Haute Ecole
Groupe ICHEC - ISC St-Louis - ISFSC

Enseignement supérieur de type long de niveau universitaire

The European ban on plastic straws : Analysis of the Horeca establishments Cat's Corner and Les Poules à Lier.

Mémoire présenté par
Elisabeth MILOS

pour l'obtention du diplôme de
Master en Sciences Commerciales- MMS-60

Academic year 2019-2020

Promoter :
Madame Marie-Lise HEINEN

Boulevard Brand Whitlock 2 - 1150 Brussels

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Introduction

The environment is in distress. This is not a secret. There are more and more people concerned by its future and proof of this are, for instance, the manifestations against climate change, which are becoming more and more numerous. These manifestations were initiated by the now seventeen-years-old Greta Thunberg (Le Monde, 2018). Lots of institutions, states or even countries are taking action to help the environment.

The oceans are filled with plastics, the temperature is rising, the seasons are warmer or colder (depending on the time of the year), and so on. The 2018 IPCC report on the climate alerts the world that by 2050, it is very likely that global warming will reach +1,5°C. This report hit hard and brought a lot of people to the streets.

The starting point of this thesis was the broadcast *Cash Investigation* about the plastic industry. This program helps understanding the pollution a lot, the world's use of plastic, what the citizens or the industries do about it and much more. Plastic is a broad subject and including all plastic objects in this thesis would be impossible. Therefore, it focuses on a single item (Cash Investigation, 2018).

Plastic is everywhere now, even where it is not suspected to be found. The environment suffers from it and it has even created a seventh continent, a continent of plastic in the oceans (The Ocean Cleanup, 2019).

National Geographic wrote an article about plastic straws, more specifically about what solutions were brought by companies to get rid of plastic straws. The plastic straws' debate dates from 2015, when a turtle was found with an ancient plastic straw stuck in its nose in Costa Rica. The extraction of the straw took 8 minutes during which the turtle was bleeding and in pain because of the 10-centimeters-long straw. To this day, the video has been watched almost 40 million times. People were alarmed by the pain the turtle was enduring. This video is one of the main triggers of people deciding to talk about banning plastic straws from the daily consumption. The anti-straw movement was born. The big issue of straws for the oceans is that they get tangled up in algae and represent a great danger for sea animals. The video of the turtle is perfect evidence of this (Refedd, 2017).

Some governments and states have listened to their citizens and decided to follow their lead by banning straws from their territories. The European Union is now also on board and has decided to ban a series of single-use plastics, including the plastic straw by 2021 (Official Journal of the European Union, 2019).

The plastic straw itself is not an object that would suggest that it harms the fauna and the flora of the planet. When looked at, it is almost insignificant, but with daily and

worldwide use, it becomes a major problem. The numbers were gathered and help to better understand the extent to which plastic straws are growing.

Each day, **one billion plastic straws** are thrown away worldwide. If these were all to be placed end to end, it would be possible to **go around the Earth five times**. Back in 2017, the plastic straw was the 7th most picked up litter by the sea. According to the International Coastal Cleanup in 2017, **410.000 straws were picked up in the world, which represents almost 9 times the height of Mount Everest**, the mountain measuring 8.841 meters (Ocean Conservancy, 2017).

Only two years later, the same organization published its 2019 annual report and plastic straws are still part of the top 10 litter picked up on the beaches globally. They even occupy the **third place in the ranking** with an amount of **almost four million straws**, almost **10 times the amount of 2017.** This amount was reached within a day with the help of more than one million people across the world. (Ocean Conservancy, 2019, report). The Ocean Conservancy organization had already discovered in 2012 that they had picked up enough straws to pop them into the beverage of one person for **1.250 years** (Refedd, 2017).

Working in a fast-food restaurant as a student job has been helpful in understanding how the straw is overconsumed. Some people take five straws for one cup, others take a handful of them while carrying the food home. It has raised us awareness in the consumption of straws to draft this thesis. Having completed a bachelor in Hotel Management, the use of plastic straws in the Horeca industry attracted our attention. Therefore, we looked at the straw consumption numbers that hotels were reporting. Here are some numbers of three well-known hotel chains using plastic straws per year :

- **300.000** : Marriott Hotels only in Great-Britain (Hotel News Now, 2018).
- **35 million** : 650 Hilton Hotels (Hotel News Now, 2018).
- **4.2 million** : Accor Hotels in the USA and Canada (Hotel News Now, 2018).

These three hotel chains are a good example that shows that the Horeca industry is a big contributor to the consumption and distribution of plastic straws. Those numbers were used frequently to raise awareness among citizens. These enterprises have now acted in withdrawing plastic straws from their establishments (Hotel News Now, 2018).

That is what led us to focus on the Horeca industry, in particular on establishments that don't have the financial means of large institutions to make a change overnight.

To help us analyze the different effects the ban has on these enterprises, we will use several tools studied in classes such as SWOT analyses, change kaleidoscope analysis and a quantitative study. The latter will be focused on the opinions of citizens and their preferences in terms of straws' alternatives since they are the customers of the two SMEs studied.

Methodology

The aim of this thesis is to determine what it takes for a bar or restaurant to replace plastic straws by an ecological alternative. To answer the research question of this thesis, the latter will be structured in two distinct parts :

1. The **contextual analysis**. This part will tackle the literature in order to build a strong background on plastic straws. It contains four chapters. The first one is a chapter about the plastic itself. The second chapter is about the straws : their story, the life-cycle of a straw, how it is produced and how it impacts the environment – what consequences a straw can have. The third chapter is about the banning of it by the European Union ; its origin, pros and cons, etc. and the initiatives taken around the world. Finally, the last chapter is focused on the alternatives already in place to replace the plastic straw.

2. The second part of this thesis is the **case study** concerning the Belgian bar *Les Poules à Lier* and the restaurant *Cat's Corner* in Namur, which consists in qualitative interviews with the managers on making the switch from plastic straws to an alternative. This part will be the enforcement of the contextual analysis that is academically supported. This part will also confront the first one in order to find what would be the ideal solution for a Horeca enterprise to ban plastic straws, taking many factors into account. These factors will include the opinion of citizens about straw alternatives through a quantitative study, which will be the second part of the practical analysis. Finally, the case study will be completed with **our recommendations** for the establishments. The aim of this thesis is to help the selected establishments and establishments that are similar to those to find the appropriate solution to the ban on plastic straws. The answers and recommendations brought to this thesis will aim at bringing answers to the establishments which are in a transition period with regards to plastic straw.

Even though the ban will be effective as of January 2021, it was interesting to note that the establishments did not give much thought to the choice of an alternative, which has led to three hypotheses :

1. They have bigger and more important projects than replacing plastic straws and did not consider straws as an environmental issue that was worth it.
2. They are afraid of the costs that the change will generate.
3. They are afraid of the people's reactions and cannot position themselves in relation to a straw's alternative.

Preface

Due to the covid-19 crisis, there have been limitations to this thesis.

Indeed, the contact with interviewees was limited and it was more complicated to reach out for people during the quarantine. Since we live in Namur and the studied establishments are in the same location, it would have been easy for us to visit them in order to make a follow-up. The follow-up was harder due to the quarantine situation.

Besides, one of the biggest limitations to this memoir was that it was not possible to carry out a full-scale test with the studied establishments, since they both are in the Horeca industry ; one is closed and the other one carries out only a delivery service. The latter would have been really useful in order to really understand what is feasible and what is not, which alternative would be best following this test, how to implement a new organization concerning the cleanup of reusable straws if they were the chosen ones, etc.

Furthermore, we would have liked to realize our quantitative study in a face-to-face manner with direct customers of the establishments but the quarantine situation did not allow it.

Still, we believe we have overcome as much as possible these limitations. We overcame the difficulties of contacting the managers of establishments by keeping contact at least once a week with them. Concerning other contacts (such as political representatives of the city of Namur), some never responded despite our efforts.

About the full-scale test, it could not be overcome. Although this was not feasible, we decided to realize a small-scale testing concerning the cleanup of stainless-steel straws. This allowed us to have an approximate idea of how much time it takes to clean them, as it is one of the biggest concerns of the managers.

Regarding the quantitative study, we went for an online survey that targeted consumers of Horeca establishments of Namur. This helped in having an idea of the opinions of customers, so the studied SMEs could use the data when implementing an alternative to plastic straws.

Part 1 : Contextual analysis

In the first part of this thesis, a contextual analysis will be developed in order to help understanding what is at stake with plastic straws. The first chapter will be treating of the plastic, as it is the material of the straws. The second chapter will help to learn more about the straws, which are a bigger issue than people may think. The third chapter will be dealing with the European ban and the initiatives around the world. Finally, the fourth chapter will be dealing with different alternatives that are already proposed worldwide. The latter is important as the aim of this thesis is to find the best possible alternative for a Horeca establishment, taking into account the cost, the ease to implement, and so on.

Chapter 1 : The plastic

As plastic is the material used to produce single-use straws and the material that poses a problem for the environment, it is essential to understand what the plastic material is, why it is so widely used nowadays, and why it has become a strong issue for the planet.

This chapter will go through different bullet points about the plastic : its definition, origins, how it is used today, its stages of production and its dangers. These bullet points will be essential for the understanding of what plastic is, in order to go further with the plastic straw itself.

1.1 Definition of plastic

Before going further, it is essential to define the plastic material. This section is composed of definitions from dictionaries, a scientist and environmentalists, which aims to have a complete and broad definition of plastic material.

1.1.1 According to dictionaries

- Le Larousse : « Synthetic material consisting essentially of macromolecules and capable of being shaped or molded, generated under heat and pressure » (Larousse, 2019, loose translation).

- Oxford Learner's Dictionaries : « A light strong material that is produced by chemical processes and can be formed into shapes when heated. There are many different types of plastic, used to make different objects and fabrics » (Oxford Learner's Dictionaries, 2020).

1.1.2 According to a scientist

We have retained only one definition which is globally shared by scientists. The engineer Jean-Paul Pothet describes plastic as such :

> « A plastic is a material that can deform under the action of an external force and retain its shape when this force is no longer exerted. From this point of view, clay and glass are natural plastics. However, the term « plastic or polymers » is reserved for synthetic products resulting from the combination of several molecules of a compound, the monomer, to form a macromolecule, the polymer, whose structure usually contains a majority of carbon atoms. The two main classes used in packaging are rigid plastics and flexible plastics »
>
> (Pothet, 2008, p.337, loose translation).

1.1.3 According to environmentalists

Environmental organizations do not describe plastic in general, they rather warn people of the dangers it contains. These organisations are more interested in finding out who is responsible for plastic pollution and in warning consumers of the dangers that plastic can cause.

An example of WWF France :

> « WARNING: Plastics pollute nature, endanger wildlife and natural systems. They enter the food we eat and the air we breathe »
>
> (WWF France, 2019, loose translation).

Anja Van Campenhout, project coordinator for *Brussels Environment*, is aware of the problem single-use plastics have on the Earth. In her opinion, the single-use plastic process (which includes production, distribution and disposal) is a waste of resources and energy and has a negative impact on the global nature and climate. Furthermore, the plastic litter that ends up in the nature and oceans might hurt the fauna and flora, even in the form of micro-plastics – that are potentially carcinogenic – ingested by animals which end up in the plates of humans (Van Campenhout, 2019).

1.2 The origins of plastic

The aim of this section is to understand how human beings have discovered plastic and how it became the material we know today.

1870

Plastic is older than we may think. We have to go back to 1870 to find the first products created out of industrial plastic. At the time, it was used to copy the ivory material and it was made of celluloid, which is an alternative name for cellulose nitrate. It was invented

by the American chemist John Wesley Hyatt and was first used for billiard balls (Larousse, 1994, p.310).

Afterwards, the plastic was used more widely. First for household items, next for army planes where acrylic was very much in use. Plastic in general was actually highly developed during the Second World War (National Geographic, 2019).

1907

Leo Hendrik Baekeland *(1863-1944)*[1] invented the Bakelite[2], the first real plastic material. Bakelite had three properties, one of which was the thermosetting plastic, the first plastic that was resistant and solid once shaped. This was the real starting point of the euphoria over plastic and the tipping point for the edge of the plastic industry (Encyclopaedia Universalis, 2020).

First and Second World Wars

As previously noted, the First and Second World Wars have been the tipping points for the development of plastic and its mastery. After the 50's, the mass consumption and the diversification have made plastic subject to a strong increase in demand. This was the beginning of the era of plastic transformation (Briand, 2014).

1950

Following Berthon (2004), a French historian, the 1950's are the age of plastics. PVC[3] was studied and declined in many ways. The PVC's resistance was its main characteristic, crucial for instance for the construction of planes. At that time, the aim was to manufacture a plastic material that would be « as resistant as steel, as clear and waterproof as glass and as low-cost as paper » (Berthon, 2004, p.298, loose translation).

1973

The first oil crisis of 1973 has permitted the plastic to become a noble material. The oil prices quadrupled at the time and it helped convincing people, who thought plastic was a cheap material, to review their opinions (Garratt, Wride, Sloman, 2015, p.713). As oil became expensive, being the principal raw material to create plastic, plastic also became expensive. It became a prized material (National Geographic, 2019).

After the 70's

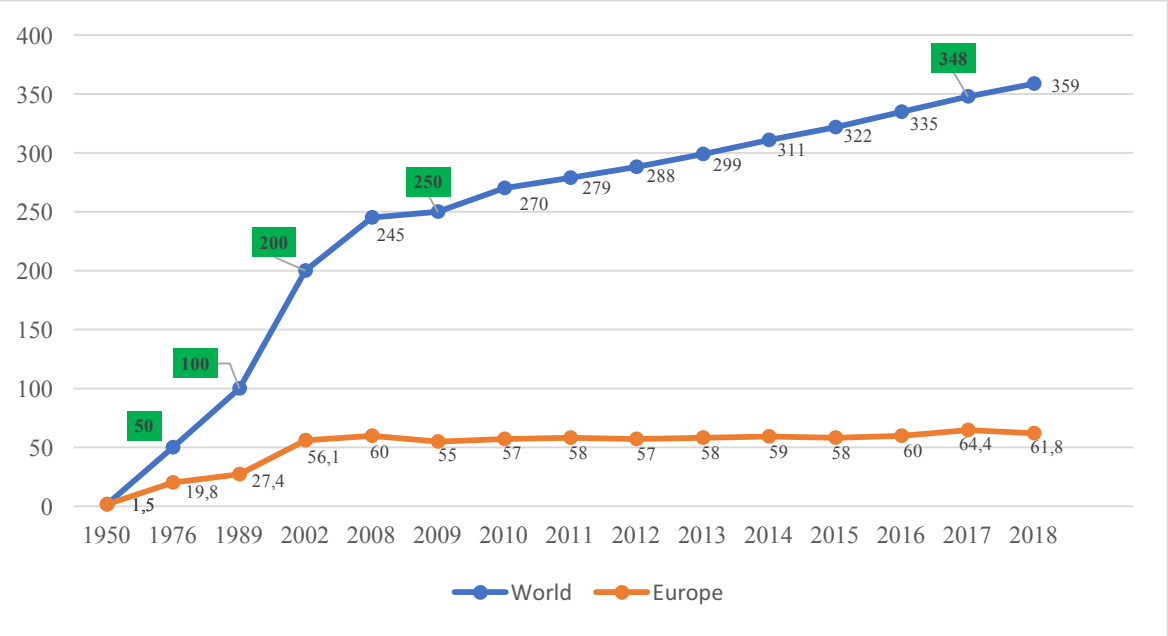
People understood that plastic could substitute anything. After the age of aluminum and metal, the age of plastic had definitively started. Indeed, on the graph below, the increase of plastic production starts to grow from the 70's (Statista, 2019).

[1] An American inventor with Belgian origins (Larousse, 1994, p.61).
[2] See glossary.
[3] Polyvinyl chloride.

1.3 Plastic nowadays

Plastic production nowadays is enormous, as it is the cheapest and easiest material to work with. The graph below shows the evolution of plastic production from the 50's to 2018, with two types of data ; one representing the global production, the other representing the European production. In contrast to the world production, the European production remains fairly stable, the latter being 17,21% of the production worldwide.

Graph 1 : Production of plastics worldwide from 1950 to 2018 (in million metric tons)



Reference : Statista (2019). *Production of plastics worldwide from 1950 to 2018 (in million metric tons)*. Recovered on April 4, 2019 from statistic_id282732_global-plastic-production-1950-2018.pdf

The worldwide plastic production has blown up in the last three decades. The green numbers are the major gaps of global plastics production. It stays quite stable until 1975, then increases a lot until reaching a peak of 359 million metric tons produced a year worldwide in 2018. The 2019 global production is not yet available which is why the graph stops in 2018. From 1976 to 1989, the production doubled which might be explained by the fall of the Berlin Wall and the collapse of communism, which led the concerned countries to turn to the West for economic reasons and their desire to modernize. China also opened up to the world in 1978 which surely had to involve plastics in view of the sudden increase in its production (CVCE[4], 2020). From 1976 onwards, it can be noted that world production doubles (or almost doubles) every 13 years at most.

The curve representing Europe is much less steep, this can be explained by the large scale used to group the two data. Still, the European production increases a lot until 2008. It

[4] « Centre Virtuel de la Connaissance sur l'Europe » in Luxembourg.

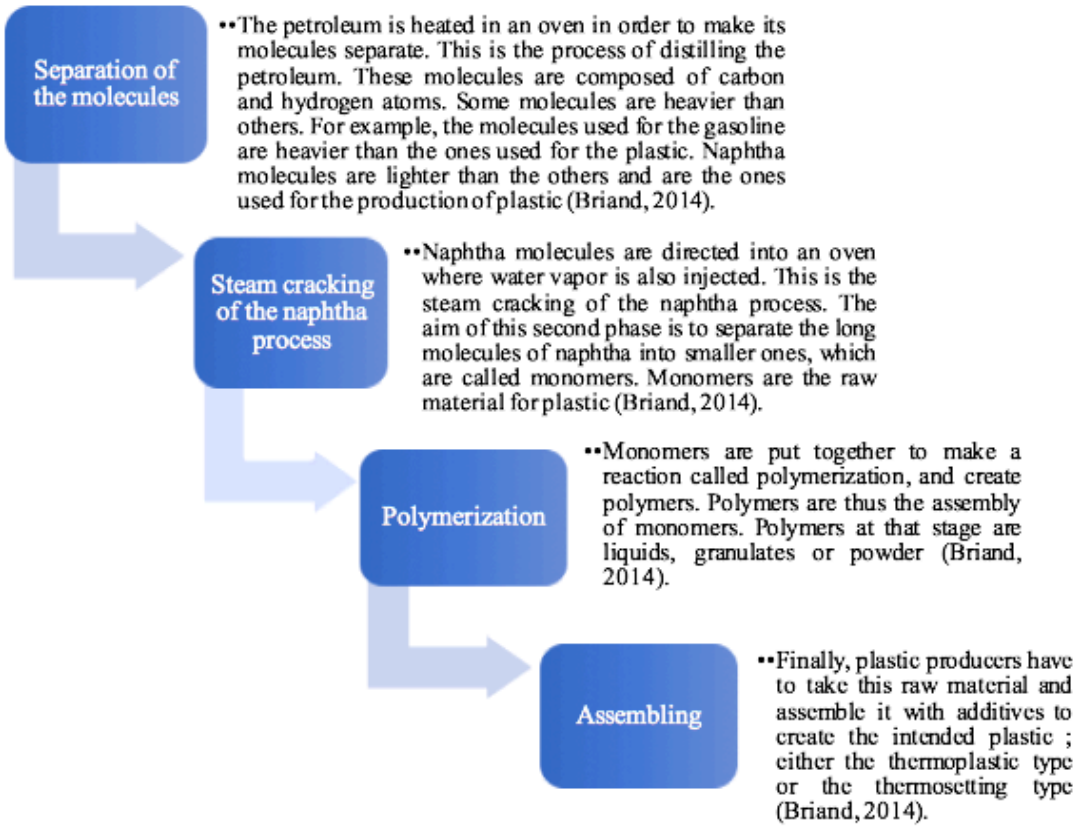
then collapses in 2009 which may be due to the global economic crisis of 2008. From 2008 to 2009, plastic production does not decrease but records the smallest increase of this graph for the worldwide production. After 2009, the curve stays quite stable, with a peak of 64.4 million metric tons in 2017 (See APPENDIX 8 : Zoom on the production of plastics in Europe).

In conclusion, we can say that global plastic production shows a tendency of permanent increase. As for the European production, there might be hope for plastic production to decrease as it already tends towards that direction.

1.4 Steps of production of plastic

After observing how much plastic is produced worldwide, how the latter is manufactured seemed essential to understand what we are dealing with. To this day, plastic is produced from petroleum. It is a great process that involves a lot of energy and resources. According to Mrs. Nathalie Briand (2014), a certified French teacher of life and earth sciences, the steps are the following :

Figure 1 : The stages of plastic production



As it is stated in the figure above, there are two types of plastic : thermoplastics[5] and thermosettings[6]. Plastic straws are part of the thermoplastic type, as it is still possible to mold them indefinitely (Berthon, 2004, pp.296-297).

Plastic is now all over the world and expands very quickly, as it stays a material that is very cheap and above all infinitely adaptable.

1.5 Dangers of plastic

Even though plastic is all over the world and is used by many (if not all) global enterprises, it has not only positive characteristics. After exploring the what of the plastic material, it is important to understand why it is creating such a big debate nowadays. Plastic can cause dangers for the flora, fauna and humans. This section will be divided into two main points ; the dangers on the environment and the dangers on human beings.

1.5.1 Dangers on the environment

Plastic harms the environment. This section will describe some of the dangers this material has already done to the Earth and its occupants, beginning with the issues on the flora and next on the fauna.

1.5.1.1 On the flora

Even though plastic is an invention that has allowed the world to evolve, it does not only have benefits. Indeed, the French historian Maurice-Édouard Berthon explained in 2004 that plastic does not rust or rot, which makes it an incredible material, but these benefits are also disadvantages. Disadvantages in the sense that it does not biodegrade, so the litter accumulates on the Earth (Berthon, 2004, p.298). According to the Ocean Conservancy report (2019), a total of more than 97 million plastic items were picked up around the world, on land and in the seas combined. The Philippines, Ghana and the United States are the countries where most pieces of plastic were found, but Ghana is the most alarming country of the list. Indeed, thousands of kilometers have been covered in the Philippines and the USA to collect these items, but only 33 kilometers have been covered to find 75 million different plastics pieces in Ghana, i.e. 77,41% of the total collected. However, the pieces are much smaller, since the total weight of the plastic pieces in Ghana are 4 times less important than in the Philippines and 20 times less important than in the United States.

[5] See glossary.
[6] See glossary.

1.5.1.1.1 The seventh continent

After considering these numbers, it is relevant in our opinion to focus on the oceans and the damage they bear. The seventh continent is the name given to the zones in the oceans where huge amounts of garbage can be found. These zones are as big as a continent, hence the name. More precisely, it is described as the seventh continent of plastic : plastic that comes from household waste that is mismanaged or thrown into nature, then taken away by the wind into the oceans. Currents and tides gather them together and it forms a mistress of plastic garbage in the oceans (The Ocean Cleanup, 2019).

As a matter of fact, plastic has been found in every ocean and sea of the planet, either in the form of macro- or micro-plastics. The only ocean where almost no macro-plastic was found is the Southern Ocean. Scientists found only one plastic and one metal piece in the touristic area of this ocean (NCBI[7], 2009).

These zones in the oceans are shaped by the movement of the earth. Marine currents roll up due to the rotation of the Earth and bring the plastic litter to one place. Because of this rotation, the litter is stuck in the middle of the rotation and will never come out of it.

Five offshore plastic patches form the seventh continent. The biggest one is the Great Pacific Garbage Patch (GPGP), located in the Pacific Ocean between Hawaii and California (number 1 on the picture below). This patch alone amounts to 80.000 tons of plastic. **This represents the weight of 500 Boeing 747**. It has been estimated by The Ocean Cleanup[8] that the GPGP contains an amount of 1.8 trillion plastic pieces, which represents 250 pieces per human worldwide. 92% of the plastic in the GPGP is mega-plastic (> 50 cm) and 8% is micro-plastic (0,05 - 0,5 cm). After a while, the floating plastic is broken apart by the UV rays of the sun and is transformed into micro-plastic, which is harder to collect and gather. The Ocean Cleanup points out that it is of crucial importance to collect the plastic in the GPGP as it still contains mostly big pieces that are easy to gather. Plastic straws are obviously part of the garbage patches of oceans. They are very easily carried away by the wind due to their light weight (The Ocean Cleanup, 2019).

The garbage patches are very harmful for the animals living in oceans. First because they can get stuck in the different plastic pieces floating on the surface (turtles, birds, fish, etc.). Second, they are likely to ingest the micro-plastics that are found in the waters (Encyclopédie de l'environnement, 2018).

[7] National Center for Biotechnology Information in the USA.
[8] A non-profit organization developing advanced technologies to rid the world's oceans of plastic.

Image 1 : The 5 offshores plastic accumulation zones in the world's oceans

Reference : The Ocean Cleanup (2019). *What is the Great Pacific Garbage Patch?*. Recovered on May 7, 2019 from https://theoceancleanup.com/great-pacific-garbage-patch/

These offshore plastic patches put the isolated islands located not far from the marine currents that gather plastics at risk. Indeed, the marine currents push the plastics to the islands and it creates plastic islands. *Henderson Island*, located in zone 2 on the map above, is a protected heritage of the UNESCO since 1988, but this island is now filled with plastic pieces. It has always been uninhabited because of its location (5.000 kilometers away from the closest civilization) and its wild fauna that does not allow to cultivate. Despite this, the marine currents have brought millions of plastic pieces to this island which is now filled with 38 million plastic pieces. This equals 671 pieces/square meter (Foreign and Commonwealth Office (UK), 2018). Below are some examples of how the flora is deteriorated because of the plastic pollution. This is, in our opinion, proof that the plastic danger is real and urgent.

Image 2 : Zoom on the Henderson Island

Reference :
Clarke, L. (2018). *Henderson Island: plastic pollution in paradise.* Recovered on August 13, 2019 from https://blogs.fco.gov.uk/lauraclarke/2018/04/10/henderson-island-plastic-pollution-in-paradise/

Image 3 : A seabed full of plastic

Reference :
Oceaneye (2020). *Plastique en mer*. Recovered on May 2, 2020 from https://www.oceaneye.ch/problematique/plastique-en-mer/

1.5.1.2 On the fauna

Plastic also has a poor effect on the living beings of the environment, which, we will see it in the next section, include human beings. Fish have been found with plastic in their organism. They do not eat a whole plastic bottle or a plastic straw as it is, they eat the micro-plastics[9] that are mostly found on the surface of the oceans.

According to a study published by the researchers Cole, Galloway, Halsband and Lindeque in 2011, fish eat micro-plastics when they are in their lower-trophic level organism. This category includes the larval stage of different varieties of fish that are commercialized but also kinds of fish such as plankton. Seabirds are also concerned, as well as crustaceans. In the North Pacific gyre, they have found fibers, fragments and films in the stomachs of 35% of the mesopelagic[10] fish sampled. In the River Clyde (adjacent to Scotland), 83% of the crayfish caught had ingested plastic (Cole, Galloway, Halsband and Lindeque, Review, 2011, p.2594). The plastic found in the crayfish was monofilament line and pieces of plastic bags. These animals end up eating micro-plastics because they mistake it for food. They cannot make the difference between food and the tiny pieces of plastic.

A study driven by Chelsea Rochman at San Diego (USA) about fish and crustaceans having ingested plastic shows that (National Geographic, 2018) :

- The livers of fish contain pure plastic.
The fish's livers are harmed and, by consequence, can then barely metabolize the pollutants found in their natural habitat.

[9] Plastic fragments below 5 millimeters.
[10] Low groundfish.

- Oysters produce less eggs and spermatozoids are less performant.
These oysters were exposed to polystyrene. This means that the reproduction of some species might be compromised.

1.5.2 Dangers on human beings

As announced at the beginning of the section 1.5.1.2, the effects of micro-plastics on the fauna have a double impact. A correlation between fish and human beings can be made. The cycle shows that if the fish ingests plastic and the human ingests the fish, it all comes down to the human eating plastic, which is harmful for its health. This proves that plastic has become a real concern not only for the living beings around humans, but for humans themselves. A study published by the Medical University of Vienna[11] had the purpose of investigating if micro-plastics were in the organisms of humans. The study was driven by scientists who examined the stools of eight participants in eight different countries. These participants had a special regime for one week composed of : plastic-packed food or beverages from PET bottles, fish or seafood and no one had an exclusively vegetarian diet (Medical University of Vienna, 2018). Scientists have found a record of micro-plastics in all participants' stools. PP[12] and PET[13] being the most found in the samples. The conclusion of the study is that there are indeed micro-plastics in the human organism. It is not known to what extent it harms the human health yet.
According to Dr. Philipp Schwabl[14] (2018) :

> « Although there are initial indications that micro-plastics can damage the gastrointestinal tract by inflammatory reactions or absorbing harmful substances, further studies are needed to assess the potential dangers of micro-plastics for humans ».

The number of volunteers for the study was limited, so they could not draw a global conclusion, but nevertheless, the facts are there. They confirm the suspicions of many scientists. A more thorough study is still needed to determine which are the real effects those micro-plastics have on humans (Medical University of Vienna, 2018).

These studies raise concerns about human health after eating fish. Especially since plastic is a danger for the fauna (and flora) of the oceans. Eating plastic cannot be a good thing.

[11] October 2018.
[12] Polypropylene.
[13] Polyethylene Terephthalate.
[14] A researcher and a physician-scientist at the Medical University of Vienna, at the Division of Gastroenterology and Hepatology more specifically. His expertise includes micro-plastics (ResearchGate, 2020).

After identifying the double impact of fish ingesting plastic, it is important to notice that the bad effects of plastic do not only come from crustaceans. Below is a table of different effects that three commonly used plastics have on the human health.

Table 1 : The health effects of three major plastics

Plastic	Effects
Polyethylene terephthalate	Risks due to additives when the plastic is manufactured. ➢ Fiberglass : risks of skin and respiratory tract irritation. ➢ Antimony oxide : very difficult to eliminate from the human body and passes through the trans placenta in men and the maternal milk in women. ➢ Polybrominated biphenyls : dangerous if ingested or by means of dermal route. (INRS[15], 2020).
Polyvinyl chloride	If inhaled: ➢ Vapors of polyvinyl chloride can cause bone and angioneurotic lesions which may lead to cancer (liver cancer in particular). ➢ Granulomatous pulmonary lesions. Risks related to additives : ➢ Lung cancer. ➢ Respiratory disorders. ➢ Skin and eye irritations. (INRS, 2020).
Styrene	Component of the polystyrene. ➢ Dangerous if inhaled. ➢ Eyes irritation. ➢ Can affect a fetus. ➢ Severe risks for organs (hearing device). (INRS, 2020).

Although this table might not evoke real danger to some people, effects of endocrine disruptors may be more telling. Endocrine disruptors raised concerns in 1960, then in 1991. Scientists agreed on the fact that these disruptors can be of danger for the fauna and

[15] « Institut National de Recherche et Sécurité » in France.

the endocrinal system of human beings (the growth, reproduction, metabolism, etc.). Endocrine disruptors could be the most famous danger that is found in plastic. For instance, paraben, phthalates, pesticides, bisphenol A, mercury contain endocrine disruptors and are also found in food packaging, food itself, tin cans, etc. (Province de Liège, 2016). This currently known danger can affect the reproductive system, genetics and immunology, provoke breast/uterus/prostate/testicle cancer and so on. Unfortunately, the only prevention is to pay attention to the products bought and for the authorities to warn the population about which products and/or additives they must pay attention to, in addition to a European regulation (INC[16], 2019).

In conclusion, dangers on the environment may be of public knowledge and are now brought to the eyes of the customers. The dangers on human beings may not be as well-known, but it teaches us that if the plastic pollution carries out that way, not only the fauna and flora will suffer it, human beings too. The dangers are multiple, plastic endangers the environment by polluting it, fish are now found with plastic in their metabolism and human beings too. Another danger will be developed in the next section, which will explore the waste and recycling of plastic worldwide.

1.6 The invasion of plastic in the daily life

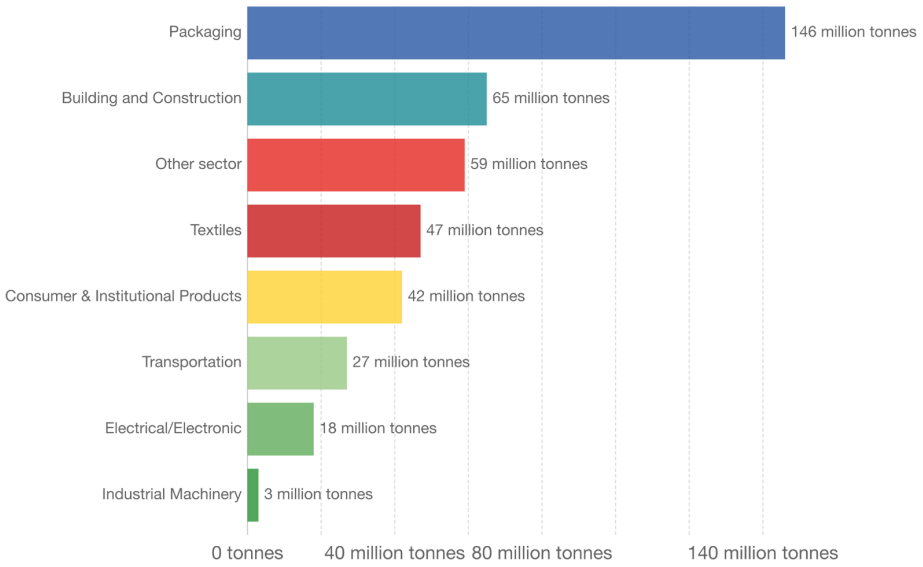
This section aims at understanding how the plastic became so essential into the lives of humans. Indeed, if we take a look around, plastic is all around us : in almost every packaging, technology device, clothing and many other items. The invasion of plastic will be analyzed firstly throughout different sectors to make it possible to see which sector uses most plastic. Next, the recycling part of the plastic will be explained.

1.6.1 By sectors

Today, 10 tons of plastic are produced every second globally and one ton ends up in oceans every two seconds. In its early days, plastic is presented as full of advantages. Light, resistant, customizable, quiet and functional are its main characteristics (Cash Investigation, 2018). By investigating the different plastic-producing sectors, the following emerges :

[16] « Institut National du Cancer » in France.

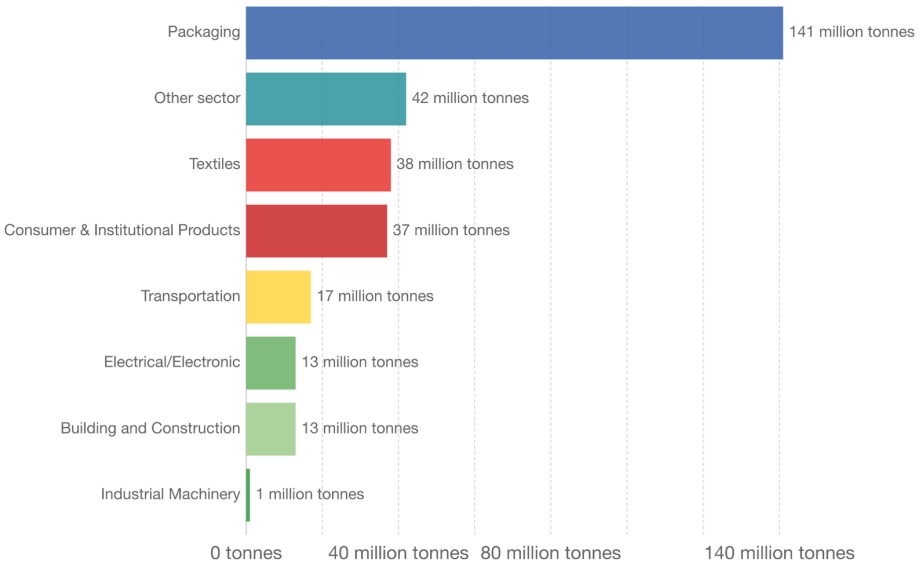
Graph 2 : Primary plastic production by industrial sector, 2015



Reference : Ritchie, A., Roser, M. (2018). *Plastic Pollution*. Recovered on April 27, 2019 from https://ourworldindata.org/plastic-pollution

Predictably, the packaging sector is the number one producer of plastic in 2015, this sector includes single-use plastic packaging as well. It represents 35% of the total production. Surprisingly, the textile sector has a strong fourth place in this ranking, as many people might not think that clothes would partly be made out of plastic. Textiles are closely followed by consumer and institutional products, which shows that enterprises produce a lot of plastic for consumers only. By looking at the figure below, it is possible to see the waste management for the same sectors in one year.

Graph 3 : Plastic waste generation by industrial sector, 2015



Reference : Ritchie, A., Roser, M. (2018, September). *Plastic Pollution*. Recovered on April 27, 2019 from https://ourworldindata.org/plastic-pollution

In the waste of plastic, the packaging sector also leads the way which seems very logical. In one year, this industry throws away almost as much as what it produces (97% !). The textile and consumer industries are neck on neck for the third position in this classification. The conclusion of these graphs is that most industries waste a great amount of what they produce with a margin from 12% to 37%, except for the *Building and Construction* industry where the waste is 80% less important than the production. The packaging industry is the most interesting for this thesis (since plastic straws are part of this sector), so we will retain that the margin between the production and the waste is **only 3%.**

But packaging has not always been the leader of the plastic production. At first, plastic was developed for clothes, which can explain its fourth position in graph 2. Then, plastic materials were mostly used in the distribution of liquids (pipes for instance). Next, they were developed to fit the materials of houses (window frames). Plastic use in the packaging sectors only started to blow up in the 70's. It has expanded very quickly, as the mass consumption and the philosophy of « I use, I throw away » was already leading the way (Ina[17], 2018).

In conclusion, even if it does not concern all sectors, most of the global production generates almost as much waste – in this case, 74% of the total production is wasted. It helps understanding that this should not be how plastic should be managed.

1.6.2 The management of recycling plastic

Now that the waste has been covered, it is relevant in our opinion to understand how waste is handled and recycled. According to Geyer, Jambeck and Lavender Law (2017), this is the common model used to estimate the waste after plastic is produced and used. At the end of its life, plastic has three possible fates, which are shown in the table below.

Table 2 : The management of recycling plastic

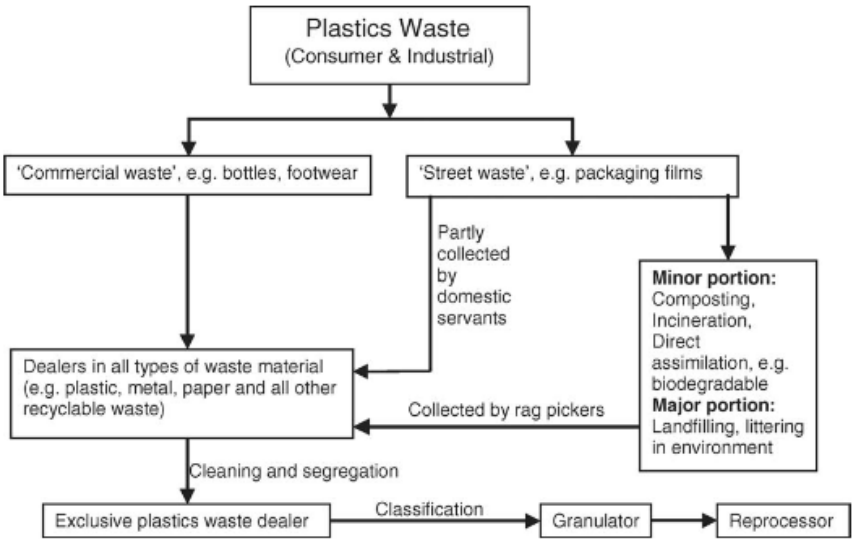
Plastic is recycled
There are two options for plastic to be recycled : either recycled or either converted to get a second life as another product. It helps to not directly destroy the plastic, so that it can be reused. Of course, if a recycling model with the aim of repurposing the plastic already produced is chosen, the current amount of plastic production should decrease, otherwise the process does not make much sense (Geyer, Jambeck and Lavender Law, 2017, report).
Plastic is destroyed
The second fate is to destroy the plastic thermally. It is usually done the traditional way, by incineration. It literally means that plastic is burnt. The incineration of the plastic can be used for urban heating for example, or it can be incinerated without a

[17] « Institut National de l'Audiovisuel » in France.

specific goal, just to get rid of the litter. The issue with incinerating plastic is that it generates high carbon emissions, which is not good for the environment nor healthy for humans (National Geographic, 2018).
Plastic is discarded
This is the most common fate of plastic. The discard of the plastic can be managed to stay in sanitary dumpsites, so the litter is controlled. MIT states that « sanitary landfills are sites where waste is isolated from the environment until it is safe. It is considered safe when it has completely degraded biologically, chemically and physically » (MIT[18], 2019, para.1). For instance, one plastic bag needs over one century to decompose in the nature (Dussud and Ghiglione, 2014).

The researchers Mutha, Patel and Premnath (2006) defined a model of recycling plastic for India (see FIGURE 2 : Flowchart for the plastic waste). India recycles 47% of its total plastic waste, which is way more than most other countries. This is what makes this model relevant for countries all over the world (Mutha, Patel and Premnath, 2006, p.234).

Figure 2 : Flowchart for the plastic waste

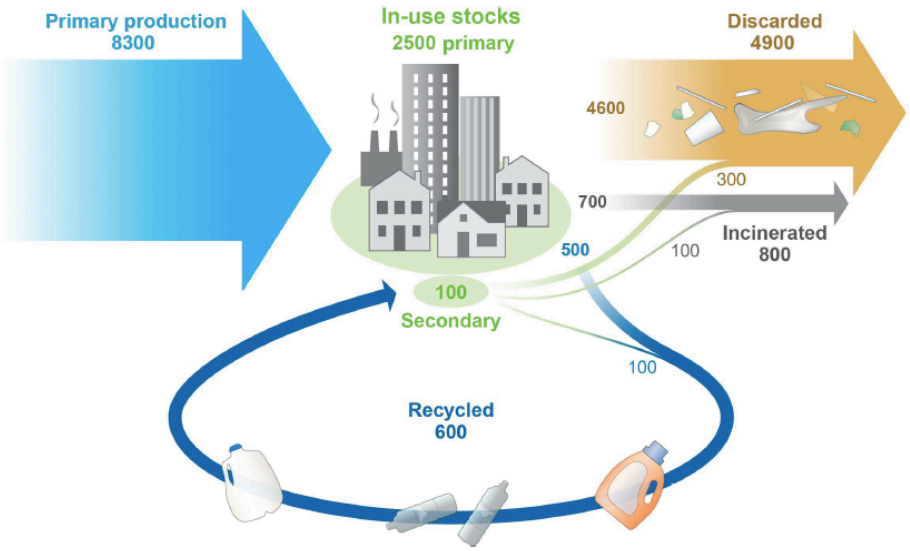


Reference : H. Mutha, N., Patel, M. and Premnath, V. (2006). *Plastic materials flow from India*. Recovered on October 25, 2019 from https://doi.org/10.1016/j.resconrec.2005.09.003

This model represents the ideal course of plastic waste. If it was always reprocessed, the plastic's issues would probably not be as important today. Indeed, nowadays, most of the plastic waste is discarded. Proof of this is the following model using global data from 1950 to 2015 for plastic waste according to Geyer, Jambeck and Lavender Law in 2017.

[18] Massachusetts Institute of Technology in the USA.

Figure 3 : Global production, use, and fate of polymer resins, synthetic fibers, and additives (1950 to 2015 ; in million metric tons)



Reference : Geyer, R., Jambeck R., J. and Lavender Law, K. (2017). *Production, use, and fate of all plastics ever made.* Recovered on October 24, 2019 from https://advances.sciencemag.org/content/3/7/e1700782

The developers of this model estimate that 8.300Mt of primary plastics were produced between 1950 and 2015. Primary plastics are plastics made from virgin materials. Out of these 8.300Mt, 2.500Mt were still in use. That is what led the researchers to believe that the waste of primary plastics amounted to 5.800Mt[19] (Geyer, Jambeck and Lavender, 2017).

They then estimated that the 5800Mt were divided as follows : 4.600Mt were discarded (either in landfills or in the environment), 700Mt were incinerated and 500Mt were recycled. The tricky part is that the recycled amounts are not fulfilling their purpose. Indeed, only 10% are recycled more than once and therefore reused. First, 100Mt of already recycled plastics are added to the new 500Mt, which makes a total of 600Mt. Out of these 600Mt :

- 100Mt become secondary plastics (recycled) and will be recycled again later ;
- 100Mt are added to the initial 700Mt of incinerated plastics ;
- 300Mt join the discarded plastics, which will then be of 4.900Mt.

Since 500Mt are not recycled and added to the general disposal of plastics, the 5.800Mt rise to 6.300Mt. This means that out of 8300Mt produced, 59% are discarded in the nature or landfills, 9,5% are incinerated, 30% are in-use, around 7% are destined to be recycled but only 1,2% of the total production of primary plastics will actually be recycled multiple times (Geyer, Jambeck and Lavender Law, 2017).

[19] 8300 – 2500 = 5800.

In Belgium, especially in Namur, the recycling process does not bypass the rule. The majority of litter is incinerated. Indeed, Xavier Gérard (2020)[20] explains that in 2019, the average citizen litters :

- **18,11kg** of PMC[21] ;
- **134,87kg** of OMB[22].

It is important to note that only a part of the PMC litter is recycled and the PMC trashcan represents only 11,83% of the total litter per citizen. Concerning OMB litter, all is incinerated (Gérard, 2020). To enhance this, the City of Namur has decided to introduce a new PMC trash bag which accepts more items (such as packaging). They now expect to add 70.000 extra plastic packages to the PMC trash and to recycle 41% to 65% of those (FostPlus, 2020).

In conclusion to the recycling process, there is a big difference between what should be done in order to follow a circular economy of the plastic and what is really performed. The easy option is to incinerate the litter and it is the one that takes precedence over recycling. This includes that neither the production nor the waste will decrease if the situation is kept this way.

[20] The Chief of staff of alderman Deborsu in Namur.
[21] « Flacons en **p**lastiques, emballages **m**étalliques et **c**artons à boissons » in Belgium.
[22] « Ordures Ménagères Brutes » in Belgium, can be translated by raw household waste.

Chapter 2 : The straws

Having discussed the plastic material and what it really means in terms of dangers, pollution and recycle process, this chapter will tackle the straws themselves. How they were invented, their evolution, the development of the product, their life-cycle, the steps of their production and finally their recycling process.

2.1 The story of straws

The straw is way older than we may think. We have always known the plastic straw and never thought that such an object could be so old. The first points of this section will focus on the history of the straw, from its legends to the realization.

2.1.1 The legends

It is believed that 5000 years ago, the first beer was produced by the ancient Sumerians. The beer was not filtered at the time, which is what drove this civilization to think of long tubes they would put in the jars to avoid drinking the solid layers that covered the drink. Straws were essential at the time since people were drinking out of tall jars and not small glasses (Penn Museum, 1986).

The idea seduced many and was even made of precious materials. A straw found in the tomb of a supposed high-priestess of the Mesopotamian times was made of gold and measured 136 cm (See APPENDIX 1 : The straw from the Mesopotamian times) and is proof that a so common object nowadays was also a luxurious product in the ancient times (Penn Museum, 1986).

Another legend concerns Marvin Stone on a hot day in the summer of 1880. According to the National Museum of American History (2002), Marvin Stone[23] was drinking a mint julep with a ryegrass as a straw, but it started to fall apart. The ryegrass is an herbaceous plant that was used as a straw long ago. This incident gave Mr. Stone an idea which is described in the section below.

2.1.2 The exploitation of an idea

He would first put a paper strip around a pencil and drink his beverage with this. Next, he replaced the normal paper with paraffin wax-coated manila paper, in order to avoid the drink to disintegrate the paper straw. In 1888, he patented his discovery, and decided to commercialize it. Marvin Stone also owned a company that sold cigarette holders. The success of his paper straws was stupendous and journalist Chris Broda-Braham wrote that

[23] Known for the invention of the paper drinking straw (Learning History, 2019).

« by 1890, his factory was producing more straws than cigarette holders » (National Museum of American History, 2002, para.1).

2.1.3 The Flex-Straw company

Only 40 years later, in the 30's, Joseph B. Friedman came into play. He saw his young daughter trying to reach the top of the non-flexible paper straw and had an idea. He would insert a screw in the straw to create a ripple, which would allow people to bend the straw. It was all about making it easier. Mr. Friedman also patented his discovery. He then created a company : the Flex-Straw Company (National Museum of American History, 2002).

Hospitals were the first to buy these straws, as it allowed their patients to drink without choking while being elongated. Hospitals seemed to be the marketing target of the bendable straw (See APPENDIX 2 : Flex-Straw ; The individual, personalized drinking tube). During the following decades, tea houses and cafés were seduced by the paper straw (National Museum of American History, 2002).

Since then, straws became massively produced. When the plastic was more commonly used and especially when it became a cheap material to produce, straw producers switched to plastic as it was less expensive. On top of this, they also understood that plastic straws could resist anything, which was an added value to the original product. It helped the fast-food industry a lot, as the plastic straw could go through a beverage lid without tearing apart (National Geographic, 2019).

2.1.4 The booming of the straws' industry

The plastic straw industry boomed during the 60's. The company created by Joseph B. Friedman, the Flex-Straw Company, was sold to the Maryland Cup Corporation in 1969. The latter was later bought by the Fort Howard Corporation in 1983 (National Geographic, 2019).

David Rhodes, the global sales manager of paper straw manufacturer Aardvark Straws, explains the madness of plastic straws :

> « It was better, cheaper, and they resisted anything. It really was a better product at a lower price, and at the time, no one cared about the environmental impact that it could have ».
>
> (National Geographic, 2019, para.20, loose translation).

Today, one billion straws are used and thrown away every day. It is important to bear in mind that the numbers collected are an approximation since there is no inventory of the global production or distribution.

2.2 The life-cycle of plastic straws

After the story and origin of drinking straws, this section will tackle the life-cycle of a straw, including the two lives of the item, the production process of it, ending with the recycling process issues of a straw.

2.2.1 The two lives of the straw

As almost every plastic item, the plastic straw has two lives. The **first life** of a straw is actually very short. People use it for a few minutes, time for them to drink their beverage to then throw it away. Since it is not intended to be reused, the plastic straw does not last long in the hands of an individual.

The **second life** is much longer. We are talking about years for a little tube of plastic, that people use for only minutes. The « recycling process » of a straw is much more complicated than one may think, which only makes this object an even more controversial subject. (Le Soir, 2018). Lost in nature, it would take 200 years to decompose. 200 years seem like a lot for a small plastic tube used for an average of about 20 minutes (Forbes, 2018).

2.2.2 The plastic straws' production process

The manufacturing process of a plastic straw is very short, thanks to the technological advances. According to the specifications of a machine producing plastic straws, used at the French company *Soyez*, one machine can produce 600 pieces/minute (Maurice[24], 2019).

As many products, the PP straw follows a manufacturing line : « Raw material, transportation, manufacturing, disposals of finished products » (Boonniteewanich *et al.*, 2014, p.1). Companies producing plastic straws are more specifically called « plastic extrusion companies ».

2.2.2.1 Raw Material

Companies receive the raw material which is a powder composed of a mix of plastic resin, colorants and additives such as plasticizers to improve the flexibility of PP and stabilizers to reduce dangerous interactions between plastic and oxygen, ultraviolet lights to protect the plastic from the sun's rays, which also prevent radiations that could otherwise result

[24] Benoît Maurice is the commercial director of the French enterprise *Soyez*, an enterprise that produced plastic straws before the announcement of the European Union to ban them. They are now producing paper straws instead. The information followed by his name are a result of an e-mail exchange.

from this, or even inert fillers to improve the visible density of the plastic straw (Schueller, 1999).

2.2.2.2 The mixing and melting

This mix is then put into the hopper of an extrusion machine that will mix them all together, melt them and finally create small beads of the mix. The mix is melted again to form thin strands that are cooled, then cut into a small pellet shape. This step is necessary in order to make the material easier to move. Finally, the pellets are dried and collected. This results in finished plastic, ready to be used to create plastic straws (Schueller, 1999).

2.2.2.3 Straw extrusion

The next step is the straw extrusion itself. The pellets are sent into another hopper where they will be completely melted. The melted mix comes out of the hopper shaped as a long string with the diameter of a straw. It is then cooled in a water bath and finally cut with a knife to fit the right size of a plastic straw. The straws are now ready to be packaged (Schueller, 1999).

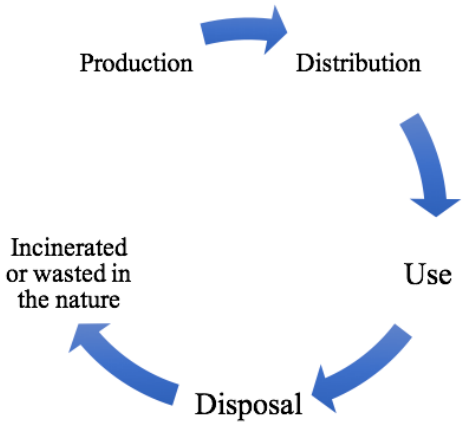
Technological advances have made this manufacturing process very easy, with almost everything being done by machines. As noted earlier, according to the capacity of the machines, it will be possible to produce more or less straws (Maurice, 2019).

After being shipped to straw consumers (most essentially fast-food restaurants), the final consumer can enjoy the plastic straw. Unfortunately, the single-use straw will only live for a few minutes. The time for the final consumer to consume his drink and throw it in the garbage (Maurice, 2019).

2.2.3 The recycling of straws

While the principle of recycling materials or products is to create new ones with the old material, plastic straws cannot follow this ideal process. Indeed, below is the complete life-cycle of a plastic straw explained in more detail, according to Boonniteewanich *et al.* (2014).

Figure 4 : Life-cycle of the plastic drinking straw



Throwing the straw in the garbage should mark the beginning of its recycling circle. Unfortunately, a straw is so small that it makes it impossible to recycle. The reason why the straw is that little is because the diameter and the length of the straw must not be too big because of aspiration reasons. In fact, the size of drinking straws is calculated for our lungs not to have to make too much effort to empty the air in the straw and have the drink in one vacuum (Indiana Public Media, 2020). Its very small size and diameter, but also its light weight play a big role in why it is not recycled.

Furthermore, the sorting of some enterprises does not help the process. In fast-food restaurants for instance, all garbage is mixed together : plastic straws, cups, cardboard packaging, cans, etc. Bins are compressed and become the responsibility of the city. Bins are directed to an incinerator plant and burnt. Also, an individual sorting its litter properly is not responsible for the impossibility to recycle the straw. Indeed, the plastic straw goes into the all-purpose bin, which is then incinerated (Van Campenhout, 2019). Gérard (2020) explains that the plastic drinking straw is not a packaging item (even though it is part of the packaging industry as explained before). It can be qualified as a tool at most, which explains why it does not go into the PMC garbage.

According to Benoît Maurice (2019) from *Soyez*, the PP used for plastic straws is entirely recyclable. The problem is indeed their size and the fact that a sorting system able to isolate the plastic straw and sort it properly does not exist. Compared to the model of Mutha, Patel and Premnath (See FIGURE 2 : Flowchart for the plastic waste), it means that plastic straws do not make it to the part where old plastic is granulated and then reprocessed to be reused.

If they are thrown away in the nature, they will decompose in about 200 years for a few minutes of consumption (Forbes, 2018). This number is still an approximation, as even a representative of the company *Soyez* does not know the decomposition time of a plastic straw, as the first plastic straw was created less than 200 years ago (Maurice, 2019).

According to Gérard (2020), plastic straws contribute to excessive waste and the environmental cost of producing them is high in terms of soil and water pollution. The latter occurs because of plastic microbeads that affect the entire natural cycle. He stresses this by saying that all studies point in that direction.

> « The only way to permanently eliminate plastic waste is by destructive thermal treatment, such as combustion or pyrolysis »
>
> (Geyer, Jambeck and Lavender Law, 2017, p.1).

Geyer, Jambeck and Lavender Law (2017) even precise that no commonly used plastic actually decomposes, but is rather accumulated in nature. This also applies to plastic straws, which have become a big part of the plastic waste, even if they are very small.

Some people think that the industries producing non-recyclable objects must be responsible for the litter they generate ; others think that consumers are responsible for it. The *Soyez* company believes that an environmentally conscious consumer knows that he cannot throw plastic straws in the nature. They add that consumers are generally conscious about that. The enterprise is now taking its responsibility by thinking of an alternative that will be entirely compostable (Maurice, 2019).

In conclusion, it may not be expected at first, plastic straws have a very short first life but their second is very long. What concerns us the most is the disposal of the product. We were surprised to observe that no recycling tool has been discovered for the item, even though one billion straws is discarded each day. Another astonishment was to observe that plastic straws were never recyclable and the issue is brought only today to the eyes of the world.

Chapter 3 : The European ban

Now that the plastic and the plastic straws have been tackled, the third chapter of this thesis will deal with the ban imposed by the European Union of June 5th, 2019. It will explain how the European Union came to ban single-use plastics and who has set the example with the different bans and initiatives around the world. The second section will focus on the ban itself and what it concerns. Finally, the chapter will conclude with users' and producers' opinions on the ban.

3.1 Plastic straws' bans in the world

This section will tackle the origin of the « ditching the straw » movement, from its beginning with citizens to the initiatives of industries and governments.

3.1.1 Turtle and petitions

The banning of single-use plastics finds its origin with plastic straws. Indeed, these are the starting point of all this. In this section, we will focus on the part of the ban concerning plastic straws. It began with the petition due to the straw that was found in the nose of a turtle in Costa Rica in the image below.

Image 4 : Turtle in Costa Rica with a straw stuck in its nose

Reference : De Mulenaere, M. (2018). *Tout le monde a les pailles dans le nez*. Recovered on January 17, 2019 from https://plus.lesoir.be/158864/article/2018-05-25/tout-le-monde-les-pailles-dans-le-nez

People were shocked by this, so they signed a petition for industries to shut down the production of plastic straws. The petition targeted companies. Citizens wanted them to withdraw plastic straws from their establishments. It also began with a 9-year-old

American : Milo Cress. This little boy decided at the age of 9 that he did not want single-use plastic straws to exist anymore. He made a considerable survey alongside companies in the United States and he is the one who found out about the **500 million plastic straws** Americans use every single day. Determining the exact number of straws people use every day is very hard, nearly impossible. He took an average of the amount manufacturers told him. Some people do not believe in the statistics he brought to the eyes of the world, saying it is overrated. Nevertheless, Cress uses his statistics in his campaign because it shows the world that it is urgent to reduce the amount of straws consumed (USA Today, 2018).

Even if the number was overrated as some may say, it was a turning point and governments are now looking into plastic straws (USA Today, 2018).

3.1.2 Public and private initiatives

Public initiatives are initiatives taken by states, countries or country unions. The private initiatives concern companies acting on their own, before or despite the decision of their country or state.

3.1.2.1 Public

After understanding how the anti-straw movement took place, this section presents a few examples where big decisions concerning plastic straws were taken and the extent to which this movement has grown, leading to the European ban.

Seattle followed the lead of Milo Cress and became the first major US city to ban plastic straws. A big city like Seattle paving the way helped other cities and countries to follow the example (LesPailles.com, 2018). After Seattle banned plastic straws in its food industry, many cities in the USA followed. **Miami Beach** and **Malibu** have banned plastic straws since May 2018. In 2018, **New-York City** planned to prohibit them by 2020 (NPR, 2018). **Los Angeles** did not ban straws but asked the state to initiate an on-request policy for the item in 2017. By doing this, they hope that the use of plastic straws will decrease from 60% to 80% (The Mercury News, 2017). They are now planning to phase out straws by 2021 (Los Angeles Times, 2019).

In **Great-Britain**, the former Prime Minister Theresa May stated that plastic straws would also be banished from the English territory, right after the success of the tax on plastic bags[25] (LesPailles.com, 2018).

With 57 million plastic straws used every day, Vancouver was the first city in **Canada** to decide to ban them. The aim of the city goes further than just banning the straws.

[25] Which eliminated the use of 9 billion plastic bags in Great-Britain.

Vancouver has implemented its « Zero Waste 2040 » plan, which will cover the entire city. Prime Minister Justin Trudeau announced in June 2019 that the entire country would get rid of single-use plastics by 2020, including straws, with this motivation :

> « We're at a point when we take our kids to the beach and we have to search out a patch of sand that isn't littered with straws, Styrofoam or bottles »
>
> (Quoted by NBC, 2019, para.4).

For now, the ban on straws only concerns bars and restaurants so it is still possible for people with disabilities for instance to buy them as their life may depend on them. The city aims to find a sustainable alternative for disabled people. In case of non-compliance by establishments, the law states that a fine of 259$ shall be paid – which amounts to almost 170€ (LesPailles.com, 2018).

South-Africa, **Costa Rica** and **Thailand** are countries where straws have been phased out since 2018. They are now using paper, wood or bamboo straws (UAE[26], 2018). **Monaco** was the very first state of the European continent to prohibit single-use plastics, which include plastic straws, by 2020. The principality acted on its own and did not wait for a bigger institution such as the European Union to show the way (L'Echo, 2018).

Even for countries or states where no strict measures are taken by governments, there is a real awakening about plastic straws and people are willing to act independently of the law to help the environment (LesPailles.com, 2018).

3.1.2.2 Private

Big names such as McDonald's, Starbucks, Hilton and Marriott Hotels, Lidl, Carrefour and so on, have decided to stop selling or proposing plastic straws. This decision was encouraged to a lot of enterprises, but not all (Money.com, 2018).

Indeed, McDonald's went from plastic to paper straws and part of the consumers were not happy about it, saying that the new straw was not appropriate for all the drinks the brand proposes. McDonald's reacted to this by saying they would not give in to pressure and they ensure that paper straws are made to last 30 minutes in almost all liquids (iNews, 2019).

3.1.3 European Union

The European Union has also followed the lead and has decided that single-use plastics (including plastic straws) will be prohibited by 2021 in the entire European Union. It is a decision that will help the environment in three ways :

[26] United Arab Emirates.

- Reduce carbon emissions by 3.4 million tons ;
- Avoid damaging the environment (by discarding these plastics in the nature for example) ;
- Make the consumers save about 10 billion euros.

(LesPailles.com, 2018).

The cost of environmental damage due to plastic pollution in Europe only is estimated to be €22 billion until 2030. One of the aims of the ban is to spend less than this amount (L'Echo, 2018). If cities and governments have decided to ban plastic straws, the European Union is taking a big step in the anti-straw movement ; it is the first entity to impose this decision on so many countries at once. This ban will thus concern over 513 million citizens[27] (Eurostat, 2019).

3.2 The European ban

The different petitions and bans around the globe have created a snowball effect. Citizens of the world became aware of the issues that a small plastic tube could create. Although some companies have decided to act on their own initiative, the EU has decided to strike a major blow by banning single-use plastics – which already have an alternative – in all the member states of the European Union.

According to the IPCC[28] report (2018) : « **We have about 12 years left** ». This is 12 years to minimize the future effects the planet will have to endure ; temperature rising, more plastic than fish in the oceans and so on. The straws have triggered the debate on single-use plastics and enterprises are the ones that have reacted the fastest by banning them. States and governments are following (Harvard Business Review, 2019).

3.2.1 A circular economy

The European Union is in favor of promoting a model of a so called circular economy, which includes plastic materials. In the legislative act concerning the directives relating to the impact of plastic items on the environment, the European parliament and the Council of the European Union admit that the plastic material is a cheap material that allows producers to create almost any kind of product due to its versatility. This is the reason why it is currently so commonly used – even misused. The role of plastic has become too ephemeral. The aim of this directive is to reduce the negative effects single-use plastics – including plastic straws – can have on the environment by setting up a legal framework (Official Journal of the European Union, 2019, p.1).

[27] Population of the EU on 1 January 2019. This amounts to 447 million citizens without the United Kingdom.
[28] Intergovernmental Panel on Climate Change.

In the various countries of the Union, **80% to 85%** of the litter found on the beaches are made from plastic. **50%** of these are single-use plastics. The European parliament has come to the conclusion that « single-use plastic products and fishing gear containing plastic are therefore a particularly serious problem in the context of marine litter, pose a severe risk to marine ecosystems, to biodiversity and to human health and damage activities such as tourism, fisheries and shipping » (Official Journal of the European Union, 2019, p.2).

3.2.2 Regulation

The directive of the European Union concerning single-use plastics (including straws) has to be respected by the 3rd of July 2021. It means that every member state will need to have its own regulations and sanctions in place by that date. The directive concerns a set of single-use plastics, but not all of them, as the European Commission believes that the set in question represents 86% of the plastic found on the beaches (Official Journal of the European Union, 2019, p.3).

The draft also states that in order to minimize the effects of single-use plastics, member states should be expected to prohibit their launch on the market but also the launch of items made from 'oxo-degradable' plastic[29]. The sanctions for establishments that do not respect the banning will be determined by the member state concerned :

> « The penalties provided for shall be effective, proportionate and dissuasive »
> (Official Journal of the European Union, 2019, p.7).

In addition to this deterrent fine, member states shall prohibit the placing on the market of single-use plastics and should put all their efforts into the fight. If no alternative exists on the market yet, member states should follow the polluter-pays principle where producer responsibility would be extended and producers would then have to bear the costs of waste management and clean-up, as well as the costs of raising awareness about littering. It is important to note that these costs should not prevent the enterprise to make profit (Official Journal of the European Union, 2019, pp.4-5).

The deadline is set. Member states of the European Union have to present their plans to the European Commission for July the 3rd, 2021 at the latest. The plans will include the steps to prohibit the launch of the concerned items on the market, the forecasted penalties and any modification that could be brought to their plans, 2019, p.16).

In Belgium, the deadline set is the 1st of January 2021. The country could be qualified as star pupil since it is acting early on the deadline of the European Union. For Wallonia, this was decided on July 18th, 2019 by an order of the Walloon government, which interests us in the case study (Walloon Government, 2019).

[29] See glossary.

3.2.3 Exception

Plastic straws are part of the prohibited items but there is an exception to their banning, anticipated by the European Union for the medical use of the plastic straw. Indeed, the directive specifies that straws are to be forbidden « except if they fall within the scope of Council Directive 90/385/CEE or Council Directive 93/42/CEE » (Official Journal of the European Union, 2019, p.17).

The 90/385/CEE directive concerns active implantable medical devices. A straw is not an implantable medical device, it is then outside the scope of application and therefore does not fall within the exception of article 5 b) of the 2019 European directive.

On the contrary, the single-use drinking straw falls within the 93/42/CEE. Indeed, it applies on the medical devices and their accessories. In the said directive, accessories are considered as medical devices (Official Journal of the European Communities, 1993, p.3).

Still, Belgium has its own regulations about what to consider as a medical device. The straw also has its exception, but it has to fit the Federal definition of a medical device (Walloon Government, 2019). Single-use drinking straws fit the non-implantable medical device :

> « It is a health product that performs its medical action in a mechanical way and that is not implanted inside the human body. There are a lot of different products that meet this definition ».
>
> (AFMPS[30], 2016, p.5, loose translation).

As long as it is non-implantable material and that the use is medically justified and approved by the Federal authorities, there can be a commercialization of the product. If a producer wants to produce plastic straws, he will have to report to the responsible authority ; AFMPS (AFMPS, 2016, p.7). Still, it is impossible to know what the Walloon government will plan for plastic straws since they have not communicated about it and they still have time to implement the European directive into a national law.

In our opinion, we believe that there will still be single-use plastic straws produced but only for a medical purpose. In that case, there will be a whole notification procedure which is provided for at European level but also at Belgian level. This procedure makes it possible to obtain the CE marking, etc., and eventually ensure the free movement of the product.

3.2.4 Recommendations of the EU

The European Union makes it clear that sustainable reusable alternatives should be preferred and these products must be at the disposal of consumers. It is explained that the

[30] «Agence Fédérale des Médicaments et des Produits de Santé » in Belgium.

products should be reusable or without any trace of plastic. It is also recommended that member states should take into account the whole life-cycle of the product, even their life if it ends up in the nature (Official Journal of the European Union, 2019, p.10).

A follow-up will be done by July 2027 and will concern the overall life-cycle of each item targeted in the directive, with an evaluation of the alternatives (also comprehending their life-cycles) to these items (Official Journal of the European Union, 2019, p.15).

The draft bill has convinced almost all the European parliament, as the totality of votes counted 571 in favor of the law, 53 were against and 34 abstained from voting (Ries[31], 2018).

3.3 Stakeholders

Opinions differ on the plastic straw ban, whether it is citizens, companies, distributors or another party. This section will focus on the different beliefs concerning straws, since opinions can vary from straws being an essential object in everyday life, to straws being useless. The analysis of the different stakeholders will be analysed thanks to the book *Managing Green Business Model Transformations* by Axel Sommer who is part of the Centre for Sutainability Management in Leuphana University, Germany.

Stakeholders can be divided in four groups :

- Regulatory stakeholders ;
- Organizational stakeholders ;
- Community stakeholders ;
- The media.

(Sommer, 2012, p.42).

3.3.1 Regulatory stakeholders

In this case, they include the governments of each member state and the European Union itself. As explained by Sommer (2012), these stakeholders are of the utmost importance to enterprises with an average commitment to the environment, which is the case for the establishments studied in Part 2 of this memoir. The biggest role of the regulatory stakeholders was to vote in favor of the ban and to decide when to apply it. As seen in the previous section, their job is done for this part. All they have to do now is to make sure it is respected by all member states and that the deadlines and objectives are met.

3.3.2 Organizational stakeholders

This section includes the opinions of citizens, producers and disabled people. Their feedback is very important in analyzing reactions to the ban on plastic straws.

[31] Frédérique Ries is a European member of parliament who is responsible for the draft bill concerning single-use plastics.

3.3.2.1 Citizens

Since the results of this study will focus on the city of Namur, the opinions of the citizens will be those resulting from the quantitative study (See APPENDIX 7 : Quantitative study responses), as the latter focused on people visiting restaurants and catering establishments in Namur.

Out of 200 participants, 19% had no idea that the European ban on single-use plastics included single-use straws. This may mean that they are unaware that there was a ban on single-use plastics or that they have not thought of the plastic straw as a subject worthy of a ban. However, the latter does not seem plausible as 95% think that it is a good idea for plastic straws to be banned. It is then more probable that citizens were unaware that straws were part of the ban or simply unaware that there was even a ban on single-use plastics.

Although people think that it is a good thing to withdraw plastic straws, it does not mean that they would rather go to establishments that promote ecological straws. Indeed, even if the majority would choose an establishment with straws' alternatives, 35% would not. This might be because people like their Horeca habits and do not wish to change them. They may not care enough about straws to change these habits.

3.3.2.2 Straws' producers

The plastic straw producers did not have a say in the ban of plastic straws. As stated above, the enterprise *Soyez* in France is one of the biggest plastic straw suppliers in Europe. They produce 6 billion plastic straws a year and their clients are fast-food restaurants, bars and other restaurants, but also industrial producers of fruit juices and dairy products who affix the straws on their cartons. Plastic straws represent 60% of their total production, which makes it their main business (Maurice, 2019).

The enterprise *Soyez* does not disagree with the basic concept of the ban, but deplores that « the government confuses speed with haste » (quoted by Le Monde, 2018, para.8, loose translation).

Indeed, Maurice (2019, loose translation) explains that « it is a major upheaval for our structure ».

The company is now forced to find an alternative to the plastic straw that will meet the expectations of the European commission. While they currently produce 600 plastic straws per minute, they have to rethink the machines to adapt them, come up with an idea that is feasible and think of how to upgrade their business. They are currently working to find biodegradable materials that will replace the plastic to obtain the label home

compost. They especially hope that the turnover they realize from plastic straws will remain the same after they will have moved on to the chosen alternative (Maurice, 2019).

The ban also generates costs for plastic producers. First for the machines, because they have to adapt them to suit the processing of the new material. Second for the biodegradable material that costs three to four times more than plastic. The company states that their main focus is to keep the jobs in the enterprise (Maurice, 2019).

The old credo of *Soyez* was : « The straw is a required accessory » (Soyez, 2019, loose translation). However, the company believes that, unfortunately for them, the consumption habits may change over time (Maurice, 2019).

3.3.2.3 Disabled people

Disabled people were offended when they heard that plastic straws were to be banned from Seattle, an entire city, without consulting them. People with disabilities do not have an easy life and they have adapt to things that do not even cross the mind of a non-disabled person. This is a fact. It is important to know that straws were also invented in order to help disabled people. They were developed for hospitals and medical centers (See APPENDIX 2 : Flex-Straw ; The individual, personalized drinking tube). Before plastic, straws were made out of rubber and used for disabled people. They were very difficult to wash and became quickly repellent (NPR[32], 2018).

The arrival of plastic straws in 1950 helped improving a lot of lives. Dianne Laurine, a 75 years old quadriplegic from Seattle, remembers that plastic straws have clearly changed her life. She felt very bad when she heard about the ban on plastic straws, and most of all that no disabled person had been consulted before doing so. Going out without a plastic straw can be a life-threatening danger for a disabled person and it is easy to forget the reusable straw at home. If a person with disabilities goes out and really needs a straw to drink but cannot find one as plastic straws are banned, it can either cause dehydration or force disabled people to stay at home (NPR, 2018). Below is the summary of opinions about the alternatives to the plastic straw according to the NPR newspaper :

Table 3 : Alternatives to plastic straws and opinions of disabled people

Alternative	Yes or no ?
Paper straw	**No** (quick deterioration, not solid enough).
Silicon straw	**No** (not flexible enough).
Reusable straw	**No** (cleanup).
Stainless-steel straw	**No** (conductor of heat, too hard, not flexible, security issues).

(NPR, 2018).

[32] National Public Radio in the USA.

Lawrence Carter-Long, the communications director for the national Disability Rights Education and Defense Fund[33], said that the politics which target the decrease of plastic straws must take disabled people into account. He also pointed out that if a disabled person has forgotten its reusable straw, how will this person be able to drink ? (NPR, 2018).

> « [That] doesn't leave a lot of room for spontaneity – something nondisabled folks get too largely for granted ».
>
> (Lawrence Carter-Long quoted by NPR, 2018, para.7).

The solution for David Perry (father of a disabled person) would be to keep the plastic straws, but in line with the principles of on-request plastic straws. If people ask for a straw, do not ask why, just provide it. « Cut waste, but don't interfere with disabled people's access to liquid » (Pacific Standard, 2018). His opinion is also that producers and industries are the ones who should be responsible for the waste of plastic straws. Disabled people cannot be collateral damage. In order to do that, he is persuaded that instead of banning plastic straws, producers should be responsible for what they do about the second life of a single-use item. He calls for the Extended Producer Responsibility to be applied (NPR, 2018).

3.3.3 Community stakeholders

Lobbyists of the plastic industry are part of the community stakeholders. Their views before the ban was voted on will be explained below.

European countries were not very excited about the ban. In different industries worldwide, there are always lobbyists present to defend what they are selling. As such, plastic lobbyists also exist (L'Echo, 2018). Their aims are simple :

- Reduce the scope of the prohibition of single-use plastics ;
- Escape the responsibility clause that forces the plastic industry to collect the plastic they have produced. (L'Echo, 2018).

The European Commission has decided to get rid of single-use plastics, but not all of them. Indeed, they have only banned the single-use plastics that already have an alternative. Concerning plastic straws, the European Commission was aware that alternatives could easily be found, so it was an easy step to ban them in a legal statement. This decision could have been taken more quickly, if there were no plastic lobbyists (L'Echo, 2018).

The main issue for plastic producers and distributors is that their responsibility towards litter and cleanup is greater and they will have to come up themselves with alternatives

[33] « A leading national civil rights law and policy center directed by individuals with disabilities and parents who have children with disabilities » (DREDF, 2020).

with a life-cycle that respects the environment, even in their end of life (Official Journal of the European Union, 2019, p.10).

The Extended Producer Responsibility (EPR) is a strategic approach that aims at giving more responsibility to producers, the latter being either financial or physical, that applies to the processing or disposal of their productions. EPR could result in a reduction of waste, the prevention of waste at the source, the promotion of new products to help the environment and finally the support of recycling in the public sector and materials management (OECD[34], 2019).

In our opinion, the challenge is that they should find an alternative that does not harm the environment in case the litter ends up in the nature, so that the constraints of waste collection are not too heavy, which « forces » companies to think of a single-use alternative, since reusable alternatives (except bamboo) are mostly not biodegradable.

3.3.4 The media

If a person types « plastic straws » on the internet, it is possible to note that the media has done its job in promoting alternatives. Most of the articles proposed are about the reason why they are banned, what environmental impact they have on the Earth and the possible eco-friendly alternatives.

3.4 The environmental awakening

The ecology and concern for the environment have not always been the main concern of individuals or enterprises. Still, if a person feels like an environmental trend is born, the movement behind it is older. Indeed, a study directed by IFOP[35] for MSN[36] in 2007 aimed at knowing if its users ranging from 15 to 30 years old were concerned by the environment or not. Out of the 808 participants, 44% seemed to be concerned by the climate change and 89% thought that each citizen was responsible for his actions in terms of environmental behaviors. According to this study, citizens would be in the best position to protect the environment (IFOP, 2007, report). Half of this study was composed of teenagers from 15 to 17 years old and 90% of them were having concerns about the environment, which shows that the workers of today were already worried about the environment in 2007 (Gentina, 2016, pp.22-23). It also shows that these participants were right about who would take actions for the planet ; the anti-straw movement began with citizens as noted earlier. More than 10 years later, mentalities have evolved to protect the planet as much as possible. For example, it is now frowned upon if someone throws away his cigarette butt or paper on the street, doesn't sort his garbage, etc., while this was not the case before as everyone did those things.

[34] Organization for Economic Co-operation and Development.
[35] « Institut Français d'Opinion Publique » in France.
[36] The social media.

Even if this study does not include enterprises that would be most efficient in protecting the environment, companies have to respect CSR. According to Klysik-Uryszek and Kuna-Marszalek (2020), CSR is Corporate Social Responsibility of a company. The Social Responsibility is what matters for this draft ; it is inter alia the way to measure the impacts their enterprise has on the environment and the society. As it is generally available to the customers, CSR charts tend to have high objectives about ecology. In view of the public's enthusiasm for straws and other single-use plastics, companies also have a duty to adapt their CSR charters in order to respect the environment as much as possible.

Since the banning of many single-use plastics, more and more people became more careful about what they are buying. More than an environmental awakening on how to buy responsibly with regards to the overconsumption of plastic, we think that there is a trend in buying reusable products such as reusable bottles, bags or others, but also a trend in going to bulk stores. As analyzed in a study written by Mať ová *et al.* (2020), the consumer is more responsible of his purchases and (ideally) follows the ‘R Framework’ : **R**ecycle, **R**educe, **R**efuse, **R**euse/**R**epair, **R**ethink/**R**einvent.

We can conclude that the ban is a good first step in the direction of wasting less and optimistically, producing less plastic. The European still remains cautious as it only bans items which already have an alternative on the market. What should also be kept in mind, in addition the different deadlines, is the fact that the European Union rather supports reusable alternatives. This is what led us to select some alternatives which will be developed in the next chapter.

Chapter 4 : Alternatives

After seeing the legal framework of the ban on single-use plastics and what initiatives were already taken around the world, this chapter will describe the different alternatives already commercialized around the globe. We have decided to focus on alternatives that seemed relevant to this draft ; alternatives that could be used by the Horeca industry.

4.1 Alternatives

The alternatives to the traditional plastic straw can be divided in two sections : the ecological single-use and the reusable straws. It is up to each individual to choose which one they prefer but for a Horeca establishment, the characteristics of each alternative is important to take into account.

4.1.1 Single-use alternatives

This section introduces the single-use alternatives combined with an eco-friendly characteristic. Whether they are made of paper, rye or edible, it offers the opportunity to an establishment to keep the single-use principle of the current straw. Those single-use straws have been chosen since they seemed to be the most relevant to this draft in our opinion. It is important to specify that the prices below are those for individuals.

Table 4 : Single-use alternatives' characteristics

Paper straws - *Aardvark*				
Cost	Advantages	Disadvantages	Eco-friendly?	Origin
3€ for 100 straws.	- Quite cheap ; - Possible to customize ; - Gluten-free.	- Tear apart quickly ; - Unpleasant in the mouth (de Fays, 2020).	- More eco-friendly than plastic ; - Decompose in 45-90 days ; - Decompose in water ; - Compostable and recyclable ; - Made of recycled paper ; - Bad ecological footprint due to the origin.	USA. (Aardvark, 2019)
Rye straws – *La Perche*				
Cost	Advantages	Disadvantages	Eco-friendly?	Origin

8€ for 100 straws	- Return to the past ; - No chemical product or conservative ; - Made of organic rye ; - Each straw is unique ; - No extra taste.	- Quite pricy ;	- Fully compostable and biodegradable ; - Fully responsible and sustainable ; - Decompose within a few weeks if disposed right of.	Normandy. (La Perche, 2019)
Edible straws - *Sorbos*				
Cost	Advantages	Disadvantages	Eco-friendly?	Origin
18,7€ for 100 straws.	- Edible ; - No litter ; - Last for 40 minutes in cold drinks ; - Customizable ; - Neutral in adding flavour ; - Allergen and gluten-free ; - No GMO's[37] ; - Storage of two years.	- Very pricy ; - Individually packaged.	- No litter so more eco-friendly than plastic straws ; - No need of a recycling system ; - Package is not eco-friendly ; - Bad ecological footprint due to the origin.	Barcelona. (Sorbos, 2019)

4.1.2 Reusable alternatives

In this section, some of the reusable alternatives to the current straw will be exposed and which seemed most appropriate, exploring the bamboo, stainless-steel and glass solutions. The prices are also those communicated to individuals (customers).

Table 5 : Reusable alternatives' characteristics

Bamboo straws – *Bali Boo*				
Cost	Advantages	Disadvantages	Eco-friendly?	Origin
117€ for 100 straws.	- Only reusable straws that are compostable ;	- Pricy ; - Clean-up process.	- 100% natural, reusable and biodegradable ; - Reusable ;	Bali.

[37] Genetically Modified Organism.

	- Lifetime of one to three years.		- Bad ecological footprint due to the origin.	(Bali Boo, 2018)
Stainless steel – *What About Waste*				
Cost	Advantages	Disadvantages	Eco-friendly?	Origin
375€ for 100 straws.	- Belgian initiative ; - Doesn't rust ; - Unlimited lifespan.	- Very expensive ; - Clean-up process.	- Reusable ; - Bad ecological footprint due to the origin.	China. (What About Waste, 2019)
Glass straws - *Novela*				
Cost	Advantages	Disadvantages	Eco-friendly?	Origin
400€ for 100 straw.	- Very tough material (same glass as Pyrex bowls) ; - Different colours available.	- Can break, it stays glass (Plamondon and Sinha, 2017) ; - Very expensive ; - Brush not included ; - Cleaning process.	- Reusable ; - Glass is recyclable.	France. (Novela, 2020)

Now that the different alternatives have been reviewed with the characteristics that we thought were important to take into account for the second part of this thesis, they will be confronted with the opinions gathered in the quantitative study of this memoir.

Part 2 : case study

While the first part of this thesis has allowed us to understand the context of the plastic straw and its environment, the second part will focus on a case study. Two Horeca establishments are discussed in this part. The latter will begin with the methodology used to get the necessary information, followed by the context and presentation of the establishments and finally, the results will be presented to understand how to switch from plastic straws to an alternative, which will answer the research question.

Methodology

1.1 Stakes of the study

The main objective of this study is to highlight a case study of establishments that need to find an alternative to the plastic straw. The final and implied aim is to help other enterprises that are in the same situation by giving them an example of which alternative could be the best choice for them. This process will be made through qualitative interviews and a quantitative study which will be described in section 1.3 of the methodology. If it seems quite easy to switch from plastic straws to an eco-friendly alternative, it actually is not. As an individual, it is just a matter of buying another product, but as an enterprise, many more factors have to be taken into account.

This study will answer the following questions :

- What are the factors to take into account when moving to an alternative ?
- What are the strengths and weaknesses of the alternatives according to the interviewed establishments ?
- What is the impact of people's mentality through a change to an alternative ?
- How to implement an alternative ?

1.2 Choice of the sector

The choice of the sector was first and foremost about Brussels, the city being the capital of Belgium. Unfortunately, the Brussels sector is not as easy to approach as one might think. In addition, it is a fast-moving city which acts quickly on bans such as the one imposed by the European Union. Because of this, the choice fell on Namur, capital of the Walloon region.

For the chosen establishments, the selection was intuitive. Having grown up near Namur, we knew which were the establishments that are well appreciated in the city. This led to sending requests to several bars and *Cat's Corner* restaurant. The bar *Les Poules à Lier* was very interested in the project and concerned by the issue of the plastic straw, which made it a perfect candidate. During discussions with a friend, she explained that the

restaurant where she works as a student uses a lot of plastic straws. After explaining to the manager of *Cat's Corner* what this memoir was about, he also wanted to cooperate, as he had not found the right alternative yet.

It was important for us to get different opinions about needs for the straws, which explains the choice of searching for both an establishment serving only drinks and a restaurant. This enables us to develop results for two different enterprises sharing the Horeca field.

1.3 Methodology of data collecting

This work started with sending e-mails, which did not lead to any positive response to continue this research. Having had a hard time finding people willing to answer the questions and to cooperate with this thesis, the contact method evolved from e-mailing to turning to social media Messenger. Allied to Facebook, it allowed to visit the pages of the desired companies and get a much quicker answer, as people managing them are more responsive on social media.

1.3.1 Interview types

It was only natural that this thesis was mainly directed towards a qualitative study. Indeed, as the case study is focused on two establishments, it was the best way to achieve the objectives set. The interviews were conducted using a semi-structured interview guide (See APPENDICES 3, 4, 5 : Interview guides) that was identical for every interview in the same field but relatively broad, as not to restrict conversations. It was very important to have a common thread so that the interviews could tackle each topic. This interview guide evolved with each appointment. After each appointment, it was very important to evaluate and develop the possibilities discussed with the owners of the establishments. In this type of interview, the type of questions was based on open questions to allow the person to be as honest as possible in his answers, but also semi-open questions to have a precise answer to certain questions such as the alternative to plastic straws for instance.

1.3.2 Interview process

The qualitative study participants were interviewed through a video-conference application as the covid-19 quarantine had not yet been lifted or via email when a face-to-face interview was not possible. The video-conference was preferred rather than the call for the interviews of the managers because it gave the opportunity to analyse non-verbal language, which is essential in an interview.

The people interviewed were the following :

- Simon de Fays, co-manager of the bar *Les Poules à Lier* ;
- Jordan Bini, manager at the restaurant *Cat's Corner* ;
- Benoît Maurice, commercial director of the French straws' producer *Soyez* ;

- Anja Van Campenhout, project coordinator for *Brussels Environment*.
- Xavier Gérard, alderman Deborsu's chief of staff in Namur.

For the case study on establishments, the first interview consisted in asking questions about their willingness to find an alternative to the straw, what their opinions were about it, etc. The second interview was more focused on contextual questions about the establishments themselves.

1.3.3 Quantitative study

The quantitative survey was realized through social media, as the quarantine situation due to the covid-19 pandemic did not allow to meet the population, i.e. the consumers of the concerned establishments, face-to-face.

The quantitative study has been developed in order to get the opinions of as many customers as possible. The type of the questionnaire is indirect administration type, so it is the role of the participant to come up with ideas. The questionnaire is composed of closed and semi-open questions, in order to obtain the clearest possible answers with a margin of freedom in suggesting ideas. Further methodology and means will be explained in section 3.3 of this part.

1.4 Methodology of data analysis

The data collected during the interviews will be analyzed according to the different factors to be taken into account. These data will be compared with each other and will allow us to make a conclusion using our academic background.

Chapter 1 : Presentation of the establishments

The purpose of this chapter is to present the SMEs, which we have decided to collaborate with, in order to offer them the best alternative to the current drinking straw in accordance with their needs. Every establishment will be described according to its place and history, its situation analysis (with the 5C's model) and context regarding straws. The two managers interviewed were Jordan Bini, *Cat's Corner*, and Simon de Fays, *Les Poules à Lier*.

1.1 Les Poules à Lier

1.1.1 Place du Marché aux Légumes

The bar *Les Poules à Lier* is located in the historical center of Namur, more specifically on the *Place du Marché aux* Légumes. This square once was a market where merchants sold their products. Today, only its name remains. The square has become a place that hosts bars, restaurants and a few other craftsmen, making it an ideal place to gather and enjoy Namur. The name of the square has not officially changed, but it is better known as *La Place du Vieux* – which could be translated as *The square of the old* (Gilles, 2020).

1.1.2 The establishment

1.1.2.1 History

Les Poules à Lier, which is a play on words for chicken coop, saw the day in 2001. The inventor of the name had decided to play on the bar's name as much as possible. He put Plexiglas benches with real chickens inside, for instance. Simon de Fays and his co-manager took over the establishment in April 2015, a little over five years ago. At the time, the current managers already owned an event company in Namur and decided a café would be a complementary business. Also, Simon was already enjoying working at the bar. When the previous manager decided to sell its business, both managers decided to seize the opportunity (de Fays, 2020).

1.1.2.2 Situation analysis

The situation analysis of *Les Poules à Lier* has been made using the 5C's analysis : Customer, Company, Competitors, Collaborators and Context.

Customers

The managers never made an empirical business mix as their type of client change depending on the day, hour or season. De Fays (2020) qualifies their customer base as disparate. The summer's and winter's customer base is not the same for instance. During the winter, their customers are regulars, while passers-by are attracted by the terrace

during the summer. Still, de Fays (2020) explains that their customer base is relatively young. Their main target are customers between 20 and 35 years old, as this age group is the most lucrative.

Company

The main weakness of the establishment may be its competition/high rent. Indeed, several cafés on the square did not succeed and had to close their doors prematurely. Fortunately, this was not the case for *Les Poules* and the competition is not a main issue as will be explained below (de Fays, 2020).

Their force is that they have their own concept in comparison to the other bars of the square. According to de Fays (2020), the establishment has a disco bar and dancefloor. It is a place that customers can enjoy with their friends. The main objective for the managers is to provide a qualitative and friendly service to satisfy their customers. As co-manager, de Fays stresses the importance of focusing on his team and make sure nobody struggles alone. He calls it « management by example ». They care a lot about the service they provide and make sure that potential employees understand their values when hiring. The café has always been quirky, which seems to please the customers.

Competitors

Their direct competition is the numerous bars on the square. Even if they are numerous, de Fays (2020) believes that they provide a healthy competition. Healthy because all bars show respect for each other and report no cases of backstabbing. What helps this competition is the fact that each establishment has its own identity and concept on the square. Even if another bar decides to copy the concept of *Les Poules*, de Fays (2020) believes this is not a bad thing as it forces them to come up with new ideas and evolve as a business.

The hospitality industry has an indirect competition, i.e. the supermarkets and the numerous night shops. The reason is simple ; the prices are lower (de Fays, 2020).

Collaborators

They work with a fixed team and a team of students. Their employees are usually acquaintances or regular clients who manifest a wish to work there. New staff members are evaluated by the regulars of the café, employees and Simon. Simon takes all opinions into account and also makes sure that the person gets the right training and advices (de Fays, 2020).

Context

The current context is not ideal since the bar is currently shut due to the covid-19 pandemic. It gives the managers time to think more about a replacement to plastic straws but it is not a situation that is enviable since both their event company and the café are closed. The context regarding plastic straws will be described in the section below (de Fays, 2020).

1.1.3 Context regarding straws

Until today, the co-manager did not count the number of straws used accurately. They buy plastic straws in boxes of 500 straws and believe they use **approximatively one box every two weeks**. However, this includes the efforts already made to reduce the plastic straw consumption (de Fays, 2020).

They took the decision of reducing plastic straws in their bar almost a year ago, when the European Union announced that single-use plastics would be banned by 2021. Before that, straws were used for every kind of beverage because there was a strong demand from the customers. Even as demand has decreased, some customers still claim one. Therefore, *Les Poules à Lier* is pursuing this on-demand policy, which shows their concern about the topic (de Fays, 2020).

The issue they are confronted with and has prevented them from choosing and implementing an alternative is the supply on the market. According to Simon de Fays (2020), he expected that an alternative, close to the cost of the current straw, would exist. Their first objective is to keep the distribution of straws at a minimum.

1.2 Cat's Corner

1.2.1 The establishments

Cat's Corner is a fast-food restaurant. The restaurant mainly serves kebabs and durums, which are not sold at a counter, but ordered and consumed at the table. There are currently two establishments in the province of Namur, located in Namur and in Jambes. The case study will focus on the *Cat's Corner* in Jambes, as it is the biggest of the two, making it more difficult to find a solution (Bini, 2020).

1.2.1.1 History

The *Cat's Corner* in Namur opened in June 2002. Out of fear of competition with other kebab/durum restaurants, *Cat's Corner* opened with very low prices. The concept was an immediate success and four years later, a second establishment opened in Jambes – only two kilometers away from the original restaurant. The objective of the second location was to have a bigger restaurant to provide its clients better service. The extra space also allowed the restaurant to include a real bar with beer, cocktails and other beverages. This was a clear signal to its customers that this was a real restaurant with the service that is expected. Originally, only the ground floor would be open for business, but the success reached was so big that the restaurant was extended to the first floor. The restaurant currently has a total of 100 seats at *Cat's Corner* of Jambes. Taking into account the success of the restaurants, the owners have the ambition to expand *Cat's Corner* restaurants and explore the possibility of a franchise system (Bini, 2020).

1.2.1.2 Situation analysis

The situation analysis of *Cat's Corner* will be made through the 5C's analysis as *Les Poules à Lier*.

Customers

In order to keep attracting its customers, *Cat's* needs to keep its food good, cheap and quickly served as the restaurant is right next to the cinema complex *Acinapolis*. As a successful fast-food restaurant, *Cat's* is very time efficient. This causes an extra challenge to find a good alternative for the plastic straw : it needs to be time efficient (Bini, 2020). According to Bini (2020), their customer base in Jambes is very disparate, contrary to Namur where the main customers are students. Customers ages range from children to the elderly. The « ideal » customer is between 25 and 35 years old, since this age category is usually the most profitable. However, they also focus on creating discounts for students as they are tomorrow's 25-35 generation. The idea is for the customer base to grow with the establishment.

Company

Bini (2020) believes that *Cat's Corner's* greatest strengths compared to the various fast-food outlets is that they offer table service, has a fully equipped bar and offers products that are not as industrial as the large chains. The weakness of the restaurant is its inability to find a solid, fixed team. Indeed, whereas Namur's *Cat's Corner* has a fixed team for a long time, it is more difficult for the Jambes' team to create and maintain a good team.

Competitors

As *Cat's Corner* has a relatively unique concept, it does not have direct competitors. The indirect competitors would be other types of restaurants or the small snacks bars around *Cat's Corner*. Bini (2020) specifies that their service and the choice of good products are what set them apart from other fast-food restaurants, combining the best of both worlds, i.e. the experience of a regular restaurant with the low prices of a fast-food restaurant.

However, copy-cats have emerged in the city of Namur, creating close competition. Former workers have opened a fast-food restaurant with the exact same concept. Fortunately for Namur's *Cat's Corner*, the attendance has not declined and it even benefits from free publicity. Indeed, customers keep comparing the new restaurant to *Cat's* Corner, saying it is identical. This could be good for the restaurant as *Cat's Corner* is known as the originator of the concept. The manager is also convinced that they would eliminate potential competition with ease since they are working continuously on their menu and try to offer new products as much as possible. This innovation is one of their biggest strengths against competition (Bini, 2020).

Collaborators

The owners have attempted to create franchises, but so far, these attempts have failed, either because of not obtaining a bank loan or because of a potential franchisee being

interested at first and then dropping out. The wish to franchise remains, but the manager's first priority is to solidify their current restaurant in Jambes by means of finding a fixed and solid team (Bini, 2020).

Context

The covid-19 situation affects them but they still got the opportunity to offer a delivery service (Bini, 2020). The context about the EU ban on plastic straws will be explained in the section below.

1.2.2 Context regarding straws

Jambes' *Cat's Corner* uses **between 100.000 and 120.000 plastic straws a year**. The reason why they use so many straws is because they automatically put a straw in the drink – soft or alcohol. The reason for this has been mentioned above ; they are very time efficient. It is faster to put a straw in a drink than asking the customers if they want one. Other examples of their time efficiency are using pans as plates in which they put paper towels so they do not have to wash them every time and serve the drinks in bottles as much as possible to avoid washing dishes. As the soft drinks are not served in glasses, they put a straw in the bottle (Bini, 2020).

Cat's Corner has also decided to reduce single-use plastic in both establishments ; they replaced plastic forks with wooden forks and try to avoid cans as much as possible for take-away orders. They have also switched from plastic bags to recycled and recyclable bags for their take-away orders. They would like for their new straws to be affordable and not over-packaged, as was the case with some alternatives to the plastic forks (Bini, 2020).

According to Bini (2020), they made these changes because of their convictions. It is also what is driving them to look for an alternative to the straw now. Unfortunately, they have not found the perfect alternative yet, in large part due to the price of alternative options on the market. The cleaning process of reusable straws is also an issue for the establishment.

> « It is great to look for an alternative, but it is striking to see how little political leaders care. We change because it is good for the environment, but we cannot find a solution that measures up to the plastic straw, so what do we do? »
>
> (Bini, 2020, loose translation).

In conclusion, both managers seem to want the change but regret that the European Union has not taken a stance by suggesting an alternative equivalent to the plastic straw, in terms of costs and habits. They are looking for a cheap and effective alternative. The next chapter will help understanding what are the issues with the alternatives on the market and what factors come under consideration when implementing one.

Chapter 2 : The alternatives

One of the first questions that popped up through the interviews concerns the businesses areas having proactively thought about the different alternatives to the straws. We will summarize their positions using SWOT analyses. For the sake of regrouping the relevant information, the straws' alternatives will be divided into two categories : on one hand the reusable and on the other hand the single-use straws. This chapter will end with the relevant factors enabling men to choose for an alternative to the straw.

It is important to note that both SWOT analyses represent the opinions of *Cat's Corner* and *Les Poules à Lier* combined.

2.1 SWOT analyses

Table 6 : SWOT analysis of a reusable straw

Strengths	**Weaknesses**
- Reusable ; - Possibility to engrave the logo.	- Cost : very expensive ; - Cleaning process (very thorough for the hygiene's criteria and time-consuming) ; - A considerable amount of pieces needed ; - Can blacken (for bamboo).
Opportunities	**Threats**
- Marketing.	- Theft of the product ; - Deterioration of the product.

(Bini and de Fays, 2020).

Table 7 : SWOT analysis of a single-use straw

Strengths	**Weaknesses**
- Edible straws : with or without taste ; - No cleanup needed ; - No change in the organization.	- Cost : too expensive ; - Cardboard straws[38] ; - Paradox of the individual packaging ; - Biodegradable : need for a special waste bin.
Opportunities	**Threats**
- Marketing.	/

(Bini and de Fays, 2020).

[38] Not appreciated at all by both managers and does not last enough in the drink.

2.2 Analysis of the SWOT's

Both establishments agree on many points about the possible alternatives. The two analyzes provide more weaknesses than strengths to both possibilities. In general, alternatives are way too expensive and the fear is that when a quality product is brought to a place, it is very much likely in their opinions that it will be stolen by many (if it is reusable), as it is very easy to put a straw in a bag or in a pocket (Bini and de Fays, 2020).

For *Cat's Corner*, it is in their opinion impossible to choose for a reusable alternative ; they do not have the appropriate cleaning capacity nor the time to wash them all thoroughly, as they sometimes use 300 to 500 straws a night. The alternative must then be a single-use one… but then appears the cost issue. They also cannot eliminate straws from the establishment since they do not have either the time nor resource to wash that many glasses (Bini, 2020).

On the contrary, *Les Poules à Lier* would like to implant reusable straws in the bar but one of the biggest issues then is that they are afraid they would be stolen as they are very expensive. The problematic here is then to find a system that would help them have their favorite alternative in the best conditions (de Fays, 2020).

Taking into account the above, a drinking straw seems essential for some beverages and both establishments do not think that banishing straws from their offer would sustainably fit within the existing business model. They could not do without straws. As explained by de Fays (2020), the famous mojito needs a straw for practical reasons ; it is composed of crushed ice, mint leaves, cane sugar in the bottom for the crispy side. Without the straw, the customer would not be able to taste this important crispy side. For these beverages, the goal is to find « the least worst-case scenario » (de Fays, 2020, loose translation).

In conclusion, it is clear in the minds of the managers that there are more inconveniences than advantages in the different alternatives. It will be our aim to understand if these fears are relevant or not and how to overcome them in the next sections.

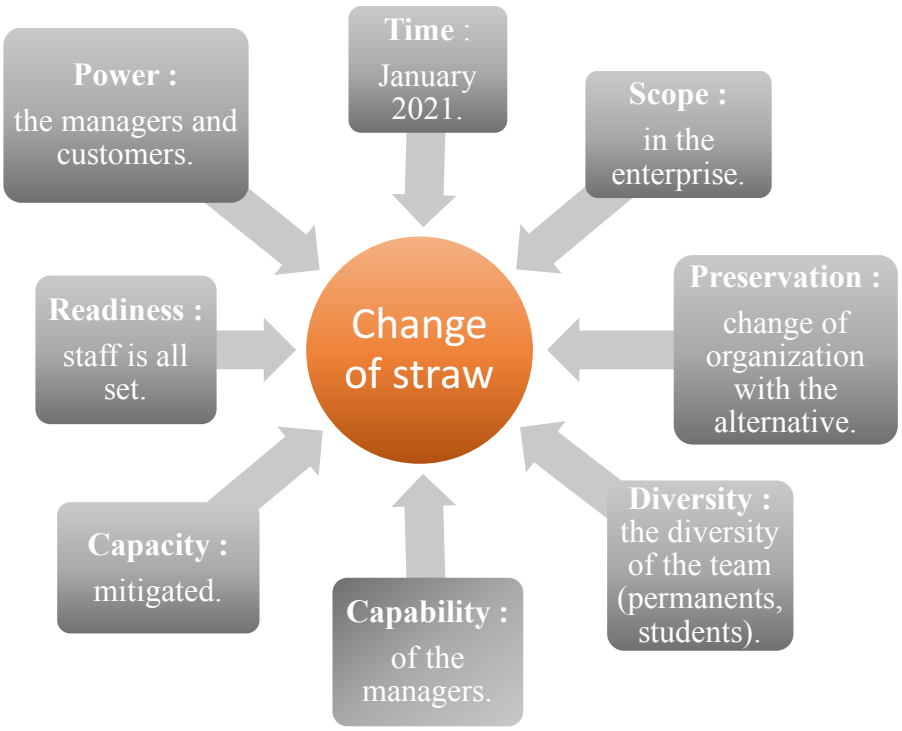
2.3 Factors to take into account

After understanding what is at stake for the studied establishments, this section will illustrate the important factors taken into account for implementing a change, and this using the change kaleidoscope.

2.3.1 Change kaleidoscope

The change kaleidoscope helps defining the contextual factors of a change. It has been adapted from the standard model to fit the aim of this thesis and help understand what is at stake when changing to a straw's alternative.

Figure 5 : Change kaleidoscope for a plastic straw's alternative



Time : the time left to find and adopt an alternative is not very long. Indeed, the banning takes place in January 2021 in Belgium, so in a few months. The European ban was issued in June 2019, it has given time to Belgium to decide to implement it before the European deadline.
Scope : for this case, the scope concerns the enterprises themselves, with a change to be implemented in the business model itself.
Preservation : the main organization will have to prepare its survival even though the change only concerns one product of the establishment. Still, all will depend on the alternative chosen (between reusable or single-use) and its impact on, for instance, the losses and profits of the concerned company. With other words, the chosen alternative will anyway have an impact on the concerned business model. Which implies massive adaptation work aiming at the preservation of the company.
Diversity : both establishments have a permanent staff and also students. It allows to have people from different ages with different opinions.

Capability : as the *Cat's* has already switched from plastic to wood cutlery, they seem very capable of managing a change (Bini, 2020). *Les Poules à Lier* has been part of a test to promote reusable plastic glasses and now uses them currently, the establishment also seems able to manage a change (de Fays, 2020).
Capacity : timewise, the capacity is high since businesses have until January to act. In contrast, the capacity is lower cost wise, because of the high prices of the alternatives. Hence the qualifier mitigated in the figure above.
Readiness : for *Les Poules à Lier*, the felt for change is clear and concise. The staff is eager going for an alternative. *Cat's* is also ready to make this change and is looking forward for an alternative that will meet its needs and expectations.
Power : the managers will be the ones to choose for the definite alternative. They are the ones who have the power. This being said, they naturally are bound by external aspects in making their decision, such as, for instance, the purchase power of the final customer, the capacity of the staff to implement the chosen alternative, and so on.

These factors will help analyze the issues both enterprises will be confronted to when operating the change to an alternative. We selected some of the relevant issues below in order to discuss them.

2.3.2 Capacity

The establishments have a high capacity timewise, the covid-19 containment is helping in having that time since for *Les Poules à Lier*, the business remains « on hold ». *Cat's* is only assuring a takeaway service, which gives it also more time to think of an alternative. The different costs are the first and biggest concern to take into account when making a change in an enterprise, as it was the first issue the interviewees mentioned about an alternative to the plastic straw (Bini and de Fays, 2020).

2.3.2.1 Cost of the product

As noted above, the cost of the alternatives is a big brake for the establishments. Indeed, even if 0,5€ a straw does not seem a lot to an individual for a straw, the term expensive takes on its full meaning for a catering establishment. If the latter sells about 250 cocktails a week with a single-use straw alternative in each glass, the bill rises directly to 125€ a week. With a reusable alternative, the cost is very expensive according to de Fays (2020) and the establishment is not safe from theft, as noted above.

Bini (2020), evaluates the cost factor as an important one. *Cat's Corner* actually pays approximatively 400€[39] a year for around 100.000 plastic straws, which is very cheap. Switching for rye straws would represent a cost-increase of 2000%. Indeed, a rye straw costs 0,08€ (which is really not a lot at first sight) but then the bill would increase to

[39] One plastic straw costs then 0,004€.

8.000€, if no reductions are made for Horeca establishments. If the calculation is made for *Les Poules à Lier*, they would go from a cost of 120€[40] to 960€ a year (de Fays, 2020).

If reusable straws were to be chosen, *Cat's Corner* would need a stock of 600 at least in order to have a rotation of 100 straws and *Les Poules à Lier* would be in need of 500 straws according to de Fays' estimations.

Table 8 : Price offer for bamboo straws

	Price for one	Price for 500
Price for individuals	1,16€	580€
Offer from Bali Boo	0,34€	170€

(Bali Boo, 2020).

These prices are relatively low thanks to the offer that Bali Boo can bring to restaurateurs. The above is further not taking theft into consideration, which is something that businesses are very worried about. Please note that we can find an alternative in order to secure this, the latter is developed later in this part.

2.3.2.2 Other costs

The other costs are the following :

- **Single-use straw** : according to de Fays (2020), the ideal situation includes setting up a specific waste bin for the biodegradable straws. This results into construction costs and landscaping costs ; not only concerning the waste bin itself but also concerning the place to dispose it if it is not yet defined. Besides, the biodegradable straw should be one that decomposes quickly. According to Gérard (2020), if no specific trashcan can be put in place, the establishments should invest in biodegradable trash bags furnished by the City of Namur and in the end, these costs could be of more importance. In addition, alderman Deborsu's chief of staff explains that single-use straws do not fit their view of reducing the litter. Indeed, single-use alternatives do not meet the expectations and objectives of the city of Namur.

- **Reusable straw** : the major other cost related to the use of reusable straws concerns the cleaning process (which is described below). Indeed, for a bamboo/stainless-steel/glass/etc. straw to be effectively well cleaned up in the opinions of both managers, it is better if they are done individually with the help of a brush, which should be done by one employee at closing and could take him a lot of time. During the time he would be cleaning them, he is not doing anything else – which is a waste of money according to de Fays (2020).

[40] They currently buy packs of 500 plastic straws for 5€ (de Fays, 2020).

The cost of employing someone to clean the straws should be taken into account, as both managers fear that it would bring an extra cost for the company. The latter will be estimated in the section 2.4.3 below.

- **Theft :** as previously noted, theft of the reusable straws by customers is a big fear in the process. Indeed, if the bar or restaurant decides to go further with the reusable option and if customers steal them all the time, the establishment will have to buy more and more of the items to fulfil their customers' needs. If the price of straws does not appear to be excessive, if the establishment has to buy straws as if they were buying single-use straws, there is a risk that the final bill will be steep (Bini and de Fays, 2020).

- **Another risk :** take into account that as the demand will go up starting from January 1, 2021, there is a risk that supply will probably remain the same. And the price will go up. Still, we can expect plastic straws' producers to reorient their business by producing alternatives, as it is the case with *Soyez* – the company is now producing paper straws (Maurice, 2019).

2.3.3 Cleaning process

The very advantage of still using single-use straws is the non-necessity of cleaning them after use. For the reusable straws, it is not the same and the co-manager of *Les Poules à Lier* is quite anxious about it. According to him, a reusable straw has to be placed in the dishwasher and then brushed individually. Doing only one of the two is not hygienic enough. First comes the problem of the dishwasher, they do not have one because of the lack of space in the bar. Secondly comes the issue of the number of reusable straws needed. As stated above, the cleaning process implies then for an employee to take time to do it well, again because of the hygiene criteria. According to de Fays (2020, loose translation) : « Which for us is an incredible waste of time and money. Because at the end of the day, someone getting paid to do this will not be able to do anything else ».

Cat's Corner's manager agrees to *Les Poules à Lier*'s opinion ; he also thinks that just placing the straws in the dishwasher is not enough, the brush is essential. Since *Cat's Corner* is frequently using until 500 straws a night, it would have to hire an employee exclusively to wash them, should they furthermore not have been stolen. The reusable option is inconceivable for this establishment.

For *Cat's Corner* and *Les Poules à Lier*, the cost of employing someone is around 20€/hour[41] (Bini and de Fays, 2020). If an employee is needed each night to clean them

[41] Fiscal, parafiscal and social obligations included.

up, it would represent an extra cost of **7.280€**[42] a year for *Les Poules à Lier* and an extra cost of **6.240€**[43] for *Cat's Corner*. This is the worst-case scenario.

Concerning the cleaning process, a home-test was performed in order to see if the fears about it are legitimate. The latter will be developed in the fourth chapter.

2.3.4 Power

If the choosing power of the alternative still rests with the managers, this remains narrowly linked to the purchase power of the final customer. The buyers in this context are the ultimate consumers, as the product must please them, cost wise as well as quality wise. Sure, it is up to the managers to decide what alternative to implement but it is extremely important to take into account the opinions of the consumers. Negative word of mouth can be very damaging for the reputation of an establishment.

The clients' need for explanations is humongous in the opinion of *Les Poules à Lier*. One of the employees' characteristics is to be able to demonstrate a certain pedagogy to clients because they have many questions and a real need for « a good explanation ». The aim of the bar is currently to explain, directly to the client, why the plastic straw is not as important as people may imagine and why it has chosen to reduce them. Each employee explains it as he wishes but the main idea is that it is useless and bad for the environment. Still, if the customer wants a plastic straw, despite what the establishment does, their duty is to provide one, which proves that the customer has a lot of power too (de Fays, 2020).

The power of buyers may also be illustrated by the fact that they are the ones accepting or not the solution offered by the establishment. Indeed, *Cat's Corner* thought of buying reusable straws with their logo on it that the consumer would have to buy. The problem is then that the customer will not agree at some point. Besides, one of the strengths of *Cat's* is that you are served quickly, so if they are wasting time washing straws for instance, the customer will not be happy about it. The business model of the establishment relies indeed on « fast-food » services (Bini, 2020).

2.3.5 Durability of the product

The durability of the product is not part of the change kaleidoscope but remains an important factor to take into consideration, as the whole aim of finding an alternative to plastic is to find a product that is sustainable and eco-friendly. The contrary would be useless in this process. The sustainability includes the product itself but also the packaging going along with the product.

[42] 20€ x 7 (days) x 52 (weeks) = 7.280€.
[43] 20€ x 6 (days) x 52 (weeks) = 6.240€.

The thoughts of the bar *Les Poules à Lier* are that it would be complicated not to have any straws at disposal, but the offer on the market is not meeting their expectations for now (de Fays, 2020). Just like *Cat's Corner*, they expected a real alternative to the banned item. An alternative respecting the environment and of course matching the current price of a « classic » straw (Bini, 2020).

At *Les Poules à Lier*, they are convinced that if they are going for an alternative, the latter has to fit the « sustainability » criteria. De Fays (2020) stresses out that single-use straws face a total paradox in relation to the European ban which aims to reduce single-use waste. The paradox is such that, for sanitary reasons, each straw is individually wrapped in paper or another material. It adds packaging to a product designed to reduce the waste. This concern is shared by *Cat's*, Bini (2020) is saddened to realize that while forbidding the straws, the government « forgot » to suggest any real solution or alternative.

Objectively, the reusable straw is more sustainable than a single-use alternative, simply because of their description. For *Les Poules à Lier*, a reusable straw would be the ideal product to replace the traditional plastic straw but they are facing the issue of the cleaning process, which is excessively heavy in its opinion (de Fays, 2020).

In conclusion, even if the cost is the major factor to take into consideration, both managers also pay attention and care for factors such as the cleaning process, the durability of the alternative and the customers' opinions, since the latter matters a lot. This will be developed in the next chapter. Still, both establishments have the capacity of managing the change in our opinion, since they are both already invested in the environment.

Chapter 3 : The customers

Final customers represent a strong factor in the decision-making process. The aim of the current section is at first to define the role of the customer concerning a change of product for an enterprise, and secondly how the establishment should manage it. We will then finally discuss a quantitative study realized online in order to obtain the opinion of customers concerning alternatives to straws.

3.1 Role of the customer

Customer : « An individual or business that purchases the goods or services produced by a business. The customer is the end goal of businesses, since it is the customer who pays for supply and creates demand » (Bossuyt, 2018, p.4).

According to Bossuyt (2018), the Age of the Customer has begun in 2010. The Age of the Customer may be described as follows :

> « A 20 year business cycle in which the most successful enterprises will reinvent themselves to systematically understand and serve increasingly powerful customers »
>
> (Bossuyt, 2018, p.2).

The current cycle of the customer means that he has all the power. It is very important to take the opinion of the customer into account given its huge (positive or negative) impact on a business. The consequences for not listening to them can be a game-changer. It has become more and more difficult to make decisions within a company, as customer's demand has become increasingly heterogeneous, individualized and fragmented. The final customer is indeed more and more looking for a « tailor-made » production/solution. The solution is to put the customer first and listen to its needs/wishes.

Indeed, the customer will have the last word. As explained before, if an establishment decides to provide plastic straws on request but the customer still asks for it, the establishment will have to provide it – naturally conditioned to the available stock (de Fays, 2020).

3.2 Customer management

In both selected establishments, the business model is obviously a B2C (Business to Consumer) – the establishments sell goods and/or services to customers. Customer management here aims to reply to the following questions : how to satisfy the majority of customers, how to promote the new product and how to raise awareness about the global use of plastic, as it is already the aim of *Les Poules à Lier* and *Cat's Corner*. Making people aware towards plastic consumption constitutes an important objective for the bar (de Fays, 2020).

3.2.1 The satisfaction of customers

Satisfying the customers is very important to a B2C establishment, as the clients are those deciding to come back and having an influence on the reputation of the place. The measurement of customer's satisfaction occurs via one of the most known and accurate tool in this respect : the customer retention. Satisfaction also depends on customer's expectations, increasing from year to year (Bossuyt, 2018). As explained in the introduction, citizens in the global sense are more and more concerned about the environment, which may be one of the reasons why institutions as the European Union have decided to implant bans on single-use plastics for instance. Once again, this proves the importance of taking into account environmental and sustainable factors.

A solution proposed to the selected Horeca establishments to help them satisfy the opinions of the citizens of Namur was to make a quantitative survey. A survey about the possible alternatives and the solutions that clients might accept to help them overcome the financing issues of an alternative, as cost seems to be one of the biggest concerns related to the withdrawing of plastic straws.

Bini (2020) points out how cost is indeed a big matter in the eyes of the customers. As a matter of fact, whenever there was an increase of prices in the restaurant's menu, people complained a lot, mentioning how shameful it was. They must take into account the financial capacity of the client since their clientele is people for whom a difference of 0,5€ or 1€ matters. This is a factor that the restaurant will have to focus on when thinking of a solution. They are aware that there will always be unsatisfied people ; the aim is satisfying the majority.

In conclusion, it is clear that customers have a strong role to play in implementing a product in the Horeca industry. Firstly because Horeca establishments are B2C businesses and they are in constant contact with customers. The customer has his limits ; it is important for an establishment to understand them. Besides, the adage « the client is always right » should not be forgotten.

3.2.2 The promotion of the product

As marketing and informing the customer of the changes that might occur or are occurring in an enterprise is very important, it will be crucial to realize a marketing strategy to promote the chosen alternative to plastic straws. People are increasingly sensitive to the environment and generally support initiatives aimed at improving our carbon footprint for instance. Proof of this is that the anti-straw movement began with citizens and now governments are banning them and many other plastic items which is, in our view, an answer to the wish of the citizens of the world (USA Today, 2018). Both establishments will have to communicate well about their convictions and reasons to proceed to the abortion of the use of plastic straws.

Social networks have become the best way to communicate with customers and promote a product. This can be illustrated by the fact that brands are now focusing their efforts on these networks, with or without the intervention of influencers (Ekhlassi, M. Adibi and N. Moghadam, 2018, p.63). It then seems essential for the bar and restaurant selected in this study to think of a strategy to make the people aware about their switch of straws on social media such as Instagram or Facebook.

Strategic visions :

1. Show from now on that they are looking for an alternative, by posting photos of them testing different straws, reusable and single-use ;
2. Explain why their establishment is looking for a change of product ;
3. Explain the chosen alternative to the plastic straw and the solution developed that will allow the alternative to be financially viable for them ;
4. Post pictures of the chosen product at different times to promote it.

3.2.3 Raising awareness

As noted earlier, *Les Poules à Lier* makes it a priority to raise awareness about the consumption of straws, leading them to adopt a « straw-on-request » policy. It is not optional for them to implement an alternative that costs more and that they know nothing about the production. The awareness will stay in their establishment by maybe proposing metal stirrers instead of always going for a straw. Every action has to be explained because if it is not done so, people will not understand by themselves or will not try to figure it out (de Fays, 2020).

For the restaurant *Cat's Corner*, pleasing customers is not the reason why they are looking for an alternative to straws. Personal convictions is. The ban of 2021 is naturally a factor but they are not thinking of it as a way to attract new customers as the environment has almost become a « trend ». They rather think of their ecological footprint because they believe it goes through them – the Horeca industry (Bini, 2020).

3.3 Quantitative study

3.3.1 Methodology

This survey aims at getting an idea of the opinion of straw consumers about the item in the Horeca establishments of Namur. This section will firstly tackle the background data of the quantitative survey. The different points of view about the alternatives will come second. Finally, the solutions viable by the customers in financial terms will be b that would be viable by these same consumers will be introduced.

3.3.1.1 Questionnaire

There was one questionnaire of 17 questions (See APPENDIX 6 : Questionnaire for the quantitative study ; APPENDIX 7 : Quantitative study responses). The size of the questionnaire has been thought so that it would take less than five minutes to complete. This is to avoid discouragement from potential participants. The questionnaire was realized through the software Google Forms, allowing customizing the required responses, in addition to be entirely free. It also offers the possibility to have three response analysis options : in summary form, per question or per individual form. On top of that, the software allows generating an Excel sheet with all the data.

3.3.1.2 Response options

The response options were based on the qualitative interviews with the managers of the Horeca establishments, so that the possible solutions discussed could to be confronted with the customers' opinions. Mohamed Selmouni, professor of statistics at ICHEC, agreed to review them in order to obtain the relevant answers. The survey has been intended at targeting people going to the city of Namur since the concerned bar and restaurant are established there. The study was broadcasted through the social media Facebook. The latter does not allow to geotag participants but it was clearly specified to whom it was addressed ; people who know and frequent Horeca establishments of Namur.

3.3.1.3 Representativeness

A total of 200 responses were collected for this survey (as a fixed target). A survey is commonly subject to a confidence level amounting to 95% and an error margin of 5%. According to that principle, called « the reduced centered normal law », the cross section should have achieved a total of 384 participants. In view of the time available for the completion of the study and the current quarantine conditions, it was not possible to achieve this result. We therefore ask you to tolerate a margin of error of 7%.

Table 9 : Calculation formula for a quantitative study sample with a 7% margin of error

$\frac{(1{,}96)^2 * (0{,}5) * (1 - 0{,}5)}{(0{,}07)^2} = 196$
1,96 = Level of confidence (95%) according to the reduced centered normal law
0,5 = Proportion of the population with the characteristic (when the unknown = 0,5)
0,07 = Tolerated margin of error
196 = Necessary cross section size to affirm that the questionnaire is representative of the population at a 95% confidence level and a 7% margin of error

As explained by Vandercammen (2018), there is no relationship between the cross section size and the population size. The latter is to be taken into account if the sample exceeds one fifth of the population ; which is not the case since it would have been higher than 22.225 participants[44]. This explains why the population was not a determining factor in the calculation of the sample size.

3.3.1.4 Reactions

The reactions of participants were good, considering the response rate on the first day. Indeed, the response rate of the first day was 106, thus 55,5% of the sample. The second day of broadcasting the survey represented 31,4% of the total participation. We may therefore conclude that the first two days were the most productive in terms of data collecting.

3.3.2 Results

We will analyze the results using different categories and realizing cross-references.

- The **first category** will highlight the general data of the participants ;
- The **second one** will be focused on their knowledge of the banning on plastic straws and their opinions ;
- The **third one** will be analysis of which alternative would be preferred in order to be implemented and ;
- The **fourth one** will focus on the possible solution in the opinions of customers in this respect.

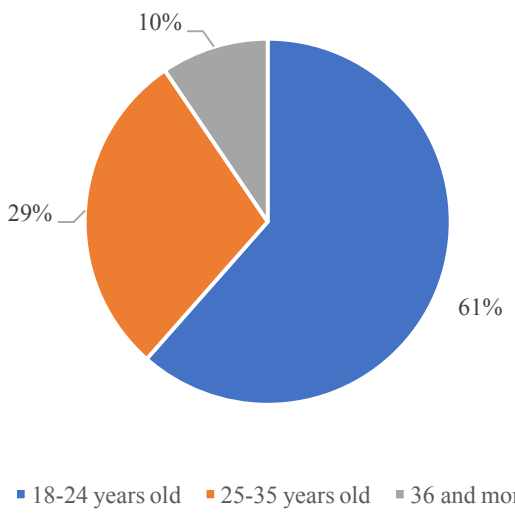
3.3.2.1 Background data

It was important to implement a solid background in order to be certain that the participants were the ones who could make a difference in the choice of an alternative and that there would be a wide range of opinions.

The analysis of the first graph shows that more than half the participants are aged between 18 and 24 years old. Almost 30% of the participants are aged between 25 and 35 years old but only 10% of them were over 36 years of age, which may show less interest about the problematic at hand as from a certain age. It may also be because of the broadcasting via Facebook ; most people within our « friends list » are people in our age group.

[44] The population of Namur is 111.127 inhabitants (Intérieur Binnenlandse Zaken, 2020).

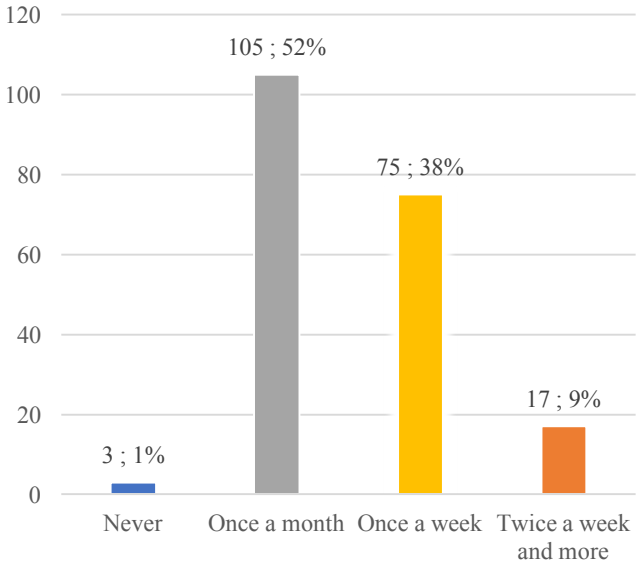
Figure 6 : Age groups



We asked the participants about their frequentation of Namur was to make sure that they were indeed people who visit Horeca establishments of the city of Namur. The results are very conclusive and show that only 2% of the participants do not visit the city.

The frequency has also been asked ; in order to identify the frequency participants were going to Namur to visit Horeca establishments, enabling to measure the impact of their answers. Half of them have a frequency rate of once a month and 38% are visiting this kind of establishments once a week, while 9% visit them for twice a week or more. The remaining 1% represents the participants not going to Namur.

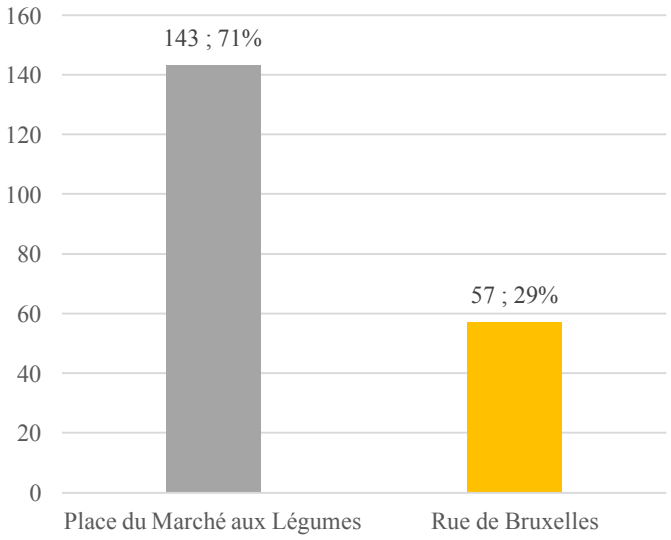
Graph 4 : Frequency



As the case study focuses on establishments including the bar *Les Poules à Lier* located on the *Place du Marché aux Légumes*, it seemed essential to know if the participants were

attracted by the location itself. 71% of the participants prefer indeed the *Place du Marché aux Légumes* which shows that the survey is accurate for the studied bar. It is important to note that the *Place du Marché aux Légumes* and the *Rue de Bruxelles* gather most of the bars in Namur.

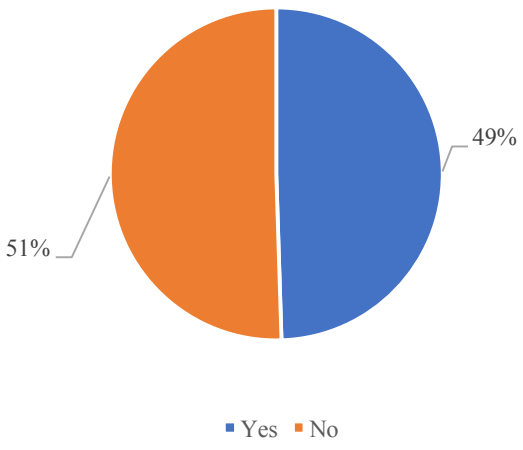
Graph 5 : Preferred location



3.3.2.2 Plastic straws' banning

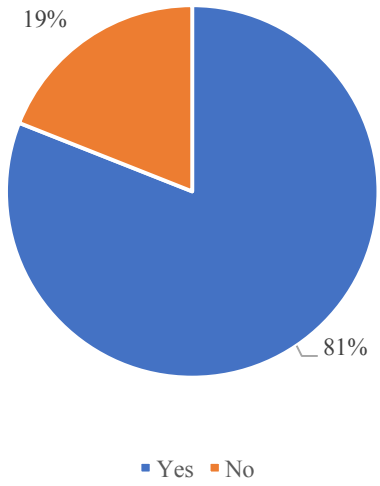
The figure below allowed identifying whether the participants show the habit of having drinks served with straws (in the style of a cocktail) during their visits to Horeca establishments – including bars and restaurants. The answers are twofold but not in a severe way ; half of people do choose beverages with straws and half do not. It is indeed important to clearly identify this tendency about taking straw beverages, enabling getting a clear idea of how important the item is since these beverages usually come with single-use drinking straws.

Figure 7 : Choice of beverages with straws



With regard to knowing that plastic drinking straws were included in the European ban on single-use plastics, 81% of the participants did know about it. Out of 200 participants, only 19% did not know that the ban would include drinking straws. This is, according to us, an important and relevant element, as there have been many press releases about it and as there are more and more places putting an alternative in place.

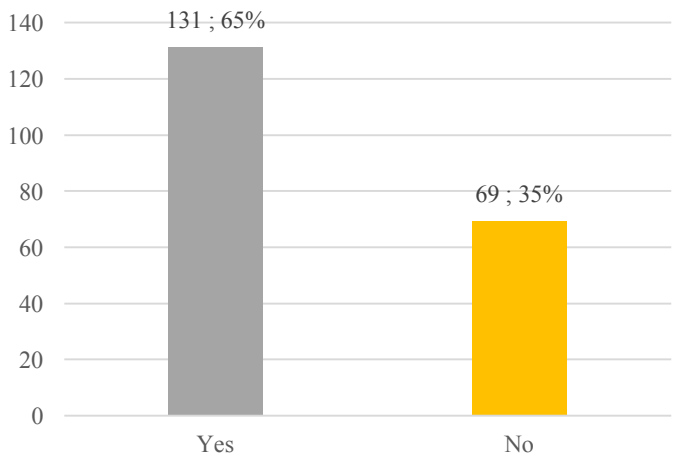
Figure 8 : Ban knowledge



Whether the participants knew about the ban or not, the answer to the question : « Do you think it is a good thing that there is a ban on plastic straws (and the like)? » was almost unanimous. 95% responded that it was indeed, a good thing. The question that would have been useful to ask would have been : « For what reason ? », but unfortunately we realized it while the questionnaire had already been answered by half the participants. Still, it shows that people are concerned by the plastic consumption and it may show that it is a good first step to ban these items.

Even though the majority believes that it is as good thing, they do not all agree on the fact that they would rather visit an establishment promoting an alternative to the plastic straw. 65% of participants would prefer a strawless establishment, while 35% do not seem to care about it. It can be explained by the fact that people may prefer to keep their habits and do not wish to change them because they have not yet made the leap from one alternative to another.

Graph 6 : Preference for a strawless establishment

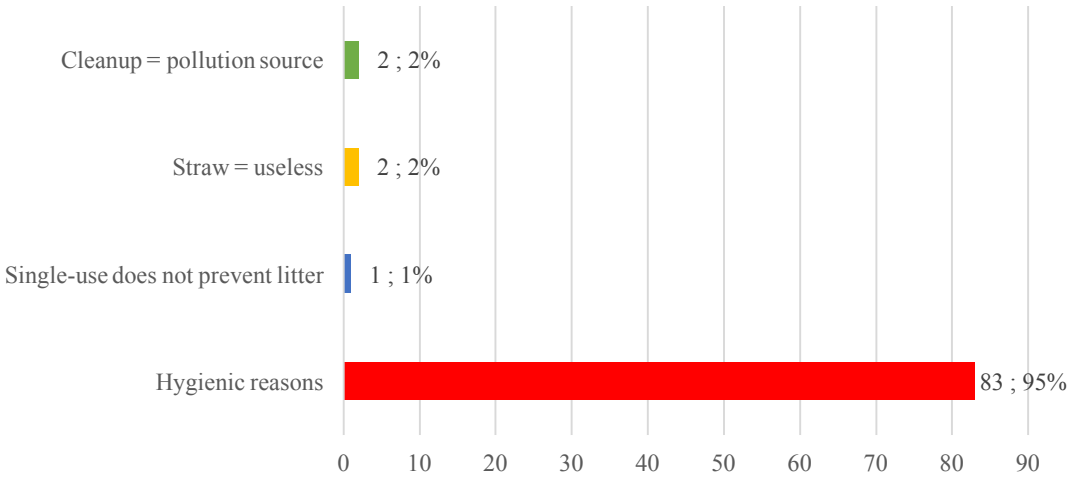


3.3.2.3 Alternatives

The first two graphs of this section will each cross-reference two questions related to the alternatives to plastic straws ; either reusable or single-use. They will both compare the reasons of the preferences based on their initial choice between reusable and single-use. The purpose of these graphs is to understand the main fears of customers about the different possible alternatives.

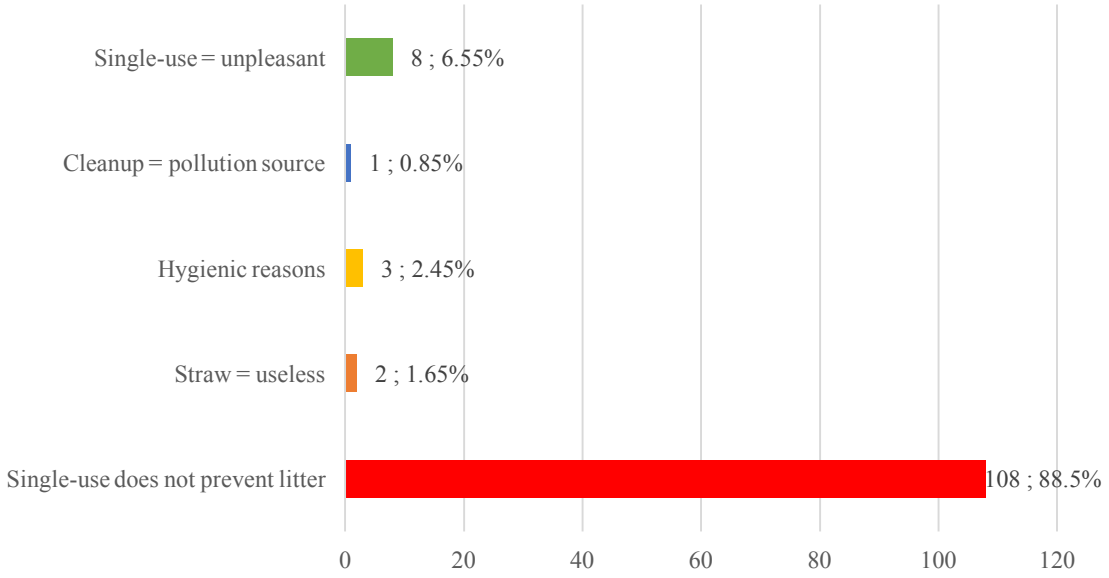
The total number of participants who chose the single-use alternative was 87, so 43,5%. There were 88 answers out of 87 participants for the single-use reasons, this is because the question about the reason why they would rather pick a single-use alternative allowed to choose several answers and also to add answers. The hygienic reasons stand for people who do not trust that reusable straws would be thoroughly cleaned up. It is clear on the graph below that it is the biggest reason why participants would prefer a single-use straw.

Graph 7 : Single-use reasons



113 participants out of 200 go for the reusable alternative, which represents 56,5% of the total number of participants. 122 answers were gathered for the same reason mentioned above, they could select several possibilities and even add some in the answers offered. With 88,5%, the single-use alternatives not preventing from litter is the main reason why people would go for a reusable straw. 6,55% state that the single-use is not pleasant to the mouth, it can be seen from the detailed responses that they are largely talking about cardboard straw in this case. Only one person has stressed out the pollution generating due to the cleaning process related to reusable straws.

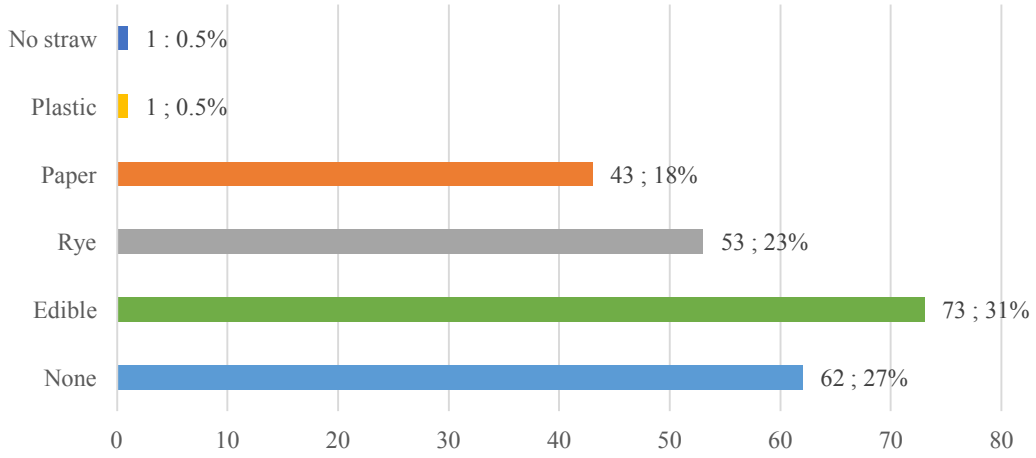
Graph 8 : Reusable reasons



In both graphs combined, even if there was the possibility to add an answer and clearly detail a position, only four participants (which represents 2% of the total participants) stated that straws are useless and that no straw at all may, to their mind, also constitute a valuable alternative. This may show that people are not ready to give up on straws, or that they would not even consider this option while answering the questionnaire.

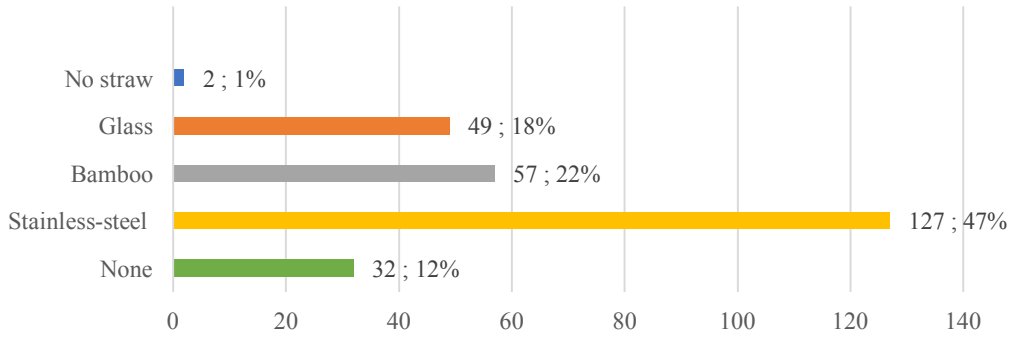
The following graph illustrates the participants' preference among single-use alternatives. They had the choice between : paper/edible/rye straws, none and the possibility to add an answer. There were 234 responses received for this question, as multiple answers were allowed. The « none » option means that they would rather go for a reusable straw. Although the paper straw is not conceivable for either managers of the studied establishment since they dislike the product, this straw received 18% of the votes. The rye straw seems to be quite popular since it reaches 23% of the possible choices. Still, the edible option is the preferred one with 31%, 8% more than the rye drinking straw. It may be explained by the fact that an edible straw is more enjoyable and it can intrigue more than the other options. Still, the « none » option rates second, which may be a sign that reusable straws might be a better solution.

Graph 9 : Preferred single-use alternative



The 10th graph represents the preference of the participants in terms of reusable alternative possibilities. Five choices were available to them : stainless-steel/bamboo/glass straws, none and the possibility to add an answer. The « none » option states for people who would rather use single-use alternatives. Here, contrary to what could be concluded from the 9th graph, this option is second last in the ranking, which may lead to the conclusion that there is a much bigger interest in the reusable option. Glass and bamboo straws are close to each other but the stainless-steel alternative is far ahead with a rate of 47%. This can be interpreted as follows ; the stainless-steel straw would be the one that would be most successful with customers.

Graph 10 : Preferred reusable alternative

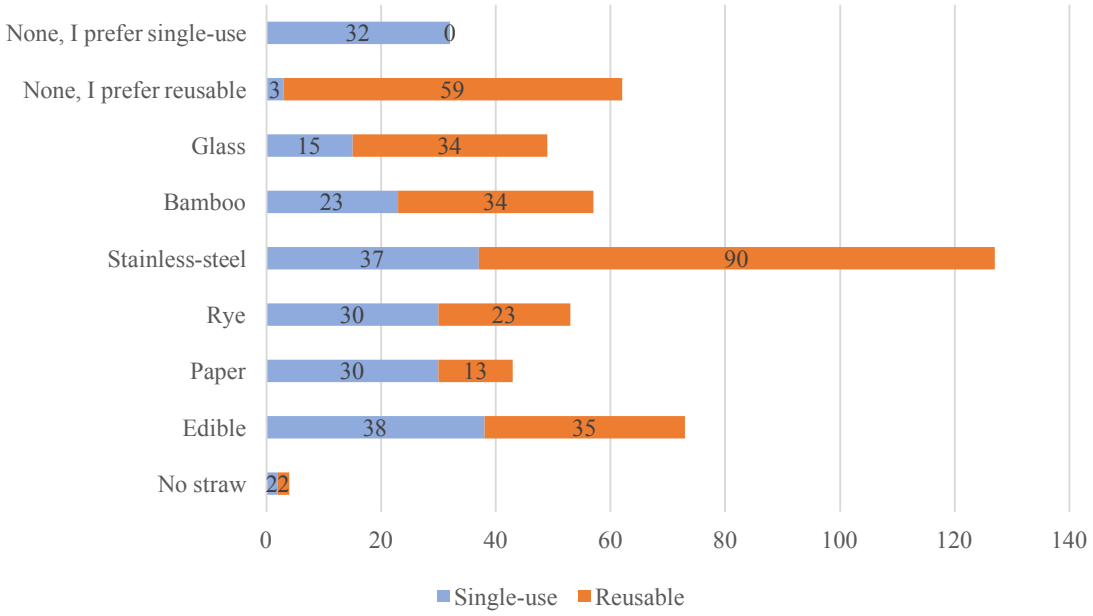


Having noticed the favorite alternatives, we thought it was relevant to cross-reference the answers to these preferences with the first choice between single-use and reusable that participants had to make. We tried this way to identify the alternatives that would please to the most participants. In graph 11, all alternatives proposed in the survey are represented on the y-axis, the amount of answers is on the x-axis and the different colors represent the participants' first preference. Since it was possible to answer both questions

about both alternatives, it is interesting to identify the choice of an initially single-use participant concerning reusable straws. It is important to specify that only one person has chosen a plastic option and only four people have included a no straw option in the questionnaire.

According to the 11th graph below, people may observe the popularity of the edible amongst both parties with an almost 50-50 percentage split. The edible straw was also the first choice in graph 9. The rye straw ranks at the second position with a 57-43 percentage split so if the edible option is not possible for an establishment, they could go with this one. The stainless-steel alternative is by far the most appreciated one, as it was the case in graph 10. Stainless-steel collects the most votes from people who initially prefer a single-use alternative. Bamboo is the next alternative that would please most people. Finally, glass straws keep their third position, since the difference between single-use and reusable preferences is the biggest there, in the three reusable alternatives.

Graph 11 : Preferences in function of first choice



3.3.2.4 Solutions

As noted earlier, an alternative costs more money than plastic straws. Therefore, the establishments must think of a system or solution to compensate or neutralize that cost. The participants to the survey were asked whether it would be a solution to pay more for a beverage coming with a straw. The gap between the « yes or no » options was not that important. Indeed, 55% do not agree with paying more and 45% answered that it could be possible for them.

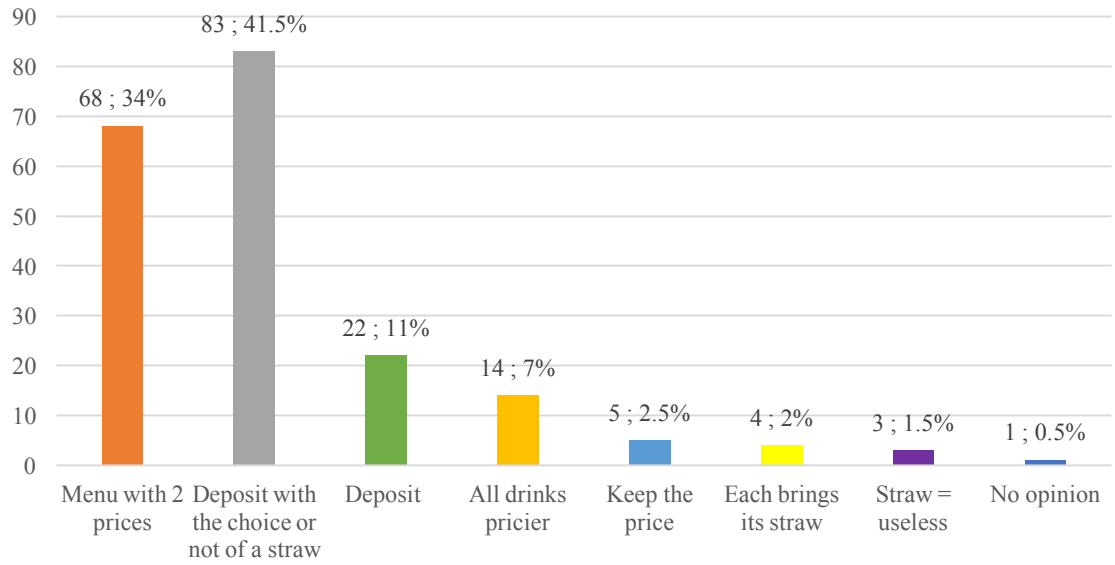
Possible solutions were then suggested to the participants, so that they could choose which one they would prefer to go with. There were five possible answers to this question, all were inspired by the discussions conducted with each the managers of the concerned establishments :

- **Reusable or single-use** : charging a little extra for all straw drinks ;
- **Reusable or single-use** : the menu would propose the drinks with the choice between a drink without straw and one with straw (the prices would then be different) ;
- **Reusable** : a deposit system (between 0,5€ and 1€) ;
- **Reusable** : a deposit, but all the same with the possibility to choose if I want a straw or not ;
- **Other**.

The other option was to give the participants the possibility to give their opinion and suggest a solution that we would not have proposed in the frame of the survey. It can be noted that single-use alternatives cannot fit all the solutions and are therefore not part of the deposit possibility, simply because the customer would give back the item to the bar/restaurant but the latter would have no use of it and would just be giving money away (when giving back a deposit in this case).

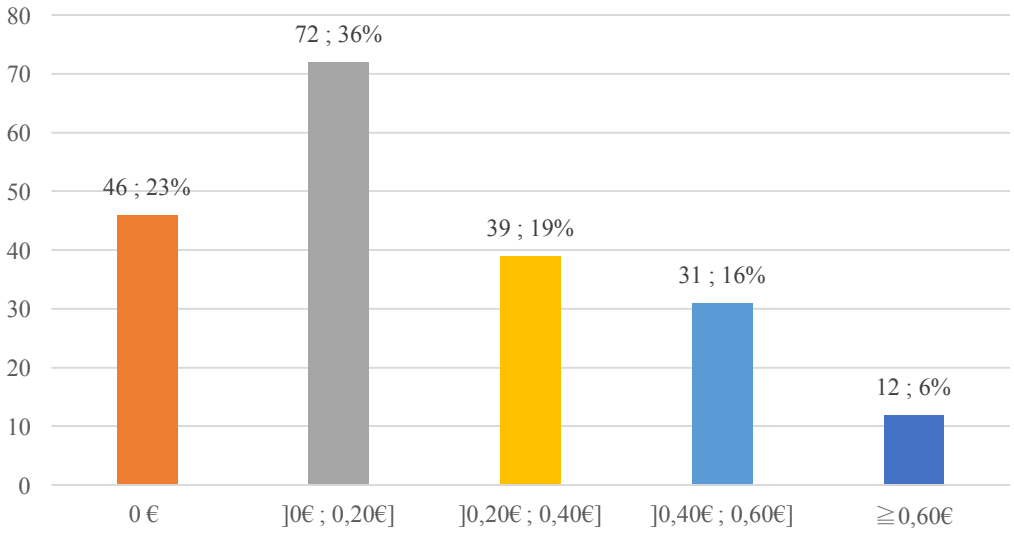
Although 45% of the participants answered that it would be a possibility to pay more their straw drinks, the percentage of responses to the choice to pay more is no longer as high as it used to be, with a drop in the percentage of 38%, this solution being now ranked 4th. Creating a menu with two prices (one with a straw included and one not) seems to be very appreciated, as 34% of the participants chose it and that percentage is quite close to the first choice. A simple deposit system is the third most chosen solution but the deposit with a choice of taking a straw or not is the first choice of the participants of this survey with 41,5%. With this solution, it seems that people who suggested to maintain the price should be happy with it since they would not have to pay more if they chose not to have a straw nor if they were to choose to have one, thanks to the deposit system. Only four people suggested for each individual to bring its straw and three stated that the item is useless, which again, may show that people are not ready to get rid of the straw.

Graph 12 : Possible solutions



Still, we considered relevant to identify the extra money the customers would accept to pay, should the establishments go with single-use alternatives, since they have the final decision. The 0€ option must represent the people who would not agree to pay more and who would be in the 55% of the participants at the grassroots level who did not agree with this system, they are now second of this ranking with a total of 23%. What might be possible to do for the establishments is to consider an increase in the price of straw drinks between 0€ and 0,20€ since it is the proposal that received the most votes. Surprisingly,]0,20€ ; 0,40€] and]0,40€ ; 0,60€] are not very far from each other in terms of percentages. Each gathered respectively 19% and 16%. This indicates that there is not a big difference between these price brackets for the participants. Far behind is the priciest proposition which, predictably, collected the fewest votes – only 6%.

Graph 13 : What price could be feasible ?



In conclusion, even if almost 20% of the surveyed population did not know that straws were included in the European ban on single-use plastics, it seems that people are more than ready to ditch plastic straws with a rate of 95% thinking it is a positive action.

43,5% prefer single-use and 56,5% prefer reusable alternatives. Taking this into consideration, the edible and the stainless-steel straw are the solutions receiving the majority of the votes. We believe that the edible straw stands out from the crowd because it is the one intriguing the most. As for the stainless-steel one, it may be because it qualifies as the most known reusable alternative.

The preferred solution would be the deposit with the choice to have a straw or not. It may be explained by the fact that this option allows the choice of having a straw and most of all, it would not cost a customer anything if the alternative is returned in good shape.

Chapter 4 : Implementation of the alternative

Having identified the relevant factors to be taken into account for each Horeca establishment as well as the opinions about the alternatives according to potential customers thanks to the quantitative study, it is now time to focus on the implementation part of an alternative. This part will require a thorough comparison of the alternatives and the related costs that would have to be engaged to finally lead to the best recommendations.

4.1 Comparison of the alternatives

This section will compare the alternatives with each other firstly in terms of needs, then in terms of costs. It will allow us to determine the « new » straw adapted to each of the concerned establishment. They will then be confronted to the opinions of the potential customers thanks to the quantitative survey.

4.1.1 Home test

Since the quarantine situation did not allow us to conduct a full-scale test with the establishments, we decided to perform a small-scale test at home. We had in our possession a set of 6 stainless-steel straws. The aim of this is to estimate how much time it takes to clean reusable alternatives. We believe that this estimation can be applied to each type of reusable straw since the cleanup does not vary a lot. Indeed, it is always recommended to put them in a dishwasher or to wash them with the brush furnished. We recommend the establishment *Les Poules à Lier*[45] to follow this process if it is not possible to wash them right away :

1. Right after use, let them sit in water (so they do not get sticky) ;
2. When a significant number of dirty straws is gathered, put them all in hot water with soap ;
3. Pass the brush through each of them and rinse them ;
4. Let them dry.

With this process, it took us 1 minute and 30 seconds to perform steps 2 and 3 – for a set of 6 straws. Each straw needs between 12 and 15 seconds to be cleaned up according to this process. By taking the worst scenario (15 seconds), it was possible to estimate how much time it would take to wash 500 straws. We also chose the worst scenario for the establishments, we believe that 500 straws would be the biggest number they could achieve a day.

[45] Because they are not in possession of a dishwasher.

With this in mind, it would take more than 2 hours to clean 500 straws. Still, we decided to cut that amount of time in half, since an efficient strategy of cleaning straws right after use may be imagined. The worst scenario would then be that at the end of the day, an employee would have to clean up the items for 1 hour – thus an amount of approximatively 250 reusable straws. If disinfection is needed, all it takes is to put the straws to boil with vinegar for 10 minutes – one shot of vinegar for 20 shots of water (Bali Boo, 2018). It is not necessary to carry out the latter after each use in our opinion.

Both establishments are persuaded that reusable straws should first go in the dishwasher then be brushed individually. Straws' distributors explain that the dishwasher is sufficient[46]. Since *Les Poules à Lier* does not own one because they do not the place to do so (de Fays, 2020), the process explained above should be applied. On the other side, *Cat's Corner* owns one, thus the straws could be washed through it. Still, Bini (2020) is sceptic about this, the cost of the cleaning process will then be added to the calculations below.

In conclusion, both managers could revise downwards their expectations regarding the cleaning process. The costs will be calculated with the idea that it would take one hour a night to clean up the straws, thereby establishments can consider the worst.

4.1.2 In terms of needs

Despite the fact that *Cat's Corner* will not consider a reusable alternative, their most important needs are quite similar with *Les Poules à Lier*. The costs for reusable straws for *Cat's Corner* will still be estimated so they can make their own opinion about the alternative.

Table 10 : Establishments' needs

Cat's Corner	- Single-use straw (non-negotiable) ; - Affordable cost ; - Not wrapped individually ; - 100.000 to 120.000 single-use straws a year ; - 600 reusable straws at minimum. (Bini, 2020)
Poules à Lier	- Single-use or reusable ; - Affordable cost ; - Not wrapped individually ; - Around 12.000 single-use straws a year ;

[46] Indeed, cutlery are only washed through a dishwasher, this comforts us in the thought that it can be extended to reusable straws.

	- 400 to 500 reusable straws. (de Fays, 2020)

4.1.3 In terms of costs

In order to obtain information as precise as possible, a call for tenders was issued to straw producers or distributors. Four companies responded, three are providing reusable straws and one is providing single-use edible straws.

Table 11 : Price offers for reusable and single-use straws

Enterprises	Product	Original price	Price offer
What About Waste	Stainless-steel straws	3,75€/straw	1€/straw + mandatory WAW label of 15€ + additional label of 3€
Novela	Glass straws	4€/straw	1,2€/straw +22,45€ delivery
Bali Boo	Bamboo straws	1,16€/straw	0,38€/straw (100[47]) 0,34€/straw (500[48]) 0,29€/straw (1000[49])
Sorbos	Edible straws	0,19€/straw	0,07€

What About Waste is in this case the company making the biggest effort to attract new establishments to use their straws. Still, the two mandatory labels can be a brake. The bamboo alternative is the cheapest and the offer is attractive.

For single-use alternatives, only one offer was received from Sorbos – an edible straw. They offer a much better price since it allows to save 11,95€ for a pack of 100 straws. For paper and rye alternatives, it is best to refer to the individuals' prices (See TABLE 4 : Single-use alternatives' characteristics).

The four most appreciated solutions were (See GRAPH 12 : Possible solutions) :

- Menu with two prices : **34%** ;
- Deposit with the choice or not of a straw : **41,5%** ;
- Deposit : **11%** ;
- All drinks pricier : **7%**.

[47] If 100 straws are purchased.
[48] If 500 straws are purchased.
[49] If 1000 straws are purchased.

In the end, both options concerning a deposit will be merged together since the customer will have the choice to accept the deposit or not. Same will happen with the other two options in order to make things clearer.

Table 12 : Comparison of solutions and costs for *Les Poules à Lier*

Solution	Costs
Menu with two prices or all drinks pricier	With these options, a renewal of the menu is non-negotiable. This would be a solution feasible with single-use straws, since the establishments cannot increase their prices of 0,5€ or 1€ to cover the costs of reusable straws. **Menu :** 150€ at least for 30 to 40 menus. Costs (for a year) **Paper** = (3€ x 120[50]) + 150€ = **510€** **Edible** = (6,75€ x 120) + 150€ = **960€** **Rye** = (8€ x 120) + 150€ = **1.110€**
Menu with two prices	This solution could also be ideal for reusable straws, the costs would concern the price of the straws, the making of a new menu and the staff costs for cleaning up the reusable straws. **Menu :** 150€ at least for 30 to 40 menus. Costs (for a year) **Bamboo** = (0,34€ x 500) + 150€ + 7.280€[51]= **7.600€** **Stainless-steel** = (1€ x 500) + 150€ + 15€ + 3€ + 7.280€ = **7.948€** **Glass** = (1,2€ x 500) +150€ + 22,45€ + 7.280€ = **8.052,45€**
Deposit with the choice or not of a straw	In this solution, only the reusable straw would fit. Since some people will certainly not wish to pay a deposit for a straw, it is important to give them this opportunity. It would not be necessary in our opinion to print new menus, maybe only display some sheets explaining : « You want a reusable straw? 1€ deposit at the bar ». Costs (for a year) **Bamboo** = (0,34€ x 500) + 7.280€ = **7.450€** **Stainless-steel** = (1€ x 500) + 7.280€ + 15€ + 3€ = **7.798€** **Glass** = (1,2€ x 500) + 7.280€ + 22,45€ = **7.902,45€**

In our opinion, it would be best for the establishment to create new menus in two cases out of four or just add a phrase/page in it, in order to explain their conviction and process with straws. The **deposit** should be of **1,5€** for glass, **1€** for stainless-steel or of **0,5€** for bamboo, so if it is stolen, the costs are covered.

[50] To reach 12.000 straws.
[51] Extra cost of an employee to clean up the straws for a year.

After seeing the costs for *Les Poules à Lier*, the following table will focus on the costs for *Cat's Corner*. They are very different in the sense that they have a bigger need of straws since they cannot go without them as noted earlier. If they go for a single-use alternative, they will surely have to engage way more money than *Les Poules à Lier*, as opposed to a choice of reusable straws. But they would have to change their whole way of working with a reusable alternative, which they do not seem ready to do so. The description of the solutions is similar to the ones described in the 10th table above, which is why they will not be repeated in the table below.

Table 13 : Comparison of solutions and costs for Cat's Corner

Solution	Costs
Menu with two prices or all drinks pricier	**Menu** : 200€ at least for 40 menus. Costs (for a year for single-use straws) **Paper** = (3€ x 1.200[52]) + 200€ = **3.800€** **Edible** = (6,75€ x 1.200) + 200€ = **8.300€** **Rye** = (8€ x 1.200) + 200€ = **9.800€**
Menu with two prices	**Menu** : 200€ at least for 40 menus. Costs (for a year for reusable straws) **Bamboo** = (0,34€ x 600) + 200€ + 6.240€[53]= **6.644€** **Stainless-steel** = (1€ x 600) + 200€ + 6.240€ + 15€ + 3€ = **7.058€** **Glass** = (1,2€ x 600) + 200€ + 6.240€ + 22,45€ = **7.182,45€**
Deposit with the choice or not of a straw	Costs (for a year) **Bamboo** = (0,34€ x 600) + 6.240€= **6.444€** **Stainless-steel** = (1€ x 600) + 6.240€ + 15€ + 3€ = **6.858€** **Glass** = (1,2€ x 600) + 6.240€ + 22,45€ = **6.982,45€**

The maximum increases in the prices for single-use alternatives for both establishments could be of :

- 0,07€ for edible straws ;
- 0,08€ for rye straws ;
- 0,03€ for paper straws.

These are the increases in order not to run a loss. As seen in graph 13, the potential increase in price should be between 0€ and 0,20€ – since it collected the most votes from potential customers (36%). With a 0,20€ increase, establishments can be sure that their costs are defrayed and it is the price that would fit the customers, so it is a win-win situation.

[5252] To reach 120.000 straws.

[53] Extra cost of an employee to clean up the straws for a year, assuming it takes 1 hour a night to clean them up.

4.1.4 In terms of customers' opinions

Stainless-steel and edible straws are the favorite alternatives considering people choosing single-use or reusable in the quantitative study. According to the opinions of customers, it is important to balance whether the costs are not too important for the establishments.

Fortunately, the establishments could both choose the preferred alternatives since the costs for stainless-steel and edible straws are not the highest. Besides, stainless-steel offers an unlimited lifespan, which brings added value to the product.

Recommendations

In this part, we will put forward our recommendations for an alternative to each concerned Horeca establishment ; *Les Poules à Lier* and *Cat's Corner*, thanks to the results obtained in the second part of this draft. These recommendations will be formulated taking their needs and capacity into consideration. We will also consider the most eco-friendly solution, the customers' opinions as well as the recommendations from the European Union.

First and foremost, it is important to note that we would have recommended the paper straw, since it is the cheapest and easiest solution to put in place. Given that this alternative to the plastic straw is not worth considering neither by *Les Poules à Lier* nor *Cat's Corner*, we rule it out from our recommendations.

1. *Poules à Lier*

As far as *Les Poules à Lier* is concerned, we strongly believe that the establishment would be able to handle reusable straws, despite what the manager fears about the cleaning process. Contrary to *Cat's Corner*, de Fays (2020) is much less close-minded. Indeed, even if the cleaning of reusable straws might be heavy, as seen in the home test realized, we believe that if straws are cleaned right after use (at the same time as glasses), the process shall be reduced. Of course, this is not always possible but they would not be the firsts to try and succeed.

Unfortunately, we observed that the cost difference between reusable and single-use alternatives is great, mainly because of the cleaning process cost. It forces us to believe that it would be best for the bar to firstly go for a single-use alternative. In this case, we recommend the bar to opt for the edible or the rye straw. We believe that the edible straw will be the easiest to implement since it does not create litter – except for the packaging, where the rye straw would necessitate a special waste bin to decompose. Besides, edible straws are the less expensive between the two and they are the most appreciated by customers. The solution to put in place in our opinion for this situation is to create a menu where two prices figure : one with the price of a cocktail without a straw and the other one with the price of the cocktail including the straw. The increase in price should be of 0,10€ at maximum.

However, the European Union supports reusable alternatives and we share this opinion. Besides, reusable is cheaper on the long-term. This is why we recommend *Les Poules à Lier* to :

1. Go for the edible straw ;
2. Perform tests for reusable alternatives on the side if the establishment cannot perform them before January 1st, 2021.

If the bar succeeds and decides to implement reusable straws, we recommend the bar to keep their on-request policy and to implement a deposit option of up to 1€. The on-request policy would allow the reduction of used straw, which would then reduce the number of

straws to clean up. In this case, we recommend the stainless-steel straw because of its unlimited lifespan contrary to bamboo straws, which constitutes an advantage, and stainless-steel is the alternative that would please most customers. In addition, it is less expensive than glass straws. The stainless-steel is produced in China for now but will soon be produced in Belgium, this represents a lower carbon footprint in terms of transportation than bamboo straws (produced in Bali, Indonesia).

2. *Cat's Corner*

Concerning the fast-food restaurant *Cat's Corner,* we believed that a single-use alternative would have been our recommendation from the beginning, since it is the wish of the manager and he is not open-minded to a reusable alternative – the brush for the cleaning process being mandatory according to his view. Many straws' sellers explain that placing them in the dishwasher is sufficient. Since the restaurant possesses one, it would pull out the extra costs of employment. This would make the reusable straw the most attractive alternative in terms of price. Bamboo is not well-appreciated by the manager, that is the reason why we recommend the stainless-steel alternative. We believe that this choice would please the customers, as it was their first choice in graph 10. Besides, reusable alternatives meet the recommendations of the European Union.

Even if an employee had to clean up each straw with a brush one hour a day, the costs differences between reusable and single-use are not significant (See TABLE 13 : Comparison of solutions and costs for *Cat's Corner*). Reusable alternatives would even cost less to the restaurant than both edible and rye straws. The solution could be a form of deposit. Reusable straws would be put in every bottle/glass and with a rapid click, the waiter would record how many straws are distributed to the table. On the way to pay the check, the customer returns the straws and if the right amount is returned, no extra cost is charged. If not, the customer would be charged 1€/straw. This should be explained in the menu.

We strongly recommend *Cat's Corner* to perform some tests and adopt the stainless-steel alternative.

Conclusion

The European ban single-use plastics was very broadcasted and it shows in our opinion that governments are now aware that plastic items are everywhere and it made us question their consumption. Plastic straws are the perfect example of the overconsumption of plastic worldwide. It is a very good thing to have banned them in our opinion. Still, we could not have imagined that such a great debate was about to arise over such a small item. The difficulty was to not think as an individual but as a company which must take much more factors into consideration.

The main objective of this memoir was to carry out a study on the different alternatives to the plastic straw. The latter was designed to bring a solution to two Horeca establishments – *Les Poules à Lier* and *Cat's Corner*. The aim is also for this study to serve as an example for other Horeca SMEs in the same situation. We will first answer the three hypotheses of this thesis.

> « They have bigger and more important projects than replacing plastic straws and did not consider straws as an environmental issue that was worth it ».

Both establishments admit they showed an interest in plastic straws' alternatives on the market almost a year ago. Even though the interest was there, prices were a big brake in the process and they regret the fact that the European Union would ban plastic straws without bringing an alternative equivalent in terms of costs. De Fays (2020) already opted for an on-request policy further to the announcement of the EU and repeated several times that a no straw policy would be the best option. This demonstrates that the straw is indeed a worthwhile topic in terms of environmental issues. At *Cat's Corner*, Bini (2020) explains that he is willing to make the change because the plastic consumption reduction also goes through the Horeca industry. They already eliminated plastic forks and work as much as possible with glass bottles, which shows their concern about the environment at the restaurant.

> « They are afraid of the costs that the change will generate ».

We can assure that this hypothesis is true, given that the costs were the very first concern evoked by both managers. We have seen that costs when replacing plastic straws with an alternative englobe more than the product, especially if it is a reusable alternative. Still, some costs can be amortized. It will be the role of the establishments to determine if the extra gross profit is of more importance than the invested amount. If the result is positive, the profit brought by reusable straws is greater than the cost of the reusable straws. It is a sign to invest. The reusable straws investment allows to reduce the taxable basis. In conclusion, the cost of reusable straws enables to bring not only an extra profit but also to reduce the part of the profit which will be submitted to tax.

> « They are afraid of the people's reactions and cannot position themselves in relation to a straw's alternative ».

We believe that they were not afraid of the customers' reactions in relation to an alternative's choice, rather in relation to a financial aspect. Indeed, customers frequently express their discontentment while prices increase, which could be the case with a single-

use alternative. We consider that what could cause a problem is the constant need of explanations of customers. We can assure that it is not the customers' reactions that caused the fact they did not position themselves but rather the cost factor.

The very first objective of this memoir was to learn more about plastic straws, how the world came to throw away one billion straws a day, how they are produced, what is at stake with the item and so on. However, it was not possible to understand why plastic straws were part of such a ban without dealing with issue of the plastic material. This is the reason why we started tackling the plastic itself since we believe that if straws were still made of paper as before, they would not have represented such debate.

We then took an interest in the legal framework of the European ban to understand what concerns plastic straws and to develop what were the different opinions/stakeholders of such a ban. Afterwards, we sorted some single-use and reusable alternatives in order to analyze their advantages and inconveniences.

The qualitative study concerned the managers of the Horeca establishments but also environmental representatives and one plastic straws' producer. As the outcome of the interviews, we could observe that establishments had not processed the change because they were not motivated, rather because they could not find what would fit, considering that, for instance, rye straws are 2000% pricier than plastic straws. It was possible to understand that they felt as left on the sidelines. The different analyses made in the second part of this memoir helped us in understanding the fears of the managers, but also in putting them into perspective. Indeed, the costs are higher and the organization should be thought over, but it is achievable if the willpower is real. In conclusion, it is possible to affirm that the costs are the real issue to a replacement of a plastic item, from the moment that plastic seems to be the cheapest material.

The quantitative study was of good help for the marketing part of the implementation. Indeed, it was helpful to understand what the customer would prefer for instance. It was important to do this quantitative study since the customer plays a big role in the Horeca industry. We would have preferred to do this study with direct customers of the establishment to make the results even more accurate but with the covid-19 quarantine, it was not realizable.

With the different interviews and management tools such as the change kaleidoscope or SWOT analyses, we were able to create a list of the different costs that both managers could expect from implementing an alternative. Still, a full-scale test in both establishments would have been helpful in the process. Since it was not feasible, we overcame this by performing one at home.

At the end of the second part of this thesis, we were able to develop recommendations for each establishment. Still, even if both managers believe that straws remain essential to their service, we always bore in mind that the straw might not be that important. What Gérard (2020, loose translation) said in our interview resumes well our opinion :

« The best waste is the one that is not produced ».

Finally, we believe that Horeca establishments in Namur could follow this process and that this thesis will be of help for restaurants or bars which are in the situation of looking

for an alternative to the plastic straw. Still, we would have appreciated to be able to realize full-scale tests with both establishments, it would have added value to our reflection. This is why we recommend each establishment to perform their own tests. This is the further step that would have been useful.

In conclusion, we could ask ourselves, what if all single-use items were to be completely withdrawn from the market ?

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Glossary

Bakelite : synthetic resin obtained by polycondensation of a phenol with metanal (Larousse, 2019).

Oxo-degradable plastics : plastics which, containing additives which, under the effect of oxidation, lead to the fragmentation of the plastic into micro-fragments or to chemical decomposition (Official Journal of the European Union, 2019, p.8).

Thermoplastic : plastics that can be mold indefinitely in any form (Berthon, 2004).

Thermosetting : plastics that once shaped, cannot be mold anymore (Berthon, 2004).