

Aside from distribution in the food industry, there are plastics sold in supermarkets that also contribute to the abundance. Most of the cutlery and utensils sold at supermarkets are made of plastic, which is convenient and affordable. These products tend to be sold in bulk, which can be seen in Figure 7 below.

Figure 7: Plastic Cutlery Being Sold at ParknShop

We also noted the cost of plastic products being sold in supermarkets so we could compare that to the price of alternatives we researched that we describe in Section 4.3. We summarize the different types of cutlery sold at supermarkets and their costs in Hong Kong Dollars (HKD) in Table 3 below (1 HKD ≅ 0.13 USD).

Table 3: Average Costs for Plastic Cutlery in Supermarkets

Utensil Type	Pieces/Pack	Average Total Cost (HKD)	Cost per Piece (HKD)
Plastic Spoons	24	11.9	0.4958
Plastic Soup Spoons	24	8.9	0.3708
Plastic Forks	24	12.9	0.5375
Wooden Chopsticks	15	7.4	0.4933
Bamboo Chopsticks	20	12.4	0.62
Plastic Straws	200	11.4	0.057

We also found that supermarkets do not sell any eco-friendly options; the lack of alternatives in supermarkets makes it difficult for people to be more environmentally friendly. This also indicates that supermarkets have yet to change the products that they offer to consumers, which could stem from a lack of understanding about the importance of reducing plastic use. This could also be because many biodegradable products are not produced or manufactured in Hong Kong. Therefore, it is easier for businesses to acquire cheap products domestically as shipping costs are reduced, compared to something that has to be shipped internationally.

4.3 Biodegradable Alternatives

After we conducted interviews with representatives in the recycling and restaurant industries, we created a weighted decision matrix and conducted a cost-benefit analysis to rank biodegradable alternatives. The complete weighted decision matrix and cost-benefit analysis are in Appendices G and H. In the following sections, we describe how we determined criteria and weights in the matrix as well as describing the top two brands of biodegradable cutlery.

4.3.1 Identifying Criteria for the Matrix

We determined the best alternatives to plastic cutlery based on the criteria that we defined in our decision matrix. We show the criteria and definitions that we used to evaluate each biodegradable alternative in Table 4 below.

Table 4: Criteria for Analyzing Biodegradable Alternatives

DEFINITION/ KEY	CRITERIA	WEIGHT
3: <1 year **2:** 1-5 years **1:** 5-100 years **0:** >100 years	**Ability to Degrade/ Degradation Time**	**3**
3: Paper/ wood **2:** Combination product **1:** Bio-plastic (PLA) **0:** Plastic	**Plastic Content**	**2**
3: 100% all natural **2:** All natural material with coating **1:** Contains chemicals within the composition **0:** Toxic when burned (plastic)	**Non-Toxic**	**2**
3: Worldwide/ HK based wholesale shipping **2:** Ships to HK, wholesale orders but <500,000 units/ month available **1:** Ships to HK, no wholesale orders available **0:** Not able to be shipped to HK	**Mass Production Quantity/ Accessibility**	**2**
3: Can be recycled or thrown away, wood/paper **2:** Bio-plastic, can be recycled **1:** Can be recycled but must be sorted by itself (PLA) **0:** Contaminates recycling and landfills	**Waste Management**	**3**
3: Attractive/ customizable, easy to use **2:** Attractive, easy to use **1:** Basic, minor difficulty to use **0:** Non-pleasing to eye, difficult to use	**Appearance**	**1**
Price of plastic/ piece: .5375 HKD (Consumer), 0.0783 HKD (Bulk) **3:** Over 3x the amount (1.6125 HKD Consumer, .2349 HKD Bulk) **2:** Over 2x the amount (1.075 HKD Consumer, .1566 HKD Bulk) **1:** Less than 2x the amount but greater than cost of plastic **0:** Less than or equal to market price of plastic	**Cost**	**-3**

We chose the criteria in the second column based on two considerations. First, we identified the factors that survey respondents circled most frequently, such as "non-toxic" or "ability to degrade," and included them. These factors align with the definition of "biodegradability," leaving out unrelated, less-common factors such as "friendliness to animals." The second consideration was the information from our interviews. The interviewees' experience and knowledge in their fields allowed us to determine which criteria may be considered more important from a management standpoint, allowing us to assign a "weight" which can be seen in column 3 of Table 4. For example, from our interviews, we learned that one of the most important factors in a product is its "ability to degrade" and how easy it is to manage ("waste

management"), which is why we assigned these two criteria a weight of "3." These weights acted as a multiplier, where we assigned more important criteria a larger multiplier and the "better" brands had a higher overall weighted score. As "cost" was considered a detriment to implementing an alternative, we gave it a negative multiplier that detracted from the overall score. We then ranked each alternative on a scale from 0 to 3 for each criterion, where "0" meant "least effective" and "3" meant "most effective" in reducing plastic around Hong Kong. The specific definitions for this scale can be seen in column 1 of Table 4. We used small numbers to have a short interval between the lowest and highest scores. This was to ensure that the difference among the product scores did not have a large gap, as having noticeable gaps between two products could lead us to make inaccurate conclusions as one product may vastly outweigh another despite small differences.

While we took measures to make our weighted decision matrix as accurate as we could, this method is subjective. When we chose the weights and defined the criteria, we had to make some subjective choices which influenced the results. Therefore, the data we present here is only a comparison of products showing the many alternatives that exist on the market and how effective they are in meeting our objectives. As a result, we were cautious when using our matrix as supportive data to promote an alternative.

4.3.2 Evaluating Best Eco-Friendly Cutlery Alternatives

The two brands of eco-friendly cutlery with the highest scores from the weighted decision matrix (Appendix H) were YIEN Wooden Cutlery and Yantai E-Stick Bamboo and Wooden Products ("E-Stick"). Both of these products are made from wood and do not contain any additional chemicals or additives, making them biodegradable and compostable. Furthermore, they have a cost equal to, or less than, the current "wholesale price" of plastic (which we defined based on McDonald's yearly spending report), making them suitable alternatives. While these two brands have a lot in common such as their material and their cost, they also have some differences that make each of them unique for specific applications which we explain below.

Yantai E-Stick Bamboo and Wooden Products:

Yantai E-Stick Bamboo and Wooden Products (E-Stick) makes all-natural, 100% birch wood cutlery that would be ideal for large chain restaurants or other fast-food organizations that plan to order in bulk (E-Stick, 2019). Table 5 below shows the scores that we assigned this cutlery in our weighted decision matrix.

Table 5: Weighted Decision Matrix Results for E-Stick vs. Plastic Product on the Market

CRITERIA	WEIGHT	BRANDS OF "ECO-FRIENDLY" CUTLERY	
		E-Stick	Plastic Product on the Market
Ability to Degrade/ Degradation Time	**3**	3	0
Plastic Content	**2**	3	0
Non-Toxic	**2**	3	0
Mass Production Quantity/ Accessibility	**2**	3	3
Waste Management	**3**	3	0
Appearance	**1**	2	1
Cost	**-3**	0	0
WEIGHTED SCORE		**38**	**7**

E-Stick cutlery has various certifications including approval from the FDA (Food and Drug Administration) claiming it as “non-toxic” and “food safe,” thus making it credible and reliable. We also assigned it a score of “3” for “accessibility” in the weighted decision matrix as it can be shipped worldwide and in bulk orders. However, this type of cutlery does take about 30 days to ship, so it would have to be ordered a month in advance. It also can not be customized causing it to receive a score of “2” for “appearance.” Regardless, this type of cutlery seems to be a reliable and cost-effective choice for large chain restaurants that care more about cost rather than appearance.

YIEN:

YIEN makes all-natural bamboo cutlery that would be a good alternative for independently owned restaurants or cafes seeking marketing opportunities (YIEN, 2019). The results from the weighted decision matrix for this brand of cutlery can be seen in Table 6 below.

Table 6: Weighted Decision Matrix Results for YIEN vs. Plastic Product on the Market

CRITERIA	WEIGHT	BRANDS OF "ECO-FRIENDLY" CUTLERY	
		YIEN	Plastic Product on the Market
Ability to Degrade/ Degradation Time	**3**	3	0
Plastic Content	**2**	3	0
Non-Toxic	**2**	2	0
Mass Production Quantity/ Accessibility	**2**	3	3
Waste Management	**3**	3	0
Appearance	**1**	3	1
Cost	**-3**	0	0
WEIGHTED SCORE		**37**	**7**

YIEN brand cutlery is sold through a wholesale distributor online at a price very comparable to plastic, which can be seen in row 7 of Table 6 above, as we assigned it a score of "0" for "Cost." Similar to E-Stick brand cutlery, YIEN is a very reputable company as they are highly responsive to inquiries, contain various certifications by organizations like the SGS (formerly Société Générale de Surveillance (French for General Society of Surveillance)) and the FDA, and have high product reviews on their distributor site. However, in comparison to Yantai E-Stick Bamboo and Wooden Products, this brand of wooden cutlery is the most visually appealing as it contains chamfered edges and a smooth, polished surface. Based on the company's website, it is not clear what the surface is polished with, which explains the score of a "2" for the product being "non-toxic." This cutlery is customizable (causing it to receive a score of "3" for "appearance"), making it ideal for smaller independently owned restaurants that care about their brand being known. Although we observed that these types of restaurants typically provide reusable metal cutlery to patrons, to-go orders still include plastic utensils that could be easily replaced with YIEN bamboo cutlery.

4.3.3 Cost Analysis of Changing to Alternatives

Cost is one of the biggest factors for businesses and consumers when choosing an eco-friendly alternative. While we expected that eco-alternatives were going to be more expensive than plastic, we found that many biodegradable products are actually very comparable in price to plastic utensils[1].

For example, McDonald's, who serves almost 1 million customers a day, is one of the largest plastic providers in Hong Kong (Li, 2016). McDonald's 2017 Balance Sheet shows that they spent approximately 104 billion HKD on inventory expenses (which includes plastic utensils) with the primary supplier being the Finnish company, Huhtamäki (United States Securities and Exchange Commission, 2017). Huhtamäki marks their prices for plastic forks on their distributor website at 0.02€/piece (0.2 HKD) which we note in row 4 of Table 7 (Huhtamaki, 2019). In comparison, YIEN markets individual pieces of cutlery (fork, knife, spoon) at anywhere from 0.078 - 0.24 HKD on their distributor site, depending on the quantity of pieces per order and if a custom logo is included, which we show in rows 2 and 3 of Table 7 below (YIEN, 2019).

Table 7: Cost Comparison for YIEN vs. Huhtamaki

	Price/Piece (HKD)	**Pieces Daily**	**Daily Cost Spent on Cutlery (HKD)**	**Yearly Cost Spent on Cutlery (HKD)**	**Difference from Current Spending (HKD)**	**Potential Percent Savings (on Cutlery)**
YIEN - Low	0.078	250,000	19,168.63	7,160,798.66	11,314,063.24	**61.4%**
YIEN - High	0.24	250,000	58,855.887	21,482,395.97	-3,007,534.07	**-18.8%**
Current (Huhtamaki)	0.202	250,000	50,616.06	18,474,861.90	0	**0**

Taking the lowest possible price of 0.078 HKD/piece for YIEN and using the estimate from our survey that one in four people (of the 1 million who go to McDonald's daily) ask for plastic utensils, McDonald's can save as much as 11.3 million HKD in cost per year. Even at the

[1] While we deemed E-Stick and YIEN as good alternatives, here we use YIEN. A cost-benefit analysis for E-Stick can be seen in Appendix G.

maximum price of 0.24 HKD/piece, McDonald's would only lose approximately 3 million HKD across all branches in Hong Kong which we show column 5 of Table 7. In addition, as seen in the final column of Table 7, McDonald's could save as much as 60% on cutlery by changing to this alternative, while only risking a loss of about 16%. While this potential loss is significant, this example takes into account the highest possible cost for our preferred alternative and is only a 16% loss compared to what they typically spend.

It is important to note that the information that we present here is our best estimate as we were unable to directly talk with McDonald's financial department and can only use financial values that we found in McDonald's yearly reports. Furthermore, we based the number of customers asking for utensils on our survey data, which is also an estimate. However, in this instance, both the increased publicity of being known as a more "environmentally conscious" restaurant and not having to commit to a heavy financial plan makes recommending YIEN to large franchises like McDonald's reasonable. As family-owned businesses vary much more in terms of their expenses and revenue, they require a more personalized analysis to determine if our recommendations would be successful, which we explain in our recommendations in Chapter 5.

4.4 Approach and Feasibility of Reducing Plastic Use

By analyzing our survey and interview data in Sections 4.1 - 4.2, we began to understand more about the culture and lifestyle in Hong Kong. This knowledge was helpful for us to determine the best alternatives for Hong Kong in Section 4.3. In the following section, we identify the best ways to educate the public about a new kind of cutlery, such as YIEN or E-Stick, as well as the feasibility with recommending alternatives.

4.4.1 Social Media and Advertising

Using social media platforms such as Facebook, Instagram, or local news stations is one of the best ways to advertise biodegradable alternatives and educate the public. While observing and interacting with the public, we noted that social media is used everywhere in Hong Kong, as people are constantly checking their phones or social media accounts. There are approximately 4.4 million Hong Kong Facebook users, with more than 3.1 million logging on at least once a day (GO-Globe, 2015). Mr. Wong of Hong Kong Scrap Plastics Association and founder of

Chun Shing Development (HK) Limited further indicated that social media is arguably one of the best advertising platforms (Personal Communication, Jan. 28, 2019). We found that, although social media is being used as an advertising strategy on a small scale for recycling and limiting plastic use, a much larger-scale application could have beneficial effects as Hong Kong attempts to become more environmentally friendly. In addition to social media, paper advertisements and flyers could also help to educate the public. Based on the results from our survey that we described in Section 4.1.2, advertising ways that people can *individually* become more environmentally friendly and education regarding *how* to actually recycle would be beneficial to the public.

4.4.2 Feasibility of Recommending Alternatives

After determining what alternatives to recommend to the World Wildlife Fund and creating educational flyers and advertisements, our final step was to determine the feasibility of implementing these alternatives. Based on our cost assessment in Section 4.3.3, the alternatives we identified are all possible solutions. However, while many restaurants seem to be aware of their eco-footprint and care about the public's opinion of their business, others still have yet to make a change, as implementing a new alternative is not a decision that branch managers or employees at fast-food restaurants are able to make. Through our interviews with employees and managers at Starbucks, Gong Cha, Jollibee, and Subway, we learned that most, if not all of, the decisions in large chain restaurants come from executives. Therefore, we concluded that in order to implement an alternative at chain restaurants, it is necessary to work directly with the franchise owner or director. While we attempted to do this for a variety of restaurants around Hong Kong, we consistently faced problems as we lacked either the appropriate contact information or were dismissed. Regardless, with all the information we gathered, we were able to determine a variety of biodegradable alternatives that would be effective in reducing the overuse of plastic. In the following chapter, we use this information to recommend ways that the World Wildlife Fund can achieve their goal of limiting plastic use in Hong Kong.

5. Conclusions and Recommendations

For the World Wildlife Fund, continuing to learn about biodegradable alternatives to plastic cutlery and educating the public could help to reduce one of the biggest sources of plastic waste in Hong Kong. In the following sections, we summarize our key findings, the recommendations that we established as a result of our findings, and the potential outcomes of implementing them.

5.1 Key Findings

Through our survey, interviews, and observations, we gained background information on Hong Kong's waste management, plastic use, and public knowledge. We learned that the restaurant industry is responsible for a lot plastic waste in the city, and while Hongkongers use much of this plastic, they do not know how to recycle it properly. Based on our survey data, the public seems to understand biodegradability and recycling, but do not understand the steps they can *personally* take to make an impact. Furthermore, we observed that the waste recycling bins are not maintained properly by the government and are therefore not easy to use. Based on the information from our interviews with recycling agency members, we noted that a large portion of Hong Kong's waste is not able to be recycled by recycling agencies due to it being contaminated and not properly disposed of by the public.

After observing a variety of different restaurants in Hong Kong, we found that although some restaurants seem to know about their plastic use and are taking measures to reduce their waste, others are not. From this, we concluded that Hong Kong is still in a transition period as biodegradability is a relatively new concept and employee training takes time. Although Hong Kong is beginning to transition to become more eco-friendly, organizations like the World Wildlife Fund can help encourage change by establishing contact with biodegradable cutlery companies and promoting these brands to businesses. Specifically, we identified two brands, YIEN and Yantai E-Stick Bamboo and Wooden Products, that would be feasible for the World Wildlife Fund to implement in Hong Kong based on their scores in our weighted decision matrix where we analyzed a variety of characteristics such as cost, material, and accessibility. Although we predicted these kinds of cutlery would be more expensive than plastic, we found through our cost-benefit analysis that they were actually very comparable to the price of plastic.

After determining these alternatives, we recognized the need for the World Wildlife Fund to increase their outreach to better promote more eco-friendly options. As a result of our observations about the high use of social media amongst the public and our interviews with recycling agencies, we concluded that the World Wildlife Fund could successfully educate a large portion of the public by using their social media accounts as they are a very credible and influential organization with a wide outreach.

5.2 Recommendations

Based on our findings in Section 5.1, we developed a set of recommendations for the World Wildlife Fund explaining how to continue work on biodegradable alternatives to plastic cutlery.

5.2.1 Recommendation for Hong Kong's Waste Management

Although Hong Kong has many waste collection bins, their poor condition is preventing people from properly disposing of their garbage.

Recommendation 1: *We recommend that the World Wildlife Fund reach out to the people responsible for maintaining the waste collection bins to improve their condition.*

Through our interview with Dr. Wong, we learned that recycling agencies are only able to manage a very small percentage of the plastic waste disposed of in recycling bins. Furthermore, our observations showed that people tend to throw away all of their trash in the generic waste bins, whether it be plastic, metal, or paper. Improper disposal of waste in the wrong bins causes contamination and makes waste more difficult for recycling agencies to manage. By talking directly with the people that manage these recycling bins and improving their conditions (such as appearance, functionality, and ease of use), the public may be more likely to properly dispose of their garbage or recognize ones that are available to them.

5.2.2 Recommendations for Public Education

Educating the public is imperative to encourage better recycling practices in Hong Kong. As we showed in our survey data, it seems that a majority of people claim to have some knowledge of recycling, but may not understand how to recycle properly. Through our observations and interviews, we found that the best way to educate the public is through social media.

Recommendation 2: *We recommend that the World Wildlife Fund create online posts and advertisements under their social media profiles and possibly cooperate with similar organizations to increase their public credibility and influence.*

Reaching out with advertisements and posts online through websites and apps would connect with the increased amount of people using social media compared to posting flyers at places around the region. Despite the benefits of using social media, the effectiveness of this approach depends heavily on the influence of the person posting, whether it be an organization or a social media influencer. Because the World Wildlife Fund is a well-known environmental organization, posts made to their social media pages already have credibility. The challenge the World Wildlife Fund may have is ensuring their posts reach as wide an audience as possible and should therefore be their main focus in the outreach effort.

Recommendation 3: *We recommend that the World Wildlife Fund educate the public on how to recycle and steps they can take on a personal level in conjunction with biodegradability and recycling in general.*

Through our interviews with members from two different recycling agencies in Hong Kong, it seems that there is some confusion among the public regarding how to properly dispose of certain materials. Incorrect disposal of waste leads to contamination. Dr. Wong stated that "the problem is that [the public] think plastic is plastic… it gets processed, and that is that. But that is not how it works," (Personal Communication, Jan. 31, 2019). If people can understand the sorting process, management will be easier as the sorting process in facilities would be more efficient. According to our survey data, the public seems to understand recycling in general, but

may not know how to actually recycle, sort their garbage, or have easy access to recycling collection bins. Therefore, it would be most beneficial to specifically educate the public about how to sort their garbage and steps that they can take personally to make an impact.

5.2.3 Recommendations for Biodegradable Cutlery

After we researched over 25 brands of available biodegradable cutlery, we identified the two brands that would be the most feasible to introduce in Hong Kong. Below are our recommendations for these two brands.

Recommendation 4: *We recommend that the World Wildlife Fund establish contact with YIEN brand biodegradable cutlery as a viable alternative to plastic utensils in independently owned restaurants.*

We gave YIEN brand cutlery an overall score of 37 out of 39 possible points in our weighted decision matrix. Although it is made of all-natural bamboo, has a low cost comparable to plastic utensils on the market, and is easily accessible in Hong Kong, YIEN cutlery is put through a polishing process where the chemicals used are unclear, which is why we deducted points for it not expressly being "non-toxic." Regardless, YIEN is a very reputable company, has high reviews on their products, and are easy to contact for inquiries and order placement.

The main characteristic of YIEN brand cutlery that make it best for independently owned restaurants or cafes is the product's visual appeal and unique customization options. Through our interviews and observations, we found that many cafes and family owned restaurants look for ways to market themselves and the atypical appearance of YIEN's product, combined with its ability to be customized, make it suitable for this type of restaurant. Establishing contact with YIEN will allow the World Wildlife Fund to increase their network. It will also help them to determine the reputability of the product and direct their further research towards reliable biodegradable alternatives.

Recommendation 5: *We recommend that the World Wildlife Fund establish contact with Yantai E-Stick Bamboo and Wooden Products as a viable alternative to plastic utensils in chain restaurants.*

We gave Yantai E-Stick Bamboo and Wooden Products (E-Stick) biodegradable cutlery an overall score of 38 out of a possible 39 points in our weighted decision matrix due to it being made of all-natural birch wood, having a low cost, and being a very accessible product. Similar to YIEN, E-Stick brand cutlery has various certifications, high consumer reviews, and is entirely compostable and biodegradable. The one category in our decision matrix where we deducted points was "appearance," as this company does not allow their cutlery to be customized due to the speed at which it is manufactured.

Through our interviews with McDonald's and Subway, we learned that these restaurants care more about cost-efficiency rather than a unique appearance of the cutlery they offer. Therefore, E-Stick would be more suitable to recommend to similar large corporations. The World Wildlife Fund can determine the product's reliability by further researching and establishing contact with E-Stick. This will help to tailor future studies on biodegradable alternatives and increase their network.

5.2.4 Recommendations for Implementation

After the World Wildlife Fund finishes establishing contact with YIEN and E-Stick, it is up to them to decide how to promote or implement these brands. With support from our research and observations, we encourage the World Wildlife Fund to focus on three key points to limit the extent of plastic cutlery in Hong Kong: Public Recognition, Cost Effectiveness, and Betterment of Hong Kong.

Recommendation 6: *We recommend that the World Wildlife Fund focus on increasing the public appearance and reputation of businesses that are trying to become more eco-friendly.*

This recommendation requires both the participation of the World Wildlife Fund and the business that is willing to transition. We encourage that the World Wildlife Fund manage and keep track of businesses that decide to use biodegradable cutlery and offer to recognize these businesses on their website, social media accounts, and locally through news articles when

discussing with other businesses yet to switch. If one of these organizations is willing to switch to a new type of cutlery, they should be rewarded through increased publicity for attempting to make Hong Kong more eco-friendly. Posts or articles through the World Wildlife Fund's social media detailing how certain businesses are working to improve their eco-footprint could increase exposure of successful alternatives and potentially drive other businesses to do the same. Advertisements aside, we recognize that exposure is not a valid form of payment or encouragement for some businesses, especially smaller/family-owned restaurants with strict revenue channels.

Recommendation 7: *We recommend that the World Wildlife Fund conduct a cost-benefit analysis for organizations attempting to transition to detail their potential savings/ losses.*

Through our interviews and observations, we found that cost is a huge factor for consumers and businesses when considering an alternative. A detailed, long-term cost-benefit analysis tailored to individual organizations (similar to that in Section 4.3.3) to layout the savings/loss each business might have by changing would be a beneficial tool for the World Wildlife Fund to use. Emphasizing the cost savings by transitioning towards a natural alternative could help reduce uncertainty among smaller restaurants.

Recommendation 8: *We recommend that the World Wildlife Fund explain how transitioning towards a more natural alternative helps to support the culture and future of Hong Kong.*

Based on our background research described in Section 2.3, tradition and culture is a massive influencing factor throughout all of Hong Kong. Therefore, we encourage that the World Wildlife Fund explain how switching to these alternatives would help improve people's lives, both now and for future generations. Promoting how biodegradable cutlery supports Hong Kong on a social and environmental level could potentially influence local and international businesses.

5.3 Future Directions

Through better maintenance of collection bins, education of the public, and promotion of biodegradable alternatives, plastic cutlery in Hong Kong could be reduced. Future IQP projects working with the World Wildlife Fund could help transition these businesses or - at the very least - evaluate the impacts these products may have during their first years. Furthermore, additional IQP groups working with the World Wildlife Fund should focus on increasing the World Wildlife Fund's professional network. We recommend trying to establish connections with organizations like the Hong Kong Municipal Waste Department or fast-food chains to increase the sphere of influence that the World Wildlife Fund has when promoting changes.

It is imperative that Hong Kong begin making a change to improve their plastic consumption for the sake of their future. Plastic utensils are incredibly damaging to the environment, take almost 450 to 1000 years to degrade, and sometimes release deadly toxins into the Earth or the air that are harmful for both humans and animals. As Hong Kong uses around 5.7 million tonnes of plastic per year, and with landfill space quickly filling up, people must find a sustainable and effective solution to their plastic problem. If the World Wildlife Fund considers all of our recommendations and ideas, and continues to promote better recycling practices, Hong Kong will be on the path for a more eco-friendly future.

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Appendices

Appendix A: Sponsor Description- World Wildlife Fund

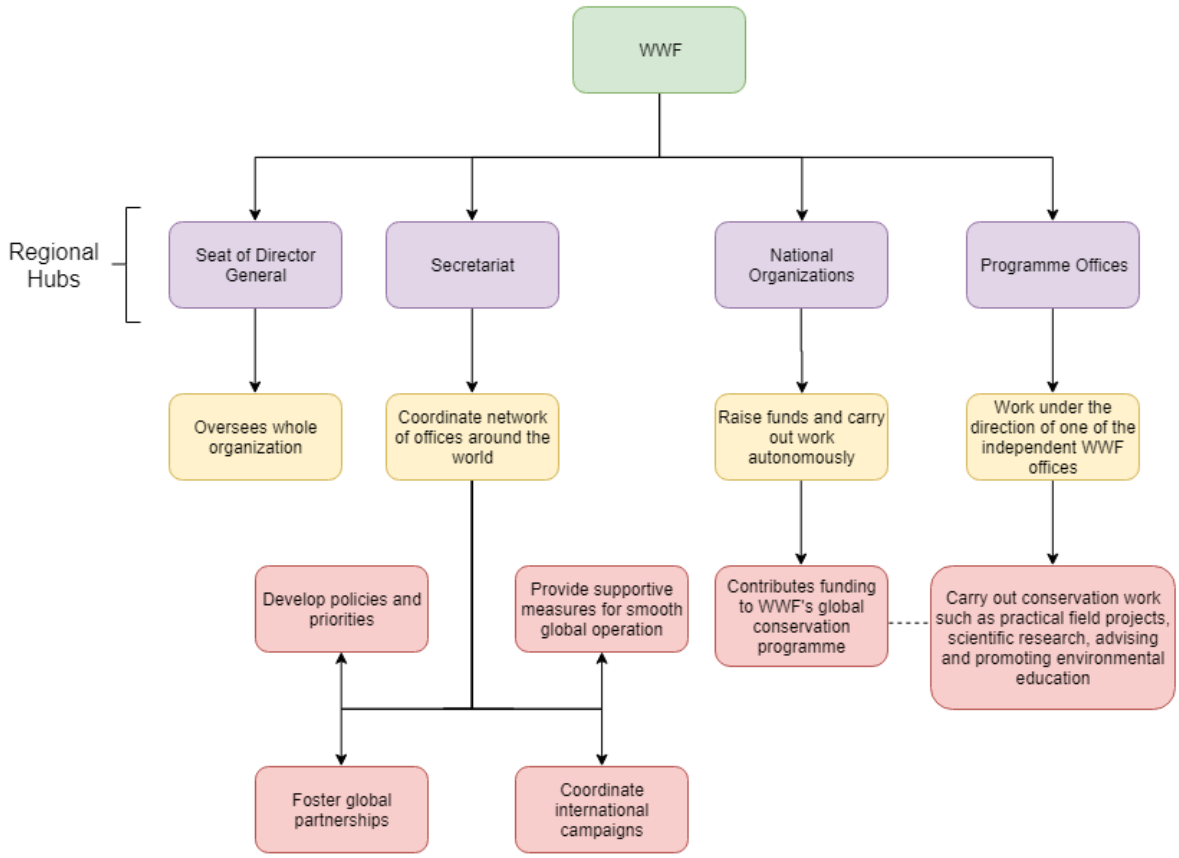
The World Wildlife Fund (WWF) Hong Kong (2018c) is an independent branch of the World Wide Fund for Nature, an international non-government organization founded in 1961. The WWF Hong Kong (2018d) was established in 1981 as an environmental organization with a focus on providing Hong Kong's conservation and educational needs. The organization's global mission is to expand wildlife preservation and reduce human impact on the environment by conserving the world's biological diversity, ensuring that renewable natural resources are sustainable, and promoting the reduction of pollution and wasteful consumption.

The WWF Hong Kong's branch (2018e) is part of an active network in more than 100 countries with over 120 full-time staff working in offices around Hong Kong. The organization is funded by a variety of sources, which range from donations, memberships, and support by the Panda Shop online store to larger funding requests from government and corporate donors. WWF Hong Kong (2018b) is made up of a board of directors, currently led by CEO Peter Cornthwaite, patrons, and trustees in the leader administration, following with the senior management division and a team consisting of members who run projects and programs to promote conservation and sustainability.

One main area of the WWF Hong Kong (2018a) division's research is looking at biodegradable plastics. The WWF division in Hong Kong works to raise awareness in the public about biodegradable plastics through research posted on their website, as well as through news publications. In addition to WWF Hong Kong, other organizations within the city are working to achieve similar goals. Plastic Free Seas (2013) is a Hong Kong based environmental charity working to change societal plastic use habits through education and action campaigns. Other similar organizations include The Green Earth (2017), HK Recycles (2018), as well as the Government of Hong Kong (2017a). These groups are able to provide the team with the necessary material and background research required to define the full scope of the project.

On the global scale, WWF Hong Kong with every other regional division strives to focus their efforts toward achieving six major goals: climate and energy, food, forests, freshwater, oceans and wildlife (WWF Global, 2017b). The research concentrates on targeting finance,

markets and governance as the key drivers of the environmental problems. The WWF continues to expand their influence worldwide as it is run and based on four regional hubs.



WWF's organizational structure (WWF Global, 2017a). WWF HK is under the National Organizations.

Appendix B: What is an IQP?

An Interactive Qualifying Project (IQP) is a team based social science project that is required for graduation at WPI (2018). The teams typically include three or four people of different majors, working together to complete a project focusing on sustainability or relating technology and science to society. Unlike a typical 1/3 credit course at WPI, the IQP is worth 1 credit, and is often completed in one term. WPI offers many IQP project sites around the globe as well as in local communities and on campus.

Our IQP project with the World Wildlife Fund focuses on researching the best ways to introduce biodegradable cutlery into Hong Kong. Throughout our project, we intend to analyze various kinds of biodegradable cutlery and alternatives to single-use plastics. We then hope to suggest long term implementation strategies to the World Wildlife Fund to help them with their efforts of making Hong Kong more sustainable. This qualifies as an IQP as it relates science and technology to a societal problem. Our group consists of three people with different majors, working together to complete the project that focuses on sustainability and bettering the environment by using scientific and analytical tools. Furthermore, it is worth 1 credit, and will be completed in one seven-week term.

Appendix C: Public Survey

Hong Kong Plastic Consumption Survey/ 香港調查

Please answer all questions to the best of your ability/ 請盡最大努力回答所有問題

1. **What does "Biodegradable" mean? / 您知道 "生物可降解" 是什麼意思？**

   _____

2. **Circle ALL factors you think are important in "Biodegradability"/ 圈出所有您認為在 "生物可降解性" 中重要的因素:**

   Friendliness to Animals/對動物的友善　Non-Toxic/ 無毒　Ability to Degrade/ 能夠降解

   Low plastic content/塑料含量低　Durability/ 耐久力　Natural Feel/自然的感覺

   Disposability/ 便於丟棄　Ease of use/便於使用

3. **Do you have access to recycling facilities near your residence? /您的居住地附近是否有回收設施可供使用？**

   Yes/是　No/否

4. **To what level do you agree with the statement "I am very informed about how to properly recycle"? / 您在多大程度上同意 "我非常了解如何正確回收" 這個說法？**

   Strongly Agree/非常同意　Slightly Agree/ 些許同意　Neutral/不同意也不反對　Slightly Disagree/ 些許不同意　Strongly Disagree/強烈反對

5. **How often do you find yourself purchasing takeout food?/ 你多久发现自己购买外卖食品？**

   Once-a-day/一天一次　Few times a week/每週數次　Once-a-week/每週一次　Few times a month/每月數次　Once-a-month/每月一次

6. **When getting take-out, do you commonly ask for plastic utensils (forks, knives, etc)?/ 外出时，您是否经常要求使用塑料器皿（叉子活着刀具）？**

   Yes/是　No, unless they are needed for my meal/不, 除非我的飯需要使用餐具　No, I have my own set of utensils/不,我有自己的一套餐具

Appendix D: Interview with Recycling Agency Member

Goal and Justification
Our goal is to determine the methods of recycling and what is recyclable in Hong Kong. Furthermore, we plan to inquire about methods recycling agencies have taken in terms of promoting less plastic usage. Our hope, is that this information will give us a better understanding of the recycling situation in Hong Kong and challenges that the agency has faced promoting recycling.

Introduction
Prior to interview, we will inquire about taking notes and minutes during the interview.

Interviewer: "As previously stated, to facilitate our research, we would like to take meeting minutes and notes during our conversations today, is that still okay with you? After the interview has been performed and the meeting minutes have been transcribed, we will send you a copy to ensure that you approve of the specifics from the interview. These meeting minutes and direct quotations from today's meeting may end up in our final research paper. Therefore, names connected to information will be changed if you would like."

We will ask the following questions to the recycling agency member:

1. Could you please provide us with a little bit of background information on your role/ position in the agency and what your recycling agency is responsible for?

2. Could you please describe how recycling is done in Hong Kong? Has it always been the same? Why or why not?

3. What kinds of plastics are able to be recycled through your agency?

4. What strategies have you taken to promote recycling in the public? Have they been successful? Why/ Why not?

5. How has recycling changed over the years? Have you noticed a difference in the number of people recycling since you started working for this agency? What materials are able to be recycled and how has that changed over the years?

6. What other recycling agencies in Hong Kong are there that you can recommend we interview for additional information? Is there anything you think that we should know and take away with?

Conclusion

Interviewer: "We appreciate you taking the time to help us better understand your recycling agency. We will provide you with the interview minutes and notes as soon they are available. Thank you!"

Appendix E: Interviews with Restaurant Owners or Employees

Goal and Justification

Our goal is to determine the types of biodegradable cutlery available to local restaurants in Hong Kong (if any) as well as their actions to promote biodegradable options. Furthermore, we plan to inquire about methods local restaurants have taken in terms of promoting less plastic usage. Our hope, is that this information will give us ideas and insight as to what options are currently on the market and challenges associated with implementing a new option.

Introduction

Prior to interview, we will inquire about taking notes, minutes, or potentially recording the interview based on the interview setting:

Interviewer: "To facilitate our research, we would like to record our conversation today, is that okay with you? If you would like, we can send you a copy of the recording and transcription once they are complete to ensure that you approve of the specifics from our conversation today. These meeting minutes and direct quotations from today's meeting may end up in our final research paper. Therefore, names connected to information will be changed if you would like."

We will select questions from the following list to ask to local restaurant owners and employees. The set of questions asked to each individual restaurant may vary given the culture and dining style of the particular restaurant or role of the person we are interviewing. Some interviews may be more conversational than formal:

1. What role do you take in purchasing and providing cutlery to customers?

2. What kind of cutlery does this restaurant offer to customers and why? Has it always been the same? Do you provide cutlery with take away orders?

3. What is the most important factor when choosing and purchasing cutlery to provide? Are environmental factors considered?

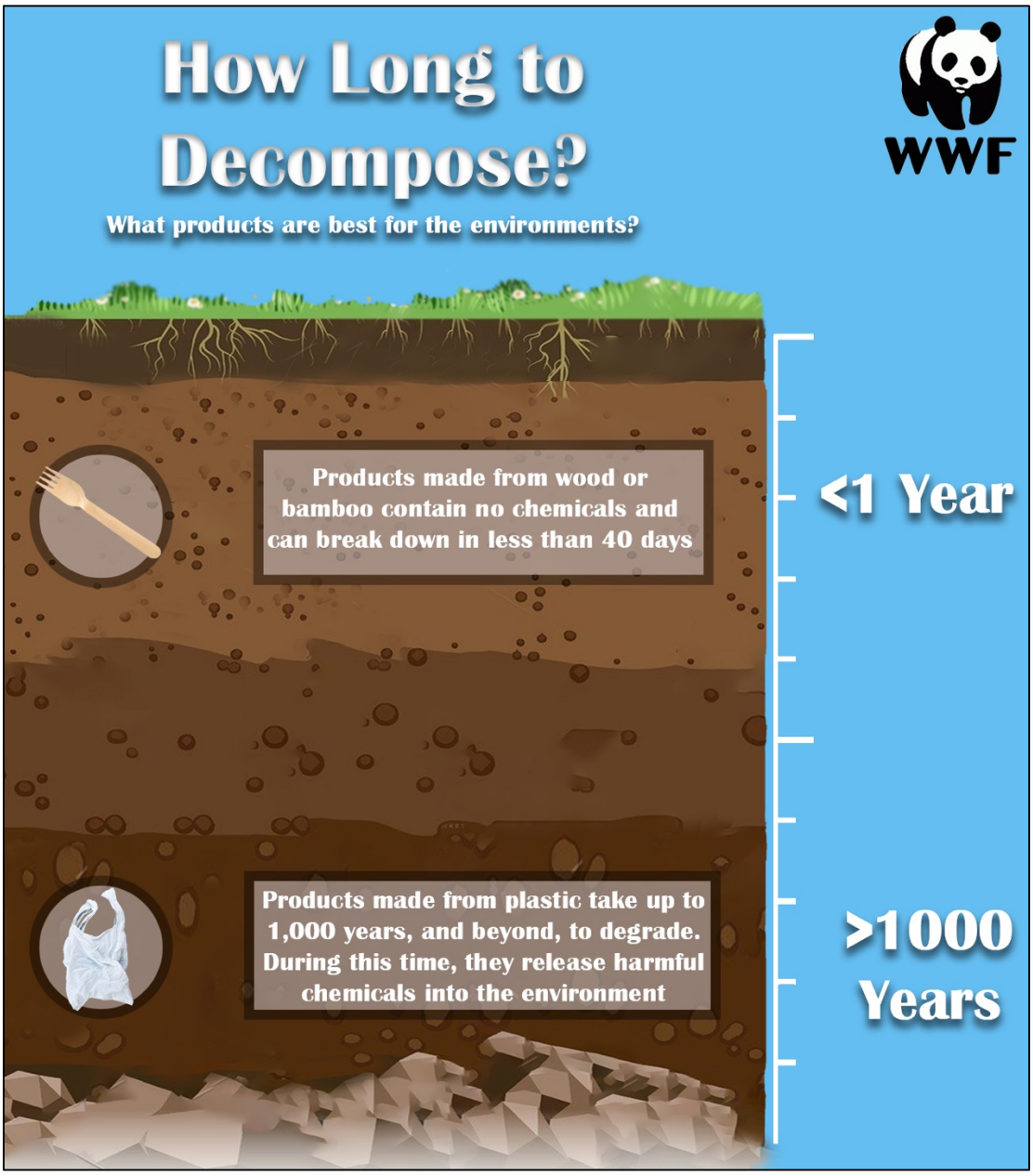
4. Are you aware of any biodegradable and potentially eco-friendlier cutlery options?

5. What would be most helpful in allowing you to transition to be eco-friendlier? What would encourage you to take these steps?

Conclusion

Interviewer: "We appreciate you taking the time to help us better understand the cutlery and plastic use at your restaurant. We will provide you with the recording and transcription as soon they are available."

Appendix F: Informational Posters and Guides




WWF
Don't Let Beauty Be Ruined
Help Reduce Trash in the Harbor

Recycling Starts with YOU

Did you know?

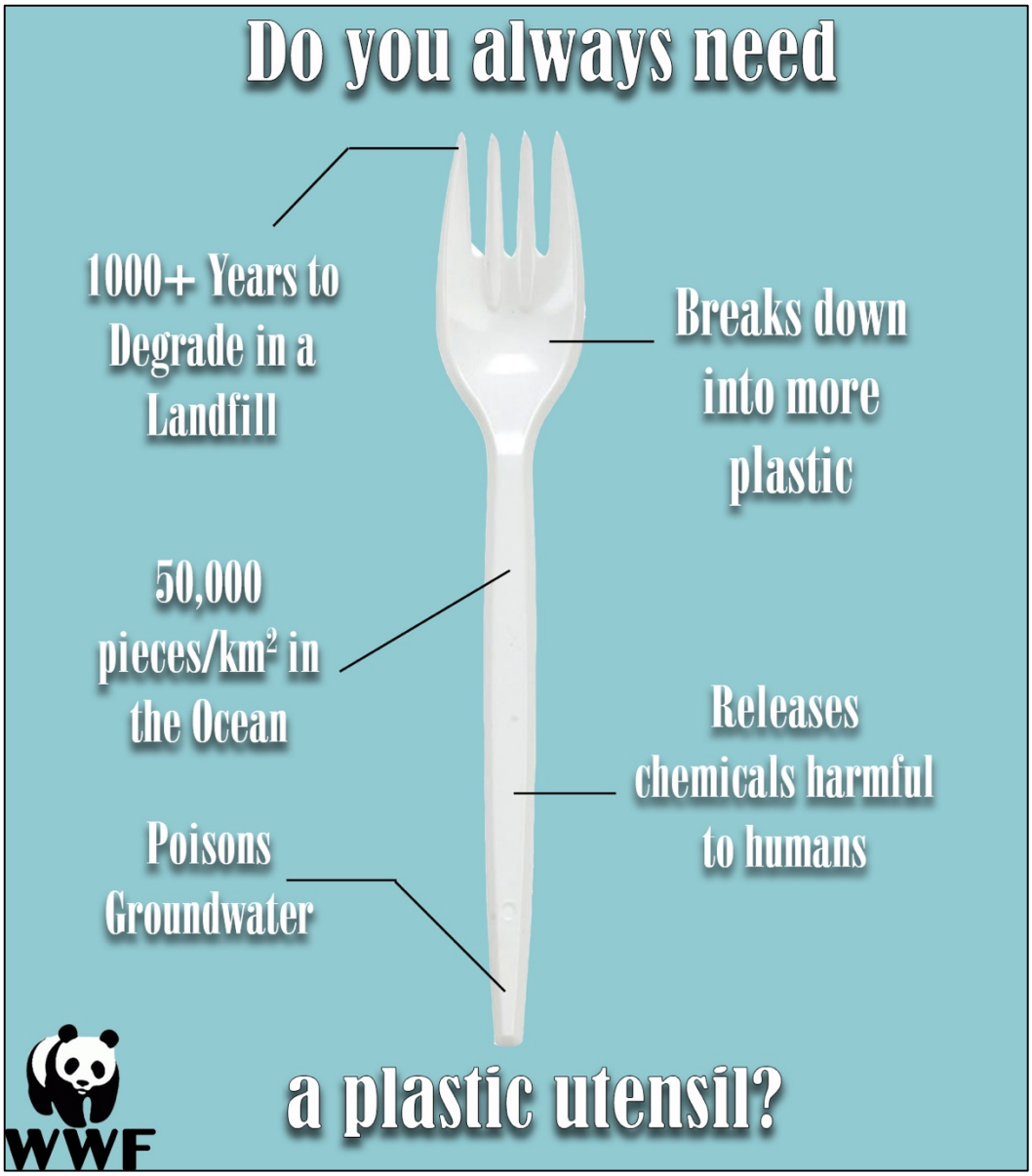
Much of what is "recycled" is not actually able to be reused due to it being contaminated or placed in the wrong bin

Sorting is one of the most important parts of recycling and it is something you can help with! Be sure to dispose of your waste in the proper bin.

Litter	Waste Paper Only	Plastics Only	Metals Only

Time to Degrade in a Landfill

Wood	Plastic	Glass
		
10/02/2029	15/06/2469	23/07/6819


Do you always need
1000+ Years to Degrade in a Landfill
Breaks down into more plastic
50,000 pieces/km² in the Ocean
Releases chemicals harmful to humans
Poisons Groundwater
WWF
a plastic utensil?

Appendix G: Cost-Benefit Analysis

YIEN Wooden Cutlery

	Price/Piece (HKD)	Pieces Daily	Daily Cost Spent on Cutlery (HKD)	Yearly Cost Spent on Cutlery (HKD)	Difference from Current Spending (HKD)	Potential Percent Savings (on Cutlery)
YIEN - Low	0.078	250,000	19,168.63	7,160,798.66	11,314,063.24	**61.4%**
YIEN - High	0.24	250,000	58,855.887	21,482,395.97	-3,007,534.07	**-18.8%**
Current (Huhtamaki)	0.202	250,000	50,616.06	18,474,861.90	0	**0**

Yantai E-Stick Bamboo and Wooden Cutlery

	Price/Piece (HKD)	Pieces Daily	Daily Cost Spent on Cutlery (HKD)	Yearly Cost Spent on Cutlery (HKD)	Difference from Current Spending (HKD)	Potential Percent Savings (on Cutlery)
E-Stick - Low	0.115	250,000	22,511.25	8,216,606.25	10,258,255.65	**43.1%**
E-Stick - High	0.217	250,000	42,477.45	15,504,269.25	-2,970,592.67	**-7.4%**
Current (Huhtamaki)	0.202	250,000	50,616.06	18,474,861.90	0	**0**

Appendix H: Weighted Decision Matrix

DEFINITIONS/KEY	CRITERIA	WEIGHT
material, time to degrade: 3: <1 year 2: 1-5 years 1: 5-100 years 0: >100 years	**Ability to Degrade/ Degratation Time**	**3**
amount of plastic per volume, wood/paper vs. bio-plastics/PLA 3: Paper/ wood 2: Combination product 1: Bio-plastic (PLA) 0: Plastic	**Plastic Content**	**2**
Look to "manufacturing" column... does it contain harmful chemicals or additives, coatings, etc. 3: 100% all natural (same product) 2: All natural material with coating 1: Contains chemicals within the composition 0: Toxic when burned, plastic	**Non-Toxic**	**2**
bulk packaging, shipping, feasible to ship to HK 3: Worldwide/ HK based shipping, sold in bulk/ wholesale 2: Ships to HK, wholesale orders less than 500,000/ month 1: Ships to HK, but no wholesale orders 0: No bulk or not shipping to HK	**Mass Production Quantity/ Accessibility**	**2**
facility work/requires more sorting, control, etc. 3: wood/ paper, can be recycled or thrown away, not harmful to landfills 2: Bio-plastic, can be recycled 1: Can be recycled but must be sorted by itself (PLA) 0: Contaminates recycling and landfills	**Waste Management**	**3**
aesthetics, color, structure, texture 3: Attractive/Customizable, easy to use 2: Attractive, easy to use 1: Basic, minor difficulty to use 0: Non-pleasing to eye, difficult to use	**Appearance**	**1**
Price/piece: .5375 HKD (Consumer) **Price/piece: 0.0783 HKD (Bulk and wholesale) - .01 USD/piece** 3: Over 3x the amount - 1.6125 Consumer, .2349 Wholesale 2: Over 2x the amount - 1.075 Consumer, .1566 Wholesale 1: Less than 2x the amount but greater than plastic 0: Less than or equal to market price of plastic	**Cost**	**-3**

CRITERIA	WEIGHT	A2U	Bakeys	Weilong	TwentyFifty	Green Paper Products	World Centric	Senyang Wood	Bambu	Anzhu	Primeware	Vegware
Ability to Degrade/ Degradation Time	**3**	2	3	2	3	1	1	2	3	2	1	2
Plastic Content	**2**	3	3	3	3	2	1	3	3	3	1	1
Non-Toxic	**2**	2	3	3	3	1	1	3	2	3	1	1
Mass Production Quantity/ Accessability	**2**	2	0	3	0	0	2	3	0	3	0	3
Waste Management	**3**	3	3	3	3	2	1	3	3	3	1	2
Appearance	**1**	2	0	2	0	3	3	3	2	3	2	2
Cost	**-3**	0	0	0	3	1	0	0	1	0	3	1
WEIGHTED SCORE		**31**	**30**	**35**	**21**	**15**	**17**	**36**	**27**	**36**	**3**	**21**

Eco Products	YIEN	利兵	Green Home Cutlery	Sabert	E-stick	Transitions to Earth	HK Food and Beverage Suppliers	Ningbo	Verterra	Eagle	Ecogecko	Current Market PLASTIC
2	3	3	2	1	3	1	1	0	2	3	3	0
1	3	3	3	1	3	2	2	1	3	3	3	0
1	2	2	3	1	3	1	2	1	2	2	3	0
2	3	3	2	0	3	3	0	0	0	0	0	3
1	3	3	3	1	3	2	1	1	3	3	3	0
1	3	2	2	1	2	2	2	2	2	3	3	1
1	0	0	0	0	0	0	1	0	2	0	0	0
15	**37**	**36**	**33**	**11**	**38**	**23**	**13**	**9**	**21**	**31**	**33**	**7**

Appendix I: Interview with Dr. Steve Wong Summary and Minutes

Interview with Dr. Steve Wong
Executive President of Fukutomi Recycling
Asia Trade Center, 79 Lei Muk Road, Kwai Chung, N.T., Hong Kong
Summary-Minutes-Transcript (January 31st, 2019)

Could you please provide us with a little bit of background information on your role/position in the agency and what your recycling agency is responsible for?

- Dr. Wong is the current Executive President of Fukutomi Recycling, and has been working for Fukutomi for over 20 years
- In addition to the office space, there is a factory where the recycling is sorted by type of plastic using infrared NIR technology
- *"We don't have infrared machine in our Hong Kong factory, instead we have an extruder from Austria, and shredders from Germany"*

Could you please describe how recycling is done in Hong Kong? Has it always been the same? Why or why not?

- Recycling is collected and then sorted at the factories by infrared light (NIR technology) to identify which type of plastic it is
- Each type of plastic must be processed differently for it to be recycled
    - *"Typically people think about collection when it comes to recycling… the most important part is actually sorting… in order to finish the whole thing [process] it must be sorted and then processed and finally recycled" (7:40)*
- *"Municipal scrap plastic is not being collected"*

What kinds of plastics are able to be recycled through your agency?

- Fukutomi collects all kinds of recycling and accepts all plastics type 1 to 7:
    - 1 – Polyethylene Terephthalate (PET or PETE or Polyester)
    - 2 – High-Density Polyethylene (HDPE)
    - 3 – Polyvinyl Chloride (PVC)
    - 4 – Low-Density Polyethylene (LDPE)
    - 5 – Polypropylene (PP)
    - 6 – Polystyrene (PS)
    - **7** – Miscellaneous plastics (includes: polycarbonate, polylactide, acrylic, acrylonitrile butadiene, styrene, fiberglass, and nylon)
- **PLA can not be processed by Fukutomi or recycled**
- PLA (polylactic acid) is difficult to identify and separate from traditional plastics like polystyrene (PS) or HDPE (28:20)
    - It ends up in landfills where it can then "biodegrade" but Dr. Wong mentions the amount of time needed for it to properly break down
    - Dr. Wong believes that while PLA is technically "biodegradable" sorting it causes a lot of difficulty for recycling agencies which costs additional money, time, and resources
    - *"[processing] paper is easier compared to PLA"*

- *"We need sorting, we have been approached by many people trying to get rid of their scraps, but the problem is that they think plastic is plastic. After the collection, it gets processed and that's that. But that's not how it works."*

What strategies have you taken to promote recycling in the public? Have they been successful? Why/Why not?

- Fukutomi does not work to educate the public, but more to manage waste
- Dr. Wong mentioned previous meetings he has had with environmental organizations as well as the knowledge he has observed within the society of Hong Kong
- *"Cost is one of the biggest challenges. Typically, people buy recycled plastic materials because they are cheap."*
- *"People think plastic is plastic and it all goes into the same machine...actually it is not that easy. There are more than 23,000 types of plastic." (8:37)*

How has recycling changed over the years? Have you noticed a difference in the number of people recycling since you started working for this agency? What materials are able to be recycled and how has that changed over the years?

- Industry has been affected with the policy in China because now Hong Kong's waste can no longer be shipped there
- The size of Fukutomi has gotten much smaller over the years
    - Currently only 10 employees work there
    - Office used to be the entire floor but now they only have half, and are still looking to downsize even more

What other recycling agencies in Hong Kong are there that you can recommend we interview for additional information? Is there anything that you think we should know?

- Suggests doing a tour of the sorting factory

Appendix J: Interview with Mr. Allan Wong Summary and Minutes

Interview with Mr. Allan Wong
China Scrap Plastic Association and Founder of Chun Shing Development (HK) Limited
Summary-Minutes-Transcript (January 28th, 2019)

Could you please provide us with a little bit of background information on your role/position in the agency and what your recycling agency is responsible for?

- *"I started the company in 2013, doing plastic and paper recycling. I wanted to develop the local recycling industry. That's why I'm the owner of the company. At first I wanted to do paper recycling but then I saw that plastic recycling was a social issue. Obviously we are not recycling our plastic very well, so I moved to plastic recycling to switch my focus there."*

- *"But the general atmosphere and the business environment is not friendly to this business. I mostly collect plastic waste and send it to the plastic factories to extrude it to melt down and reproduce it as raw material. This depends on the import of the plastic waste instead of local plastic waste because there is no incentive to send the plastic to recycle bins or recycling companies. That's why we cannot collect enough quantities."*

Could you please describe how recycling is done in Hong Kong? Has it always been the same? Why or why not?

- There are several recycling channels in Hong Kong that we collect waste from. A collection fee is applied
    - **Government owned ones (recycling bins on the streets):** *"Only account for a very little percentage of the whole Hong Kong plastic generation. Government recycling bins are collecting about two to three tonnes of plastic everyday, but Hong Kong disposes of 2100 metric tonnes that go to landfill sites daily. You can calculate that it's less than 1% for the government recycle bins."*
    - **NGO Channels:** *"...supported by the government. The government sends funds to NGO to collect plastic waste, but they are not collecting a lot, we have 18 districts, and they have 19 recycling centers. Each center collects about almost 10 tonnes per month."*
    - **Commercial waste channel**

What kinds of plastics are able to be recycled through your agency?

- Mostly THP, LDP, PP5 for the plastics.
- Bottles are what people are most aware of, but water bottles only account for about 10% of all plastic waste.
    - *"We estimate around about 200 tonnes of plastic bottles… but around 2100 metric tonnes disposed in the landfill sites. People think that the bottles are the most serious issue but 90% are waste that are not plastic bottles."*

- *"From a study, they say that since the production of plastic from the last century, only 9% of the plastics have been recycled, about 39% get incinerated, and the rest of it gets dumped in the seas and landfills."*

What strategies have you taken to promote recycling in the public? Have they been successful? Why/Why not?

- *"I'm seeing the situation after several years of frustration in the industry, I started a Facebook page, I talk about what I know in the industry, what I know in other countries, what they are doing, and where we in Hong Kong are, in general as citizens."*
- Mr. Wong writes essays to post online
- *"I think that social media is the best. A lot of Hong Kong people use Facebook, if you write things, it gets liked and shared... If the mass media likes it, it gets up on the news, they will ask to report your story."*

How has recycling changed over the years? Have you noticed a difference in the number of people recycling since you started working for this agency? What materials are able to be recycled and how has that changed over the years?

- *"Recently, restaurants stop providing the plastic straws, and a lot of people are upset about it. Some people complain...I always say to the public that I think people have the freedom to use the straws, but they have the obligation to manage their own waste. So if you choose to use it, then you have to dispose of it properly, take responsibility with your own trash."*
- Some places like local Hong Kong chain stores have stopped providing plastic straws, but they still continue to provide other single-use plastics
- Paper straws are growing more common in Hong Kong… *"I expected that some people are not favorable of paper straws because of the taste of the paper and whatnot, paper straws are quite new right now. I expect to see much more feedback later on [when the straws have been provided more]"*
- *"I think people are not getting the main focus on the matter… I think if people want to use plastic straws, just let it be, but the whole society has to take responsibility of dealing with their own waste."*

What other recycling agencies in Hong Kong are there that you can recommend we interview for additional information? Is there anything else that you think we should know?

- Mr. Chu from Green Earth
- Dr. Wong of China Scrap Plastics Association - international plastic expert, he used to buy a lot of plastic from the states and Europe and ship it to China. He also runs a plastic factory in Hong Kong, but he usually focuses on international business

Appendix K: Interview with Starbucks Manager- Transcript

Interview with Starbucks Employee
Starbucks G/F, Shop 9,11&12, 38 Tai Tok Tsui Road, Hong Kong
January 28, 2019

Abbie: As previously mentioned, we are a group of students working with the World Wildlife Fund to do a project regarding Hong Kong's plastic consumption. To start off, I would like to ask how long you have worked at this particular Starbucks?

Employee: About 6 months.

Abbie: Okay. We're trying to get a better understanding about the types of plastic you give to customers... so when somebody orders here, do you give them cutlery with their meal?

Employee: Often, but we ask them [customers] if they need it, then we give it to them if it is requested.

Abbie: So it's only if somebody asks for it?

Employee: Yes.

Abbie: And how long have you been doing that? Do you know?

Employee: ...About 3 to 4 months.

Max: Do you know by any chance how much is spent by Starbucks on plastic forks and knives? Do you have access to that information?

Employee: We don't really have an idea for that question because everyday we have so many customers coming here...we don't work with that [numbers].

Max: I know that Starbucks has a straw policy, where you reduce the amount of straws you give out, do you still see a lot of people asking for plastic straws though?

Employee: Yes.

Abbie: Have you tried anything else to educate the public?

Employee: If the customers are drinking here [in the store], we try to ask them if they would like to use a mug instead of the plastic/paper cups.

Max: Are people then more susceptible to use a mug instead if you ask them?

Employee: Yes.

Appendix L: Interview with Jollibee Employee- Transcript

Interview with Jollibee Employee
Jollibee 16 號 Argyle St, Mong Kok, Hong Kong
January 30, 2019

Abbie: Do you provide plastic forks and knives with every meal?

Employee: Yes, for the spaghettis, yes we do.

Abbie: Okay, so if it's a burger or chicken, you don't give cutlery with those?

Employee: No.

Abbie: Have you done that for as long as you can recall?

Employee: Yes.

Abbie: What about straw and cups?

Employee: We do provide them but we put up "Skip the Straws" signs.

Abbie: So there's the signs but you still provide them?

Employee: Yes, we still provide them.

Abbie: Have you done anything to become more eco-friendly or have you tried anything so far other than the signs?

Employee: I'm not so sure...the company [decides] so...

Abbie: Okay, but this branch [store] doesn't have anything other than the signs?

Employee: Yes.

Abbie: Would you consider learning more about eco-friendly brands, or switching?

Employee: Not sure because it's the company's [decision].

Abbie: Because it's not this branch? It's the company's…

Employee: It's like a bigger [decision]...

Abbie: Okay, well thank you so much!

Appendix M: Interview with Subway Manager- Transcript

Interview with Subway Store Manager
38 Tai Tok Tsui Road, Hong Kong
January 28, 2019

Abbie: Hi there. As previously mentioned, we are students working with the World Wildlife Fund to do a project regarding plastic consumption in Hong Kong. I would like to start off by asking how long have you been working in this Subway?

Manager: Six years.

Max: We were wondering, do you give out plastics forks, knives, spoons, or anything like that with meals?

Manager: You stay here [eat in], you use this one [basket with cutlery for customers to take]. You take away [takeout], you get plastic bag.

Max: So, the only plastic is through a bag, and maybe a straw?

Manager: Straws are available for customers to take themselves. We don't give it to them [in hand].

Abbie: Ok, so it is up to the customer is they would like to take one then?

Manager: Yes.

Max: Do you do any actions, or rather, have you seen any changes to reduce plastic in some way in this Subway?

Manager: No.

Abbie: Have you considered any biodegradable options or anything of the sort?

Manager: No idea... actually when they go away [with takeout] they need a bag. No bag, it is impossible for customers to get takeout easily. We usually give out forks to them [customers]. For example, when they eat a salad, if they don't have a fork, how are they going to eat?

Max: Do you know by any chance know how much Subway spends on plastic straws and cutlery?

Manager: No.

Max: You don't keep track of the finances and of the sort?

Manager: No we do not.

Abbie: Would you be open to switching to a biodegradable alternative or would you be open to learn more about them?

Manager: No.

Abbie: That's alright, thank you so much!

Appendix N: Interview with Gong Cha Employee- Transcript

Interview with Gong Cha Employee
38 Tai Tok Tsui Road, Hong Kong
January 30, 2019

Max: Hello, I'm a student working with the World Wildlife Fund in an attempt to reduce plastic around Hong Kong. Do you mind if I ask you a few questions? It should only take a minute or two.

Employee: Yes, but uh...I don't speak English too well...but I can try

Max: Thank you so much! So, does Gong Cha only use plastic cups when giving out drinks

Employee: Plastic cups are used for cold drinks. Paper cups are used for hot drinks as plastic doesn't work there.

Max: Do you know if there has been an attempt to use only paper cups?

Employee: Uh no… no. Plastic allows for seeing drink. People like they style and appearance.

Max: Ah, okay thanks. And you use plastic straws you use, do you have other one or tried to use say a paper straw?

Employee: No. Paper straws aren't big enough. Need plastic straw to make hole in top and for pearls or jelly.

Max: Okay, I understand. Lastly, do you have a contact at Gong Cha, either your manager or someone higher, we can contact.

Employee: Sorry, I don't understand the question.

Max: Do you have a boss we can contact?

Employee: I don't think she can, sorry.

Max: No worries; thank you so much for your time, I greatly appreciate it!